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Research Article

RISK FACTORS OF CHILDHOOD OBESITY IN URBAN VS. RURAL INDIA: A SYSTEMATIC REVIEW

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ABSTRACT

Background:- Childhood obesity has emerged as a critical global public health concern, with its impact being especially pronounced in low- and middle-income countries, including India. This systematic review aims to examine the prevalence of childhood obesity and place a strong emphasis on identifying the associated risk factors in both urban and rural regions of India. By conducting a thorough analysis of

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existing research studies, this review aims to identify the most significant risk factors associated with childhood obesity in these distinct settings. This knowledge is essential for designing and implementing targeted interventions and policies that can effectively address the growing epidemic of childhood obesity in India and promote healthier lifestyles among children. Understanding these risk factors will enable policymakers, healthcare professionals, and parents to work together to develop evidence-based strategies that support the health and well-being of children in India, ultimately helping to reduce the prevalence of childhood obesity and its related health problems.

Methods: - A thorough search of PubMed, Embase, and Scopus databases was conducted to find relevant English-language studies from the last ten years. These studies had to be conducted in India, focus on children and adolescents aged 0-18, and either report the prevalence of childhood obesity or identify factors that increase the risk of childhood obesity. After a meticulous review process, ten studies were selected that met these criteria. These studies employed cross-sectional research designs. This comprehensive approach ensured that the analysis was based on high-quality, relevant data, offering valuable insights into the patterns and determinants of childhood obesity in both urban and rural settings across India.

Results: - The study found that childhood obesity is more common in urban areas of India compared to rural areas. Urban children had an estimated obesity rate of 9%, while rural children had a rate of 4%. In urban areas, factors such as unhealthy eating, lack of physical activity, higher income, parental education, and attending private schools were linked to childhood obesity. Conversely, in rural areas, different factors are associated with childhood obesity. Gender differences play a role, with boys and girls potentially experiencing different levels of physical activity and dietary patterns. Age is another factor, as older children might have different lifestyle habits compared to younger ones. Household size also influences obesity prevalence, with larger families possibly having less per capita resources for healthy food and physical activity opportunities.

Discussion: - The results of this study underscore the critical need for interventions tailored to the specific conditions of urban and rural areas to effectively address the disparities in childhood obesity prevalence. In urban regions, strategies should prioritize promoting healthy dietary habits and increasing opportunities for physical activity. This could involve initiatives such as improving access to nutritious

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foods, creating safe spaces for exercise, and implementing educational programs that encourage healthy lifestyle choices among children and their families. In rural areas, interventions must also consider the unique challenges and cultural contexts. Programs should be designed to be inclusive, ensuring they address the needs of both boys and girls. This might include community-based activities that promote physical fitness and nutrition education tailored to local dietary practices and resources. Furthermore, future research should consider the regional and cultural distinctions that influence childhood obesity.

Conclusion:- This systematic review not only sheds light on the risk factors associated with childhood obesity in India but also provides a roadmap for developing targeted, region-specific interventions that can help combat this pressing health issue and reduce disparities across different populations.

KEYWORDS

Childhood obesity, prevention strategies, lifestyle modifications, interventions, health inequalities, geographic variations, cultural influences, public health programs.

INTRODUCTION

Childhood obesity has emerged as one of the most pressing global public health challenges of the 21st century, with profound implications for the future health, well-being, and economic productivity of nations. Over the last few decades, the prevalence of childhood obesity has risen dramatically across both high- and low-income countries, including India, where rapid urbanization and lifestyle changes have contributed to the growing problem. While the prevalence of obesity among children is alarming, understanding the risk factors contributing to this epidemic is essential for developing targeted interventions. The focus of this systematic review is to explore the underlying factors that are driving childhood obesity in both urban and rural regions of India. Emphasizing these risk factors is crucial to understanding how best to address and mitigate this growing public health concern.

Historically, obesity was considered a problem exclusive to affluent nations, where sedentary lifestyles and an abundance of high-calorie, processed foods were the norm. However, more

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recent data show that low- and middle-income countries (LMICs), including India, are facing a rapid increase in childhood obesity as well. The World Health Organization (WHO) reported that by 2019, more than 38 million children under the age of five were overweight, and in 2016, over 340 million children and adolescents aged 5-19 were overweight or obese (1). A particularly worrying trend is the rise in childhood obesity in LMICs, where rates have more than doubled from approximately 8.5% in 1980 to over 20% by 2020 (2). The sharp increase in obesity rates in such a short period underscores the urgency of addressing the risk factors driving this epidemic.

A range of interconnected factors has contributed to the global rise in childhood obesity. These include changes in dietary patterns, decreases in physical activity, and broader socio-environmental shifts, such as urbanization. Globally, there has been a shift in diets towards energy-dense foods that are high in fats, sugars, and salt but low in essential nutrients such as vitamins and minerals (3,4). These foods, which are often highly processed, are more accessible in urban environments, where fast food outlets, convenience stores, and packaged goods are widespread. Simultaneously, there has been a decline in physical activity, with children in urban areas increasingly leading sedentary lifestyles. The transition from active play to activities such as watching television, playing video games, or using smartphones for extended periods has become a significant contributor to childhood obesity in urban settings (5).

Urbanization has been one of the driving forces behind these dietary and lifestyle changes. In urban environments, children are more exposed to unhealthy food options and have fewer opportunities for physical activity, exacerbating the risk of obesity (6-8). The fast pace of urban life often leads to the consumption of convenient, processed foods that are high in calories but low in nutritional value (7). Moreover, children in cities tend to have more screen time and less outdoor play, contributing to a sedentary lifestyle that increases the likelihood of weight gain (8,9). In India, this pattern is particularly evident, with urban children showing higher rates of obesity compared to their rural counterparts (12).

Despite the higher prevalence of childhood obesity in urban areas, rural regions are not immune to the problem. As rural areas become more developed and lifestyles change, obesity is also becoming more common in these regions.

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Historically, rural children in India were protected to some extent by more physically demanding lifestyles and traditional diets that were higher in fiber and lower in fat. However, with the increasing availability of processed foods and the growing influence of Western dietary patterns, rural children are now exposed to the same unhealthy food options as urban children. This shift is concerning because it suggests that the protective factors traditionally associated with rural life are being eroded, leading to a convergence in obesity rates between urban and rural areas (13).

The risk factors for childhood obesity in India are multifaceted and vary between urban and rural settings. In urban areas, the availability and accessibility of unhealthy food options are significant contributors to the rise in childhood obesity. Fast food chains, sugary beverages, and snacks are widely available, and their consumption is often driven by aggressive marketing targeted at children. In addition to dietary factors, the urban environment itself contributes to a more sedentary lifestyle, as children have fewer opportunities for physical activity. Limited access to parks and safe play spaces, coupled with the growing use of digital devices, means that urban children are spending more time indoors and less time engaging in physical activity (5).

In rural areas, while traditional diets and active lifestyles once offered some protection against obesity, these protective factors are increasingly being undermined by changing lifestyles and dietary patterns. Processed foods, high in fat, sugar, and salt, are becoming more common in rural diets as global food systems expand and rural areas become more integrated into the market economy. Additionally, rural children are becoming more sedentary as technological advancements reduce the need for physical labor and traditional forms of play give way to more sedentary forms of entertainment, such as television and mobile phones (9).

Socioeconomic factors also play a crucial role in childhood obesity in both urban and rural areas of India. In urban areas, children from wealthier families may have better access to unhealthy foods, such as fast food and sugary snacks, while children from lower-income families may have limited access to healthy food options and physical activity opportunities. In rural areas, socioeconomic disparities can affect access to healthcare, education, and nutrition, which in

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turn influence the risk of obesity. For instance, children from wealthier rural families may be more likely to adopt Western dietary habits, while those from poorer families may suffer from both malnutrition and obesity due to a lack of access to nutritious foods (6).

Parental influence is another significant risk factor for childhood obesity in India. Parents play a key role in shaping children's eating habits and lifestyle choices. In urban areas, busy working parents may rely on convenience foods and may not have the time to encourage physical activity or prepare healthy meals for their children. In rural areas, traditional beliefs and practices may influence children's diets, with some parents encouraging the consumption of calorie-dense foods as a sign of prosperity and well-being. Additionally, a lack of awareness about the health risks associated with childhood obesity means that many parents may not recognize the importance of healthy eating and physical activity for their children (10).

Psychological factors, including stress, depression, and anxiety, have also been linked to childhood obesity. Children who experience psychological distress may turn to food as a coping mechanism, leading to overeating and weight gain. In urban areas, where academic pressure and social competition can be intense, children may be more likely to experience stress-related eating. In rural areas, the stress associated with poverty and limited opportunities may contribute to emotional eating and obesity (6).

The health implications of childhood obesity are extensive and often persist into adulthood. Children who are obese are at a higher risk of developing non-communicable diseases (NCDs) such as type 2 diabetes, cardiovascular disease, and various musculoskeletal disorders (6). These conditions, once thought to be primarily adult concerns, are now being diagnosed at increasingly younger ages. The psychological effects of obesity, including low self-esteem, depression, and social isolation, further compound the problem. Obese children may face discrimination or bullying from their peers, which can exacerbate psychological distress and lead to poor academic performance (7).

Addressing childhood obesity in India requires a multi-faceted approach that considers the unique risk factors in both urban and rural settings (14-16). Public health interventions must target the underlying causes of obesity, including poor dietary habits, sedentary lifestyles, and

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socioeconomic disparities. In urban areas, efforts should focus on reducing the consumption of processed foods and encouraging physical activity through the creation of safe, accessible play spaces. In rural areas, interventions should aim to preserve traditional diets and active lifestyles while addressing the growing availability of unhealthy food options. Moreover, public health campaigns must raise awareness among parents and caregivers about the importance of healthy eating and physical activity for their children's long-term health (17-19).

