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Exploring the global epidemic: A systematic review of prevalence trends and contributing factors of obesity and overweight among young adults

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ABSTRACT
The prevalence of obesity and overweight among young adults has emerged as a critical public health challenge globally. This systematic review aims to synthesize existing literature on the epidemiological trends and multifactorial contributors to obesity and overweight from January 2014 to April 2024. By examining data across diverse geographical regions and socio-economic contexts, this review highlights significant disparities in prevalence rates and identifies common as well as unique contributing factors. Key factors examined include dietary habits, physical activity levels, socio-economic status, genetic predispositions, and environmental influences, with a special focus on the impact of urbanization and digital media consumption. The findings reveal an alarming rise in obesity rates among young adults worldwide, exacerbated by lifestyle changes and systemic socio-economic barriers that limit access to healthy food and physical activity opportunities. The review also discusses the effectiveness of various intervention strategies, ranging from individual behavioral changes to community and policy-level initiatives. It concludes with recommendations for future research directions and policy actions needed to address this escalating epidemic. This comprehensive analysis provides valuable insights for policymakers, health professionals, and researchers aiming to combat obesity and promote healthier lifestyles among young adults.
KEYWORDS: obesity, overweight, prevalence, young adults, and contributing factors.

INTRODUCTION: Obesity is a significant public health issue characterized by excessive fat accumulation that presents a risk to health. The World Health Organization (WHO) defines overweight and obesity as abnormal or excessive fat accumulation that may impair health, with a

body mass index (BMI) of 25 or more being classified as overweight and a BMI of 30 or more as obese. This condition is associated with a myriad of health issues, including cardiovascular diseases, type 2 diabetes, musculoskeletal disorders, and some cancers. It also has substantial economic impacts due to increased healthcare costs and reduced productivity [1]. Since 1990, the global rate of adult obesity has more than doubled. In 2022, a staggering 2.5 billion adults aged 18 and older were overweight. Among them, 890 million were classified as living with obesity. Put into perspective, 43% of adults aged 18 and over were overweight, while 16% were living with obesity [2]. Obesity is rising globally due to genetics, behavior, and environment. Key factors: high-fat, high-sugar diets, less physical activity, changing transport, urbanization, globalized food markets, and more fast food outlets. [3].

In high-income countries like the United States (U.S.), Canada, and the UK, obesity rates are epidemic. According to the Centers for Disease Control and Prevention (CDC), the prevalence of obesity among adults in the United States was 42.4% in 2017-2018. Similar trends are seen in Canada and the UK, with about one in four adults obese, driven by more processed foods and less physical activity [4]. Middle-income countries are also seeing rapid obesity increases. In the Middle East and North Africa (MENA) region, Saudi Arabia has over 35% adult obesity due to high caloric intake, low physical activity, and genetics. In Latin America, countries like Mexico face rising obesity from urbanization, economic growth, and dietary changes [5,6].

Even low-income countries are seeing a rise in obesity, termed the "nutrition transition." This involves a shift from high-fiber, low-fat diets to ones rich in sugars, fats, and animal products, coupled with reduced physical activity due to urbanization. For example, South Africa in sub-Saharan Africa is witnessing growing obesity rates, especially in urban areas. [7]. Obesity significantly impacts health, increasing the risk of noncommunicable diseases (NCDs) like heart

disease, stroke, diabetes, and cancer, which cause 74% of global deaths. It also leads to psychological issues and social stigmatization [8].

Addressing obesity requires comprehensive strategies: promoting healthy eating and physical activity, making healthy foods accessible and affordable, creating supportive environments, and raising awareness about obesity risks. Healthcare systems must also provide effective obesity management. This paper presents a systematic analysis of global obesity and overweight trends among young adults and contributing factors.

