Study Of Impact On Dietary Pattern Of Children During And Following COVID-19 Lockdown In Various Socio Economic Groups

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COVID-19, dietary patterns, children, nutrition, socioeconomic status, lockdown, public health

ABSTRACT

Background The COVID-19 pandemic and subsequent lockdowns had significant effects on lifestyle and dietary behaviors, particularly among children. Changes in food accessibility, increased screen time, reduced physical activity, and psychological stress contributed to altered dietary patterns across various socioeconomic groups.

Objective This study aimed to evaluate the impact of COVID-19 lockdown on the dietary patterns of school-going children from different socioeconomic backgrounds and to assess whether these changes persisted post-lockdown.

Methods A cross-sectional observational study was conducted among 385 school-going children (ages 11-18) in Noida and Greater Noida. A food frequency questionnaire was used to collect data on meal composition, snacking habits, and consumption of various food groups before, during, and after the lockdown. Statistical analysis was performed using IBM SPSS Statistics 27.0, with a significance level set at $p<0.05$.

Results Snacking and fast-food consumption increased during lockdown, with 13% of children maintaining these habits post-lockdown. While staple food intake remained stable, processed food consumption (bread, biscuits, pasta, ice cream, chocolates) rose after restrictions lifted. Fruit and vegetable intake improved, but sweets and sugary beverage consumption also increased. Socioeconomic status influenced food accessibility and choices.

Conclusion The COVID-19 lockdown increased snacking and processed food intake, with some persistent unhealthy habits. While fruit and vegetable consumption improved post-lockdown, targeted nutritional interventions are needed to promote healthier eating.

INTRODUCTION:

The emergence of COVID-19, caused by the novel coronavirus SARS-CoV-2, has profoundly impacted societies worldwide, challenging global health systems, economies, and daily life. Nutrition plays a pivotal role in individual well-being, crises like the COVID-19 pandemic have the potential to disrupt food systems and alter societal attitudes towards food. (1) Lockdowns

imposed to curb the virus spread led to the closure of schools, workplaces, restaurants, and markets, significantly altering food accessibility, preparation, and consumption habits. For children, the most significant dangers arising from the COVID-19 pandemic are not primarily associated with the virus's direct effects, but rather with its indirect consequences. These include inadequate nutrition leading to potential weight issues, excessive screen time, disruptions in schooling, mental health challenges, social isolation, heightened risk of abuse, declining vaccination rates, and limited access to healthcare. (2) There are worries about an increased risk of pediatric obesity, particularly in middle and high-income countries, which could lead to an "obesity pandemic"(3). Meanwhile, undernutrition is expected to worsen in low-income countries, posing a threat to the progress made in preventing child deaths. In regions where both underweight and overweight are prevalent, undernutrition is anticipated to rise. The unhealthy dietary habits adopted during the pandemic may persist for children and their caregivers (3). While all children are affected by the COVID-19 pandemic, vulnerable groups like migrants, refugees, children with mental health issues, and households with low income or education levels face heightened risks. The impact on nutrition and lifestyle is a significant but often overlooked aspect of this crisis, with potential long-term consequences across generations. Integrating nutrition and lifestyle considerations into pandemic response plans, especially for marginalized populations, is crucial. The full extent of the pandemic's impact on children remains to be revealed.

MATERIAL AND METHODS:

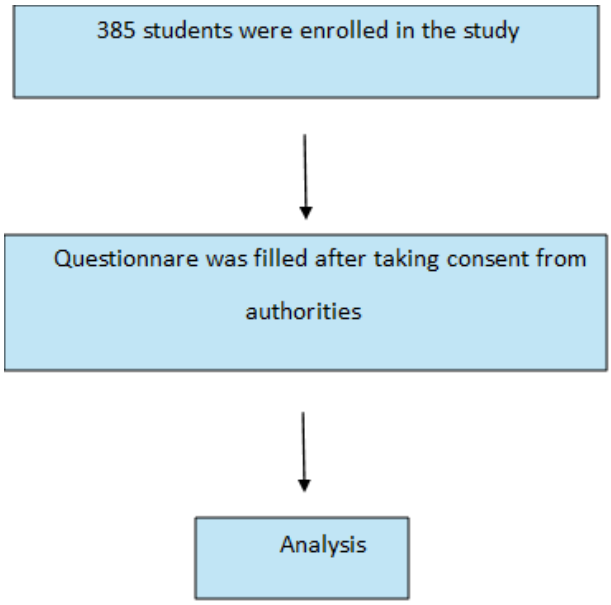
This cross-sectional observational study was conducted in schools across Noida and Greater Noida after obtaining ethical approval. A total of 385 school-going children (ages 11-18 years) were enrolled using a food frequency questionnaire to assess dietary habits before, during, and after the COVID-19 lockdown.

