Trends in Overweight and Obesity Among Children and Adolescents in Qatar Before and During the COVID-19 Pandemic: A Retrospective Cohort Study

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Abstract

Background: Due to the COVID-19 pandemic lockdown, countries implemented health preventive measures, including travel bans, online schooling, restricted access to parks and beaches, and restrictions on all other gatherings. In Qatar, schools implemented virtual learning, families relied on online shopping, and for almost six months, children were mainly confined to their homes, leading to drastic lifestyle changes across society, especially among children and adolescents.

This study aimed to examine trends in the prevalence of overweight and obesity among children and adolescents attending Primary Health Care Corporation (PHCC) health centers in Qatar before and during the COVID-19 pandemic.

Methods: This retrospective cohort study used longitudinal electronic health record data from children and adolescents aged 2–18 years attending PHCC health centers in Qatar between 1 January 2017 and 31 July 2021. Participants entered the cohort when they first met the eligibility criteria and were followed longitudinally through subsequent years. Each participant was followed across subsequent years using their available BMI measurements. Overweight and obesity were classified according to WHO growth references, and trends were assessed using chi-square tests for trend. Analyses were performed using SPSS version 28.0.

Results: A total of 160,209 cases aged 2 to 18 years were followed from January 2017 to July 2021. Females were 77,904, representing 48.6%, and males were 82,305, representing 51.4%. In 2017, the overweight rate was 6.4%, while the obesity rate was 5.6%. In 2018, overweight was 8.1%, and obesity was 6.7%; in 2019, overweight was 11.0%, and obesity was 9.8%. In 2020, overweight was 16.6%, and obesity was 15.2%. In 2021, overweight was 15.5%, and obesity was 16.3%.

Conclusions: During the study period, obesity almost tripled, starting from 5.6% in 2017 to 16.3% in 2021. The overweight rate more than doubled, increasing from 6.4% in 2017 to 15.5% in 2021. This showed an increasing trend in obesity and overweight among children aged 2–18 years before the pandemic, with a further increase during the pandemic period. Males showed a significantly higher prevalence of obesity than females. Based on the study results, we recommend a national strategy for preventing, screening, and managing obesity and overweight involving families, schools, and the health sector.

Keywords: Obesity, Prevalence, COVID-19, Lockdown, Overweight

Introduction

Obesity and overweight are complex metabolic disorders caused by an imbalance between energy intake and energy expenditure, resulting in abnormal accumulation of body fat and weight gain that causes health impairment. They are a global health problem affecting both developed and developing countries and carry a substantial economic burden, as they involve not only the disease itself but also its health and socioeconomic complications. In the last 40 years, obesity has emerged as a health problem that also threatens children and adolescents, as the prevalence of obesity and overweight in childhood and adolescence has increased drastically from 4% in 1975 to over 18% in 2016 in children between 5 and 19 years old, according to WHO, meaning that over 340 million children and adolescents were obese or overweight that year. Moreover, in 2019, about 38.2 million children under the age of 5 years were overweight or obese, and almost half of them lived in Asia (1).

Obesity in adults is defined by body mass index (BMI), with higher numbers indicating more adipose tissue. Using BMI in the definition of obesity and overweight in children has its inaccuracies, as a higher number may indicate more muscle mass in the growing child, not more adipose tissue; despite this fact, in the absence of another easy, accurate way to assess obesity, BMI continues to be the essence of the obesity definition. In children and adolescents, gender-specific charts are used for BMI, weight, and weight-for-height. WHO defines obesity as greater than three standard deviations above the WHO Child Growth Standards median for weight-for-height in children under 5 years old and greater than two standard deviations above the WHO Growth Reference median for BMI for children from 5 to 19 years old (1).

Obesity is caused by increased energy intake, decreased energy consumption, or both. Unhealthy eating patterns, such as skipping breakfast, consuming high-calorie sweetened drinks, and eating highly saturated foods; lack of physical activity; and spending more time on screens and leading a highly sedentary lifestyle all contribute to an energy imbalance. Genetic, social, and environmental factors interact together to alter both body physiology and personal behavior, affecting energy intake and consumption that may lead to obesity and overweight (2-4).