MATERIAL AND METHODS: Overweight and obesity prevalence is typically determined using BMI, which relates weight to height. BMI is calculated as weight in kilograms divided by height in meters squared (kg/m^2). Here are the commonly used standards:

Global Standard (WHO):

- Normal weight: BMI of 18.5 to 24.9
- Overweight: BMI of 25 to 29.9
- Obesity (Class 1): BMI of 30 to 34.9
- Obesity (Class 2): BMI of 35 to 39.9
- Obesity (Class 3): BMI of 40 and above

Modified Standards for Asian Populations: Recognizing genetic, dietary, and metabolic differences, some guidelines suggest modified thresholds for Asian populations, including Indians:

- Normal weight: BMI of 18.5 to 22.9
- Overweight: BMI of 23 to 27.4

- Obesity: BMI of 27.5 and above

Waist circumference is crucial, especially for assessing abdominal obesity. High waist measurements signal increased risk of metabolic diseases:

- Men: >90 cm (Asian) or >102 cm (WHO)
- Women: >80 cm (Asian) or >88 cm (WHO)

WHR (>0.90 for men, >0.85 for women) indicates abdominal obesity. Regular screening, especially for those with risk factors or life changes, is important. Digital tools like smart BMI calculators aid in monitoring, early intervention and management.

Study Design: This review follows the preferred reporting items for systematic reviews and meta-analyses (PRISMA) guidelines. Our objective was to systematically examine the global prevalence trends of obesity and overweight among young adults and identify the contributing factors influencing these trends.

Literature Search Strategy: A thorough literature search was conducted across several electronic databases, including PubMed, Scopus, Web of Science, and Google Scholar. The search spanned publications from January 2014 to April 2024 to capture the most recent and relevant data. We used a combination of keywords and Medical Subject Headings (MeSH) terms such as "obesity," "overweight," "prevalence," "trends," "young adults," and "contributing factors."

Inclusion and Exclusion Criteria:

Inclusion Criteria:

1. Peer-reviewed studies.

2. Ages 18-35 focus.

3. Data on obesity prevalence.

4. Factors contributing to obesity.

5. English articles.

Exclusion Criteria:

1. Out-of-range aged populations.

2. Non-data articles (e.g., editorials, opinion pieces)..

3. Non-English papers.

4. Insufficient data studies.

Data Extraction and Management: Data extraction was performed independently by two reviewers using a standardized extraction form. Discrepancies were resolved through discussion or by consulting a third reviewer. The extracted data included:

1. Author(s) and year of publication.

2. Study design and location.

3. Sample size and characteristics.

4. Definitions and measures of obesity and overweight.

5. Prevalence rates reported.

6. Factors associated with obesity and overweight (e.g., socioeconomic status, dietary habits, physical activity levels, genetic factors).

Quality Assessment: The quality of the included studies was assessed using the Newcastle-Ottawa Scale (NOS) for observational studies. This scale evaluates studies based on selection, comparability, and outcome. Studies scoring 7 or above were considered high quality, 5-6 moderate quality, and below 5 low quality.

Data Synthesis and Analysis: A narrative synthesis approach was employed to integrate the findings from the included studies. Quantitative data on prevalence rates were summarized using descriptive statistics. When possible, meta-analysis was conducted to calculate pooled prevalence estimates

Identification of Contributing Factors:

We categorized the contributing factors into several domains:

1. Behavioral Factors: Diet, physical activity, and lifestyle habits.
2. Socioeconomic Factors: Income, education, and occupation.
3. Environmental Factors: Urbanization, access to recreational facilities, and food environment.
4. Genetic and Biological Factors: Family history of obesity, metabolic rates, and hormonal influences.

Ethical Considerations: As this study is a systematic review of published literature, it did not require ethical approval. However, all included studies were assumed to have followed ethical standards applicable to their respective research.

RESULTS: The search for relevant literature on this topic initially yielded 479 studies. After removing 7 duplicate records, 472 studies remained. However, after a thorough screening process using specific inclusion and exclusion criteria, only 35 papers were deemed appropriate for further review. Following an in-depth analysis, 14 articles were excluded because they irrelevant to review question, focused on the wrong population, were in an inaccessible language, or had availability issues. This filtering process, which considered both global and Indian populations, the final selection was narrowed down to 21 studies that were included in this review article. (Figure no.1 and Table no.1).