The study included children from diverse socioeconomic backgrounds, categorized using the Kuppuswamy scale. Participants were selected from different school types, representing both higher and lower-income groups. Children with chronic illnesses were excluded.

Data was collected via in-classroom surveys with prior consent from school authorities and assent from student. IBM SPSS Statistics 27.0 was used for analysis, with descriptive and inferential statistics applied. A Chi-square test was used to examine relationships, and statistical significance was set at $p < 0.05$

RESULTS AND DISCUSSION:

The study analyzed 385 school-going children to assess changes in dietary patterns during and after the COVID-19 lockdown.



•**Increased Snacking & Fast-Food Consumption:** There was a significant rise in snacking and fast-food intake during lockdown, with 13% of children continuing these habits post-lockdown. Mid-morning and mid-evening snacking increased, reflecting changes in daily routines and increased sedentary behavior.

•**Stable Staple Food Intake:** The consumption of staple foods such as rice, chapati, and pulses remained largely unchanged, indicating that essential meal patterns were maintained despite disruptions.

•**Higher Processed Food Consumption Post-Lockdown:** Intake of bread, biscuits, pasta, ice cream, and chocolates increased significantly after lockdown restrictions were lifted, suggesting a shift towards convenience foods.

•**Improved Fruit & Vegetable Intake:** The study found a positive trend in fresh fruit and vegetable consumption post-lockdown, likely influenced by increased health awareness and dietary adjustments.

•**Beverages & Sweets:** There was a moderate increase in the consumption of tea, coffee, and sugary beverages, alongside a rise in sweets and desserts post-lockdown.

•**Socioeconomic Influence:** Dietary habits varied across different socioeconomic groups, with food accessibility playing a key role in influencing the type and quality of food consumed.

Gender wise distribution of study participants(n=385)

Sex	Frequency	Percent
Male	196	50.9
Female	189	49.1
Total	**385**	**100.0**

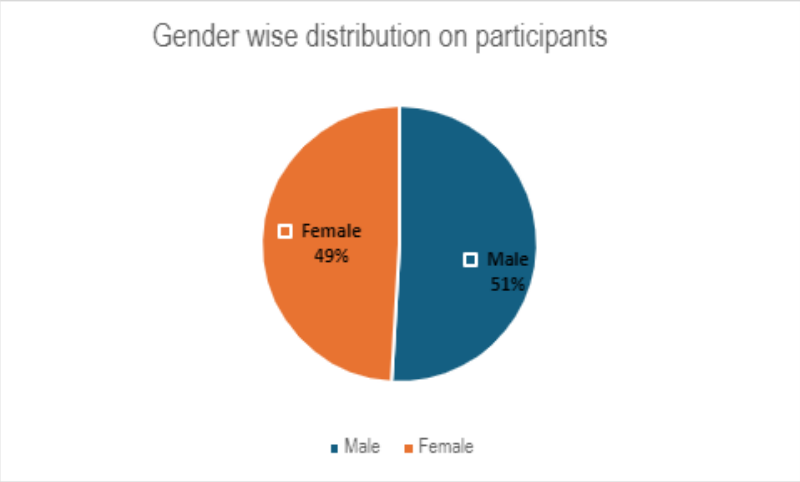


Figure 1: Gender wise distribution of study participants

Table 1: Age-wise distribution of study subjects(n=385)

Age	Frequency	Percent
11 Years	35	9.1%
12 Years	79	20.5%
13 Years	67	17.4%
14 Years	77	20.0%
15 Years	52	13.5%
16 Years	35	9.1%
17 Years	40	10.4%