Childhood obesity can affect children and adolescents' lives in various ways. Physically, as it is a proinflammatory state affecting all body systems, it may lead to hypertension, dyslipidemia, impaired glucose tolerance, type 2 diabetes, fatty liver disease, obstructive sleep apnea, asthma, menstrual abnormalities, and orthopedic problems like slipped capital femoral epiphysis and increased fractures. Psychosocially, it can lead to anxiety, depression, low self-esteem, being stigmatized and discriminated against, increased risk of bullying, and academic failure. Children and adolescents with obesity are also more likely to struggle with adult obesity and its complications (2-6).

International efforts have been made to prevent and treat obesity after recognizing obesity as a global health problem on both the state and international levels. For example, the "Global action plan on physical activity 2018–2030: more active people for a healthier world" was launched by the WHO to encourage healthy lifestyle changes worldwide (7).

The Global School-Based Student Health Survey-Qatar 2011 reported that most children and adolescents had poor eating habits and low levels of physical activity (8).

In Qatar, significant efforts are being made to reduce the risk factors associated with overweight and obesity by ensuring greater access to recreational facilities, such as neighborhood parks, and by promoting physical exercise and fitness through campaigns. Additionally, efforts emphasize promoting healthy eating and other healthy lifestyle choices. However, due to the COVID-19 pandemic, Qatar implemented preventive health measures similar to other countries, including a travel ban; the closure of schools, parks, wellness clubs, and beaches; and restrictions on gatherings. These measures led to virtual schooling and increased reliance on online shopping, with children and adolescents confined to their homes for at least 6 months from the start of the COVID-19 lockdown, resulting in drastic lifestyle changes across society, especially among children and adolescents.

This study aimed to examine trends in the prevalence of overweight and obesity among children and adolescents attending PHCC health centers in Qatar before and during the COVID-19 pandemic.

Methods

This was a retrospective cohort study conducted between 1 January 2017 and 31 July 2021.

Enrollment criteria: For the year 2017, all individuals aged 2 years up to 15 years during the year 2017 and who had at least one valid BMI measurement before the end of that year (together with at least one BMI from 2018 and another from 2019 if available) and at least one other BMI measurement after January 1, 2020, were included. For the year 2018, individuals who had not visited PHCC health centers during 2017 and who had completed 2 years up to 16 years during that year and had at least one valid BMI measurement before the end of that year (together with at least one BMI from the year 2019 if available), and at least one other BMI measurement after January 1, 2020, were included. For the year 2019, individuals who had not visited PHCC health centers during 2017 to 2018 and completed 2 years up to 17 years during that year and had at least one valid BMI measurement before the end of that year, and at least one other BMI measurement after January 1, 2020, were included.

Children and adolescents entered the cohort when they first met the eligibility criteria and were subsequently followed longitudinally through the remaining study period; each participant was followed across subsequent years using their available BMI measurements.

We obtained data from Cerner, the electronic health record system for PHCC, the primary health care provider covering all of Qatar through its widespread health centers. The data were de-identified and recorded during outpatient encounters. We used the WHO reference ranges for obesity and overweight (1).