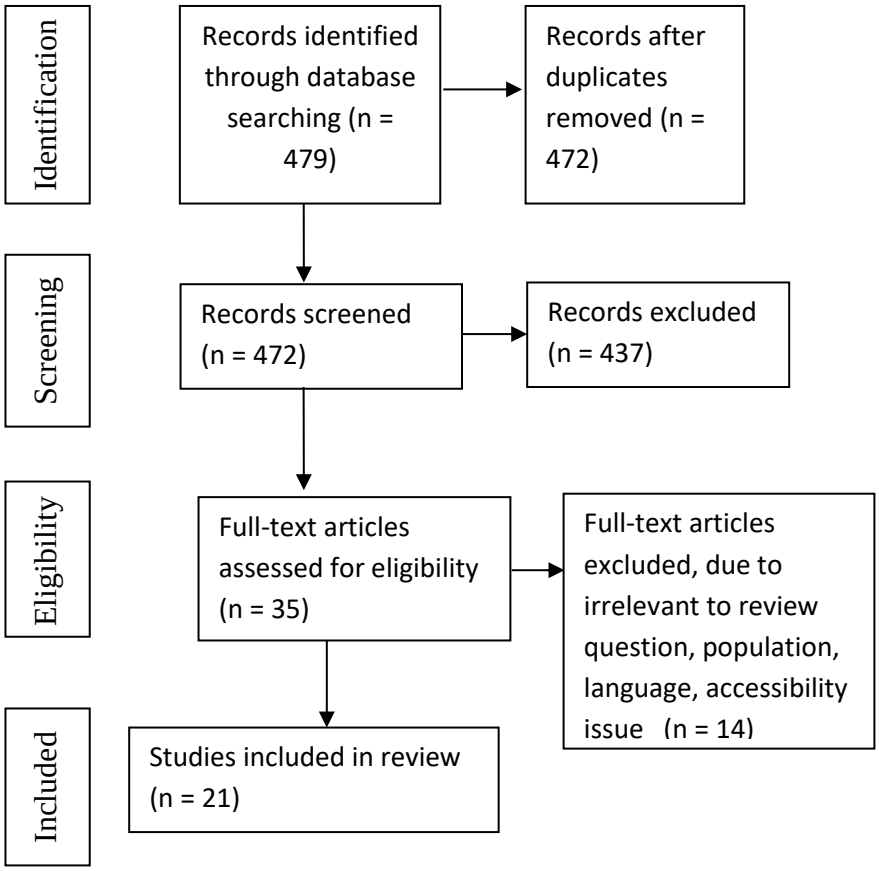

Figure no.1: PRISMA flow diagram used to select studies for the review

Table no. 1: Presentation of articles based on the author and year of study, location, contributing factors, and key findings regarding the prevalence trends and contributing factors of obesity and overweight among young adults.

Author and Year of study	**Location**	**Prevalence of overweight and obesity**	**contributing factors**	**Key finding**
Verma M et al [9]., 2023	India	National Family Health Survey-5 (2019-21): Overall weighted prevalence of overweight and obesity in males and females was 44.02% and 41.16% respectively.	Socio-economic status, smoking, unclean cooking fuel, and diabetes.	The incremental rise in overweight and obesity is mainly attributed to the effect of socio-demographic variables.
Abiri B et al [10]., 2023	Iran	The prevalence of overweight and obesity in Iran was estimated at 20.1 (95% CI 17.92–22.30) and 13.44 (95% CI 11.76–15.22), respectively.	Urbanization	Overweight/obesity is on the rise among Iranians of all ages and sexes.
Keramat SA et al [11]., 2021	Australia	Prevalence of overweight, obesity and combined overweight and obesity among Australian adults in	Geographic remoteness is positively associated with a higher likelihood of	Substantial geographic variation in the prevalence of overweight and obesity exists

