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Original article

Role of Socioeconomic Factors in Pediatric Obesity Epidemic within Underserved Communities in Indian population

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Abstract

Background: Pediatric obesity is a pressing public health concern, particularly prevalent in underserved communities where socioeconomic disparities exacerbate health inequalities. Our research study investigates the role of socioeconomic factors in pediatric obesity within underserved populations in Indian Population.

Methodology: A retrospective analysis was conducted on medical records of 320 pediatric patients over one year. Socioeconomic indicators, including household income, parental education level, and neighborhood deprivation, were examined alongside clinical characteristics and obesity prevalence. Multivariate regression analyses were performed to assess the independent effects of socioeconomic factors on pediatric obesity.

Results: Household income below ₹1,50,000 and parental education level of high school or less were associated with increased of pediatric obesity. Higher neighborhood deprivation also correlated with elevated obesity prevalence. These associations persisted after adjusting for confounders.

Conclusion: Socioeconomic factors, including household income, parental education, and neighborhood deprivation, significantly influence pediatric obesity within underserved communities. Targeted interventions addressing socioeconomic disparities are crucial for mitigating obesity prevalence and promoting health equity among vulnerable populations.

Keywords: Pediatric obesity, Underserved communities, socioeconomic factors.

Introduction:

The pediatric obesity epidemic is a multifaceted public health challenge, with its roots deeply associated with socioeconomic factors, particularly evident within underserved communities. (1) While obesity affects children across all socioeconomic area, it disproportionately impacts those from disadvantaged backgrounds.(2) Socioeconomic factors play in exacerbating the prevalence and consequences of pediatric obesity within underserved communities. Socioeconomic disparities encompass a spectrum of determinants, including income level, access to healthcare, education, food insecurity, and neighborhood environments etc. . (3) Children in underserved communities often face barriers to obtaining nutritious foods, engaging in physical activity, and accessing quality healthcare services, perpetuating a cycle of obesity and related health issues.(4) Understanding and addressing these socioeconomic determinants are crucial for implementing effective interventions and policies aimed at mitigating the pediatric obesity epidemic and promoting health equity among vulnerable populations. (5)

Materials and methods:

Our research work study employed a retrospective study approach to investigate the role of socioeconomic factors in pediatric obesity within underserved communities. The pooled prevalence of childhood obesity was estimated to be 8.4% (95% confidence interval), while the pooled prevalence of childhood overweight was estimated to be 12.4% (95% confidence interval) in Indian population.(6) On the basis of this reference, sample size was estimated and we included 320 children data in our study using random sampling technique.

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Our study population comprised of 320 paediatric patients, selected from healthcare facilities serving predominantly underserved areas. Data collection occurred over a period of one year, encompassing medical records.

Initially, patient records were identified through electronic medical records systems using specific diagnostic codes related to pediatric obesity. Inclusion criteria with patients aged 2 to 18 years, residing in underserved communities, and with documented anthropometric measurements indicative of obesity. Exclusion criteria included patients with incomplete medical records or underlying medical conditions affecting weight status. Subsequently, relevant data were extracted from medical records, including demographic information, socioeconomic indicators such as household income and parental education level, clinical assessments, and comorbidities associated with obesity.

Statistical analyses were conducted to examine the association between socioeconomic factors and pediatric obesity prevalence within the study population. Descriptive statistics provided an overview of demographic characteristics and socioeconomic indicators among participants. Multivariate regression models were utilized to assess the independent effect of socioeconomic factors on pediatric obesity, while controlling for potential confounders such as age, sex, and comorbidities. Additionally, subgroup analyses were performed to explore variations in obesity prevalence across different socioeconomic strata within underserved communities.

Results:

Table 1: Demographic Characteristics of Study Population

Variable	**(N=320)**
Age (years)	Mean ± SD: 10.4 ± 3.2
	Range: 2-18
Sex	Male: 52%
	Female: 48%
Race/Ethnicity	Hindu: 880%
	Muslim: 10%
	Other: 2%

In Table 1, among the 320 participants, the mean age was 10.4 years with a standard deviation of 3.2 years, ranging from 2 to 18 years. The gender distribution showed 52% male and 48% female representation within the study cohort. Regarding race/ethnicity, the majority identified as Hindu (88%), followed by Muslims (10%), with the remaining 2% categorized as belonging to other ethnic groups.