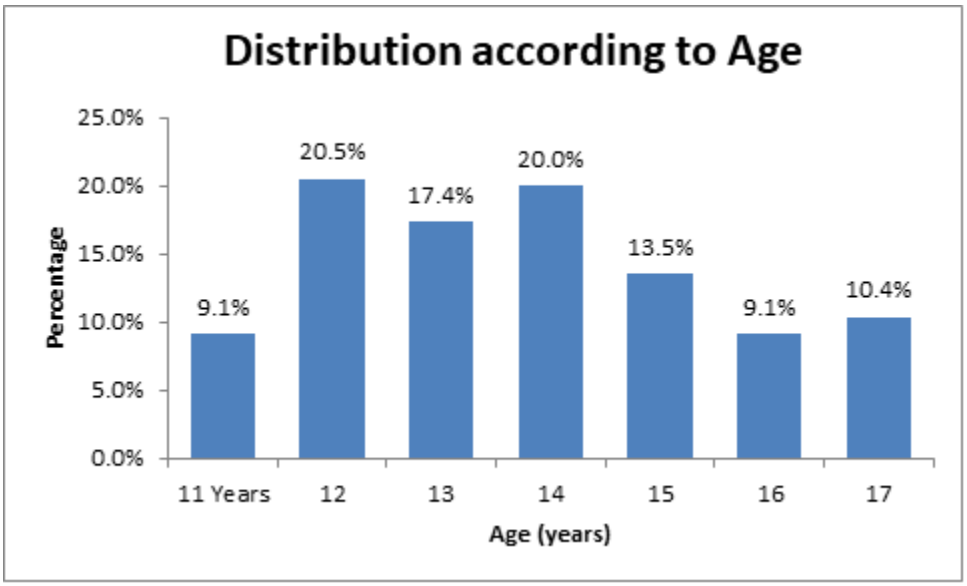


Figure 2: Age wise distribution of study participants

Table 2: Consumption of Sweets and Beverages

	During lockdown		After lockdown	
Frequency per week		**Percent**		**Percent**
Chocolate				
Once	4	1.0%	62	16.1%
Twice	137	35.6%	89	23.1%
Thrice	162	42.1%	222	57.7%
Four times	82	21.3%	12	3.1%
Carbonated drinks				
Never	68	17.7%	0	0.0%
Once	83	21.6%	77	20.0%
Twice	169	43.9%	218	56.6%
Thrice	65	16.9%	88	22.9%
Four times	0	0.0%	2	0.5%
Tea				
Never	8	2.1%	8	2.1%
Once	6	1.6%	7	1.8%
Twice	137	35.6%	2	0.5%
Thrice	80	20.8%	137	35.6%
Four times	2	0.5%	78	20.3%
Daily	152	39.5%	153	39.7%
Coffee				
Never	303	78.7%	298	77.4%

Once	2	0.5%	4	1.0%
Twice	80	20.8%	5	1.3%
Thrice	0	0.0%	77	20.0%
Daily	0	0.0%	1	0.3%
Other sweets				
Never	301	78.2%	300	77.9%
Once	3	0.8%	2	0.5%
Twice	79	20.5%	5	1.3%
Thrice	0	0.0%	78	20.3%
Five times	1	0.3%	0	0.0%

