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Original Research Article

Prevalence of Obesity amongst Children between 5 and 18 Years in Rural Areas of Jaipur

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Abstract:

Introduction: Lifestyle, heredity, and environmental variables all have a role in the development of obesity, a complicated disorder. The rising prevalence of childhood obesity in India is associated with serious health problems such as diabetes and cardiovascular disease. The problem is worsened by urbanisation and changes in diet, whereas rural areas already encounter nutritional difficulties. These complex concerns require holistic solutions and better healthcare.

Aims and Objectives: To conduct a study to determine the frequency and causes of obesity in children between the ages of 5 and 18 in rural ,Jaipur to gather information for the development of specific interventions.

Method: A cross-sectional study was conducted during the period of one year in rural area, examined 334 obese 5-18-year-olds. Mothers filled out surveys that collected information like anthropometrics and sociodemographics. Regular procedures for determining body mass index (BMI) involved measuring both height and weight. Achieving a healthy weight was determined by referring to CDC growth charts. National Family Health Survey-3 combined overweight and obese children due to diet similarities.

Result: This research investigates the prevalence of childhood obesity in Jaipur, India, focusing on a variety of characteristics, including socioeconomic level, family history, dietary patterns, and lifestyle habits. Findings showed that income, parental occupation, food choices, and exercise habits were significantly correlated with the prevalence of obesity. These findings highlight the significance of tackling many factors in order to successfully address the issue of childhood obesity.

Conclusion: The study has concluded that the prevalence of obesity in rural areas of Jaipur was found to be 7.18% and the factors like genetic predispositions, socioeconomic level, nutrition, and lifestyle are the primary factors affecting obesity among children.

Keywords: Childhood obesity, Rural areas, Socioeconomic factors, Lifestyle habits, Intervention strategies.

Introduction

Obesity is defined as a disproportionate buildup of fatty tissue in the body and is associated with a major risk to health due to a disparity in energy consumption and dissipation. This complicated disorder results from the interaction of socioeconomic factors, social factors, and biological factors. It is brought on by a number of variables, including decreased levels of exercise, sleep issues, hormonal abnormalities, adverse drug reactions, and easy access to and consumption of meals high in carbohydrates and sugar [1]. Reduced consumption of energy also aggravates this complex network of causal factors. For the most part, obesity is a complicated health issue with a wide range of causes and effects, therefore managing and preventing it effectively requires a holistic strategy [1,2].

Childhood obesity is becoming more and more common in a variety of age categories, which poses a serious public health concern. Specifically, a notable increase in the proportion of obese children had been noted in the 6–11 age group [2,3]. The Body Mass Index (BMI), a unit of measurement that divides weight and height (kg/m^2) into categories for overweight and obesity, is essential to the evaluation of pediatric obesity. Though it changes significantly with age and gender, the interpretation of BMI in young people and adolescents is more complex [2].

So, to find a child's BMI percentile, one usually compares it to reference values that are customized for a given gender and age group. A child who is overweight is therefore defined as one who falls between the 85th and 94th percentile, while those

who are at or over the 95th percentile, are considered obese. This complicated framework emphasizes the difficulty in diagnosing obesity in children and the pressing need for focused treatments and preventative strategies [2,3]. A range of serious health consequences are associated with childhood obesity, including early maturity, abnormalities in the development pattern, and an increased susceptibility to metabolic diseases including diabetic complications and obstructive breathing while sleeping. In addition, children who are obese have a higher risk of developing high blood pressure, fatty liver conditions, and polycystic ovaries, all of which can lead to long-term health issues and a reduced quality of life [4,5].

This increases the risk of developing non-alcoholic fatty liver disease and breathing problems including asthma. It also increases the likelihood of mental health issues, malignancies, and musculoskeletal problems, highlighting its widespread effects on general health and well-being [4,5]. Studies show that prevalence rates of obesity in kids in India are rising, with rates amongst kids attending private educational institutions ranging from 12.64 percent to nearly thirty percent and in public educational institutions ranging from eleven percent to twenty-nine percent Significantly, figures show that Indian youngsters are not immune to apparent health problems; by the IOTF classification, the rate of overweight and obesity is 18.2 percent, and by WHO criteria, it is twenty-three percent. This worrying trend is fueled by a number of intersecting variables, such as the impact of feminine gender, urban living, and high socioeconomic level. These complex processes highlight how obesity among children is a multidimensional issue that requires focused treatments and legislative changes to stop its rise [6-8].

