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Impact of Family Meal Pattern on Childhood Obesity

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Abstract: *Childhood obesity is a growing public health problem that touches the lives of children across the world, including India. This study looked at how family meal patterns relate to obesity among school-age children. The objectives of the study were to assess the nutritional status of children using WHO BMI-for-age standards, find out how often children eat meals with their families and examine whether meal frequency is linked to children's weight status. A total of 100 children between the ages of 6 and 12 were included in the study, selected from different areas in Patna. Height and weight measurements were taken, and a structured questionnaire was used to gather information on meal habits, food preparation at home, and what makes it difficult for families to eat together. BMI was calculated for each child and nutritional status was classified using WHO Z-score charts. The data were analysed using descriptive statistics, Pearson correlation, and chi-square tests. The results showed that only a small number of children had a normal weight. Girls were more likely to be obese, while boys had higher rates of being underweight. About half of the children ate meals with their family on a regular basis. The key finding of the study was that children who ate with their families more often had much lower rates of obesity, while those who rarely shared meals were more likely to be overweight or obese. This pattern was statistically significant. The study also found that busy schedules — including school timings, parents' work hours, and after-school activities — were the main reasons families did not eat together. Overall, the study shows that sharing meals as a family can play a meaningful role in keeping children at a healthy weight. These findings are useful for various stakeholders including families, schools, health workers, and those working on public health policy related to childhood obesity prevention.*

Keywords: *Childhood obesity, family meals, nutritional status, BMI, WHO standards, meal frequency, obesity prevention*

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Introduction:

Background : Childhood obesity has become one of the more pressing health concerns of our time, affecting roughly one in ten school-age children across the globe. It does not have a single cause; rather, it results from a combination of behavioural, environmental, and social influences that interact in ways that make prevention difficult. In recent years, researchers have begun to look at shared family meals as one factor that might help protect children from becoming obese, though this area has not been well-studied, especially in lower- and middle-income countries (World Health Organization, 2023).

Definition and Diagnosis: Doctors and health professionals use BMI cut-offs that are adjusted for age and sex to assess weight status in children. Under WHO guidelines, a child at or above the 85th

percentile is considered overweight, and one at or above the 95th percentile is classified as obese. Children falling below the 5th percentile are classified as underweight, while those between the 5th and 85th percentiles are considered to have a normal weight (Shenoy, 2023).

Socioeconomic Context in India: The 2024 World Obesity Atlas reports that around 33 million children in India are currently overweight or obese, which works out to about 9% of the population under 20 years of age. The problem is expected to grow at a rate of 6.2% per year, which makes addressing childhood obesity a matter of some urgency for India's public health system (World Obesity Federation, 2024).

Shifting Patterns in India: While childhood obesity was once seen mainly in wealthier, urban families, it is now rising at a faster rate in rural communities and among lower-income groups. This shift is tied to broader changes in how people live — more families moving to cities, rising incomes, greater access to packaged and processed foods, and changes in daily routines (Gupta et al., 2022). The traditional Indian pattern of home-cooked food and sitting down together as a family is giving way to ready-made meals and irregular eating schedules. Factors such as more mothers joining the workforce, the growth of nuclear family households, and less time available for cooking have all contributed to this change.

Clinical Manifestations and Symptoms: Children who carry excess weight may show a range of physical signs that require medical attention and timely care.

Metabolic Indicators: Some children with weight problems show early signs of metabolic disturbance, such as gynecomastia in boys. These warning signs can be early indicators of conditions like type 2 diabetes or metabolic syndrome developing later on (Kumar and Singh, 2022).

Psychological and Emotional Impact: Being overweight or obese can take a real toll on a child's emotional health. Many of these children deal with low self-esteem, tend to pull away from social situations, develop unhealthy relationships with food, and feel distressed about their appearance (Brown et al., 2023).

Respiratory Complications: Children with obesity often experience breathing difficulties, including getting out of breath during ordinary physical activities (American Academy of Pediatrics, 2023).

Gastrointestinal Issues: Digestive issues such as chronic constipation and acid reflux are also common in obese children (Johnson and Martinez, 2023). Fatty liver disease has been seen more frequently in this group, though it often goes undetected in its early stages because it causes no obvious symptoms.