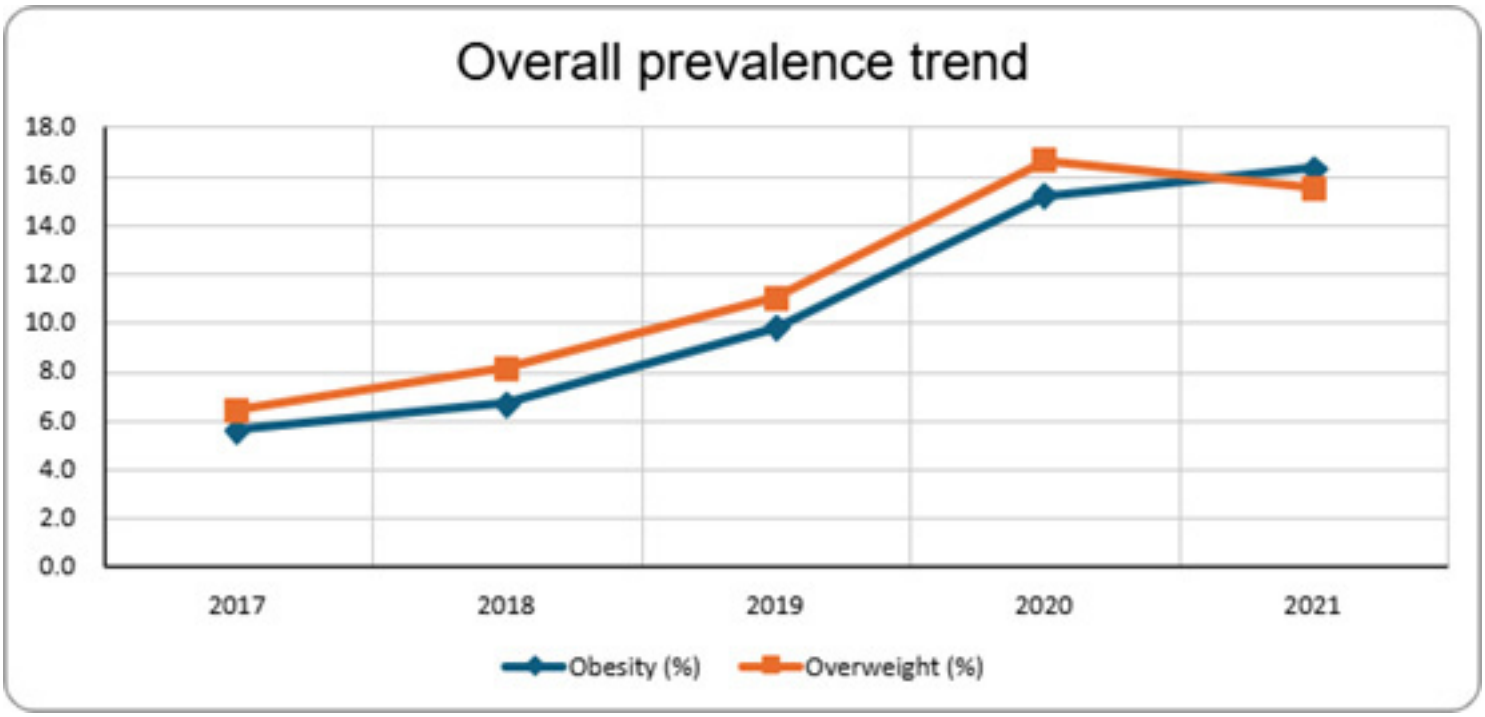
Statistical methods:
Frequencies with percentages were calculated for obesity and overweight according to the years (2017 to 2021). A chi-square test for trend analysis was performed to examine the trends in obesity and overweight by year and gender. A p-value of 0.05 (two-tailed) was considered a statistically significant level. SPSS 28.0 statistical package was used for analysis.

The study was reviewed and approved under the exempt category by PHCC Research Sub-Committee, Qatar (reference number: PHCC/DCR/2021/03/022; approval date: 6 June 2021). The study used participant data in accordance with the approved study scope, with confidentiality and data protection maintained throughout the study.