One of the main causes of the rise in rates of obesity among children in India is the country's changing industrialization and modifications to lifestyles. Numerous studies highlight the association between childhood obesity risk and urbanization, with urban areas showing much greater rates of overweight and obesity than rural areas. This urban environment, characterized by dietary changes, sedentary lifestyles, and an increasing reliance on processed foods, is linked to children's higher BMIs. The combination of these variables presents a complicated picture of urban settings acting as breeding grounds for childhood obesity, requiring all-encompassing approaches to lessen its rapidly increasing effects [9,10].

Reductions in exercise and nutritional changes are closely linked to childhood obesity in rural areas. Poor nutrition for children and the quick assimilation of new eating habits are major contributors to this problem, especially for those who migrate from rural to an urban area. Proper avoidance and control of illnesses like diabetes is hampered by the lack of readily available healthcare and dietary advice in India, especially in rural areas where disparities in socioeconomic status are already pronounced. Comprehensive treatments targeting both sides of the starvation continuum are urgently needed, as evidenced by the continued epidemic of hunger and mortality among children under five caused by deficits in the quality and accessibility of nutritional and health services [11,12].

Method

A population based cross-sectional study was conducted during the period of one year among obese children who were aged 5 to 18 in the rural areas of Jaipur, Rajasthan, India. The study considered children from 2500 population in Jaipur people, with aged 5-18. It estimated the prevalence of obesity among schoolchildren resulting in 334 samples. On the other hand, to reach the desired goal mothers were individually questioned about each kid. Interviews were conducted following the questionnaire, and data from the sample population were gathered.

The mothers of selected children were informed of the study's goal and approaches and provided consent before the interview. It was administered in the form of a two-part questionnaire. The initial section of the pro forma focused on providing general sociodemographic data about the children, such as their age, gender, religion, and socioeconomic position. The second section of the pro forma was utilised to document the child's height (measured in centimetres) and weight (measured in kilogrammes), as well as their exercise length, hours spent watching TV, hours spent using the computer, dietary preferences, and duration of physical activity.

As the percentage of obese children was small and overweight children were at risk of developing obesity, the National Family Health Survey (NFHS)-3 combined data of overweight and obese children to discover that their dietary patterns were similar, in order the tables merged them.

Inclusion and exclusion criteria

Inclusion

- Rural School children aged 5 to 18 years and parents giving consent for inclusion in the study.

Exclusion

- Young people who are not between the ages of 5 and 18 years old.

- Children who have any pre-existing medical illnesses or disabilities that have an impact on their weight or their abilities to engage in physical activity.

Statistical Analysis

This study used standardised methods to measure 5-18-year-olds' anthropometrics. The weight of youngsters was measured using a weighing machine, ensuring that the zero mark was verified before each weight measurement. The weight was measured with an accuracy of 500 grammes. To measure height, the individual stood upright, heels together, toes apart, without shoes. The height was measured in centimetres from the head to the heel using tape. Body mass index (BMI) was found by dividing the person's weight by the square of their height, which is usually given in metric units:

BMI = Weight (in kilograms)/height2 (in meters)2

Using the CDC growth chart, we determined age- and gender-specific BMI reduced criteria for overweight and obesity among participants aged 5-18 years. Children with ≥85 percentile were overweight, ≥95 percentile were obese, 5-85 percentile were normal, and <5 percentile were lean. To obtain fair and confidential information, interpersonal communication was employed. Statistical tests were used.

Result

Figure 1 shows the distribution of children's BMI (Body Mass Index) as a percentage. The 334 children surveyed had 24 (7.18%) obese BMIs of 95 or above. Fifty children, or 14.97% of the total, were overweight, defined as a body mass index (BMI) of 85 or lower. Among the youngsters surveyed, 200 (or 59.88%) had a body mass index (BMI) that fell within the healthy range of 5 to 85. Furthermore, 60 kids (17.96%) were underweight, as their body mass index was less than 5. This breakdown shows that most of the surveyed children are healthy, although some are overweight, obese, or underweight.