Reproductive Health Concerns: Girls with obesity may have early or irregular periods and are at higher risk of polycystic ovarian syndrome, while boys may experience delays in puberty. These hormonal disruptions can have lasting effects on fertility and overall reproductive health (Pediatric Endocrinology Society, 2023).

Musculoskeletal Problems: The extra strain on the body from excess weight puts children at risk of bone and joint problems, including persistent joint pain, flat feet, misaligned knees, and unstable hip joints, all of which can affect how freely they move. If left unaddressed, some of these children may develop osteoarthritis at an early age (Roberts and Thompson, 2022).

Long-term Health Complications: The effects of childhood obesity do not end in childhood. Children who are obese are at significantly greater risk of developing serious health conditions in adulthood, including type 2 diabetes, high blood pressure, heart disease, certain types of cancer, and early death (Simmonds et al., 2016).

Statement of the Problem: Childhood obesity is a growing problem worldwide, driven by a mix of factors including unhealthy food choices, low physical activity, excessive screen time, genetic predisposition, and economic conditions. Matters are made worse by a lack of awareness among parents, weak health education in schools, and aggressive marketing of junk food to children. When obesity is not addressed in childhood, it tends to carry into adulthood, causing long-term health complications and placing a heavy burden on healthcare systems (Wang et al., 2023).

In India, long-established family structures and mealtime routines are changing quickly. Families are eating together less often, owing to urbanisation, shifts in work schedules, and changing daily habits. It is important to understand how these changes in meal patterns might be contributing to childhood obesity, so that practical, culturally relevant interventions can be developed for Indian households.

Research Gap: Much of the existing research on childhood obesity has focused on individual-level factors such as diet, physical activity, and genetics. Comparatively little attention has been given to the role of family meals as a potential protective factor. Most studies on this topic have been conducted in Western settings, which means there is a noticeable gap when it comes to understanding how family

mealtime practices affect children's weight in the Indian context, where eating together as a family still holds cultural significance. Children between the ages of 6 and 12 are at a stage where eating habits begin to take shape and where prevention efforts may have the most impact, yet this age group has not been well-researched in India specifically.

Research Question: What is the nutritional status of children aged 6-12 years according to WHO BMI-for-age standards?

1. How often do children (aged 6-12) years eat meals with their families?
2. Is there a considerable relationship between the number of family meals per week and children's BMI categories?
3. Do children who eat more frequent family meals demonstrate lower rates of overweight and obesity?

Objectives:

The present study aims to achieve the following objectives:

1. To assess the nutritional status of children aged 6-12 years using WHO BMI-for-age standards
2. To determine the frequency of family meals among study participants
3. To evaluate the association between family meal frequency and children's BMI categories

Research Hypothesis:

Alternative Hypothesis (H_1): Children who consume meals with their family more frequently (5-7 times per week) demonstrate lower prevalence of obesity compared to children who eat with their family less frequently (0-2 times per week).

Null Hypothesis (H_0): There is no significant association between family meal frequency and prevalence of obesity among children aged 6-12 years.

Significance :

This study is relevant for a number of stakeholders. Family members must see to it that, they focus on children's everyday routines specially related to meals and eating habits, without major disruption. The school team must plan interventions that stress the value of family mealtimes. The study would also help public health policy makers, to formulate and design more family oriented approaches for reducing childhood obesity.

Research Design: A cross-sectional study design was used in the study, which involves collecting data from participants at a single point of time.

Geographic Location: This research was done in the city of Patna in the the state of Bihar. Respondents were selected from the following areas – Khagaul, Walmi (AIIMS), Anisabad, Gola Road, Baliey Road.

Study Population: The target population comprised children aged 6-12 years, along with their parents or legal guardians.

Sample Size : A total of **100 children** and their families were selected as study participants.

Sampling Technique: Convenience sampling was utilized as the primary sampling technique.

Data Collection Methods and Instruments

Data were collected through two main approaches to capture information on children's nutritional status and family meal habits.

Anthropometric Measurements: Children's height was measured using a calibrated stadiometer, and body weight was recorded using a calibrated digital weighing scale. These measurements were used to calculate BMI and classify children's nutritional status according to WHO standards.

Family Meal Pattern Questionnaire: A questionnaire was developed specifically for this study. The questionnaire was administered to parents of the respondents.