Largely, childhood obesity is a growing public health concern in India, driven by a complex interplay of dietary, lifestyle, socioeconomic, and psychological factors. The rise in obesity among Indian children poses significant challenges for the country's future health and economic well-being. By understanding the specific risk factors associated with childhood obesity in both urban and rural areas, policymakers and public health advocates can develop targeted interventions that address the root causes of this epidemic and protect the health and well-being of India's future generations.

Search Strategy

To conduct the literature search, a comprehensive search strategy was developed using the SPIDER (Sample, Phenomenon of Interest, Design, Evaluation, Research type) framework (20,21). The search terms used are presented in the following tables.

Table 1: SPIDER Framework for Literature Search Terms

Element	Description	Search Terms
Sample	Children in urban and rural areas of India	Children, Adolescents, Youth, School-aged
Phenomenon of Interest	Obesity and associated risk factors	Obesity, Overweight, Body Mass Index, BMI
Design	Studies examining risk factors	Cross-sectional, Cohort, Case-control, Survey
Evaluation	Measurement of obesity and identification of risk factors	Risk factors, Determinants
Research type	Both quantitative and mixed method research	Quantitative, Study

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Table 2: Search Strategy

Search term	Description
(childhood OR pediatric) AND (obesity OR overweight)	Search terms for childhood obesity
(India OR Indian)	Search term for location
(urban OR rural)	Search term for setting
(prevalence OR incidence)	Search term for outcome measure
(risk factors OR determinants)	Search term for study design

NB: Search terms for childhood obesity, location, setting, outcome measure, and study design are presented in Table 1.

The search strategy was conducted in PubMed, Embase, and Scopus, which are among the most reputable and comprehensive health and biomedical research databases (22-23). PubMed is a premier database for biomedical literature, encompassing a vast range of topics relevant to the study's focus on childhood obesity (22). Embase's strong emphasis on pharmacology and drug research provides extensive literature on clinical and medical interventions, which is invaluable for understanding obesity treatment and prevention (23). Scopus, being one of the largest abstract and citation databases, offers broad interdisciplinary coverage, ensuring a comprehensive scope for collating varied research on obesity (23).

The search results were screened for eligibility based on the inclusion and exclusion criteria, and the quality of the included studies was assessed using the Cochrane Risk of Bias Tool (25). The data extraction process was conducted using a standardized data extraction form, and the extracted data were analysed using descriptive statistics and meta-analysis (26).

Inclusion Criteria

Inclusion and exclusion criteria are essential components of a systematic review, ensuring consistency, relevance, and rigor. They provide

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clear guidelines for identifying pertinent studies, eliminating potential biases, and addressing the research question comprehensively. Moreover, they enhance the review's transparency and replicability, establishing trust in the findings (25).

This study adopted the following inclusion criteria:

- Geographical context: Studies conducted in India, focusing on either urban or rural settings, or both.
- Target population: Studies examining children and adolescents up to the age of 18 years.
- Outcomes of interest: Studies that report on the prevalence of childhood obesity or identify specific risk factors associated with childhood obesity in India.
- Study types: Both mixed-method studies and quantitative primary research studies, including cross-sectional, cohort, case-control, and observational studies.
- Publication language: Studies published in English.
- Time frame: Studies published in the last ten years to ensure relevance and capture recent trends and developments.

Exclusion Criteria

- Out of scope: Studies focusing on adult obesity without separate data for the child and adolescent age group.
- Geographical irrelevance: Studies that are not specific to India or do not differentiate results between India and other countries.
- Unrelated outcomes: Studies that discuss childhood weight or nutrition but do not specifically report obesity prevalence or associated risk factors.
- Review articles: Systematic reviews, literature reviews, meta-analyses, and other secondary publications.
- Non-empirical studies: Opinion pieces, editorials, and commentaries without original research data.
- Language barrier: Studies not published in English and for which a reliable translation is unavailable.

Quality Assessment

Studies meeting a predetermined threshold of quality criteria were included in the review, ensuring that the synthesized findings are both reliable and valid. The "Strengthening the Reporting of Observational Studies in

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Epidemiology" (STROBE) checklist was used to appraise the studies (26). The checklist includes critical reporting suggestions for the study heading, abstract, introduction or background, utilized methods in each study, findings of the studies, and discussion. Each paper's quality is presented in Appendix 3.

Data Extraction

Initially, a standardized data extraction form was designed, capturing pertinent details such as authors, publication year, study design, and key findings among others (27). The form's effectiveness was evaluated through pilot testing on select studies, allowing for refinements as needed (28). The compiled data was meticulously documented, with digital tools like spreadsheets facilitating organization (29). As a quality control measure, a random subset of studies underwent a cross-check to validate the extraction process's accuracy.

Data Synthesis

Data synthesis in systematic reviews are pivotal for amalgamating disparate pieces of information into a cohesive understanding of the studied phenomenon. Narrative synthesis was used to summarize the findings of the selected studies and to meet the objectives of this research study. Pooled prevalence was also assessed. I^2 value was assessed to find out the heterogeneity level of the studies. A forest plot was also created.

Results

Study Selection

The study selection process was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (30). A PRISMA chart (Figure 1) was used to summarize the overall study selection process.

The search strategy identified 861 records, which were then screened for duplicates. A total of 294 duplicate records were removed, leaving 567 unique records. These records were then screened based on the eligibility criteria outlined in the methodology chapter, resulting in the removal of 334 records.

The remaining 233 full reports were assessed for eligibility, and some were deemed ineligible due to their evident ineligibility. After this stage, 10 articles were identified as eligible and selected for this study. All the selected articles were quantitative in nature.

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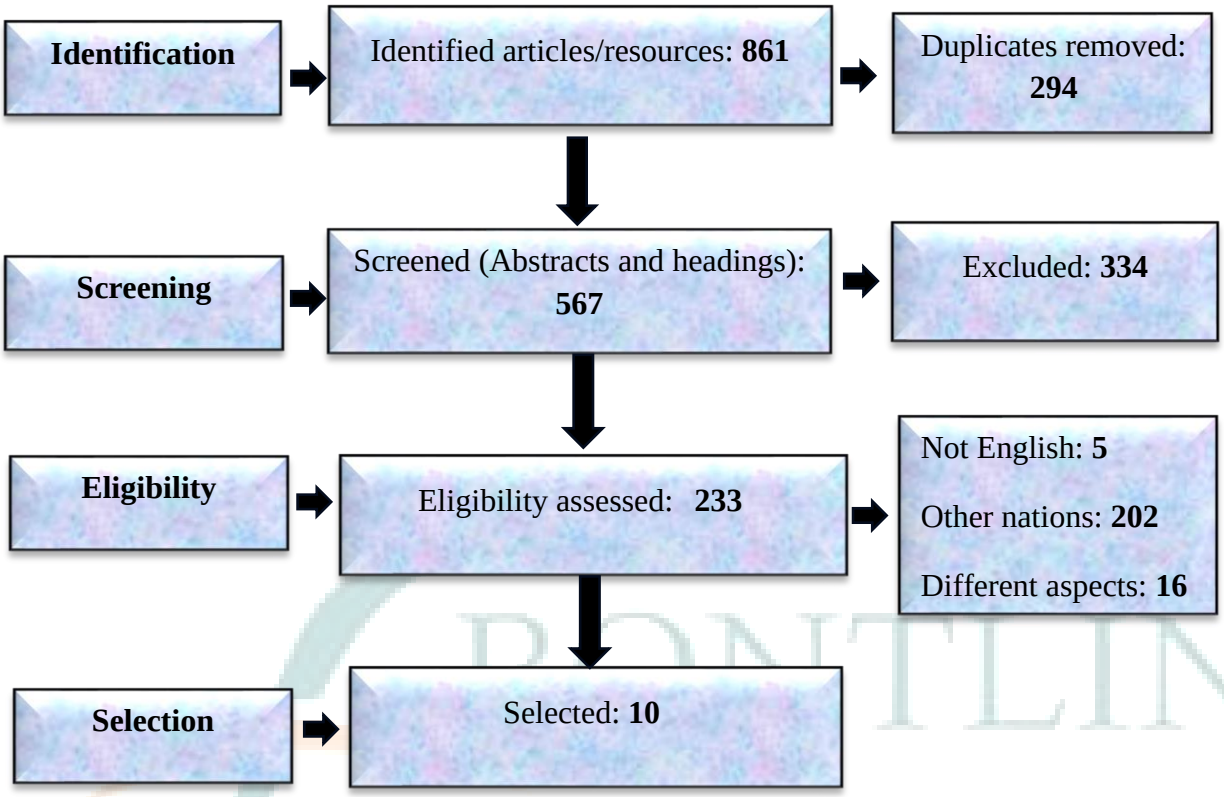

Figure 1: Study selection approach

Study Characteristics

Ten research studies, all employing a cross-sectional design, were included in this review. All studies focused on children or adolescents aged 18 or younger. The specific age groups of participants in each study are detailed in Appendix 2. Table 3 provides information on the study settings, including urban or rural locations, for the ten research studies.

Table 3: Study settings

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Study	Study location	Setting information
(30)	Jaipur, Rajasthan	Urban
(38)	Pune, Maharashtra	Urban
(39)	Ganjam, Odisha	Urban and rural
(33)	Chennai, Tamilnadu	Urban
(34)	Vadodara, Gujarat	Urban and rural
(35)	Trichy, Tamilnadu	Rural
(32)	Kanchipuram, Tamilnadu	Rural
(36)	Coimbatore, Tamilnadu	Rural
(37)	Bangalore, Karnataka	Rural
(31)	Trissur, Kerala	Urban

As shown in Figure 2, the sample sizes of the studies included in this review ranged from 100 to 1842 participants. The 10 research studies employed various random sampling methods to recruit eligible study subjects, as detailed in Appendix 2.