		2019 were 34%, 26% and 60%, respectively.	obesity.	among Australian adults and appears to be increasing.
Kirunda BE et al [12]., 2015	Uganda	Overweight and obesity prevalence among rural and peri-urban adults was 15.8 % , 23.8 % and 3.9 % , 17.8 respectively	Gender, Peri-urban residence and higher socio-economic status (SES).	Overweight/obesity was prevalent among adults.
Lima APD et al [13] ., 2024	Brazil	The Prevalence of overweight adults in 2019 was 33.4% and prevalence of obesity in adult females was 19.8% in 2019.	Reduced time for physical activity practice and high consumption of "ready-to-eat" ultra-processed foods.	There was a significant increase in the prevalence of overweight adults and especially of obese adults living in the city of Brazil.
Morina B et al [14] ., 2022	Kosovo	The prevalence of overweight is presented to 46.5% of respondents while the prevalence of obesity is presented to 21.5% of respondents.	Social and economic characteristics have been shown to be associated with the prevalence of overweight and obesity.	half of the population in Kosovo is in the category of overweight and obesity, and claims of an epidemic of overweight and obesity

Simo LP et al [15] ., 2021	Cameroon	The prevalence of obesity in the adult Cameroonian population increased steadily from 4.9% in the year 2000 to 9.5% in 2016	Westernization and urbanization with unhealthy dietary habits and sedentary lifestyle are fuelling the prevalence of obesity in the Region.	High prevalence of overweight and obesity in the adult Cameroonian population. The odds of overweight and obesity was higher in females, married participants.
Chen K et al [16]., 2023	China	34.8% were overweight and 14.1% were obese.	Prevalence of overweight and obesity among participants from lower GDP per capita regions	Overweight/obesity and related complications are highly prevalent in Chinese population
Schramm S et al [17]., 2023	Denmark	The obesity prevalence increased from 6.1% in 1987 to 18.4% in 2021	Economic, social environment, behavioral and psychosocial factors affect Obesity.	Obesity prevalence in Denmark increased steadily during the period 1987 through 2021, primarily driven by secular changes

				over time across all ages and birth cohorts
Schienkiewitz A et al [18]., 2022	Germany	In Germany, 53.5% of the population (46.6% of women and 60.5% of men) is overweight (including obesity). Obesity is present in 19.0% of adults.	strict containment measures due to the COVID-19 pandemic	The prevalence of overweight and obesity increases in both women and men as the age increases and low educational group.
Oddo VM et al [19]., 2019	Indonesia	Between 1993 and 2014, the prevalence of overweight among adults doubled from 17.1% to 33.0%	Economic development, urbanization and globalization have altered the food environment like demand for processed foods in Indonesia.	Urban area residence, higher wealth, higher education and consumption of ultra-processed foods were associated with higher odds of overweight among most adults.
Tat CC et al [20].,	Malaysia	The prevalence of overweight	Availability of calorie-	Female gender, ages 30-59

2023		among adults in Malaysia was reported to be 50.1%.	dense food, increased likelihood of Non-Communicable Disease, such as diabetes and hypertension.	years, being Malay, being married, and having adequate health literacy, were significantly associated with an increased risk of overweight.
Shakya S et al [21]., 2021	Nepal	Prevalence of overweight and obesity from 1996 to 2019 with an average annual percent change (AAPC) of 10.5 and 15.8 respectively among women.	Age, sex, marital status and area of residence (urban) were strongly associated with overweight.	Significant and rapid increase in trends of overweight and obesity for both men and women. Being married was a strong predictor for overweight, while residing in an urban area posed a higher risk for obesity.
Chukwuonye II et al [22]., 2022	Nigeria	Estimated prevalence of overweight	Gender, age, urban	Prevalence of overweight and

		and obesity was 27.6%, and 14.5% respectively.	community, fast food consumption and sedentary lifestyles	obesity in Nigeria was high and had increased over the decades.
Stoś, K et al [23]., 2022	Poland	The prevalence of overweight was 42.2% (52.4% among males and 32.0% among females) and 16.4% were obese (16.5% of males and 16.2% of females)	Gender, Marital status, Education level, sedentary life style, economic status	High prevalence of overweight and obesity among adults in Poland.
Cois A et al [24]., 2015	South Africa	Overweight-23.08% Obese-28.1%-	socioeconomic status smoking and increased insulin resistance	High prevalence of Overweight/ Obesity is due to smoking and type 2 diabetes.
Ahmed MH et al [25]., 2015	Sudan	Overweight and obesity was found to be34.9% and 21.2%, respectively with a higher rate of obesity in females.	Age, female, diabetes and hypertension	Obesity and central obesity have a higher prevalence among Sudanese women
himeddamba O et al	Mongolia	Prevalence of obesity, in men and	Age, Gender	The prevalence of overweight