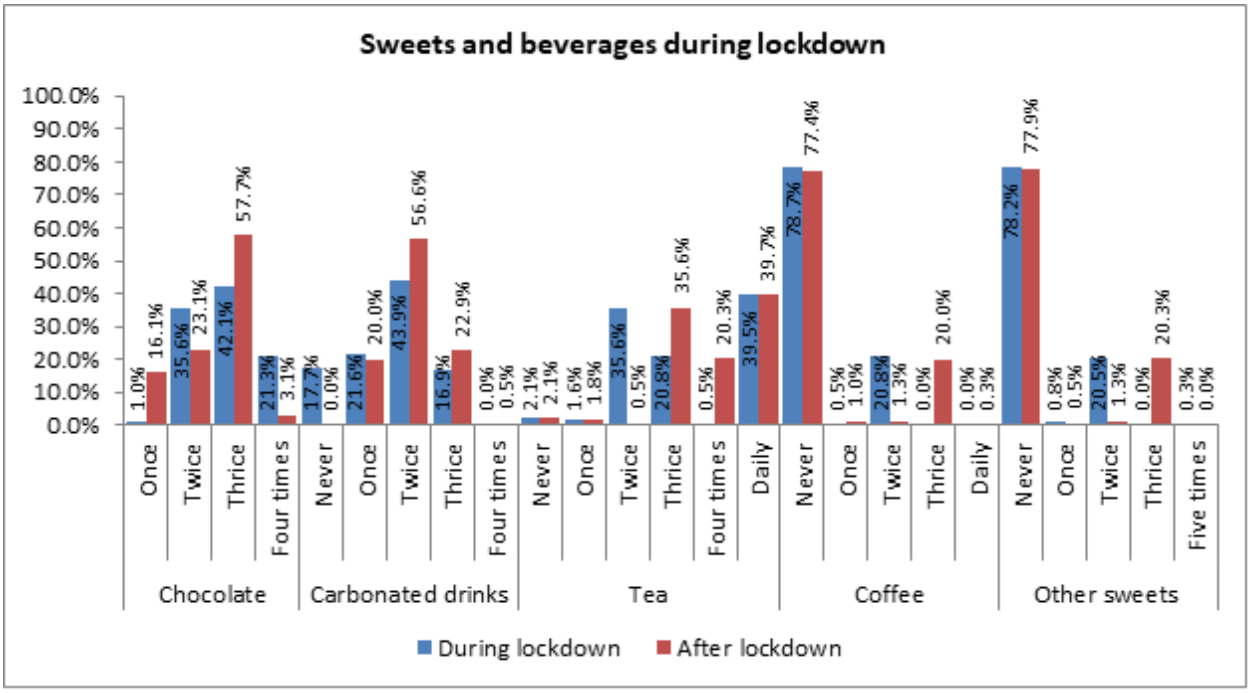


Figure 3: Consumption of sweets and beverages

Table 3: Fruits and Vegetables during lockdown

	During lockdown		After lockdown	
Frequency per week		**Percent**		**Percent**
Dry fruits				
Never	0	0.0%	0	0.0%
Once	62	16.1%	0	0.0%
Twice	136	35.3%	5	1.3%
Thrice	22	5.7%	140	36.4%

Four times	165	42.9%	158	41.0%
Five times	0	0.0%	82	21.3%
Fresh fruits				
Once	4	1.0%	5	1.3%
Twice	10	2.6%	71	18.4%
Thrice	5	1.3%	6	1.6%
Four times	71	18.4%	144	37.4%
Five times	12	3.1%	150	39.0%
Six times	0	0.0%	1	0.3%
Daily	283	73.5%	8	2.1%
Roots and tubers				
Once	0	0.0%	1	0.3%
Four times	1	0.3%	0	0.0%
Five times	2	0.5%	2	0.5%
Daily	382	99.2%	1	0.3%
Cooked vegetables				
Never	143	37.1%	69	17.9%
Once	2	0.5%	1	0.3%
Twice	11	2.9%	149	38.7%
Thrice	223	57.9%	21	5.5%
Four times	4	1.0%	143	37.1%
Five times	1	0.3%	2	0.5%
Six times	1	0.3%	0	0.0%
Salad (raw)				
Never	316	82.1%	316	82.1%
Once	71	18.4%	7	1.8%
Twice	0	0.0%	61	15.8%
Thrice	0	0.0%	1	0.3%
Others				
Never	85	22.1%	317	82.3%
Once	142	36.9%	7	1.8%
Twice	14	3.6%	60	15.6%
Thrice	66	17.1%	1	0.3%
Four times	78	20.3%	0	0.0%