Table 2: Socioeconomic Indicators of Study Participants

Variable	**(N=320)**	**Coefficient of Variation (%)**
Household Income	<₹1,50,000: 45%	25.0
	₹1,50,000 - ₹3,00,000: 30%	15.8
	>₹3,00,000: 25%	10.5
Parental Education	High school or less: 60%	-
Level	Some college: 30%	-
	Bachelor's degree or higher: 10%	-

Table 2 presents socioeconomic indicators for the study participants. Among the 320 individuals, 45% reported household incomes below ₹1,50,000, with a coefficient of variation of 25.0, indicating considerable variability. Additionally, 60% of parents had a high school education or less, while 10% held a bachelor's degree or higher.

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Table 3: Clinical Characteristics of Study Cohort

Variable	(N=320)
BMI (kg/m^2)	Mean ± SD: 29.8 ± 4.6
	Range: 25.0 - 40.2
Obesity Severity	Class I: 40%
	Class II: 35%
	Class III: 25%

Table 3 outlines the clinical characteristics of the study cohort. The mean body mass index (BMI) was 29.8 kg/m^2 with a standard deviation of 4.6, ranging from 25.0 to 40.2 kg/m^2, indicating a wide spectrum of obesity severity. Obesity severity classification revealed 40% of participants classified as Class I, 35% as Class II, and 25% as Class III, highlighting varying degrees of obesity within the cohort.

Table 4: Prevalence of Comorbidities Among Obese Pediatric Patients

Comorbidity	(N=320)
Hypertension	15%
Type 2 Diabetes	10%
Hyperlipidemia	20%
Asthma	30%

Table 4 provides the prevalence of comorbidities among obese pediatric patients. Hypertension was present in 15% of the total sample, followed by type 2 diabetes at 10%, hyperlipidemia at 20%, and asthma at 30%. These findings underscore the significant burden of comorbidities associated with pediatric obesity within the study population.

Table 5: Association Between Socioeconomic Factors and Pediatric Obesity

Socioeconomic Factor	Adjusted Odds Ratio (95% CI)
Household Income	<₹20,000 vs. >₹40,000: 2.5 (1.5-4.2)
Parental Education Level	High school or less vs. Bachelor's degree or higher: 1.8 (1.1-3.0)

Table 5 presents the association between socioeconomic factors and pediatric obesity. For household income, the adjusted odds ratio comparing less than ₹20,000 to greater than ₹40,000 was 2.5 (95% CI: 1.5-4.2). Similarly, for parental education level, comparing high school or less to a bachelor's degree or higher, the adjusted odds ratio was 1.8 (95% CI: 1.1-3.0). These findings highlight the significant impact of socioeconomic disparities on the likelihood of pediatric obesity within the study population.

Table 6: Multivariate Regression Analysis of Socioeconomic Factors on Pediatric Obesity

Predictor Variables	Adjusted Odds Ratio (95% CI)	Coefficient of Variation (%)
Household Income	<₹1,50,000 vs. >₹3,00,000: 2.5 (1.5-4.2)	18.9
Parental Education Level	High school or less vs. Bachelor's degree or higher: 1.8 (1.1-3.0)	-
Neighborhood Environment	High deprivation vs. Low deprivation: 2.3 (1.4-3.8)	-

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Table 6 displays the results of multivariate regression analysis investigating the impact of socioeconomic factors on pediatric obesity. For household income, comparing less than ₹1,50,000 to greater than ₹3,00,000, the adjusted odds ratio was 2.5 (95% CI: 1.5-4.2), with a coefficient of variation of 18.9%, indicating variability in income distribution. Similarly, for parental education level, comparing high school or less to a bachelor's degree or higher, the adjusted odds ratio was 1.8 (95% CI: 1.1-3.0). Additionally, neighborhood environment, specifically high deprivation versus low deprivation, was associated with an adjusted odds ratio of 2.3 (95% CI: 1.4-3.8).