Operational Definitions:

Family Meal: For the purposes of this study, a **family meal** was defined as any meal where the child ate at the same time and in the same place as at least one parent or legal guardian. This definition is in line with criteria commonly used in family meal research (Berge et al., 2014), and centres on the shared physical presence during eating rather than on how the food was prepared or what was served.

Statistical Analysis: Descriptive statistics were computed using Microsoft Excel to summarise the characteristics of the study sample. The chi-square test of independence was run in SPSS to check for associations between categorical variables. The Pearson correlation coefficient was also calculated in SPSS.

Results and Discussions:

Demographic Profile of Study Participants:

Table 1 . Demographic Characteristics of Study Participants (N=100)

Variables	Frequency (n)	Percentage (%)
Age Group		
6-8 years	18	18.0
9-10 years	35	35.0
11-12 years	47	47.0
Mean Age ± SD	10.00 ±1.66 years	
Gender		
Male	35	35.0
Female	65	65.0
Family Size		
Small (≤4 members)	55	55.0
Medium (5-6 members)	34	34.0
Large (≥7 members)	11	11.0
Mean family size ± SD	4.56 ± 1.43 members	
Mother's Education		
No formal/Primary	15	15.0
High school	32	32.0
College/University	45	45.0
Professional degree	8	8.0
Father's Education		
No formal/Primary	12	12.0
High school	28	28.0
College/University	48	48.0
Professional degree	22	22.0
Monthly Family Income		
< ₹20,000	15	15.0
₹20,000-40,000	20	20.0
₹40,000-60,000	30	30.0
> ₹60,000	35	35.0
Mother's Occupation		
Homemaker	78	78.0
Working (private/ govt/business)	22	22.0

The sample included 65% girls and 35% boys. Most children came from small families (55%), with an average household size of 4.56 members (SD = 1.43). Parents were somewhat well educated, with 45% of mothers and 48% of fathers having completed college or university. The majority of families (65%) had a monthly income above ₹40,000, suggesting that most participants were from middle- to upper-middle-class households. About 78% of mothers were homemakers.

Anthropometric Measurements

Table 2. Mean BMI by age group and gender (n=100)

Age Group (years)	Boys (n=35)			Girls (n=65)			Total (N=100)		
	n	Mean BMI (kg/m²)	SD	n	Mean BMI (kg/m²)	SD	n	Mean (kg/m²)	SD
6-8years	7	12	1.6	7	14.53	1.5	14	13.26	1.5
8-10years	6	16.78	1.8	25	21.61	2.2	31	20.67	2.1
10-12years	22	19.36	2.7	33	24.97	3.1	55	22.73	2.9
Overall	**35**	**17.4**	**3.2**	**65**	**17.8**	**3.6**	**100**	**17.7**	**3.5**

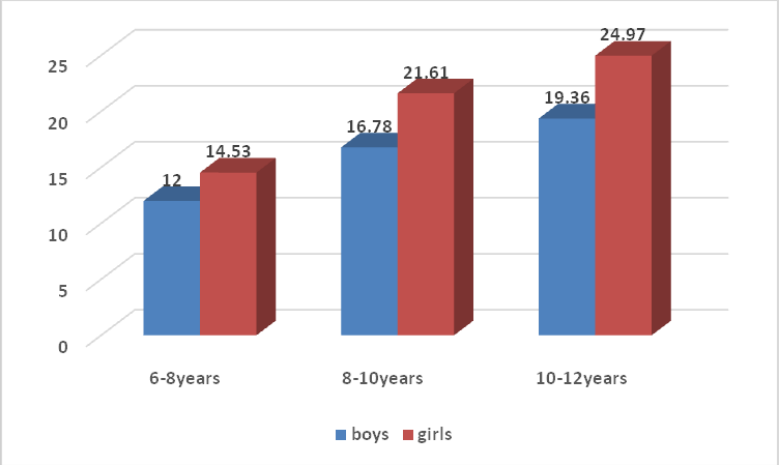

Fig. 1. Mean BMI (kg/m²) by Age Group and Gender

BMI Distribution

Table 2 shows that mean BMI increased with age across all groups. The overall mean BMI for the sample was 17.7 kg/m² (SD = 3.5). Differences between boys and girls were small, although girls in the older age groups had slightly higher BMI values.