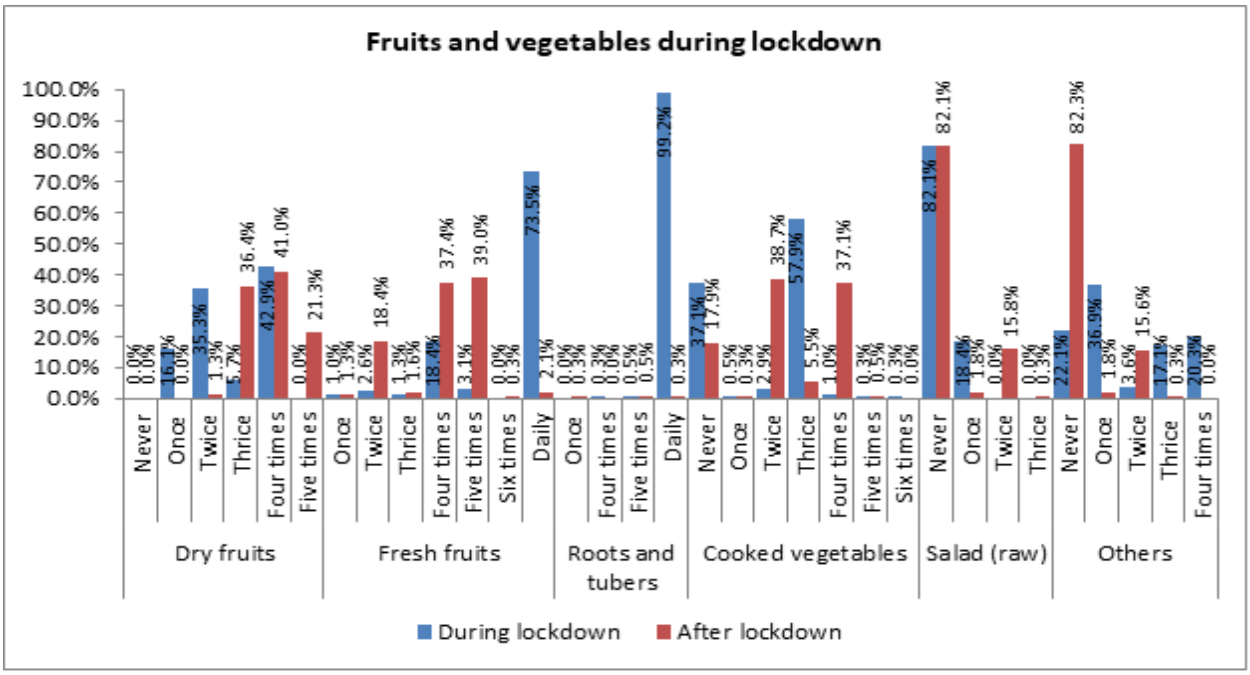


Figure 4: Consumption of fruits and vegetables

Table 4: Consumption of Sweets and Beverages

	During lockdown		After lockdown	
Frequency per week		**Percent**		**Percent**
Chocolate				
Once	4	1.0%	62	16.1%
Twice	137	35.6%	89	23.1%
Thrice	162	42.1%	222	57.7%
Four times	82	21.3%	12	3.1%
Carbonated drinks				
Never	68	17.7%	0	0.0%
Once	83	21.6%	77	20.0%
Twice	169	43.9%	218	56.6%
Thrice	65	16.9%	88	22.9%
Four times	0	0.0%	2	0.5%
Tea				
Never	8	2.1%	8	2.1%
Once	6	1.6%	7	1.8%
Twice	137	35.6%	2	0.5%
Thrice	80	20.8%	137	35.6%
Four times	2	0.5%	78	20.3%
Daily	152	39.5%	153	39.7%

Coffee				
Never	303	78.7%	298	77.4%
Once	2	0.5%	4	1.0%
Twice	80	20.8%	5	1.3%
Thrice	0	0.0%	77	20.0%
Daily	0	0.0%	1	0.3%
Other sweets				
Never	301	78.2%	300	77.9%
Once	3	0.8%	2	0.5%
Twice	79	20.5%	5	1.3%
Thrice	0	0.0%	78	20.3%
Five times	1	0.3%	0	0.0%