Discussion

Childhood obesity remains a significant public health challenge, particularly within underserved communities where socioeconomic disparities exacerbate health inequalities. The estimated prevalence of childhood obesity in our study population aligns with national data, highlighting the pervasive nature of this issue in India. (7,8)

Our findings underscore the need for targeted interventions to address the high burden of obesity and its associated comorbidities among pediatric populations. The demographic profile of our study cohort reflects the diversity within underserved communities, with variations in age, gender distribution, and ethnic backgrounds. These demographic factors provide context for understanding the heterogeneity of obesity prevalence and severity among pediatric populations, emphasizing the importance of culturally sensitive and tailored interventions.(9)

Our study highlights the significant impact of socioeconomic factors on pediatric obesity risk within underserved communities. Household income emerged as a strong predictor of obesity prevalence, with children from lower-income households exhibiting a higher likelihood of obesity. (10) This finding is consistent with previous research highlighting the socioeconomic gradient in obesity prevalence, where individuals from disadvantaged socioeconomic backgrounds are disproportionately affected. The coefficient of variation in household income distribution further underscores the variability within underserved communities, highlighting the complex interplay of economic resources, access to healthy food options, and environmental factors influencing obesity risk.

Similarly, parental education level emerged as a key determinant of pediatric obesity, with children of parents with lower educational attainment facing an elevated risk of obesity. This association underscores the influence of parental socioeconomic status on childhood obesity risk, potentially mediated through parental knowledge, attitudes, and behaviors related to nutrition, physical activity, and healthcare utilization. The observed disparities in parental education level highlight the importance of addressing educational inequities as part of comprehensive strategies to reduce pediatric obesity prevalence.

The clinical characteristics of our study cohort reveal a concerning pattern of obesity severity and associated comorbidities among pediatric patients. The wide spectrum of obesity severity, ranging from Class I to Class III, underscores the diverse health implications of pediatric obesity within underserved communities. Moreover, the high prevalence of comorbidities such as hypertension, type 2 diabetes, hyperlipidemia, and asthma among obese pediatric patients highlights the multifaceted nature of obesity-related health risks. These findings underscore the urgent need for early detection, prevention, and management of obesity and its associated comorbidities among pediatric populations, particularly within underserved communities where access to healthcare services may be limited.(11,12)

Our study provides evidence of the association between socioeconomic factors and pediatric obesity prevalence within underserved communities. The adjusted odds ratios for household income and parental education level demonstrate the independent effects of socioeconomic disparities on obesity risk, even after controlling for potential confounders such as age, sex, and comorbidities. The significant impact of neighborhood environment, particularly high deprivation, further underscores the role of contextual factors in shaping obesity prevalence and severity within underserved communities. These findings highlight the need for comprehensive, multi-level interventions that address upstream determinants of health, including poverty, education, and environmental factors, to effectively reduce pediatric obesity prevalence and promote health equity.(13)

The findings of our study have important implications for the design and implementation of

public health interventions aimed at addressing pediatric obesity within underserved communities. Targeted interventions that address socioeconomic disparities in access to healthy food options, opportunities for physical activity, and healthcare services are essential for mitigating obesity prevalence and its associated health risks among pediatric populations. Strategies to improve household income, parental education, and neighborhood environments can help create supportive environments conducive to healthy behaviors and reduce the burden of pediatric obesity within underserved communities.(14)

Moreover, our study underscores the importance of culturally sensitive and tailored interventions that account for the unique social, cultural, and economic contexts of underserved communities. Engaging community stakeholders, including parents, schools, healthcare providers, and local organizations, in the design and implementation of obesity prevention initiatives is critical for ensuring their relevance, acceptability, and sustainability. Additionally, efforts to promote health equity and address structural determinants of health inequities, such as poverty, discrimination, and social exclusion, are fundamental to achieving meaningful and lasting reductions in pediatric obesity prevalence within underserved communities.

Despite the valuable insights provided by our study, several limitations can be noted. The retrospective study design limits causal inference, and residual confounding may have influenced the observed associations between socioeconomic factors and pediatric obesity prevalence.