Results

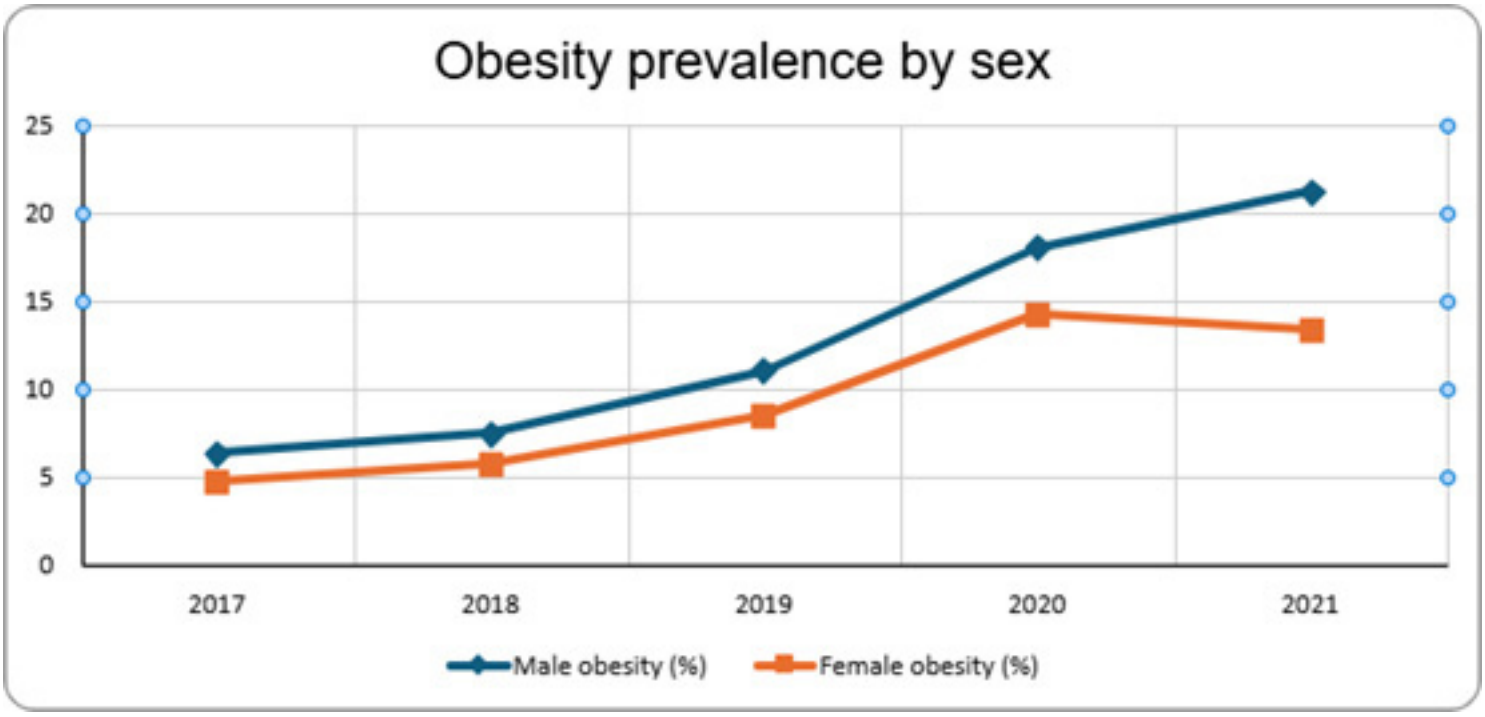
A total of 160,209 cases aged 2 to 18 years were followed from January 1, 2017, to July 31, 2021. Females were 77,904, representing 48.6%, and males were 82,305, representing 51.4%. In 2017, the overweight rate was 6.4%, while the obesity rate was 5.6%. In 2018, overweight was 8.1%, and obesity was 6.7%; in 2019, overweight was 11.0%, and obesity was 9.8%. In 2020, overweight was 16.6%, and obesity was 15.2%. In 2021, overweight was 15.5%, and obesity was 16.3%. Overweight and obesity rose from 2017 to 2020; obesity continued to increase, reaching 16.3% in 2021, while overweight decreased slightly to 15.5% in 2021, as shown in Figure 1.