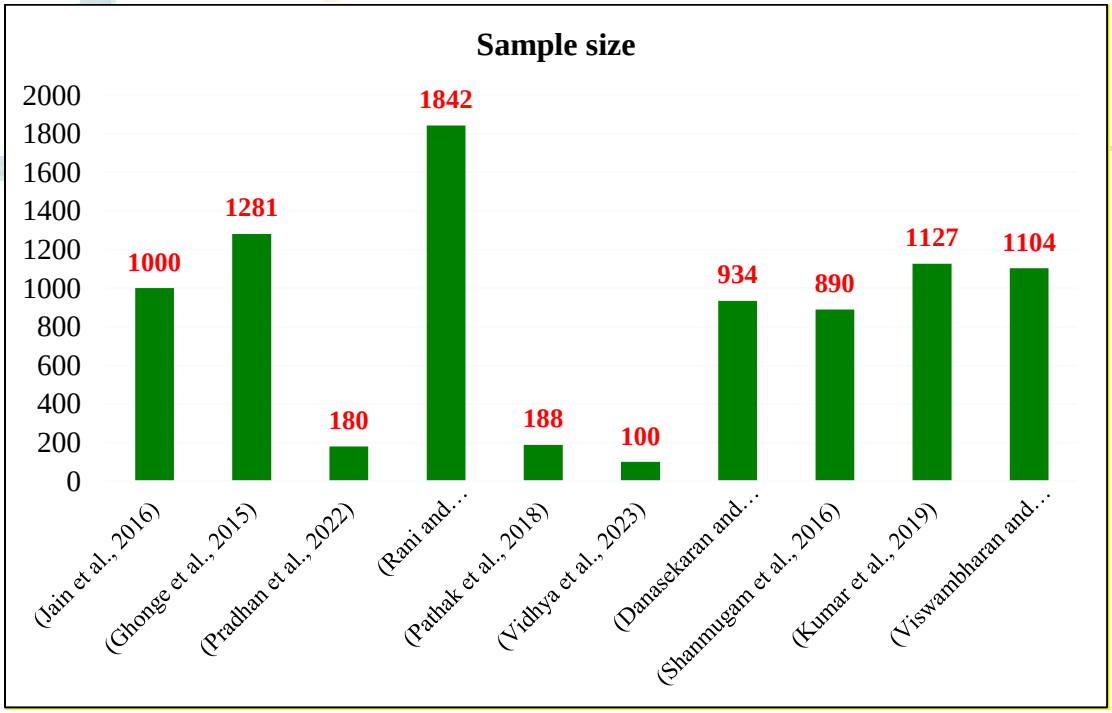

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Figure 2: Sample sizes of selected studies

BMI was calculated for all participants in the included studies, along with the administration of other relevant tools and questionnaires. Descriptive and inferential statistics were employed to identify the prevalence and risk factors of childhood obesity. Ethical standards were adhered to in most of the investigations.

Critical appraisal of selected studies

A systematic review of ten research studies was conducted to assess the prevalence and risk factors of childhood obesity in India. The STROBE checklist was used to appraise the methodological quality of these studies.

While all studies demonstrated various strengths, areas for improvement were also identified. Several studies explicitly outlined their study design in the title or abstract, providing clarity to readers. However, some studies (29) could have benefited from a clearer statement of their hypothesis to enhance interpretation.

Regarding confounding factors, (30) missed addressing potential confounders, which can significantly impact the depth of a study. The inclusion of rural perspectives by (31) and (32) enriched the overall body of research. However, consistency in addressing potential biases was lacking among the studies. While (32) addressed some biases, a more exhaustive account of statistical methods, particularly concerning confounding variables, was needed in some cases. (33) stood out in terms of methodology, but addressing missing data could have further enhanced the accuracy of their findings.

In terms of results, (27) and (29) effectively linked their findings to the study objectives. However, a more in-depth discussion of missing data, confounding adjustments, and broader implications is necessary for a more holistic interpretation of results.

Risk Factors

Childhood obesity is a growing public health concern in India, with significant implications for the health and well-being of children and adolescents. To understand the complex factors contributing to this issue, it is essential to examine the various risk factors associated with childhood obesity in both urban and rural settings.

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Risk Factors in Urban Areas

Several studies have identified a range of risk factors for childhood obesity in urban India. Higher income levels, parental education, and attendance at private schools have been found to be associated with increased obesity rates. These factors may contribute to unhealthy lifestyles, such as sedentary behaviours and consumption of processed foods.

Unhealthy eating habits, including excessive consumption of junk food, sugary drinks, and processed snacks, are also significant risk factors for childhood obesity in urban areas. The ready availability and affordability of these unhealthy foods, coupled with aggressive marketing strategies, can contribute to unhealthy dietary choices among children.

Limited physical activity is another important risk factor. Increased screen time, sedentary lifestyles, and lack of access to safe and accessible recreational facilities can all contribute to reduced physical activity levels.

Risk Factors in Rural Areas

While the prevalence of childhood obesity is generally lower in rural areas compared to urban areas, several risk factors have been identified. One study found a significant association between household size and childhood obesity, suggesting that larger families may be more likely to have children with obesity (35). However, gender, age, and other factors did not show significant associations in most rural studies.

As this review has demonstrated, childhood obesity in rural India is a growing public health concern, despite generally lower prevalence rates compared to urban areas. Several interconnected factors contribute to this issue.

Socioeconomic factors, such as poverty, limited access to resources, and family size, can significantly impact children's health and nutrition. In rural areas, limited access to nutritious food, coupled with traditional dietary practices and food insecurity, can contribute to unhealthy eating habits and inadequate calorie intake.

Environmental factors also play a role. Lack of access to recreational facilities, parks, and safe spaces for physical activity can lead to sedentary lifestyles. Exposure to environmental pollutants from agricultural practices, industrial waste, and other sources can have adverse health effects.

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Cultural factors, such as social norms and beliefs regarding food, body image, and physical activity, can influence children's behaviours. Overprotective or permissive parenting styles may also contribute to unhealthy eating habits and limited physical activity.

Common Risk Factors in Both Urban and Rural Settings

Two studies (27,32) conducted in both urban and rural areas identified several common risk factors for childhood obesity:

- Media consumption: Excessive use of television, laptops, and mobile phones has been linked to childhood obesity in both urban and rural settings. Screen time displaces physical activity and can lead to unhealthy eating habits.
- Unhealthy eating habits: Consuming junk food and canteen food is a common risk factor for childhood obesity. These foods are often high in calories, sugar, and unhealthy fats.
- Limited physical activity: Lack of physical exercise or participation in sports can contribute to weight gain and obesity.
- Method of transportation: Reliance on motorized vehicles for transportation to school can reduce opportunities for physical activity.
- Parental income: Lower income levels may be associated with higher obesity rates due to limited access to healthy foods and resources.

Additional Considerations

It is important to note that the specific risk factors for childhood obesity may vary across different regions and communities within India. Cultural factors, social norms, and access to healthcare services can also influence the prevalence and patterns of childhood obesity.

Understanding the specific risk factors in urban and rural settings is essential for developing targeted interventions. While some risk factors, such as unhealthy eating habits and limited physical activity, are common across both settings, others may vary based on regional differences.

As childhood obesity is a complex issue with multifaceted causes and significant implications for the health and well-being of children, addressing this growing public health challenge

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requires a comprehensive approach that targets both individual and environmental factors.

Interventions should prioritize promoting healthy eating habits and increasing physical activity levels. This involves encouraging children to consume nutritious foods, limiting their intake of unhealthy snacks and beverages, and providing opportunities for regular physical activity. Creating supportive environments for children and families is also crucial. Schools can play a vital role by implementing healthy school meals, providing nutrition education, and promoting physical activity programs. Healthcare providers can offer counselling and support to families regarding healthy lifestyle choices. Additionally, policymakers can implement policies that promote healthy eating and physical activity, such as restricting the marketing of unhealthy foods to children and creating safe and accessible spaces for physical activity.

Addressing socioeconomic disparities is another critical component of combating childhood obesity. Poverty, inequality, and lack of access to healthcare can significantly impact children's health and well-being. Interventions should aim to address these underlying issues to create more equitable opportunities for all children.

By tailoring interventions to address the unique needs and challenges of different communities, policymakers and healthcare providers can improve the effectiveness of their efforts.

In essence, a comprehensive approach that combines individual, environmental, and policy-level interventions is necessary to address childhood obesity in India. By promoting healthy lifestyles, creating supportive environments, and addressing socioeconomic disparities, policymakers, healthcare providers, schools, and communities can work together to improve the health and well-being of children and reduce the prevalence of childhood obesity.

Discussion

This systematic review provides a critical assessment of risk factors contributing to childhood obesity in urban and rural settings in India. By analysing the results of ten primary studies, it highlights key differences in the prevalence of obesity between these two environments and identifies various socioeconomic, lifestyle, and environmental factors that contribute to the rising burden of childhood obesity across the country. The findings underscore the complexity of obesity as

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a public health issue in India and emphasize the need for context-specific interventions that address these risk factors more effectively.

Urban-Rural Disparities in Childhood Obesity

The significantly higher prevalence of childhood obesity in urban areas (9.0%) compared to rural regions (4.0%) aligns with global trends, where urbanization and economic development have contributed to changes in dietary habits and physical activity levels. Urban settings tend to facilitate a more sedentary lifestyle, with easier access to processed foods high in fat, sugar, and calories (40). These environmental factors play a central role in shaping obesity risk among urban children. In contrast, rural areas in India have traditionally maintained more physically demanding lifestyles and diets rich in whole foods such as grains, vegetables, and legumes. However, the gradual introduction of modern conveniences and processed foods into rural areas is beginning to erode these protective factors, as suggested by the increasing prevalence of obesity in some rural regions.