Assessment of Nutritional Status Using WHO BMI-for-Age Standards

[Objective 1: To assess the nutritional status of children aged 6-12 years using WHO BMI-for-age standards]

Table 3. Nutritional Status of Children Based on WHO BMI-for-Age Standards (N=100)

BMI Category (WHO Classification)	Boys	Boys	Girls	Girls	Total n (%)
BMI Category (WHO Classification)	(N=35)	%	(n=65)	%	Total n (%)
Thinness	5	14.2	26	40	31
Normal Weight	23	65.7	17	26.1	40
Overweight	2	5.7	13	20	15
Obese	5	14.2	9	25.5	14
Total	35		65		100

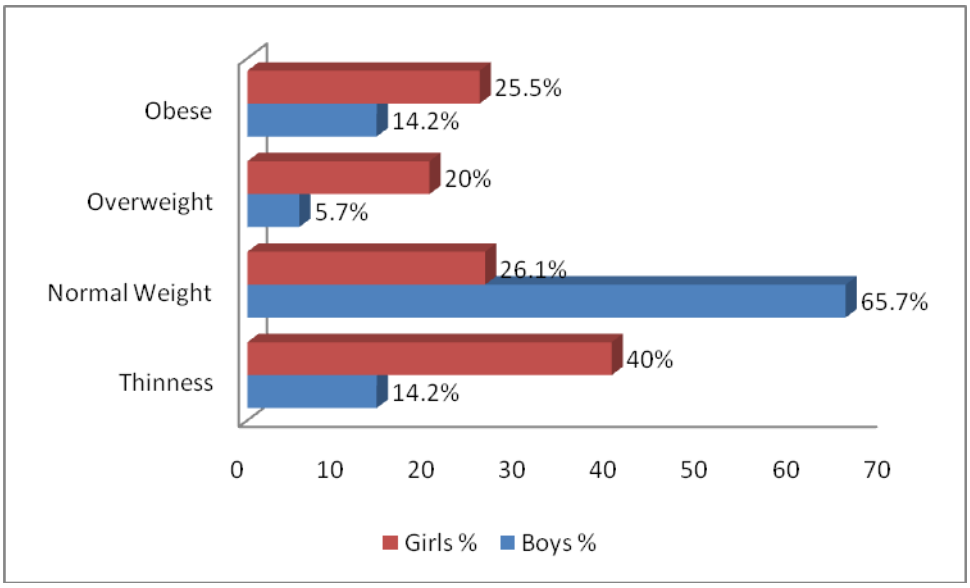

Fig. 2. Nutritional Status of Children Based on WHO-BMI-for-Age Standards

Table 3 shows the variation in nutritional status of the respondents. 31% of the respondents were classified as thin according to WHO criteria, which indicated under nutrition. 40% of the respondent had a normal weight. On the other hand, 14% were obese and 15% were overweight. **Family Meal Frequency Patterns**

[Objective 2: To determine the frequency of family meals among study participants]

Participants were asked how many times per week they ate meals together with family members. Responses were categorized into high frequency (5-7 times/week), moderate frequency (3-4 times/week), and low frequency (0-2 times/week).

Table 4. Distribution of Family Meal Frequency (N=100)

Family Meal Frequency	Frequency (n)	Percentage (%)
High (5-7 times/week)	49	49.0
Moderate (3-4 times/week)	30	30.0
Low (0-2 times/week)	21	21.0
Total	**100**	**100.0**

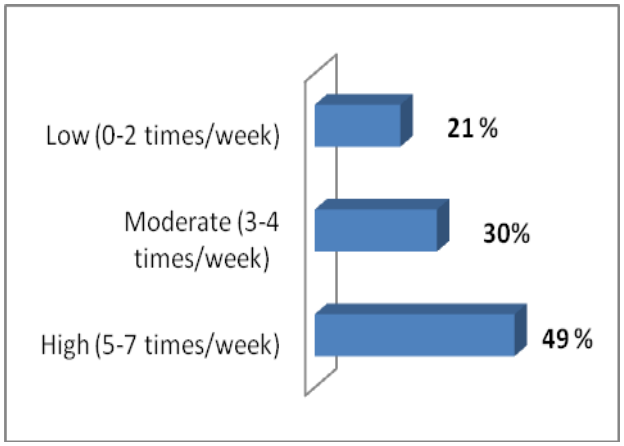

Fig. 3. Distribution of Family meal frequency

Table 4 clearly indicates that 49% of children ate meals with their families frequently (5–7 times a week), 30% did so moderately (3–4 times a week), and 21% rarely ate together as a family (0–2 times a week). While nearly half the children shared family meals regularly, the remaining 51% had inconsistent or infrequent family mealtimes.