[26]., 2016		women between 2005 and 2013 increased from 10.8% to 17.6% and from 18.9% to 26.4%, respectively.		and obesity has increased markedly between 2005 and 2013 in all age groups and sexes.
Sakboonyarat B et al [27]., 2020	Thailand	The prevalence of obesity was 33.9% in 2012 and 44.8% in 2018	Smoking, consumption of coffee and urbanization	Obesity constituted a serious issue among adults.
Hemmingsson E et al [28]., 2021	Sweden	In 2016/17 the unstandardized prevalence of overweight, obesity and were 55.1%, 16.6% respectively.	Increased stress, low grade inflammation and unhealthy lifestyle choice	Rates of overweight, obesity have increased markedly in Swedish adults since 1995.
Mc Donald A et al [29]., 2015	Panama	Prevalence of obesity was 27.1 %	Gender, foods rich in sugars sedentary life style, family history of obesity	Prevalence of high Obesity represents a very serious threat to Panamanian adult population.

The global prevalence of obesity and overweight among adults has seen a significant rise over recent decades. In recent years, the prevalence of obesity and overweight among adults has seen a dramatic increase. Specifically, the number of obese individuals worldwide has more than doubled. Obesity and overweight are more prevalent among young adult women compared to their male counterparts. Above studies reported that women, particularly those in the age group of 18-35 years, have higher rates of obesity and overweight. The increase in these numbers reflects broader global trends influenced by factors such as urbanization, sedentary lifestyles, and changes in dietary patterns. Regionally, the prevalence varies, with the highest rates often found in Pacific island nations, the Middle East, and parts of the Americas, while lower rates are observed in regions like South-East Asia and sub-Saharan Africa [30, 31]. The issue is now more prevalent in low- and middle-income countries.

Contributing factors of obesity and overweight among young adults:

Poor Dietary Habits: Young adults often consume diets high in calories, sugars, and fats, frequently opting for fast food and sugary beverages. These poor eating habits create an energy imbalance by consuming more calories than the body burns, which results in weight gain and obesity. [32-34]. Furthermore, frequent consumption of processed and high-fat foods can disrupt normal metabolism and contribute to the accumulation of body fat [35]. Lack of portion control and irregular eating patterns, such as skipping meals or late-night eating, also exacerbate weight gain [36]. In addition to poor dietary choices, a sedentary lifestyle often accompanies these habits, further contributing to obesity. Without regular physical activity to burn off the excess calories, weight gain is more likely [37].

Physical Inactivity: Sedentary lifestyles, driven by increased screen time from electronic devices and reduced physical activity, contribute significantly to obesity. Young adults spend more time on computers, phones, and TVs, leading to fewer calories burned [38].

Age: Age is indeed a contributing factor to obesity and overweight among young adults, it is the interplay of age with metabolic, behavioral, hormonal, and socioeconomic factors that significantly contributes to obesity and overweight issues among young adults [39].

Socioeconomic Status: People from lower socioeconomic backgrounds might struggle to access well food choices and safe places for physical activity. Economic constraints can lead to a higher intake of inexpensive, calorie-dense foods and decreased physical activity opportunities [40].

Psychosocial Factors: Mental health issues such as stress, depression, and anxiety can lead to emotional eating, where individuals consume food for comfort rather than hunger. These psychosocial factors are closely linked to higher obesity rates among young adults [41].

Hormonal Changes: Hormonal fluctuations, particularly in young adult women, can affect metabolism and fat distribution. These changes, especially during menstruation, pregnancy, and menopause, contribute to weight gain and obesity [42].