The urban-rural divide in childhood obesity can be attributed to multiple risk factors, including dietary shifts, decreased physical activity, and the socioeconomic determinants unique to each setting. In urban areas, children are more likely to engage in sedentary activities, such as watching television, playing video games, and using smartphones. These behaviours, combined with the prevalence of unhealthy food options, significantly contribute to weight gain. In rural regions, while traditional diets and higher levels of physical activity provide some protection, changing lifestyles and increasing access to processed foods are emerging as significant concerns. The findings highlight the importance of addressing these diverging factors through tailored public health interventions.

Socioeconomic and Environmental Risk Factors

Socioeconomic factors, such as income levels, parental education, and school types, play an influential role in shaping childhood obesity risk, particularly in urban areas. Children from higher-income families and those attending private schools are more likely to be exposed to energy-dense, nutrient-poor foods due to greater access to fast food and convenience foods. The association between higher parental education and childhood obesity may also reflect greater household income, which enables families to

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purchase more food, including unhealthy options. Conversely, higher parental education can sometimes be protective, as educated parents may be more aware of the health risks associated with unhealthy diets and sedentary lifestyles.

In rural areas, while the impact of socioeconomic factors on obesity may be less pronounced, changes in dietary practices and physical activity are becoming increasingly apparent. Economic development and increased access to processed foods in rural India are gradually contributing to higher obesity rates. However, lower income and limited access to healthcare in these regions may delay the identification and treatment of obesity, exacerbating its long-term health consequences.

The review also highlights the impact of environmental risk factors, such as urbanization, on childhood obesity. Urban environments promote sedentary lifestyles and provide greater access to unhealthy food options through markets, street vendors, and fast-food outlets. Furthermore, the limited availability of safe spaces for physical activity in cities, combined with the proliferation of screen-based leisure activities, significantly contributes to the higher obesity prevalence in urban areas. In rural regions, although traditional lifestyles may offer some protection, the gradual shift toward less physically demanding occupations and the growing availability of processed foods are eroding these protective factors.

Dietary and Lifestyle Risk Factors

The findings of this review highlight the critical role of diet and physical activity in determining childhood obesity risk in both urban and rural India. A major contributor to obesity is the consumption of energy-dense, nutrient-poor foods such as junk food, sugary beverages, and snacks. These dietary habits are prevalent in both urban and rural settings but are more pronounced in urban areas due to greater access to fast food and convenience stores. In schools, the availability of unhealthy food options, such as fried snacks and sugary drinks, further exacerbates the problem, as children often consume these foods during their school hours.

Physical activity is another critical factor influencing childhood obesity. The review found that children in urban areas are more likely to engage in sedentary activities, such as watching television and using digital devices, which significantly reduces their physical activity levels. This sedentary lifestyle is a key contributor to

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obesity in urban India, where the availability of parks and recreational spaces may be limited. In contrast, children in rural areas have traditionally been more active due to the physical demands of rural life, including walking long distances and participating in agricultural activities. However, as rural areas become more developed, and technology becomes more accessible, sedentary behaviours are also becoming more common in these regions.

Gender Differences in Obesity Prevalence

The review observed slight gender differences in obesity prevalence, particularly in urban areas, where boys showed a higher prevalence than girls. While these differences were not statistically significant, they suggest potential gender-based disparities in obesity risk, which may be driven by cultural, social, or biological factors. For example, boys in urban settings may have greater access to sedentary leisure activities, such as video games, while girls may face societal expectations to engage in household chores, which involve more physical activity. Furthermore, gender norms may influence dietary patterns, with boys potentially consuming more calorie-dense foods, such as fast food, compared to girls.

In rural areas, gender differences in obesity prevalence were less pronounced, suggesting that childhood obesity is a concern that affects both boys and girls equally. This indicates the need for gender-inclusive interventions that target both boys and girls, ensuring that all children benefit from obesity prevention programs.

Implications for Public Health Interventions

The findings of this systematic review underscore the need for multifaceted public health interventions that address the diverse risk factors contributing to childhood obesity in urban and rural India. In urban areas, interventions should focus on promoting healthier dietary habits, increasing physical activity levels, and reducing screen time. Public health policies that regulate the marketing and availability of unhealthy foods, particularly in schools, are essential to curbing the consumption of junk food among children.

In rural areas, where traditional diets and active lifestyles have historically provided protection against obesity, interventions should aim to preserve these protective factors while addressing the emerging risk of sedentary behaviours and unhealthy dietary practices. Educational campaigns that promote the benefits

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of traditional diets rich in whole grains, vegetables, and legumes can help mitigate the growing consumption of processed foods in rural regions. Additionally, initiatives that encourage physical activity through community sports programs and safe recreational spaces are critical to maintaining active lifestyles in both urban and rural areas.

Socioeconomic factors must also be addressed through targeted interventions that consider the unique challenges faced by different income groups. In urban areas, higher-income families may benefit from nutrition education programs that encourage healthy food choices, while lower-income families may require policies that improve access to affordable, nutritious food. In rural areas, addressing socioeconomic disparities through improved access to healthcare and obesity screening can help reduce the long-term health consequences of childhood obesity.

Future Research Directions

This review highlights several areas for future research, particularly the need for longitudinal studies that track the long-term effects of childhood obesity and its associated risk factors in diverse Indian contexts. Longitudinal data can provide valuable insights into the progression of obesity over time and the impact of interventions on preventing or mitigating obesity-related health outcomes.

Further research is also needed to explore the cultural, social, and environmental determinants of childhood obesity in different regions of India. For example, studies examining the role of family dynamics, peer influences, and societal norms in shaping dietary and physical activity behaviours can provide a more nuanced understanding of the factors contributing to obesity. Additionally, qualitative research that examines the psychosocial barriers to behaviour change, such as stigma, self-esteem issues, and mental health challenges, can inform more effective interventions.

Finally, future studies should evaluate the cost-effectiveness of various interventions aimed at reducing childhood obesity, particularly in resource-limited settings. Understanding the economic impact of interventions can help policymakers allocate resources more efficiently and ensure that obesity prevention programs are sustainable in the long term.

CONCLUSION

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This systematic review provides critical insights into the risk factors contributing to childhood obesity in urban and rural India, with a focus on dietary, lifestyle, socioeconomic, and environmental determinants. The findings highlight the urgent need for context-specific interventions that address the unique challenges posed by urbanization, economic development, and changing lifestyles. Urban areas require targeted public health strategies that promote healthy eating, reduce sedentary behaviours, and regulate the availability of unhealthy foods. In rural areas, efforts should focus on preserving traditional diets and active lifestyles while addressing emerging risks associated with modernization.

Public health interventions must also account for the socioeconomic disparities that influence obesity risk, ensuring that all children, regardless of income level or geographic location, have access to the resources and education necessary for healthy living. Gender-inclusive approaches are essential to ensuring that both boys and girls benefit from obesity prevention programs, particularly in urban settings where gender-based differences in obesity prevalence may exist.

Future research should continue to explore the complex factors contributing to childhood obesity in India, with a focus on longitudinal studies, qualitative research, and cost-effectiveness analyses. By addressing these research gaps and implementing evidence-based interventions, India can take significant steps toward reducing the burden of childhood obesity and improving the health and well-being of its young population.

Availability of Data and Materials

The authors declare consent for all available data present in this study.

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Authors' Contributions

The entire study procedure was conducted with the involvement of all writers.

Competing Interests

The authors declare no conflicts of interest.

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REFERENCES

1. World Health Organisation, (2021). Obesity and overweight, Available at: https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight, (Accessed: 23 October 2024).
2. World Obesity Federation. World Obesity Federation. 2020 [cited 2023 Aug 12]. Childhood Obesity. Available from: https://www.worldobesity.org/what-we-do/our-policy-priorities/childhood-obesity
3. Abarca-Gómez L, Abdeen ZA, Hamid ZA, Abu-Rmeileh NM, Acosta-Cazares B, Acuin C, et al. Worldwide trends in body-mass index, underweight, overweight, and obesity from 1975 to 2016: a pooled analysis of 2416 population-based measurement studies in 128·9 million children, adolescents, and adults. The Lancet. 2017 Dec 16;390(10113):2627–42.
4. Popkin BM, Adair LS, Ng SW. Global nutrition transition and the pandemic of obesity in developing countries. Nutrition reviews. 2012;70(1):3–21.
5. Pedišić Ž, Dumuid D, S Olds T. Integrating sleep, sedentary behaviour, and physical activity research in the emerging field of time-use epidemiology: definitions, concepts, statistical methods, theoretical framework, and future directions. Kinesiology. 2017;49(2.):252–69.
6. Altman M, Wilfley DE. Evidence update on the treatment of overweight and obesity in children and adolescents. Journal of Clinical Child & Adolescent Psychology. 2015;44(4):521–37.
7. Buttitta M, Iliescu C, Rousseau A, Guerrien A. Quality of life in overweight and obese children and adolescents: a literature review. Quality of life research. 2014;23:1117–39.
8. Tremmel M, Gerdtham UG, Nilsson PM, Saha S. Economic burden of obesity: a systematic literature review. International journal of environmental research and public health. 2017;14(4):435.