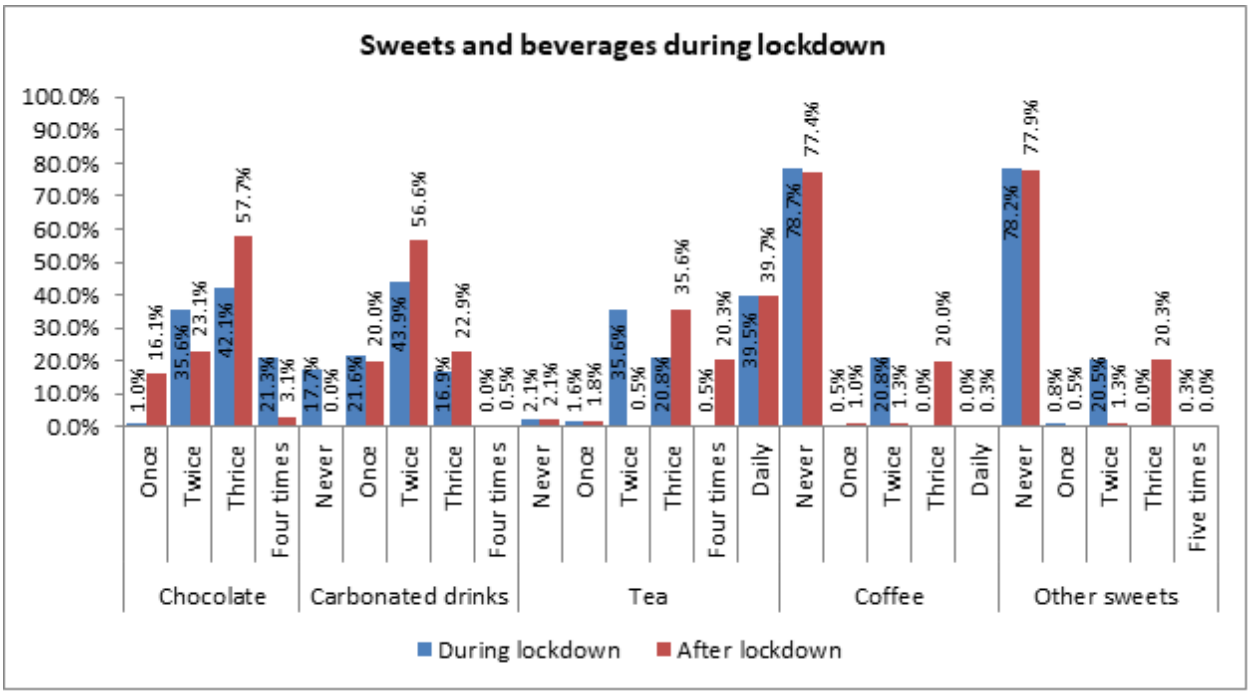


Figure 5: Consumption of sweets and beverages

Table 5: Consumption of Fast food

Frequency per week	During lockdown		After lockdown	
		Percent		Percent
Pakora/Samosa				
Once	69	17.9	8	2.1
Twice	217	56.4	142	36.9
Thrice	20	5.2	227	59.0
Four times	79	20.5	8	2.1

Chaat				
Never	141	36.6	3	0.8
Once	156	40.3	209	54.3
Twice	10	2.6	170	44.2
Thrice	78	20.3	2	0.5
Four times	0	0.0	1	0.3
Shawarma				
Never	300	77.7	299	77.4
Once	4	1.0	83	21.6
Twice	81	21.0	3	0.8
French Fries				
Never	154	40.0	153	39.7
Once	2	0.5	83	21.6
Twice	143	37.1	144	37.4
Thrice	85	22.1	5	1.3
Four times	1	0.3	385	100.0
Pizza/Burger				
Never	155	40.3	153	39.7
Once	4	1.0	151	39.2
Twice	147	38.2	79	20.5
Thrice	78	20.3	2	0.5
Four times	1	0.3	0	0.0
Others				
Never	236	61.3	158	41.0
Once	147	38.2	226	58.7
Twice	2	0.5	0	0.0