Association Between Family Meal Frequency and BMI Categories

[Objective 3: To evaluate the association between family meal frequency and children's BMI categories]

Table 5 : Association between Family Meal Frequency and BMI Categories (N=100)

Family Meal Frequency	Underweight (n)	Underweight (%)	Normal Weight (n)	Normal Weight (%)	Overweight (n)	Overweight (%)	Obese (n)	Obese (%)	Total (n)
High(5-7/week)	13	41.9	33	82.5	2	13.3	1	7.1	49
Moderate(3-4/week)	16	51.6	5	12.5	8	53.3	1	7.1	30
Low (0-2/week)	2	6.4	2	5	5	33.3	12	85.7	21
Total	31		40		15		14		*100*

**Thinness includes both severe thinness and thinness categories combined*

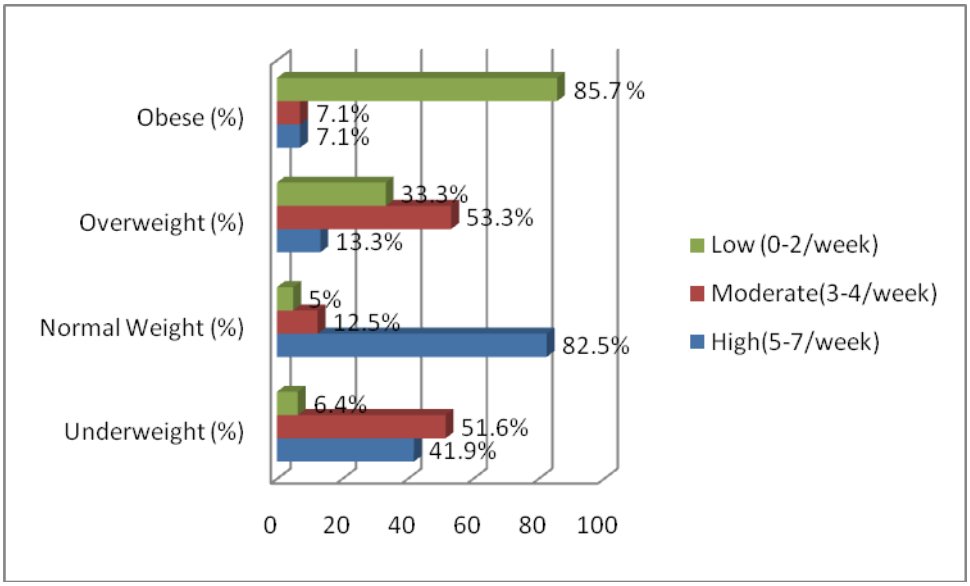

Fig. 4. Association between family meal frequency and BMI categories

Table 5 presents results related to the research hypothesis. Among children who ate frequently with their families (5–7 times per week), only 7.1% (1 out of 49) were obese and 13.3% (2 out of 30) were overweight. Majority of this group (82.5%, n=40) had a normal weight.

On the other hand children who rarely ate with their families (0–2 times per week), 85.7% (12 out of 21) were obese and 33.3% (5 out of 21) were overweight. Only 5% (2 out of 21) were of normal weight.

The moderate frequency group fell between these two extremes: 7.1% (1 out of 30) were obese and 53.3% (8 out of 30) were overweight.

Statistical Analysis of the Relationship between Family Meal Frequency and BMI

To further examine the relationship between family meal frequency and BMI, both correlation analysis and the chi-square test were carried out.

Correlation Analysis between BMI and Family Meal Frequency

Table 6: Pearson Correlation between BMI and Family Meal Frequency (N=100)

Variables	BMI	Meal Frequency
BMI		
Pearson Correlation	1	-0.529**
Sig. (2-tailed)	-	0.000
N	100	100
Meal Frequency		
Pearson Correlation	-0.529**	1
Sig. (2-tailed)	0.000	-
N	100	100

**Note: Correlation is significant at the 0.01 level (2-tailed)

Table 6 presents the Pearson correlation results for BMI and family meal frequency. Meal frequency was the number of times per week the child shared at least one meal with family members (ranging from 0 to 7), while BMI was calculated by dividing weight in kilograms by height in metres squared.

