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The Obesity Equation: Unpacking the Role of Changing Food Consumption Patterns

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Abstract: Overweight and obesity are now recognized as serious global public health concerns. In Kerala, a state known for its high social development standards, lifestyle diseases—particularly obesity—are on the rise. This growing issue is closely linked to metabolic syndrome, which includes conditions like high blood pressure, diabetes, and elevated cholesterol levels.Non-communicable diseases (NCDs) such as cancer, heart disease, and respiratory conditions are increasing rapidly, placing a heavy burden on the state's healthcare system and reducing productivity. Poor diet, sedentary lifestyles, alcohol consumption, and smoking are key contributors, and these issues are now affecting children and adolescents as well as adults. Despite numerous studies on obesity and its causes, there has been little focused research on adult obesity in Kerala. This study aims to assess the prevalence of overweight and obesity among adults and explore the socio-economic and consumption patterns driving this trend. Adolescent obesity, influenced by changing socio-economic conditions and dietary habits, remains an under-researched area. Addressing it is essential—not only as a matter of human rights but also for the long-term economic and health benefits to society. Investing in adolescent health ensures a healthier, more productive future population and reduces the burden of disease in later life.

Keywords: Overweight, Obesity, BMI

INTRODUCTION

Overweight and obesity are defined as the unhealthy accumulation of body fat. Globally, obesity rates have alarmingly tripled since 1975. As of 2016, 39% of adults worldwide were overweight (BMI ≥ 25), and 13% were obese (BMI ≥ 30), according to the World Health Organization. Strikingly, most of the world's population now lives in countries where more deaths are linked to overweight and obesity than to being underweight. Access to good healthcare and healthy living is crucial for both individual well-being and societal advancement. Kerala, with its evenly distributed population and advanced demographic transition, faces the challenges posed by this global trend.

Health Indicators of Kerala: Kerala has made significant strides in its health sector, evidenced by a rapidly decreasing population growth rate, the highest average age at marriage (especially for women), widespread acceptance of family planning, and a notable decline in mortality. Key characteristics of Kerala's health landscape include low birth and death rates, a higher life expectancy for women than men, low infant mortality with minimal urban-rural differences, and reduced disability levels. These successes are largely due to a well-established healthcare system with a skilled workforce, forward-thinking policies from successive state administrations, and strong social factors like female education, public health awareness, and a general emphasis on hygiene among the population. A comparison of Kerala's health indicators with the national averages in India, based on the latest available data, further highlights the state's progress.

Table 1

Comparison of Health Indicators: Kerala vs. India

Health Indicator	Kerala	India (National Average)
Infant Mortality Rate (IMR)	~6 per 1,000 live births	~28 per 1,000 live births
Maternal Mortality Ratio (MMR)	~19 per 100,000 live births	~97 per 100,000 live births
Life Expectancy at Birth	~75 years	~70 years
Total Fertility Rate (TFR)	1.8	2.0
Under-5 Mortality Rate	~7 per 1,000 live births	~32 per 1,000 live births
Institutional Delivery Rate	>99%	~89%
Female Literacy Rate	~92%	~70%
Immunization Coverage (Full)	>90%	~76%
Access to Improved Sanitation	>95%	~70%
Prevalence of Undernourishment (Children <5)	Much lower than national average	~35% stunted, ~19% wasted (NFHS-5)

Source:NFHS-5, SRS, and other government health statistics

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Kerala's progressive agrarian reforms in the late 1950s empowered the landless, improving their socio-economic status and health. A strong three-tiered public health system, complemented by the acceptance of traditional medicine, has been crucial in achieving high health standards. The public distribution system supports nutrition for the poor, and remittances from abroad have boosted household income, increasing healthcare spending. Despite a robust public system, there's a significant reliance on private healthcare and a growth in specialized private hospitals. High literacy rates, especially among women, and widespread immunization have also been vital.

However, Kerala now faces a major health crisis with a surge in lifestyle diseases, alongside mental health issues, high suicide rates, and trauma-related deaths. Key challenges include the increasing prevalence of lifestyle and age-related diseases, a rise in environment-related illnesses due to poor hygiene and pollution, and inadequate infrastructure with a shortage of trained healthcare staff. The once-acclaimed "Kerala Model of Health" is facing sustainability issues, with high morbidity despite low mortality. Sedentary lifestyles, unhealthy diets, and urbanization have led to widespread physical inactivity across all age groups, with screen time replacing outdoor play and high-calorie foods becoming commonplace. Consequently, lifestyle diseases like obesity, diabetes, hypertension, heart disease, and certain cancers are rapidly increasing, posing a threat to Kerala's long-term health achievements.