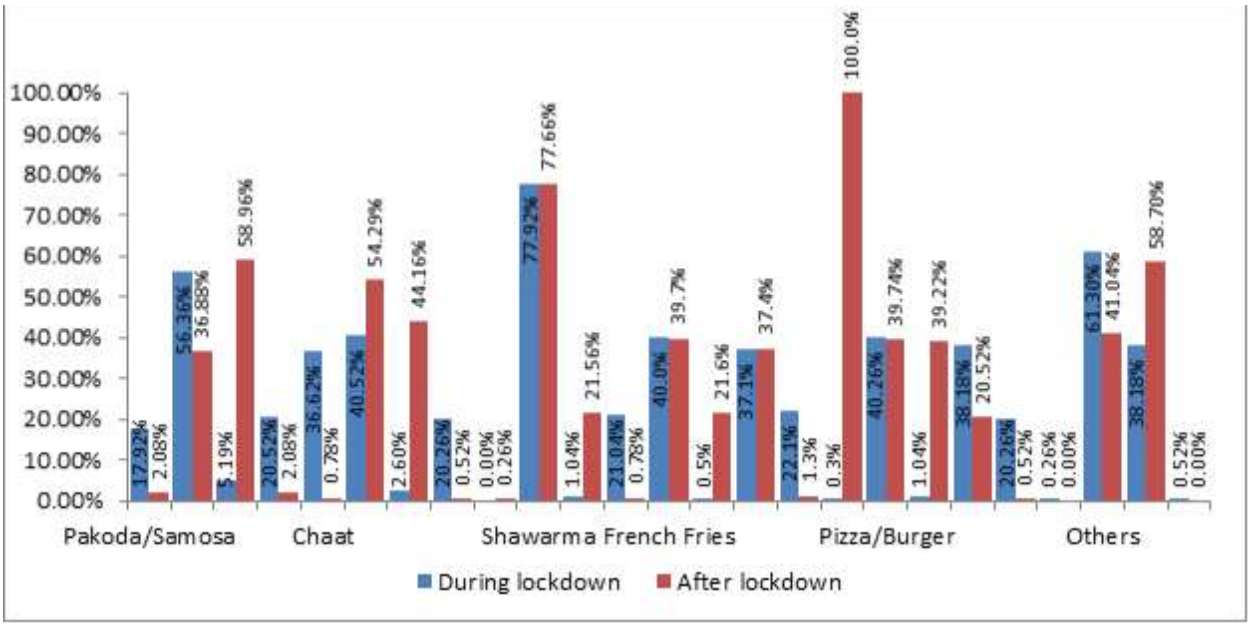


Figure 6: Consumption of fast foods

The findings indicate both positive and negative dietary shifts, with improved fruit and vegetable intake but also an increase in processed and sugary foods. These changes highlight the need for targeted nutritional interventions to promote healthier eating habits in children.

The COVID-19 lockdown had a profound impact on children's daily routines, affecting their exercise, schooling, outdoor activities, and dietary habits. This study sought to assess how children's eating behaviors changed during and after the lockdown period.

One of the most significant findings was the increase in snacking and fast-food consumption during the lockdown, with 13% of children continuing these habits post-lockdown. The disruption of daily schedules, increased screen time, and stress contributed to more frequent snacking, as children spent more time at home with easy access to food. Additionally, emotional eating due to boredom and anxiety was a key factor in the observed dietary changes.

While the consumption of staple foods such as rice, roti, and pulses remained stable, there was a notable increase in the intake of processed foods, including bread, biscuits, pasta, ice cream, and chocolates, after restrictions were lifted. This shift indicates that habits formed during the lockdown persisted even when normal activities resumed.

Another positive outcome observed in the study was an increase in the consumption of fruits and vegetables post-lockdown. This could be attributed to increased awareness of nutrition and immunity, leading to a conscious effort to adopt healthier eating habits. However, alongside this improvement, there was a moderate rise in the consumption of sweets, sugary beverages, and caffeinated drinks such as tea and coffee.

Broader Dietary Trends and Behavioral Changes

The study aligns with global research suggesting that frequent meal consumption, especially late-night eating, is associated with an increased risk of obesity and metabolic disorders(4). During the

pandemic, many children followed irregular eating patterns, leading to long-term implications for their health.