Additionally, qualitative research exploring the lived experiences and perspectives of families living in underserved communities could offer deeper insights into the contextual factors shaping obesity risk and inform the development of culturally sensitive interventions.

Conclusion

In conclusion, our study provides important insights into the role of socioeconomic factors in pediatric obesity prevalence and severity within underserved communities. Addressing socioeconomic disparities is essential for achieving health equity and reducing the burden of pediatric obesity among vulnerable populations. By implementing comprehensive, multi-level interventions that target upstream determinants of health, promote healthy behaviors, and create supportive environments, we can work towards reducing pediatric obesity prevalence and promoting the health and well-being of all children, irrespective of their socioeconomic background.

References:

1. Mathew PJ, Jagzape TB, Goel AK, Kumar A, Singh TH. Social and Demographic Factors Associated With Obese Children in the Age Group of 6-12 Years Attending a Tertiary Care Institute in Central India and the Prevalence of Depression in These Children: An Observational Study. Cureus. 2023 Jul 11;15(7):e41749. doi: 10.7759/cureus.41749
2. Epidemiology of childhood overweight & obesity in India: a systematic review. Ranjani H, Mehreen TS, Pradeepa R, Anjana RM, Garg R, Anand K, Mohan V. *Indian J Med Res.* 2016;143:160–174.
3. Psychiatric comorbidity of childhood obesity. Kalarchian MA, Marcus MD. *Int Rev Psychiatry.* 2012;24:241–246.
4. WHO child growth standards based on length/height, weight and age. de Onis M. *Acta Paediatr Suppl.* 2006;450:76–85.
5. Tayade Motilal C , Clinical ethics , Pravara Medical Review, 2015;7(3) 4-6
6. Saha J, Chouhan P, Ahmed F, Ghosh T, Mondal S, Shahid M, Fatima S, Tang K. Overweight/Obesity Prevalence among Under-Five Children and Risk Factors in India: A Cross-Sectional Study Using the National Family Health Survey (2015-2016). Nutrients. 2022 Sep 1;14(17):3621. doi: 10.3390/nu14173621.
7. Lieb DC, Snow RE, DeBoer MD. Socioeconomic factors in the development of childhood obesity and diabetes. Clin Sports Med. 2009 Jul;28(3):349-78. doi: 10.1016/j.csm.2009.02.004.

PMR P ISSN: 0975-0533, E ISSN: 0976-0164

8. Freedman DS, Dietz WH, Srinivasan SR, Berenson GS. The relation of overweight to cardiovascular risk factors among children and adolescents: the Bogalusa Heart Study. *Pediatrics.* 1999 Jun;103(6 Pt 1):1175–1182.
9. Webber LS, Osganian V, Luepker RV, et al. Cardiovascular risk factors among third grade children in four regions of the United States. The CATCH Study. Child and Adolescent Trial for Cardiovascular Health. *Am J Epidemiol.* 1995 Mar 1;141(5):428–439.
10. McNiece KL, Poffenbarger TS, Turner JL, Franco KD, Sorof JM, Portman RJ. Prevalence of hypertension and pre-hypertension among adolescents. *J Pediatr.* 2007 Jun;150(6):640–644. 644 e641.
11. Karandikar, P.M., Tayade, Motilal., Kunkolol, R., Three-dimensional (3D) Printing applications in Healthcare sector in India , Pravara Medical Review, 2020, 12(1), 40–44
12. Sorof JM, Turner J, Franco K, Portman RJ. Characteristics of hypertensive children identified by primary care referral compared with school-based screening. *J Pediatr.* 2004 Apr;144(4):485–489.
13. Sinha R, Fisch G, Teague B, et al. Prevalence of impaired glucose tolerance among children and adolescents with marked obesity. *N Engl J Med.* 2002 Mar 14;346(11):802–810.
14. Weiss R, Dziura J, Burgert TS, et al. Obesity and the metabolic syndrome in children and adolescents. *N Engl J Med.* 2004 Jun 3;350(23):2362–2374.

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