Figure 1. Prevalence of overweight and obesity by year



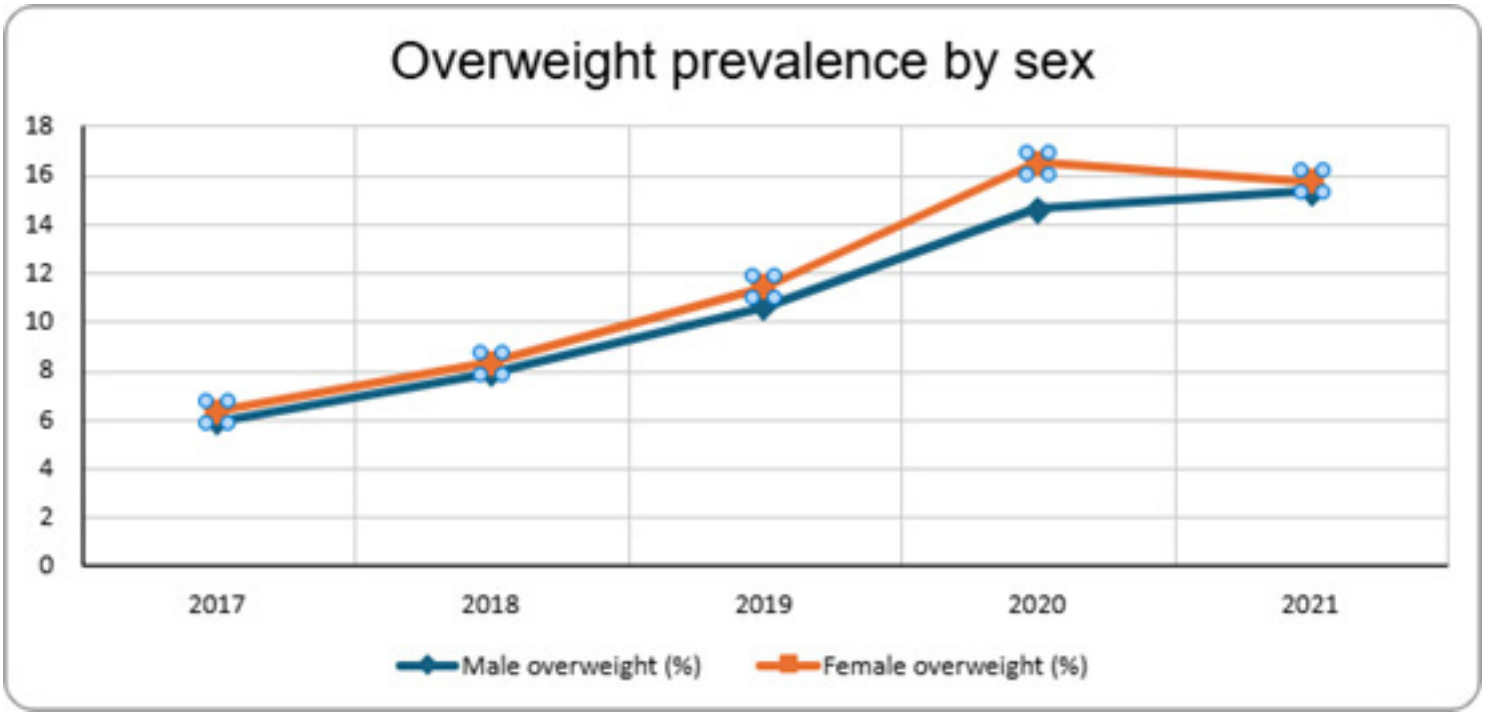
Obesity distribution among males and females was as follows: in 2017, obesity was 4.8% in females and 6.4% in males (p=0.001); in 2018, it was 5.8% in females and 7.5% in males (p=0.001). In 2019, it was 8.5% in females and 11.1% in males (p=0.001). In 2020, obesity was 14.3% among females and 18.1% among males (p=0.001); in 2021, it was 13.4% among females and 21.3% among males (p=0.001), as shown in Figure 2.

Figure 2. Prevalence of obesity by sex and year



Overweight distribution among males and females was as follows: in 2017, females 6.3%, males 5.9%; in 2018, females 8.3%, males 7.9% (p=0.001); in 2019, females 11.4%, males 10.6%; in 2020, females 16.5%, males 14.6% and in 2021 females 15.7%, males 15.3%. The trend was statistically significant, rising in both females and males, as illustrated in Figure 3.

Figure 3. Prevalence of overweight by sex and year



Discussion

Overweight and obesity are defined as abnormal or excessive fat accumulation that may impair health. It is a global health concern as the prevalence of obesity and overweight among children and adolescents has almost tripled since 1975. In 2016, over 340 million children and adolescents were obese or overweight worldwide (1).

A 2018 study by Al-Thani et al. in Qatar found that the prevalence of overweight and obesity was 44.8% and 40.4% among males and females, respectively, among school students aged 5–19 years (9).

In 2020, as COVID-19 spread globally, countries implemented preventive health measures that varied from one country to another. In Qatar, after the first announced COVID-19 cases on February 29, 2020, the lockdown started on March 11, 2020, and continued till September 2020. Then restrictions were gradually lifted in four phases, taking into account health risks and social and economic benefits. The first phase began on June 15, 2020; the second on July 1, 2020; and the third and fourth on August 1, 2020, and September 1, 2020, respectively. Online schooling began on March 10, 2020, and with phase 4, learning gradually returned to in-person learning until late 2021, when Qatar officially stopped using online learning as the primary mode of instruction (10-12).

This study aimed to examine trends in the prevalence of overweight and obesity among children and adolescents attending PHCC health centers in Qatar before and during the COVID-19 pandemic.

This retrospective cohort study included 160,209 children and adolescents who were registered and followed at PHCC health centers from January 1, 2017, to July 31, 2021. 77,904 (48.6%) were female, and 82,305 (51.4%) were male.

During the study period, obesity and overweight increased before the pandemic, with a further marked increase during the pandemic. Obesity almost tripled, from 5.6% in 2017 to 16.3% in 2021. Compared to 2019 (the pre-pandemic year), obesity rates continued to increase, from 9.8% in 2019 to 15.2% in 2020 and 16.3% in 2021.