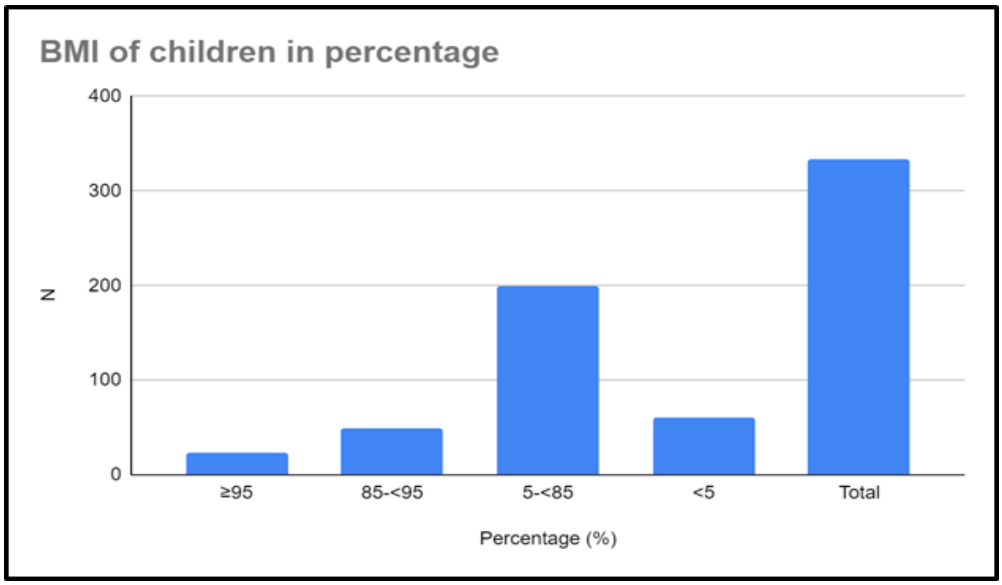

Figure 1: BMI of children in percentage

Table 1 shows factors linked to childhood obesity and overweight, along with their P-values. First, sex: 50 (25.00%) of 200 boys and 60 (44.77%) of 134 girls were obese or overweight. The chi-square test showed no significant connection between sex and obesity/overweight status (P>0.05), with 1 degree of freedom. Next, considering monthly income per capita, 60 (28.57%) of the 210 children from households with a monthly income of 5,000 or more were obese or overweight, while 50 (40.32%) of the 124 children from homes with 2,000 to 5,000 were. The chi-square test revealed a significant link (P<0.05) between income and obesity/overweight status. Among the 134 children whose moms worked, 60 (44.77%) were obese or overweight, compared to 50 (25.00%) of the 200 housewives. A substantial correlation (P<0.0001) exists between parental work and the risk of a child being fat or overweight. In addition, 55 (47.82%) of the 115 children with a family history of obesity were obese or overweight, while 55 (25.11%) of the 219 children without such a history were. A chi-square test showed a significant link (P<0.0001) between family history and obesity/overweight status. These data show that income level, paternal occupation, family history, and the risk of a kid being fat or overweight are strongly correlated, emphasising the importance of socioeconomic and familial factors in childhood obesity.

Table 1:childhood obesity and overweight

Particulars	Obese and over-weight	Nonobese	Total	P value
Sex				
Boys	50 (25.00%)	150 (75.00%)	200 (100.00%)	P>0.05
Girls	60 (44.77%)	74 (55.22%)	134 (100.00%)	
Income per capita per month				
≥5,000	60 (28.57%)	150(71.42%)	210 (100.00%)	P<0.05
2,000-5,000	50 (40.32%)	74(59.67%)	124 (100.00%)	
Occupation of father				
Working	60 (44.77%)	74 (55.22%)	134 (100.00%)	P<0.0001
Housewife	50(25.00%)	150(75.00%)	200 (100.00%)	
Family history				
Present	55(47.82%)	60(52.17%)	115 (100.00%)	P<0.0001
Absent	55 (25.11%)	164(74.88%)	219(100.00%)	
Total	110 (32.93%)	224(67.06%)	334(100.00%)	