The results showed a statistically significant moderate negative correlation between meal frequency and BMI ($r = -0.529$, $p < 0.001$, two-tailed).The results clearly indicate that children who ate with their families more often tended to have lower BMI values. The negative sign of the correlation confirms this inverse pattern.

These results suggest that the frequency of children's meals along with their families were related to their weight. More frequent shared meals were associated with a healthier BMI in the 6–12 year age group.

Chi-Square Analysis of Association Between BMI Categories and Meal Frequency

Table 7. Cross-tabulation of BMI Categories and Meal Frequency (N=100)

Family Meal Frequency	Underweight (n)	Underweight (%)	Normal Weight (n)	Normal Weight (%)	Overweight (n)	Overweight (%)	Obese (n)	Obese (%)	Total (n)
High(5-7/week)	13	41.9	33	82.5	2	13.3	1	7.1	49
Moderate(3-4/week)	16	51.6	5	12.5	8	53.3	1	7.1	30
Low (0-2/week)	2	6.4	2	5	5	33.3	12	85.7	21
Total	31		40		15		14		*100*

Table 7 highlights how BMI categories were found among the three meal frequency groups.

The chi-square test found a highly significant association between meal frequency and BMI category ($\chi^2 = 69.454$, $df = 6$, $p < 0.001$). The the chi-square value indicates a strong relationship, between the BMI and meal frequency of the respondents.

Table 7 therefore shows a highly significant association ($\chi^2 = 69.454$, $p < 0.001$) between family meal frequency and BMI category.

Hypothesis Testing: The alternative hypothesis (H_1) is supported.

Children who ate with their families more often (5–7 meals per week) had considerably lower rates of obesity than those who hardly ate (0–2 times per week).

The null hypothesis (H_0) is rejected.

Factors Related to Family Meal Patterns

Table 8. Food Preparation and Meal Quality (N=100)

Factor	Category	Frequency (n)	Percentage (%)
Home Cooked Meals	Always/Most of the time	88	88.0
	About half the time	10	10.0
	Rarely/Never	2	2.0
Food Decision Maker	Parents decide/ some input from family	63	63.0
	Child chooses from options	25	25.0
	Child decides completely	12	12.0
Child Helps in Preparation	Yes (regularly/ sometimes)	54	54.0
	Rarely	31	31.0
	Never	15	15.0

Table 8 shows that 88% of families regularly prepared home-cooked meals, which is favorable for nutritional quality. In most families (63%), parents

made primary food decisions . More than half the children (54%) participated in meal preparation.

Table 9. Barriers to Family Meals (N=100)

Barrier	Frequency (n)	Percentage (%)
Child's school timing	23	23.0
Parents' work schedules	22	22.0
No one available to cook	22	22.0
Child's tuition/activity classes	20	20.0
Different food preferences	8	8.0
Other reasons	5	5.0
Total	**100**	**100.0**

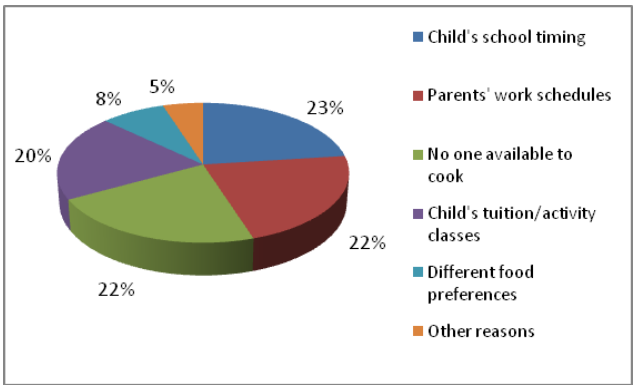

Fig. 5. Barriers to Family Meals (N=100)

Table 9 identifies primary obstacles to regular family meals. The most important barriers were: child's school timing (23%), parents' work schedules (22%), lack of someone to cook (22%), and children's activity classes (20%). Food preference disagreements represented only 8% of barriers, indicating that day to day challenges were the main barrier to frequent family meals.