At the beginning of the study, males were slightly more obese, 6.4% compared to 4.8% for females, and this pattern persisted throughout the study, reaching 21.3% in 2021, compared to only 13.4% for females. Obesity increased significantly for both males and females in 2020: males were 18.1%, and females were 14.3%, up from 11.1% in males and 8.5% in females in 2019. This significant male-female difference warrants further research into the sex-specific behavioral, environmental, and biological factors that may have contributed to this discrepancy.

The overweight rate more than doubled, rising from 6.4% in 2017 to 15.5% in 2021, with a more noticeable increase in 2020 to 16.6% compared to 11% in 2019. Overall, overweight was higher than obesity each year, except in 2021, when obesity was 16.3%, and overweight was 15.5%. Compared to obesity, the proportion of females with overweight was slightly higher than that of males with overweight over the years of the study.

The study results are consistent with previous studies. In one large cohort study conducted in the USA by Lange et al., 432,302 persons aged 2 to 19 years, with outpatient visits, showed that the rate of BMI increase almost doubled during the COVID-19 pandemic compared to the pre-pandemic period, and obesity also increased from 19.3% in August 2019 to 22.4% one year later. In a study by Woolford et al., youths aged 5 to 17 years gained more weight during the COVID-19 pandemic than before the pandemic. Furthermore, in another study by Jenssen et al., similar results were reported (13-15).

The rise in obesity began in the 1st year of the study and continued to increase throughout the study period. So, when the COVID-19 lockdown started, the rates of obesity had already drastically increased, and after the COVID-19 lockdown, obesity continued to increase. Overweight substantially increased from 2017 to 2020, but it decreased slightly to 15.5% from 16.6% in 2020.

Before the pandemic, obesity and overweight prevalence was high in Qatar, as reported in the study by Al-Thani et al. (9). Most children and adolescents had poor eating habits and low activity, as shown in the Global School-Based Student Health Survey-Qatar 2011. The survey reported that 55.4% of girls and 43.6% of boys spent three or more hours per day on sedentary activities during a typical day. Regarding physical activity, only 15% of survey participants were considered appropriately active (i.e., engaging in at least 60 minutes of activity per day for five or more days per week). Moreover, 62.5% of students (60% boys, 64.8% girls) drank carbonated soft drinks at least once per day in the past 30 days (8).

Before the pandemic, Qatar invested significant effort in preventing and treating obesity in its population by ensuring greater access to recreational facilities, such as neighborhood parks, and by promoting campaigns to encourage physical exercise and fitness, as well as healthy eating and other healthy lifestyle choices.

Many studies show that during the COVID-19 pandemic and after infection-prevention measures were implemented, children and adolescents' lifestyles changed dramatically, with decreased physical activity, increased sedentary time, longer hours at home, and shifts in eating patterns. In a study conducted by Dunton et al. in the USA, it was found that physical activity decreased and sedentary behavior increased during the early COVID-19 lockdown among children aged 5–13 years (16). Another large longitudinal study conducted by Xiang et al. in China, which included children and adolescents aged 6 to 17 years, showed a substantial decrease in physical activity and an increase in screen time during the COVID-19 pandemic among the study population (17). Also, in a study by Nicodemo et al. in Italy, maintaining a healthy lifestyle was difficult for these children despite enrollment in a Food-Education Program ((18). Indeed, children and adolescents developed eating habits during the COVID-19 period that were different from their previous habits. This was supported by a systematic review by Pourghazi et al., a literature review by Stavridou et al., and another literature review by Abbas et al. (19-21).

The increase in obesity among children and adolescents during COVID-19 raises concerns regarding the increased severity of COVID-19 infection in obese children and adolescents and the likelihood of progressing to adulthood obesity, especially if the behavior patterns that this population developed during the COVID-19 lockdown continue after returning to everyday life with no lockdown, and this needs to be investigated further after the COVID-19 preventive measures are lifted (22-23).

Conclusions

This study showed that the prevalence of obesity and overweight among children and adolescents attending PHCC health centers increased markedly during the COVID-19 pandemic period; however, an increasing trend was already present before the pandemic.

A national strategy for preventing, screening, and managing overweight and obesity, involving families, schools, the health sector, communities, and policymakers, is necessary to address the more serious health complications that may result if childhood obesity progresses to adulthood obesity.

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Conflict of interest
The authors declare no conflict of interest.

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