Table 2 shows obese and overweight children's food patterns and related P-values. Of the 164 children who followed a vegetarian diet 110 (67.07%) were obese or overweight children. Of the 170 children who followed a mixed diet 50 (29.41%) were obese or overweight children. The substantial difference ($P < 0.001$) indicates a link between diet type and obesity/overweight status. Of the 110 kids who ate meat no more than once a week, 54.54 % were overweight or obese. In contrast, the percentages of overweight and obese children and non-obese children were similar among the 110 children who ate nonvegetarian cuisine 2-3 times weekly or 5-6 times weekly. The chi-square test showed a significant link ($P = 0.000$) between nonvegetarianfood consumption and obesity/overweight status. The frequency of weekly out-of-home dining was significantly associated ($P < 0.0001$). Out of 110 children who ate outside the home less than twice a week, 50 (45.45%) were obese or overweight, while 60 (54.54%) were. High use of carbonated soft drinks, sweets/candies/chewing gums/chocolate, and potato chips/popcorn/packed meals was linked to obesity and overweight status. P-values below 0.0001 indicated these connections were significant. Table 2 shows that vegetarianism, frequency of particular foods, and the likelihood of being obese or overweight among kids are strongly correlated, emphasising the role of nutrition in obesity.

Table 2: Obese and overweight children's food pattern

Frequency of taking (times per week)	Obese and over-weight	Nonobese	Total	P value
Diet				
Vegetarian	110(67.07%)	54(32.92%)	164 (100.00%)	P<0.00
Mixed	50(29.41%)	120(70.58%)	170 (100.00%)	
Frequency of eating Nonvegetarian (per week)				
≤1	60 (54.54%)	50(45.45%)	110 (100.00%)	P=0.000
2-4	50(45.45%)	60(54.54%)	110 (100.00%)	
5-6	50(43.85%)	64(56.14%)	114 (100.00%)	
Frequency of eating outside home (per week)				
≤2	50(45.45%)	60 (54.54%)	110 (100.00%)	P<0.0001
≥3	60(54.54%)	50(45.45%)	110 (100.00%)	
Almost daily	64(56.14%)	50(43.85%)	114 (100.00%)	
Milk and other dairy product				

≤1	50(45.45%)	60 (54.54%)	110 (100.00%)	P>0.05
2-4	60(54.54%)	50(45.45%)	110 (100.00%)	
5-6	64(56.14%)	50(43.85%)	114 (100.00%)	
Raw fruits and vegetables				
≤1	64(56.54%)	50(43.85%)	114 (100.00%)	P<0.0001
2-4	50(45.45%)	60(54.54%_)	110 (100.00%)	
5-6	60(54.54%)	50(45.45%)	110 (100.00%)	
Pizza or similar food				
≤1	60(54.54%)	50(45.45%)	110 (100.00%)	P=0.0001
2-4	60(54.54%)	50(45.45%)	110 (100.00%)	
5-6	50(43.85%)	64(56.54%)	114 (100.00%)	
Carbonated soft drinks				
≥1	110(67.07%)	54(32.92%)	164 (100.00%)	P<0.0001
<1	50(29.41%)	120(70.58%)	170 (100.00%)	
Sweets/candies/chewing gums/chocolate				
≥1	110(67.07%)	54(32.92%)	164 (100.00%)	P<0.01
<1	50(29.41%)	120(70.58%)	170 (100.00%)	
Potato chips/popcorns/packed food				
≥1	110(67.07%)	54(32.92%)	164 (100.00%)	P<0.0001
<1	50(29.41%)	120(70.58%)	170 (100.00%)	
Total	160(47.90%)	174(52.09%)	334 (100.00%)	

Table 3 shows lifestyle characteristics and their associations with childhood obesity and overweight, along with P-values. From daily exercise habits, 110 (67.07%) of the 164 children who exercised daily were fat or overweight, while 50 (29.41%) of the 170 who did not were. The chi-square test did not indicate a significant link between daily exercise and obesity/overweight status (P > 0.05). Exercise duration was significantly linked to obesity/overweight status in children who exercised daily (P < 0.0001). Among those exercising for less than an hour, 64 (56.54%) were obese or overweight, whereas those exercising for 1-2 or more than 2 hours had similar percentages. Outdoor games showed a significant connection (P < 0.0001). Out of the 114 children who participated in outdoor games daily, 64 (56.54%) were classified as obese or overweight. Conversely, the percentages were higher among the obese/overweight children who engaged in outdoor games weekly or not at all. Compared to motorised modes of transportation, walking, and cycling to school were associated with a reduced prevalence of obesity and overweight status. However, the correlation was not significant (P > 0.05). Moreover, watching TV during meals was linked to obesity/overweight status (P< 0.001). Of the 164 children who watched TV while eating, 110 (67.07%) were fat or overweight, compared to 50 (29.41%) who did not. Table 3 shows that exercise duration, outdoor activities, TV-watching habits, and modes of transportation are linked to childhood obesity and overweight. These findings emphasise the need for healthy lifestyles to prevent childhood obesity.