FRONTLINE MEDICAL SCIENCES AND PHARMACEUTICAL JOURNAL
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OCLC – 1272874727
Crossref doi Google Scholar WorldCat MENDELEY
FRONTLINE JOURNALS
Publisher: Frontline Journals

9. Sommer A, Twig G. The impact of childhood and adolescent obesity on cardiovascular risk in adulthood: a systematic review. Current diabetes reports. 2018;18:1–6.
10. Misra A, Bhardwaj S. Obesity and the metabolic syndrome in developing countries: focus on South Asians. In: International nutrition: achieving millennium goals and beyond. Karger Publishers; 2014. p. 133–40.
11. Kumar S, Kelly AS. Review of childhood obesity: from epidemiology, etiology, and comorbidities to clinical assessment and treatment. In: Mayo Clinic Proceedings. Elsevier; 2017. p. 251–65.
12. Weihrauch-Blüher S, Wiegand S. Risk factors and implications of childhood obesity. Current obesity reports. 2018;7:254–9.
13. Lobstein T, Jackson-Leach R. Planning for the worst: estimates of obesity and comorbidities in school-age children in 2025. Pediatric obesity. 2016;11(5):321–5.
14. Almeida F. Strategies to perform a mixed methods study. European Journal of Education Studies. 2018;
15. Sharma M. Theoretical foundations of health education and health promotion. Jones & Bartlett Learning; 2021.
16. Sahoo K, Sahoo B, Choudhury AK, Sofi NY, Kumar R, Bhadoria AS. Childhood obesity: causes and consequences. Journal of family medicine and primary care. 2015;4(2):187.
17. Sørensen K, Van den Broucke S, Fullam J, Doyle G, Pelikan J, Slonska Z, et al. Health literacy and public health: a systematic review and integration of definitions and models. BMC public health. 2012;12(1):1–13.
18. Smith V, Devane D, Begley CM, Clarke M. Methodology in conducting a systematic review of systematic reviews of healthcare interventions. BMC medical research methodology. 2011;11(1):1–6.
19. Guagliardo MF. Spatial accessibility of primary care: concepts, methods and challenges. International journal of health geographics. 2004;3(1):1–13.
20. Amir-Behghadami M. SPIDER as a framework to formulate eligibility criteria in qualitative systematic reviews. BMJ Supportive & Palliative Care. 2021;

FRONTLINE MEDICAL SCIENCES AND PHARMACEUTICAL JOURNAL
(ISSN – 2752-6712)
VOLUME 04 ISSUE 11 Pages: 21-90
OCLC – 1272874727
Publisher: Frontline Journals

21. Stern C, Jordan Z, McArthur A. Developing the review question and inclusion criteria. AJN The American Journal of Nursing. 2014;114(4):53–6.

22. Ghaferi AA, Schwartz TA, Pawlik TM. STROBE Reporting Guidelines for Observational Studies. JAMA Surgery [Internet]. 2021 Jun 1 [cited 2023 Sep 16];156(6):577–8. Available from: https://doi.org/10.1001/jamasurg.2021.0528

23. Elamin MB, Flynn DN, Bassler D, Briel M, Alonso-Coello P, Karanicolas PJ, et al. Choice of data extraction tools for systematic reviews depends on resources and review complexity. Journal of clinical epidemiology. 2009;62(5):506–10.

24. Saldanha IJ, Wilson LM, Bennett WL, Nicholson WK, Robinson KA. Development and pilot test of a process to identify research needs from a systematic review. Journal of clinical epidemiology. 2013;66(5):538–45.

25. Frank RA, Salameh JP, Islam N, Yang B, Murad MH, Mustafa R, et al. How to Critically Appraise and Interpret Systematic Reviews and Meta-Analyses of Diagnostic Accuracy: A User Guide. Radiology. 2023;307(3):e221437.

26. Jain A, Jain A, Pankaj J, Sharma BN, Paliwal A. The study of obesity among children aged 5-18 years in Jaipur, Rajasthan. Muller Journal of Medical Sciences and Research [Internet]. 2016 Dec [cited 2023 Sep 14];7(2):125. Available from: https://journals.lww.com/mjmr/Fulltext/2016/07020/The_study_of_obesity_among_children_aged_5_18.8.aspx

27. Viswambharan JK, Abraham R. A cross sectional study on the prevalence of overweight and obesity in affluent school children of central Kerala. International Journal Of Community Medicine And Public Health [Internet]. 2021 Aug 27 [cited 2023 Sep 15];8(9):4284–8. Available from: https://www.ijcmph.com/index.php/ijcmph/article/view/8609

28. Danasekaran R, Ranganathan K. (PDF) Prevalence of overweight and obesity among rural adolescent school students in Kanchipuram district, Tamil Nadu [Internet]. 2019 [cited 2023 Apr 21]. Available from: https://www.researchgate.net/publicatio

FRONTLINE MEDICAL SCIENCES AND PHARMACEUTICAL JOURNAL
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OCLC – 1272874727
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Publisher: Frontline Journals

n/329898100_Prevalence_of_overweight_and_obesity_among_rural_adolescent_school_students_in_Kanchipuram_district_Tamil_Nadu

29. Rani MA, Sathiyasekaran BWC. Behavioural Determinants for Obesity: A Cross-sectional Study Among Urban Adolescents in India. J Prev Med Public Health [Internet]. 2013 Jul [cited 2023 Sep 14];46(4):192–200. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3740224/

30. Pathak S, Modi P, Labana U, Khimyani P, Joshi A, Jadeja R, et al. Prevalence of obesity among urban and rural school going adolescents of Vadodara, India: a comparative study. International Journal of Contemporary Pediatrics. 2018 Jun 11;

31. Vidhya C, Muthuvel, Agneeswaran A, Rajkumar S, Kumar RBP. A cross sectional study on Prevalence of overweight and obesity among school children of 6-12 years age in a rural area in Trichy district, Tamil Nadu. 2023;

32. Shanmugam K, L R, Kannappan S, Chacko T. Prevalence of overweight and obesity among children aged 5-15 years in a rural school in Coimbatore. Int J Med Sci Public Health [Internet]. 2016 [cited 2023 Sep 14];5(10):2186. Available from: http://www.scopemed.org/fulltextpdf.php?mno=230902

33. Kumar SD, Rohith M, Philip G. A study on prevalence of overweight and obesity amongst school children of Bangalore. International Journal Of Community Medicine And Public Health [Internet]. 2019 [cited 2023 Sep 14];6(1):159–63. Available from: https://www.ijcmph.com/index.php/ijcmph/article/view/3059

34. Ghonge S, Adhav PS, Landge J, Thakor N. Prevalence of obesity and overweight among school children of Pune city, Maharashtra, India: a cross sectional study. International Journal of Research in Medical Sciences [Internet]. 2015 [cited 2023 Sep 14];3(12):3599–603. Available from: https://www.msjonline.org/index.php/ijrms/article/view/1967

35. Pradhan S, Beriha SS, Patjoshi SK, Supakar S. PREVALENCE OF OBESITY AMONG ADOLESCENT SCHOOL CHILDREN IN RURAL AND URBAN SOUTH ODISHA. 2022;

FRONTLINE MEDICAL SCIENCES AND PHARMACEUTICAL JOURNAL
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OCLC – 1272874727
Crossref doi Google Scholar WorldCat MENDELEY
FRONTLINE JOURNALS
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36. Dinsa GD, Goryakin Y, Fumagalli E, Suhrcke M. Obesity and socioeconomic status in developing countries: a systematic review. Obesity reviews. 2012;13(11):1067–79.

37. Wise PM, Nattress L, Flammer LJ, Beauchamp GK. Reduced dietary intake of simple sugars alters perceived sweet taste intensity but not perceived pleasantness. The American journal of clinical nutrition. 2016;103(1):50–60.

38. Ng M, Fleming T, Robinson M, Thomson B, Graetz N, Margono C, et al. Global, regional, and national prevalence of overweight and obesity in children and adults during 1980–2013: a systematic analysis for the Global Burden of Disease Study 2013. The lancet. 2014;384(9945):766–81.

39. Sørensen HT, Sabroe S, Olsen J. A framework for evaluation of secondary data sources for epidemiological research. International journal of epidemiology. 1996;25(2):435–42.

40. Campbell M, Katikireddi SV, Sowden A, Thomson H. Lack of transparency in reporting narrative synthesis of quantitative data: a methodological assessment of systematic reviews. Journal of clinical epidemiology. 2019;105:1–9.

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Supplemental Materials

Appendix 1: Quality Appraisal I

Study 1: The study of obesity among children aged 5-18 years in Jaipur, Rajasthan					
	Item No	**Recommendation**	**Yes/No/ Not clear**	**Page number**	**Comments**
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	Yes	125	Clearly mentioned
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	Yes	125	Clearly mentioned
Introduction					
Background/ rationale	2	Explain the scientific background and rationale for the investigation being reported	Yes	125-126	Clearly mentioned
Objectives	3	State-specific objectives, including any prespecified hypotheses	Yes	125-126	Hypothesis not mentioned
Methods					
Study design	4	Present key elements of study design early in the paper	Yes	126	Clearly mentioned
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	Yes	126	Dates not mentioned

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Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	Yes	126	Clearly mentioned
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	Yes	126	Outcomes defined and others were not applicable
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	Yes	126	No comparison is there
Bias	9	Describe any efforts to address potential sources of bias	Yes	126	Sampling randomly done
Study size	10	Explain how the study size was arrived at	Yes	126	Clearly mentioned
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	Not clear	NA	NA
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	Yes	127-129	Not about confounders
		(*b*) Describe any methods used to examine subgroups and interactions	Yes	127-129	Chi-square test
		(*c*) Explain how missing data were addressed	No	NA	Not mentioned
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	Not clear	NA	NA
		(*e*) Describe any sensitivity analyses	No	NA	NA

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Results					
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	Yes	126	As per cross-sectional study
		(b) Give reasons for non-participation at each stage	NA	NA	NA
		(c) Consider use of a flow diagram	NA	NA	NA
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	Yes	126-127	Not about exposure and confounders
		(b) Indicate number of participants with missing data for each variable of interest	NA	NA	No missing data
Outcome data	15*	Report numbers of outcome events or summary measures	Yes	127	Prevalence reported
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	NA	NA	NA
		(*b*) Report category boundaries when continuous variables were categorized	Yes	127	Age, income, are categorized
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	NA	NA	NA
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	NA	NA	NA