Obesity and its Measurement: Obesity has a long history, with evidence found in ancient civilizations, where it was sometimes viewed as a sign of prosperity. However, attitudes shifted in the 20th century with changing fashion and increasing medical awareness. By the mid-20thcentury, institutions began to address obesity, and in the 1990s, the Body Mass Index (BMI) was widely adopted as a measure, coinciding with a surge in obesity rates, especially among young people. Today, obesity is a recognized global health crisis, linked to serious conditions like diabetes, hypertension, and heart disease. It's defined as excessive body fat that harms health, with morbid obesity carrying severe risks. While various methods exist to measure body fat, BMI, calculated as weight (kg) divided by height squared (m^2), is most commonly used for its simplicity, despite its limitations in very muscular individuals. The World Health Organization classifies BMI as follows: underweight (<18.5), normal weight (18.5–24.9), overweight (25.0–29.9), and obese (≥30.0).

Objectives

·To examine the nature and underlying causes of obesity in Kerala

·To assess how shifting food consumption patterns contribute to overweight and obesity

·To identify key factors influencing the prevalence of overweight and obesity

MATERIALS AND METHODS

The study was conducted among adults residing in Kozhikode Corporation, a coastal city in Kerala and the second largest urban area in the state, with a population of 2 million, a sex ratio of 1.093, and a literacy rate of 96.8% . Data were collected from 50 respondents between January and April. Body Mass Index (BMI) was used to assess overweight and obesity. Statistical tools such as Chi-square test is employed to examine the relationship between BMI and various factors. Trained investigators measured weight using a calibrated scale, ensuring participants were without shoes, heavy clothing, belts, or items in pockets. Height was measured using a portable anthropometric rod. The study uses both primary and secondary data. Primary data were collected from 50 randomly selected respondents. The study's limitations include the personal sample collection, as respondents were reluctant to answer questions. With only 50 respondents, the sample size is too small to generalize the findings. Additionally, the study was limited to Kozhikode Corporation only.

RESULTS AND DISCUSSIONS

Changing trend in food habits of people in Kerala: Globalization has noticeably changed the eating habits of Kerala's urban population, especially young people. There's a clear move away from traditional foods towards fast food, along with increased consumption of processed foods and packaged juices. This shift is largely driven by market influences and advertising from multinational corporations, which promote a "junk food culture."This change in diet, combined with a lack of physical activity, is linked to many of today's health problems. The traditional food pyramid, which emphasized minimal consumption of oil, fat, sugar, and salt, has become inverted in modern diets, with these unhealthy components now being consumed in larger quantities.It's important to educate and empower the younger generation about the value of home-cooked meals. Home cooking not only promotes family connection and mental well-being but also ensures better health and saves money. Food is a key part of our regional identity and represents both health and social well-being, so preserving our traditional food values is crucial.

Changing consumption pattern: The increased wealth in Kerala, fueled by foreign remittances and exposure to Western culture, has dramatically altered Keralites' food habits due to easy access to calorie-rich packaged foods, sweets, and meat

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products. Urbanization and a shift from manual labor to sedentary lifestyles have further contributed to this change, negatively impacting the population's nutritional status, especially among children and adolescents.Modern food industries' use of artificial additives and hormones poses health risks. Keralites now consume significantly more calories, with sugar and fried food intake doubling, and alcohol consumption reaching alarming levels. Conversely, the consumption of vital green leafy vegetables is alarmingly low, at only half the recommended amount.These dietary shifts have made the population highly susceptible to lifestyle diseases like obesity, diabetes, hypertension, and heart problems. This study aims to analyze the relationship between the high consumption of soft drinks, meat, snacks, bakery items, and fast food with overweight and obesity in the population.

Chi-square test of independence: The chi-square test is employed to determine if there's a relationship between BMI, changing food habits, and the respondents' socio-economic background. In this test, the starting assumption (null hypothesis) is that these factors are independent of each other. A p-value below 0.05 indicates that we reject this assumption of independence and conclude that there is a statistically significant association between the variables being examined. Conversely, a p-value of 0.05 or higher means we don't have enough evidence to reject the null hypothesis, and we would accept that the factors appear to be independent.

*Vegetarian and Non-Vegetarian:*The table given below shows the relationship between two attributes, that is, the BMI and the attribute weather a person is a vegetarian or a non-vegetarian.

Table 2 Relation between BMI and type of food preferred.

BMI	Non-veg	Veg	Total
Normal	11	7	18
Overweight	22	2	24
Obesity	7	1	8
Total	40	10	50

Source: Primary data

The chi-square test yielded a p-value of 0.042, which is below the significance level of 0.05. Therefore, we reject the null hypothesis, indicating a statistically significant association between BMI and dietary preference (vegetarian vs. non-vegetarian) in this sample.The provided data on 50 adults shows that 80% are non-vegetarian and 20% are vegetarian. Among those with a normal BMI (36% of the sample), 62% are non-vegetarian and 38% are vegetarian. In the overweight category (48% of the sample), a striking 92% are non-vegetarian, while only 8% are vegetarian. Similarly, among obese

individuals (16% of the sample), 88% are non-vegetarian and 12% are vegetarian. However, it's important to note that some vegetarians in the sample are also overweight or obese, likely due to factors such as insufficient exercise and their overall lifestyle.