India has long exhibited poor dietary patterns at a population level, characterized by high intake of processed foods and low consumption of vegetables and fruits. The pandemic further highlighted these dietary imbalances, with economic hardships forcing many families to rely on cheaper, calorie-dense foods instead of nutritious options. While some children maintained their pre-pandemic eating habits, others developed new routines influenced by altered lifestyles and financial constraints.[5,6]

Additionally, changes in hunger perception and satiety were observed, with some individuals reporting intensified feelings of hunger and changes in portion sizes. This shift might explain the perception of weight gain during the lockdown, as stress and disrupted eating patterns influenced metabolic responses.[7,8]

CONCLUSION

In our study we found that the overall dietary pattern of school going children was relatively stable in the meal composition but there was a substantial increase in snacking and increased consumption of fast foods during lockdown. After lockdown was lifted there was an increase in consumption of certain food items like pasta/noodles, ice creams. There was a significant increase in consumption of fruits and vegetables after lockdown.

Limitations & Strengths

The main limitation of this study is its reliance on self-reported data, which may introduce recall bias. Since the study was conducted after the lockdown, participants may have overestimated or underestimated their responses, leading to potential inaccuracies.

However, a significant strength of this research lies in its comprehensive assessment of dietary patterns across socioeconomic groups. By considering children from different financial backgrounds, the study provides valuable insights into how food accessibility and affordability shaped eating habits during the pandemic.

Future Implications

The World Health Organization (WHO) introduced the term "Disease X" in 2018 to describe an unidentified pathogen that could trigger a future pandemic. This concept highlights the ongoing risk of emerging infectious diseases and the need for global preparedness.

While the world has begun to recover from COVID-19, research suggests that future pandemics may be even more severe, making it essential to address not only direct health impacts but also secondary effects, such as changes in dietary behavior and long-term health consequences.[9,10]

Moving forward, it is crucial to focus on public education, policy development, and awareness campaigns to promote healthy eating habits among children. Interventions should be tailored to reduce processed food consumption, encourage balanced diets, and promote nutritional awareness, particularly in vulnerable populations. By implementing these measures, societies can mitigate the lasting effects of pandemic-related dietary changes and improve children's overall well-being.

REFERENCE:

1. Janssen M, Chang BPI, Hristov H, Pravst I, Profeta A, Millard J. Changes in Food Consumption During the COVID-19 Pandemic: Analysis of Consumer Survey Data From the First Lockdown Period in Denmark, Germany, and Slovenia.
2. Zemrani B, Gehri M, Masserey E, Knob C, Pellaton R. A hidden side of the COVID-19 pandemic in children: the double burden of undernutrition and overnutrition. Int J Equity Health.
3. Androutsos O, Perperidi M, Georgiou C, Chouliaras G. Lifestyle Changes and Determinants of Children's and Adolescents' Body Weight Increase during the First COVID-19 Lockdown in Greece: The COV-EAT Study. Nutrients.
4. Sutaria M, Keny G, Pratinidhi SA. COVID-19 and its effect on nutrition. Int J Community Med Public Health.
5. Clemente-Suárez VJ, Ramos-Campo DJ, Mielgo-Ayuso J, Dalamitros AA, Nikolaidis PA, Hormeño-Holgado A, et al. Nutrition in the Actual COVID-19 Pandemic. A Narrative Review.
6. Madan J, Blonquist T, Rao E, Marwaha A, Mehra J, Bharti R, et al. Effect of COVID-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.
7. Raman S, Harries M, Nathawad R, Kyerematen R, Seth R, Lonne B. Where do we go from here? A child rights-based response to COVID-19.
8. Samanta S, Banerjee J, Rahaman SN, Ali KM, Ahmed R, Giri B, et al. Alteration of dietary habits and lifestyle pattern during COVID-19 pandemic associated lockdown: An online survey study. Clinical Nutrition ESPEN.
9. Sharma SV, Chuang RJ, Rushing M, Naylor B, Ranjit N, Pomeroy M, et al. Social Determinants of Health–Related Needs During COVID-19 Among Low-Income Households With Children.
10. Mishra B, Rath S, Mohanty M, Mohapatra PR. The Threat of Impending Pandemics: A Proactive Approach. Cureus.