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Discussion					
Key results	18	Summarise key results with reference to study objectives	Yes	128-130	Mentioned
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	No	NA	Not mentioned
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	Yes	128-130	Mentioned
Generalisability	21	Discuss the generalisability (external validity) of the study results	Yes	130	Implications provided
Other information					
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	NA	130	No funding

Study 2: Prevalence of obesity and overweight among school children of Pune city, Maharashtra, India: a cross-sectional study

	Item No	Recommendation	Yes/No/ Not clear	Page number	Comments
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	Yes	3599	Clearly mentioned

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		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	Yes	3599	Clearly mentioned
Introduction					
Background/ rationale	2	Explain the scientific background and rationale for the investigation being reported	Yes	3599- 3600	Clearly mentioned
Objectives	3	State-specific objectives, including any prespecified hypotheses	Yes	3599- 3600	Only objectives mentioned
Methods					
Study design	4	Present key elements of study design early in the paper	Yes	3600	Clearly mentioned
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	Yes	3600	Applicable aspects mentioned
Participants	6	(*a*) Give the eligibility criteria and the sources and methods of selection of participants	Not clear	NA	Eligibility criteria not clear
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	Yes	3600	Outcome measures were explained and others were not mentioned

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Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	Yes	3600	No comparison is there
Bias	9	Describe any efforts to address potential sources of bias	Yes	3600	Random type sampling done
Study size	10	Explain how the study size was arrived at	Yes	3600	Clearly mentioned
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	Yes	3600	mentioned
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	Not clear	NA	Not explained
		(*b*) Describe any methods used to examine subgroups and interactions	Yes	3601-3602	Chi-square test
		(*c*) Explain how missing data were addressed	NA	NA	NA
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	Not clear	NA	NA
		(*e*) Describe any sensitivity analyses	No	NA	NA
Results					
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	Yes	3600	Sample size mentioned

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		(b) Give reasons for non-participation at each stage	NA	NA	NA
		(c) Consider use of a flow diagram	No	NA	NA
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	Yes	3600	Mentioned except exposures and potential confounders
		(b) Indicate number of participants with missing data for each variable of interest	NA	NA	NA
Outcome data	15*	Report numbers of outcome events or summary measures	Yes	3601	Prevalence mentioned
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	Not clear	NA	Chi-square results only mentioned
		(*b*) Report category boundaries when continuous variables were categorized	Not clear	NA	NA
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	NA	NA	NA
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	NA	NA	NA
Discussion					
Key results	18	Summarise key results with reference to study objectives	Yes	128-130	Mentioned
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or	No	NA	Not mentioned

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		imprecision. Discuss both direction and magnitude of any potential bias			
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	Yes	128-130	Mentioned
Generalisability	21	Discuss the generalisability (external validity) of the study results	Yes	130	Implications provided
Other information					
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	NA	130	No funding

Study 3: Prevalence of obesity among adolescent school children in rural and urban south Odisha

	Item No	Recommendation	Yes/No/ Not clear	Page number	Comments
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	Yes	261	Clearly mentioned
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	Yes	261	Clearly mentioned
Introduction					
Background/ rationale	2	Explain the scientific background and rationale for the investigation being reported	Yes	261-262	Clearly mentioned

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Objectives	3	State-specific objectives, including any prespecified hypotheses	Yes	262	Only objectives mentioned
Methods					
Study design	4	Present key elements of study design early in the paper	Yes	262	Clearly mentioned
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	Yes	262	Applicable aspects mentioned
Participants	6	(*a*) Give the eligibility criteria and the sources and methods of selection of participants	Not clear	NA	Eligibility criteria not clear
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	Not clear	NA	Only outcome measures were explained
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	Yes	262	Mentioned
Bias	9	Describe any efforts to address potential sources of bias	Yes	262	Random sampling done
Study size	10	Explain how the study size was arrived at	Yes	262	Clearly mentioned

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Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	Yes	262	Mentioned about coding
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	Yes	262	Not about confounders
		(*b*) Describe any methods used to examine subgroups and interactions	Yes	262	Chi-square test
		(*c*) Explain how missing data were addressed	NA	NA	Not mentioned
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	Not clear	NA	NA
		(*e*) Describe any sensitivity analyses	No	NA	NA
Results					
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	Yes	262	As per the cross-sectional study
		(b) Give reasons for non-participation at each stage	NA	NA	NA
		(c) Consider use of a flow diagram	No	NA	No diagram
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	Yes	262-263	No information on exposures and potential confounders
		(b) Indicate number of participants with missing data for each variable of interest	NA	NA	NA

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Outcome data	15*	Report numbers of outcome events or summary measures	Yes	263	Prevalence mentioned
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	No	NA	NA
		(*b*) Report category boundaries when continuous variables were categorized	Yes	263-264	mentioned
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	NA	NA	NA
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	NA	NA	NA
Discussion					
Key results	18	Summarise key results with reference to study objectives	Yes	264-265	Mentioned
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	Yes	264-265	Mentioned
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	Yes	264-265	Mentioned
Generalisability	21	Discuss the generalisability (external validity) of the study results	Yes	265	Implications provided
Other information					

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Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	NA	NA	No funding

Study 4: Behavioural Determinants for Obesity: A Cross-sectional Study Among Urban Adolescents in India

	Item No	Recommendation	Yes/No/ Not clear	Page number	Comments
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	Yes	192	Clearly mentioned
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	Yes	192	Clearly mentioned
Introduction					
Background/ rationale	2	Explain the scientific background and rationale for the investigation being reported	Yes	192-193	Clearly mentioned
Objectives	3	State-specific objectives, including any prespecified hypotheses	Yes	193	Only objectives mentioned
Methods					
Study design	4	Present key elements of study design early in the paper	Yes	193	Clearly mentioned

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Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	Yes	193	Applicable aspects mentioned
Participants	6	(*a*) Give the eligibility criteria and the sources and methods of selection of participants	Not clear	NA	Method of selection mentioned
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	Yes (only outcome)	194	Outcome measures were explained and others were not applicable
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	Yes	193-194	Mentioned
Bias	9	Describe any efforts to address potential sources of bias	Yes	193	Random sampling done
Study size	10	Explain how the study size was arrived at	Yes	193	Clearly mentioned
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	Yes	194	Grouping based on tools
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	Yes	194	Mentioned

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		(*b*) Describe any methods used to examine subgroups and interactions	Yes	194	Chi-square test, multivariate analysis
		(*c*) Explain how missing data were addressed	NA	NA	Not mentioned
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	Not clear	NA	NA
		(*e*) Describe any sensitivity analyses	No	NA	NA
Results					
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	Yes	193	As per the cross-sectional study
		(b) Give reasons for non-participation at each stage	Yes	194	Some not provide consent
		(c) Consider use of a flow diagram	No	NA	No diagram
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	Yes	194	No information on exposures and potential confounders
		(b) Indicate number of participants with missing data for each variable of interest	NA	NA	NA
Outcome data	15*	Report numbers of outcome events or summary measures	Yes	196	Prevalence mentioned
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates	Yes	196	Logistic regression

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		and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included			
		(*b*) Report category boundaries when continuous variables were categorized	Yes	195	mentioned
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	NA	NA	NA
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	NA	NA	NA
Discussion					
Key results	18	Summarise key results with reference to study objectives	Yes	196	Mentioned
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	Yes	198	Mentioned
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	Yes	196-198	Mentioned
Generalisability	21	Discuss the generalisability (external validity) of the study results	Yes	198	Implications provided
Other information					
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	Yes	198	Just funding only mentioned

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Study 5: Prevalence of obesity among urban and rural school going adolescents of Vadodara, India: a comparative study					
	Item No	**Recommendation**	**Yes/No/ Not clear**	**Page number**	**Comments**
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	Yes	1355	Clearly mentioned
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	Yes	1355	Clearly mentioned
Introduction					
Background/ rationale	2	Explain the scientific background and rationale for the investigation being reported	Yes	1355-1356	Clearly mentioned
Objectives	3	State-specific objectives, including any prespecified hypotheses	Yes	1356	Only purpose mentioned
Methods					
Study design	4	Present key elements of study design early in the paper	Yes	1356	Clearly mentioned
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	Yes	1356	Applicable contents mentioned
Participants	6	(*a*) Give the eligibility criteria and the sources and methods of selection of participants	Not clear	NA	Method of selection mentioned

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Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	Yes (only outcome)	1356	BMI were explained and others were not applicable
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	Yes	1356	Mentioned
Bias	9	Describe any efforts to address potential sources of bias	No	NA	NA
Study size	10	Explain how the study size was arrived at	No	NA	NA
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	Yes	1356	Mentioned
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	Yes	1356	Mentioned
		(*b*) Describe any methods used to examine subgroups and interactions	Yes	1356	Different tests done
		(*c*) Explain how missing data were addressed	NA	NA	Not mentioned
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	Not clear	NA	NA
		(*e*) Describe any sensitivity analyses	No	NA	NA
Results					

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Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	Yes	1356	As per the cross-sectional study
		(b) Give reasons for non-participation at each stage	Yes	1356	Mentioned about incomplete data of some children
		(c) Consider use of a flow diagram	No	NA	No diagram
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	Yes	1356	No information on exposures and potential confounders
		(b) Indicate number of participants with missing data for each variable of interest	Yes	1356	36 data record sheets were incomplete
Outcome data	15*	Report numbers of outcome events or summary measures	Yes	1357	Prevalence mentioned
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	Not clear	NA	NA
		(*b*) Report category boundaries when continuous variables were categorized	Yes	1356	mentioned
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	NA	NA	NA

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Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	Yes	1356	Some analysis done
Discussion					
Key results	18	Summarise key results with reference to study objectives	Yes	1357	Mentioned
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	Yes	1358	Mentioned
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	Yes	1357-1358	Mentioned
Generalisability	21	Discuss the generalisability (external validity) of the study results	Not clear	NA	NA
Other information					
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	Yes	1358	No funding