Table 3: Lifestyle characteristics and their associations with childhood obesity and overweight

Particulars	Obese and overweight	Nonobese	Total	P value
Daily exercise				
Yes	110(67.07%)	54(32.92%)	164 (100.00%)	P>0.05
No	50(29.41%)	120(70.58%)	170 (100.00%)	
Duration in hour (for children who did daily exercise)				

<1	64(56.54%)	50(43.85%)	114 (100.00%)	P<0.0001
1-2	50(45.45%)	60(54.54%_)	110 (100.00%)	
>2	60(54.54%)	50(45.45%)	110 (100.00%)	
Outdoor games				
Daily	64(56.54%)	50(43.85%)	114 (100.00%)	P<0.0001
Weekly	50(45.45%)	60(54.54%_)	110 (100.00%)	
None	60(54.54%)	50(45.45%)	110 (100.00%)	
Modes of transport to school				
Walking or cycling	110(67.07%)	54(32.92%)	164 (100.00%)	P>0.05
Auto rickshaw/car/bus	50(29.41%)	120(70.58%)	170 (100.00%)	
TV-watching while eating				
Yes	110(67.07%)	54(32.92%)	164 (100.00%)	P<0.001
No	50(29.41%)	120(70.58%)	170 (100.00%)	
Total	160(47.90%)	174(52.09%)	334 (100.00%)	160(47.90%)

Discussion

Studies conducted in different parts of India have shown regional differences in the overall incidence of overweight and overweight amongst kids aged 5-18. For example, a study carried out in Lucknow by Vohra et al. (2011) found that the total incidence of overweight and obesity was four percent [13]. Ganie et al. (2017) found that the rate of obesity was slightly greater in Kashmir, where 4.6 percent of kids were classified as obese and 6.69 percent. as overweight [14]. Similarly, Sidhu et al. (2005) found different statistics in Amritsar: 9.91 percent of boys and eleven percent of girls were classified as overweight, and 4.95 percent of boys and six percent of girls were classified as obese. These disparate data provide insight into the complex terrain of childhood overweight and weight gain incidence throughout distinct locations of India, emphasizing the necessity for specific approaches and focused public health plans to handle these various issues [15].

In India, there is a clear disparity in the rates of overweight and obesity in children aged 5 to 18 living in urban and rural areas. The rates of overweight and adiposity are significantly greater in urban areas than in rural ones. A noteworthy study conducted by Misra et al. (2011) reveals a considerable gap in the prevalence rates of overweight/obesity: twenty-four percent in urban schools and sixteen percent in rural schools [10]. Premkumar et al.'s (2019) study, which focused on schoolchildren in urban regions, revealed a general incidence of eighteen percent for overweight and five percent for obesity, compared to fourteen percent and two percent in rural areas, respectively, further highlighting this disparity between urban and rural areas [16]. The results highlight the significant influence of industrialisation on the rising incidence of obesity among children in India, hence calling for focused initiatives to tackle this growing public health issue [10,16].

Examining the complex relationships between household income and educational attainment in rural India reveals a wide range of factors that affect the prevalence of obesity among kids. Though financial status and educational levels generally reduce the likelihood of underweight children across the country, certain rural areas exhibit a counterintuitive pattern. Here, higher education levels in women may surprisingly increase young girls' risk of underweight. Furthermore, differences in the concentration of community income as well as accessibility to medical care exacerbate the childhood obesity rate gap between urban and rural areas. Thus, in order to fully address the complex issue of childhood obesity, it becomes essential to guarantee fair availability of medical facilities and nutritional education in remote regions [17,18].