Table 10. Children's Individual Eating Patterns (N=100)

Pattern	Category	Frequency (n)	Percentage (%)
Frequency of Eating Alone	Never/Rarely (0-2 times/ week)	48	48.0
	Sometimes (3-4 times/ week)	35	35.0
	Often/Always (5-7 times/ week)	17	17.0
School Lunch Pattern	At school (tiffin from home)	53	53.0
	At school (school meal)	25	25.0
	At home	15	15.0
	Other	7	7.0
Appetite Comparison	Better during family meals	45	45.0
	Same appetite	34	34.0
	Better when eating alone	21	21.0

Table 10 shows children's eating behaviors. While 48% rarely ate alone, 52% ate alone at least sometimes during the week. Most children (53%) brought lunch from home to school. Significantly, 45% reported having better appetite during family meals, suggesting the social environment positively influences eating behavior.

Summary, Conclusion and Implications:

This study examined how eating meals together as a family affects childhood obesity in school-age (6 - 12 years) children. The study focused on school-age children to understand if those who regularly shared meals with their families had healthier body weight compared to children who rarely ate together with family members.

The findings showed clear patterns. When looking at nutritional status, less than half of the children (40%) were having normal weight according to the WHO BMI-for-age standards. Some (31%) were too thin while others were overweight (15%) and obese (14%), showing that weight problems existed at both ends. Boys tended toward being underweight while girls showed higher rates of obesity.

The connection between family meals and obesity was striking. Children who ate with their families almost on a regular basis that is 5-7 meals /week had minimum obesity rates (7.1%) and the majority (82.5 %) maintained normal weight. On the other hand, children who rarely ate family meals, identified by 0-2 meals per week, showed maximum obesity rates (85.7 %).

The moderate group eating together sometimes fell between these extremes. Statistical analysis also supported these patterns.

These results lead to clear conclusions that family meal patterns significantly affected childhood obesity. Children eating frequent family meals receive strong protection against obesity while those rarely eating together face maximum risk of obesity. Family meals promote healthy weight generally, helping children avoid both excessive thinness and obesity. Without regular family meals, children's eating patterns become unstable, with some becoming too thin and others obese.

These conclusions carry important practical implications for everyone involved in child health. Families need to realize that eating together regularly, signifies a positive healthy behavior and not just a pleasant tradition. Schools play a significant but often

overlooked role in whether families can eat together. School dismissal times, homework amounts, and scheduling of required activities directly affect family meal opportunities. Healthcare providers have opportunities to influence family behavior through routine discussions during child health visits. Policymakers should recognize that individual families cannot easily overcome barriers without broader support. Addressing childhood obesity effectively requires coordinated effort across multiple sectors, rather than the family's efforts only.

Recommendations, Limitations and Scope for Further Research:

Recommendations for Families:

- Make eating together a regular habit by sharing meals at least five to seven times each week
- Set specific times for family meals and treat and follow them on a regular basis
- Turn off televisions, mobile phones, and other electronic devices during meals
- Involve children in meal preparation through age-appropriate tasks like washing vegetables or setting the table

Recommendations for Schools:

- Review daily schedules to ensure students are dismissed early enough for family meal time
- Avoid scheduling frequent after school extracurricular activities
- Assign reasonable amounts of homework that allow time for family activities
- Include lessons about nutrition and family meals in health education classes
- Teach students simple meal planning ideas they can share with their families

Recognize that preventing childhood obesity requires coordinated support across multiple areas

Limitations:

Study Limitations:

- **Cross-sectional design:** The study examined family meals and obesity at a single point in time. A longer time period could have proved causation.
- **Sample size:** The sample size of 100 children, was relatively small and was drawn from a specific geographic area. This limits generalizing findings to all school-age children, particularly those in different regions, socioeconomic levels, or cultural contexts.

Scope for Further Research:

- Conduct research with families from various income levels and cultural backgrounds
- Study families from rural and urban areas with different family structures
- Examine exactly how family meals prevent obesity by looking at foods served and portion sizes
- Explore the best ways to help families overcome barriers like work schedules or lack of time
- Conduct research specifically with teenagers to see if family meals remain important as children become more independent.

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