Study 6: A cross-sectional study on the Prevalence of overweight and obesity among school children of 6-12 years age in a rural area in Trichy district, Tamil Nadu

	Item No	Recommendation	Yes/No/ Not clear	Page number	Comments

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Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	Yes	210	Clearly mentioned
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	Yes	210	Clearly mentioned
Introduction					
Background/ rationale	2	Explain the scientific background and rationale for the investigation being reported	Yes	210	Clearly mentioned
Objectives	3	State-specific objectives, including any prespecified hypotheses	Yes	210	Only aim mentioned
Methods					
Study design	4	Present key elements of study design early in the paper	Yes	211	Clearly mentioned
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	Yes	211	Applicable contents mentioned
Participants	6	(*a*) Give the eligibility criteria and the sources and methods of selection of participants	Yes	211	Mentioned
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	Yes (only outcome)	211	BMI was explained and others were not applicable

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Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	Yes	211	Mentioned
Bias	9	Describe any efforts to address potential sources of bias	No	NA	NA
Study size	10	Explain how the study size was arrived at	No	NA	NA
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	Yes	211	Grouping not clear
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	Yes	211	No mention on control for confounding
		(*b*) Describe any methods used to examine subgroups and interactions	Yes	212	Chi square
		(*c*) Explain how missing data were addressed	NA	NA	Not mentioned
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	Not clear	NA	NA
		(*e*) Describe any sensitivity analyses	No	NA	NA
Results					
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	Yes	211	Sample size mentioned
		(b) Give reasons for non-participation at each stage	NA	NA	NA

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		(c) Consider use of a flow diagram	No	NA	No diagram
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	Yes	211	No information on exposures and potential confounders
		(b) Indicate number of participants with missing data for each variable of interest	NA	NA	NA
Outcome data	15*	Report numbers of outcome events or summary measures	Yes	211	Prevalence mentioned
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	No	NA	NA
		(*b*) Report category boundaries when continuous variables were categorized	Yes	212	mentioned
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	NA	NA	NA
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	NA	NA	NA
Discussion					
Key results	18	Summarise key results with reference to study objectives	Yes	213	Mentioned
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	Yes	213	Mentioned

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Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	Yes	213	Mentioned
Generalisability	21	Discuss the generalisability (external validity) of the study results	Not clear	NA	NA
Other information					
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	No	213	No funding

Study 7: Prevalence of overweight and obesity among rural adolescent school students in Kanchipuram district, Tamil Nadu					
	Item No	**Recommendation**	**Yes/No/ Not clear**	**Page number**	**Comments**
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	Yes	173	Clearly mentioned
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	Yes	173	Clearly mentioned
Introduction					
Background/ rationale	2	Explain the scientific background and rationale for the investigation being reported	Yes	173	Clearly mentioned
Objectives	3	State-specific objectives, including any prespecified hypotheses	Yes	173	Not specified it as objectives, just mentioned

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Methods					
Study design	4	Present key elements of study design early in the paper	Yes	173	In abstract only
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	Yes	174	Not all applicable
Participants	6	(*a*) Give the eligibility criteria and the sources and methods of selection of participants	Not clear	NA	Not clear. But mentioned few points
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	Yes (only outcome)	174	BMI were explained and others were not applicable
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	Not clear	NA	Not clear
Bias	9	Describe any efforts to address potential sources of bias	Yes	174	Simple random technique used for sampling
Study size	10	Explain how the study size was arrived at	Yes	174	Mentioned
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable,	Yes	174	Grouping not clear

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		describe which groupings were chosen and why			
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	No	NA	NA
		(*b*) Describe any methods used to examine subgroups and interactions	No	NA	NA
		(*c*) Explain how missing data were addressed	NA	NA	Not mentioned
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	Not clear	NA	NA
		(*e*) Describe any sensitivity analyses	No	NA	NA
Results					
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	Yes	174	Sample size mentioned
		(b) Give reasons for non-participation at each stage	NA	NA	NA
		(c) Consider use of a flow diagram	No	NA	No diagram
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	Yes	174-175	No information on exposures and potential confounders
		(b) Indicate number of participants with missing data for each variable of interest	NA	NA	NA

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Outcome data	15*	Report numbers of outcome events or summary measures	Yes	175	Prevalence mentioned
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	No	NA	NA
		(*b*) Report category boundaries when continuous variables were categorized	Not clear	NA	NA
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	NA	NA	NA
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	NA	NA	NA
Discussion					
Key results	18	Summarise key results with reference to study objectives	Yes	175	Mentioned
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	Yes	175	Mentioned
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	Yes	175	Mentioned
Generalisability	21	Discuss the generalisability (external validity) of the study results	Yes	175	implications
Other information					
Funding	22	Give the source of funding and the role of the funders for the present study and, if	No	175	No funding

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		applicable, for the original study on which the present article is based			

Study 8: Prevalence of overweight and obesity among children aged 5-15 years in a rural school in Coimbatore					
	Item No	**Recommendation**	**Yes/No/ Not clear**	**Page number**	**Comments**
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	Yes	2186	Clearly mentioned
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	Yes	2186	Clearly mentioned
Introduction					
Background/ rationale	2	Explain the scientific background and rationale for the investigation being reported	Yes	2186-2187	Clearly mentioned
Objectives	3	State-specific objectives, including any prespecified hypotheses	Yes	2186-2187	Not specified about hypothesis
Methods					
Study design	4	Present key elements of study design early in the paper	Yes	2187	mentioned
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	Yes	2187	Not all applicable

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Participants	6	(*a*) Give the eligibility criteria and the sources and methods of selection of participants	Not clear	NA	Not clear.
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	Yes (only outcome)	2187	BMI were explained and others were not applicable
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	Yes	2187	Mentioned
Bias	9	Describe any efforts to address potential sources of bias	No	NA	No mention
Study size	10	Explain how the study size was arrived at	No	NA	No mention
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	Yes	2187	Grouping not clear
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	No	NA	NA
		(*b*) Describe any methods used to examine subgroups and interactions	No	NA	NA
		(*c*) Explain how missing data were addressed	NA	NA	Not mentioned

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		(*d*) If applicable, describe analytical methods taking account of sampling strategy	Not clear	NA	NA
		(*e*) Describe any sensitivity analyses	No	NA	NA
Results					
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	Yes	2187	Sample size mentioned
		(b) Give reasons for non-participation at each stage	NA	NA	NA
		(c) Consider use of a flow diagram	No	NA	No diagram
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	Yes	2187	No information on exposures and potential confounders
		(b) Indicate number of participants with missing data for each variable of interest	NA	NA	NA
Outcome data	15*	Report numbers of outcome events or summary measures	Yes	2187	Prevalence mentioned
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	No	NA	NA
		(*b*) Report category boundaries when continuous variables were categorized	Not clear	NA	NA

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		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	NA	NA	NA
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	NA	NA	NA
Discussion					
Key results	18	Summarise key results with reference to study objectives	Yes	2187	Mentioned
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	Yes	2187	Mentioned
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	Yes	2187-2188	Mentioned
Generalisability	21	Discuss the generalisability (external validity) of the study results	Yes	2188	implications
Other information					
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	No	2189	No funding

Study 9: Study on prevalence of overweight and obesity amongst school children of Bangalore

	Item No	Recommendation	Yes/No/ Not clear	Page number	Comments

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Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	Yes	159	Clearly mentioned
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	Yes	159	Clearly mentioned
Introduction					
Background/ rationale	2	Explain the scientific background and rationale for the investigation being reported	Yes	159-160	Clearly mentioned
Objectives	3	State-specific objectives, including any prespecified hypotheses	Yes	160	Not specified about hypothesis
Methods					
Study design	4	Present key elements of study design early in the paper	Yes	160	Mentioned
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	Yes	160	Mentioned applicable aspects
Participants	6	(*a*) Give the eligibility criteria and the sources and methods of selection of participants	Yes	160	Not clear. But mentioned
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	Yes (only outcome)	160	Outcomes defined

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Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	Yes	160-162	Mentioned
Bias	9	Describe any efforts to address potential sources of bias	No	NA	No mention
Study size	10	Explain how the study size was arrived at	No	NA	No mention
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	Yes	160	Grouping not clear
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	No	NA	NA
		(*b*) Describe any methods used to examine subgroups and interactions	No	NA	NA
		(*c*) Explain how missing data were addressed	NA	NA	Not mentioned
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	Not clear	NA	NA
		(*e*) Describe any sensitivity analyses	No	NA	NA
Results					
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	Yes	161	Sample size mentioned
		(b) Give reasons for non-participation at each stage	NA	NA	NA

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		(c) Consider use of a flow diagram	No	NA	No diagram
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	Yes	161	No information on exposures and potential confounders
		(b) Indicate number of participants with missing data for each variable of interest	NA	NA	NA
Outcome data	15*	Report numbers of outcome events or summary measures	Yes	161	Prevalence mentioned
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	No	NA	NA
		(*b*) Report category boundaries when continuous variables were categorized	Yes	161	Mentioned
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	NA	NA	NA
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	NA	NA	NA
Discussion					
Key results	18	Summarise key results with reference to study objectives	Yes	162-163	Mentioned
Limitations	19	Discuss the limitations of the study, taking into account sources of potential bias or imprecision. Discuss both the direction and magnitude of any potential bias	No	NA	NA

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Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	Yes	161-162	Mentioned
Generalisability	21	Discuss the generalisability (external validity) of the study results	Yes	162-163	Implications
Other information					
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	No	163	No funding

Study 10: A cross-sectional study on the prevalence of overweight and obesity in affluent school children of central Kerala					
	Item No	**Recommendation**	**Yes/No/ Not clear**	**Page number**	**Comments**
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	Yes	4284	Clearly mentioned
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	Yes	4284	Clearly mentioned
Introduction					
Background/ rationale	2	Explain the scientific background and rationale for the investigation being reported	Yes	4284-4285	Clearly mentioned
Objectives	3	State-specific objectives, including any prespecified hypotheses	Yes	4284 and	Not specified about hypothesis