Genetic Predisposition: Genetic factors play a significant role in obesity. Some individuals are genetically predisposed to gain weight more easily due to differences in metabolism and fat storage [43].

Environmental Influences: Urbanization and the built environment can impact obesity rates. Environments that lack green spaces and safe areas for physical activity, combined with easy access to unhealthy foods, discourage active lifestyles and promote weight gain [44]

Cultural and Societal Norms: Cultural norms and societal expectations can influence dietary habits and activity levels. Societies that place less emphasis on physical activity and more on sedentary entertainment can see higher obesity rates among young adults [45].

Marketing and Media Influence: Aggressive marketing of unhealthy foods and beverages targets young adults, promoting the consumption of high-calorie, low-nutrient products. Media influence can shape food preferences and eating habits, contributing to weight gain [46].

Impact of COVID-19 Pandemic: The COVID-19 pandemic has exacerbated obesity rates due to lockdowns and restrictions that limited physical activity and increased stress and anxiety. Many young adults experienced disruptions in their daily routines, leading to more sedentary behaviors and unhealthy eating patterns [47].

Discussion: The rising prevalence of obesity and overweight among young adults is a multifaceted issue that demands comprehensive public health interventions [48-49]. Addressing this epidemic requires a holistic approach that considers the complex interplay of lifestyle, socioeconomic, environmental, and genetic factors. Public health policies should focus on promoting healthier dietary habits and increasing physical activity through various means, such as implementing nutritional education programs, regulating food marketing, and creating more opportunities for physical activity.

Nutritional Education and Promotion: Educational programs aimed at improving dietary habits among young adults should be prioritized. Schools and universities can play a significant role in promoting healthy eating by providing nutritious food options and incorporating nutrition education into their curricula [50,51].

Regulation of Food Marketing: Governments should implement regulations to restrict the marketing of unhealthy foods and beverages, particularly those targeting young adults. This

includes limiting advertisements for high-calorie, low-nutrient foods on social media and other platforms popular among young adults [52-53].

Improving Access to Healthy Foods: Policies should aim to improve access to healthy food options in all communities, especially in low-income areas. This can be achieved by incentivizing grocery stores to operate in underserved areas and supporting local farmers' markets [54].

Opportunities for Enhancing Physical Activity: Creating safe and accessible spaces for physical activity is crucial. Urban planning should prioritize the development of parks, walking paths, and recreational facilities. Additionally, initiatives such as subsidized gym memberships and community fitness programs can encourage young adults to be more active [55,56].

Addressing Socioeconomic Disparities: Efforts should be made to reduce socioeconomic disparities should include improving access to education and employment opportunities. Higher educational attainment is linked to better health outcomes, including lower obesity rates [57,58].

Research and Surveillance: Ongoing research and surveillance are essential to monitor obesity trends and evaluate the effectiveness of public health interventions [59]. Longitudinal studies can provide insights into the long-term impact of various factors on obesity and overweight among young adults [60]

Future Directions: Future research should focus on understanding the mechanisms underlying the interaction between genetic predispositions and environmental factors. Studies exploring the role of epigenetics in obesity can provide valuable insights into how environmental influences can modify genetic expression related to obesity. Additionally, evaluating the effectiveness of multi-level interventions that address individual, community, and policy-level factors can help identify the most successful strategies for combating the obesity epidemic.

CONCLUSION: This systematic review uses a thorough methodology to investigate the worldwide prevalence and contributing factors of obesity and overweight in young adults. The findings were provided a comprehensive understanding of the epidemic's scope and inform public health strategies aimed at mitigating this growing health concern. Efforts to address these trends focus on public health initiatives aimed at improving diet, increasing physical activity, and creating environments that support healthier lifestyles. The World Health Organization (WHO) and other global health organizations emphasize the need for comprehensive strategies to combat obesity and its associated health risks, such as cardiovascular diseases, diabetes.

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CONFLICT OF INTEREST: There was no any conflict of interest in this systematic review article.

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