In India, urbanisation drives a change in dietary standards, with all population groups—urban, urban slum, and rural—showing inadequate intake of fruits and vegetables. This nutritional shift, which is most common in urban areas, is gradually making its way to rural areas as well, contributing to an increase in obesity and metabolic syndrome cases. The increasing prevalence of non-communicable diseases in India is a reflection of the negative effects of urbanised lifestyles, which are typified by sedentary routines and poor eating habits, even while greater amounts of vigorous exercise are seen in rural areas. The shift in food habits and exercise levels brought about by urbanisation is a major factor in the rising incidence of diseases with an early onset, which emphasises the need for comprehensive interventions to address these growing health issues [19-21].

Significant health risks are associated with childhood obesity in rural settings, as it is linked to metabolic disorders as well as reduced levels of vitamin D. Long-term health consequences result from these immediate health hazards and higher death rates. While short-term dangers are important to monitor, long-term effects are more harmful to health [22, 7]. In India, it is still difficult to access

healthcare services for managing and preventing obesity among kids. This is particularly true in metropolitan areas where the prevalence of overweight and obesity is rising, which exacerbates already-existing inequalities between government- and private-funded schools [7]. Moreover, the enduring public health consequences comprise a heightened probability of subclinical inflammatory processes, glucose resistance, and obesity, which ultimately leads to an elevated probability of acquiring heart ailments and additional difficulties linked to obesity, which in developing countries like India fuel the growing epidemic of non-transmissible illnesses linked to poor nutrition [23, 24].

A promising approach that integrates dietary alterations, frequent exercise, and psychological improvements is a stepwise technique for controlling pediatric obesity [25]. In order to prevent disease, communities, schools, and healthcare providers must work together, with doctors who provide primary care playing a key role. There is a lot of promise in putting multi-component therapies into school and family settings [26]. Improving physical activity possibilities, promoting healthy eating habits, and improving infrastructure should be the top priorities for policy suggestions for rural India. Effective long-term solutions must equally address the socio-economic consequences of changes and the lack of resources [27].

Conclusion

The study has concluded that the prevalence of obesity in rural areas of Jaipur was found to be 7.18% and the factors like genetic predispositions, socioeconomic level, nutrition, and lifestyle are the primary factors affecting obesity among children.The study underscores socioeconomic and familial influences on childhood obesity. Higher household income, maternal employment, and family history of obesity are strongly associated with increased obesity risk in children. Additionally, dietary patterns, such as vegetarianism and high consumption of certain foods, correlate with obesity. Moreover, lifestyle factors, including exercise duration, outdoor activities, and TV-watching habits, play significant roles in childhood obesity prevention. These findings emphasize the multifaceted nature of obesity, highlighting the necessity of comprehensive interventions addressing dietary, socioeconomic, and lifestyle factors.While most assessed children are a healthy weight, a significant number are overweight, obese, or underweight, underscoring the need for focused treatments. Socioeconomic factors including household income and maternal occupation strongly predict childhood obesity, emphasising the need to address resource and opportunity inequality. Vegetarian diets are less likely to cause obesity than mixed diets. Additionally, regular nonvegetarian food consumption, dining out, and unhealthy snack and beverage consumption are linked to childhood obesity. Physical activity, outdoor activities, transportation, and sedentary habits like TV-watching during meals also contribute to childhood obesity. Regular exercise and outdoor games cut obesity rates, while sedentary lifestyles are dangerous. Childhood obesity requires a holistic strategy that considers individual behaviours, environmental, and societal influences. To counteract childhood obesity, healthy eating habits, access to nutritional foods, frequent physical activity, and supportive settings must be promoted. By understanding how the many factors that affect childhood obesity interact with each other, policymakers, healthcare professionals, educators, and communities can come up with targeted interventions and strategies to stop and manage obesity effectively, protecting children's future well-being and health. The causes of childhood obesity in rural places like Jaipur are not well understood, even though this problem is becoming more well recognised in India. Prior research frequently focuses on cities or generalise findings without considering regional differences. While socioeconomic variables are acknowledged, there is little study on rural regions' particular childhood obesity challenges. Future research should examine rural Jaipur's socioeconomic, cultural, and environmental aspects affecting childhood obesity. Longitudinal research can reveal obesity development and therapeutic efficacy. Interdisciplinary approaches combining healthcare experts, politicians, educators, and community leaders are needed to design personalised interventions for rural childhood obesity's many facets.

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