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				4285	
Methods					
Study design	4	Present key elements of study design early in the paper	Yes	4285	Mentioned
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	Yes	4285	Mentioned applicable details
Participants	6	(*a*) Give the eligibility criteria and the sources and methods of selection of participants	Yes	4285	Not fully mentioned
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	Not clear	4285	Outcome variables measurement mentioned
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	Yes	4285	Mentioned
Bias	9	Describe any efforts to address potential sources of bias	Yes	4285	Sampling; universal
Study size	10	Explain how the study size was arrived at	No	4285	Mentioned
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	Yes	4285	Grouping not mentioned clearly

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Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	Yes	4285	Not mentioned about confounding
		(*b*) Describe any methods used to examine subgroups and interactions	Yes	4286	Chi-square done
		(*c*) Explain how missing data were addressed	NA	NA	Not mentioned
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	Not clear	NA	NA
		(*e*) Describe any sensitivity analyses	No	NA	NA
Results					
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	Yes	4285	Sample size mentioned
		(b) Give reasons for non-participation at each stage	NA	NA	NA
		(c) Consider use of a flow diagram	No	NA	No diagram
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	Yes	4285	No information on exposures and potential confounders
		(b) Indicate number of participants with missing data for each variable of interest	NA	NA	NA
Outcome data	15*	Report numbers of outcome events or summary measures	Yes	4285	Prevalence mentioned
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates	No	NA	NA

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		and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included			
		(*b*) Report category boundaries when continuous variables were categorized	Not clear	NA	NA
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	NA	NA	NA
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	Not clear	NA	NA
Discussion					
Key results	18	Summarise key results with reference to study objectives	Yes	4286	Mentioned
Limitations	19	Discuss the limitations of the study, considering sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	No	4286	NA
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	Yes	4286	Mentioned
Generalisability	21	Discuss the generalisability (external validity) of the study results	Yes	4286-4287	Implications
Other information					
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	No	4287	No funding

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Appendix 2: Data Extraction Table

Childhood Obesity in Urban and Rural India: A Systematic Review and Meta-Analyses of Prevalence Studies

Authors/year	Aim/objectives	Study design	Study setting	Urban/ rural area	Sample size	Sampling	Study population (age group)	Data collection details
(Jain et al., 2016)	To study the obesity among children of aged 5-18 years in Jaipur, Rajasthan.	Cross sectional study	Jaipur, Rajasthan	Urban	1000	Simple random sampling	Children (5-18 years)	Semi-structured questionnaire, (BMI) was calculated
(Ghonge et al., 2015)	To find out prevalence of obesity and overweight among school children.	Cross sectional study	Pune, Maharashtra	Urban	1281	Random sampling	Children (10 and 15 years)	Pre-designed, pre-tested, semi-structured performa, BMI were calculated
(Pradhan et al., 2022)	Estimating the prevalence of obesity among rural and urban adolescent school children and to assess the risk factors associated with adolescent obesity.	Cross sectional study	Ganjam, Odisha	Urban and Rural	180	Systematic random sampling	Adolescents (high school)	Pre-designed and pre-tested questionnaire, (BMI) was calculated

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(Rani and Sathiyasekaran, 2013)	To address the prevalence of behavioural risk factors for obesity among randomly selected urban adolescent students from both private and government schools in Chennai, Tamil Nadu.	Cross sectional study	Chennai, Tamil Nadu	Urban	1842	Simple random sampling	Adolescents (12-18 years)	Age-appropriate modified GSHS self-administered questionnaire, standardized International Physical Activity Questionnaire (short form),(BMI) was calculated
(Pathak et al., 2018)	To compare the prevalence of obesity among urban and rural school going children of adolescent age in district of Vadodara and also to study various predisposing factors.	Cross sectional study	Vadodara, Gujarat	Urban and Rural	188	No details	School going children of adolescent age group (10 to 18 years of age)	(BMI) was calculated, standardized questionnaire
(Vidhya et al., 2023)	To assess the prevalence of obesity among rural school children of 6-12 years of age and to determine factors associated with obesity	Cross sectional study	Trichy district, Tamil Nadu	Rural	100	Multistage cluster sampling	Children aged 6-12 years	(BMI) was calculated, Semi structured questionnaire.

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(Danasekaran and Ranganathan, 2	To assess the prevalence of overweight and obesity among the school in the age group of 14-17 years in Kanchipuram district of Tamil Nadu.	Cross sectional study	Kanchipuram, Tamil Nadu	Rural	934	Simple random sampling	Children aged 14-17 years	(BMI) was calculated, questionnaire
(Shanmugam et al., 2016)	To study the prevalence of overweight and obesity among school children in a rural school in Coimbatore using the WHO standard reference for age 5–19 years.	Cross sectional study	Coimbatore, Tamil Nadu	Rural	890	No details	School children aged 5–15 years	(BMI) was calculated, questionnaire
(Kumar et al., 2019)	To assess the prevalence of overweight and obesity amongst school children of Bangalore and to study the association of age and gender with overweight and obesity amongst school children of Bangalore.	Cross sectional study	Bangalore, Karnataka	Rural	1127	No details	School children aged 6 to 16 years	(BMI) was calculated BMI charts based on NCHS (National Centre for Health Statistics), CDC USA (United States of America) standards, questionnaire

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(Viswambharan and Abraham, 2021)	To assess the prevalence of obesity among affluent school children in Thrissur	Cross sectional study	Thrissur, Kerala	Urban	1104	Universal sampling method	Private school children (4 and 18 years)	Semi-structured questionnaire, BMI was calculated

Appendix 3: Quality Appraisal II

Childhood Obesity in Urban and Rural India: A Systematic Review and Meta-Analyses of Prevalence Studies									
Authors/year	**Analysis details**	**Ethics information**	**Funding information**	**Conflict of interest present or not**	**Total prevalence**	**Rural prevalence**	**Urban prevalence**	**Gender based prevalence**	**Risk factors**
(Jain et al., 2016)	**Software:** No details **Methods:** Descriptives, Chi-square test	**Consent attained:** Yes **IRB approval attained:** No details	No funding	No	5.60 %	NA	5.60 %	**Male:** 17.9 % **Female:** 15.9 %	Less physical activity, High-income family, Male gender, Junk food, chocolate, and eating outside the home, more nonvegetarian diet,

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									lesser physical activity
(Ghonge et al., 2015)	**Software:** Microsoft Excel and Open- Epi Software (Version 2.3). **Methods:** Descriptives, Chi-square test	**Consent attained:** Yes **IRB approval attained:** Yes	No funding	No	5.62 %	NA	5.62 %	**Male:** 4.62 % **Female:** 6.8%	Age groups (15 years age group both in Government schools and private schools), children of Private schools have higher prevalence
(Pradhan et al., 2022)	**Software:** SPSS ver.16.0 **Methods:** Proportions, chi-square test, mean, and standard deviations, unpaired t-test	**Consent attained:** Yes **IRB approval attained:** Yes	No funding	No	5.00 %	3.33 %	6.66 %	More in males	Urban school students, older students, hours of television and/or smartphone and laptop use, Consumption of carbonated drinks, and irregular breakfast, Tiffin from canteen, physical activities like outdoor games and

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									mode of conveyance to school
(Rani and Sathiyasekaran, 2013)	**Software:** SPSS ver 15.0 **Methods:** Descriptives, Pearson's chi-squared test, logistic regression models	**Consent attained:** Yes **IRB approval attained:** Yes	Ramachandra University	No	5.20 %	NA	5.20 %	More in females	Younger age group, female sex, a high level of father's and mother's education, and the type of school they were attending, type of school, and fast-food consumption, private schools,
(Pathak et al., 2018)	**Software:** SPSS ver 23 **Methods:** Descriptives, Independent sample test (Kruskal-Wallis test), Spearman's rho, Odds ratio, Mann-Whitney U	**Consent attained:** Yes **IRB approval attained:** Yes	No funding	No	17.60%	2.20 %	31.30%	**Male:** 20.2 % **Female:** 15.4 %	Higher parental Annual income, frequency of restaurant and school canteen food consumption and lesser frequency of physical training sessions

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	test, chi-square test								conducted in schools.
(Vidhya et al., 2023)	**Software:** SPSS **Methods:** Descriptives, Chi-square test	**Consent attained:** No details **IRB approval attained:** Yes	No funding	No	6.00 %	6.00 %	NA	**Male:** 4.0% **Female:** 2.0%	Number of family members
(Danasekaran and Ranganathan, 2	**Software:** SPSS **Methods:** Descriptives	**Consent attained:** Yes **IRB approval attained:** Yes	No funding	No	4.40 %	4.40 %	NA	**Male:** 4.58 % **Female:** 4.20 %	Not covered
(Shanmugam et al., 2016)	**Software:** SPSS ver 19 **Methods:** Descriptives, Chi-square tests	**Consent attained:** Yes **IRB approval attained:** Yes	No funding	No	4.72 %	4.72 %	NA	**Male:** 6.43 % **Female:** 2.96 %	No significant findings
(Kumar et al., 2019)	**Software:** SPSS ver 24 **Methods:** Descriptives, Chi-square tests	**Consent attained:** Yes **IRB approval attained:** Yes	No funding	No	4.08 %.	4.08 %.	NA	**Male:** 2.04 %. **Female:** 2.04 %.	No significant findings

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(Viswambharan and Abraham, 2021)	**Software:** SPSS ver 20 **Methods** Proportions, means and standard deviations, Bivariate analysis	**Consent attained:** Yes **IRB approval attained:** Yes	No funding	No	7.30 %	NA	7.30 %	**Male:** 8.3% **Female:** 5.9%	Increase in age and male gender