Regular consumption of Snacks between meals: The following table illustrates how Body Mass Index (BMI) relates to the health status of individuals who regularly consume snacks between meals.

Table 3 Relationship between BMI and regular consumption of snacks

BMI	Snacks		Total
	Yes	No	
Normal	6	12	18
Overweight	11	13	24
Obesity	5	3	8
Total	22	28	50

Source: primary data

With a chi-square p-value of 0.372, which is greater than the standard threshold of 0.05, we accept the null hypothesis. This indicates that, in this sample, there is no statistically significant association between an individual's BMI and the habit of regularly snacking between meals.Looking at the data from the 50 individuals, 44% reported

snacking between meals, while 56% did not. Among the 22 individuals who snacked regularly:
• 50% were classified as overweight based on their BMI.
• 23% were classified as obese.
• The remaining 27% had a normal BMI.

Regular consumption of Bakery items: The study,

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involving 50 participants, examines the impact of regular bakery food consumption on individuals classified as overweight or obese based on their BMI, given that bakery items are typically high in oil and fat.

Table 4 Relation between BMI and regular consumption of bakery items

BMI	Bakery		Total
	Yes	**No**	
Normal	7	11	18
Overweight	14	10	24
Obesity	7	1	8
Total	28	22	50

Source: primary data

The chi-square test yielded a p-value of 0.048, which is below the 0.05 significance level. This leads us to reject the null hypothesis, indicating a statistically significant relationship between BMI and the regular consumption of bakery items in our sample. Among the 50 participants, 56% reported consuming bakery items regularly, while 44% did not.

• In the normal BMI category (36% of the sample), 38% consumed bakery items regularly, and 62% did not.

• In the overweight BMI category (48% of the sample), 58% consumed bakery items regularly, and 42% did not.

• Notably, within the obese BMI category (16% of the sample), a high proportion (88%) reported regular consumption of bakery items, with only 12% not consuming them regularly.

This data suggests a strong association between regular bakery item consumption and being overweight or obese in this study group.

Regular consumption of meat: The following table examines the relationship between Body Mass Index (BMI) and the regular consumption of meat among the study participants, considering meat as a potential contributor to overweight and obesity in adults.

Table 5 Association between regular consumption of meet and BMI categories

BMI	Meat		Total
	Yes	**No**	
Normal	10	8	18
Overweight	15	9	24
Obesity	6	2	8
Total	31	19	50

Source: Primary data

The chi-square test resulted in a p-value of 0.640, which is greater than the significance level of 0.05. Therefore, we accept the null hypothesis, indicating no statistically significant association between BMI and the regular consumption of meat in this sample. The data reveals that 62% of the surveyed individuals reported regular meat consumption, while 38% did not.

• Among those with a normal BMI (36% of the sample), 32% were regular meat consumers, and 44% were not.

• In the overweight category (48% of the sample), 63% regularly consumed meat, while 37% did not.

• Among the obese individuals (16% of the sample), 75% were regular meat consumers, and 25% were not.

Based on this analysis, in this particular sample, there is no statistically significant link between regular meat consumption and an individual's BMI category.

Regular consumption of Soft drinks: Soft drink contributes to form over-weight and obesity in a large measure. The regular consumption of soft drinks create many lifestyle diseases including Diabetes, Morbidity etc.

Table 6 Relationship between regular consumption of soft drinks and BMI

BMI	Soft drinks		Total
	Yes	**No**	
Normal	4	14	18
Overweight	10	14	24
Obesity	7	1	8
Total	21	29	50

Source: primary data

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Among the surveyed individuals, those with a normal BMI (36% of the sample) showed that 23% regularly consumed soft drinks, while 77% did not. In the overweight BMI category (42% of the sample), 42% were regular soft drink consumers, and 58% were not. Notably, within the obese BMI category (16% of the sample), a high proportion (88%) reported regular soft drink consumption, with only 12% not consuming them regularly. The chi-square test yielded a p-value of 0.008, which is below the significance level of 0.05. Therefore, we reject the null hypothesis and conclude that there is a statistically significant 1 association between BMI and the regular consumption of soft drinks in this sample.

Regular consumption of Alcohol: A significant 2011 study by Washington University researchers explored the connection between obesity and alcohol consumption using data from two large surveys. Their analysis, accounting for other variables, indicated that individuals with a family history of alcoholism had a higher likelihood of obesity in the more recent survey. The following table examines alcohol consumption habits in our sample of 50 individuals, distinguishing between regular and non-regular drinkers.

Table 7 Association of regular consumption of alcohol to BMI

BMI	Alcohol		Total
	Yes	No	
Normal	4	14	18
Overweight	6	18	24
Obesity	2	6	8
Total	12	38	50

Ssource: primary data

The chi-square test yielded a p-value of 0.976, which is well above the significance level of 0.05. Therefore, we accept the null hypothesis, suggesting that there is no statistically significant relationship between BMI and regular alcohol consumption in this sample. Our data indicates that only 24% of the 50 respondents reported regular alcohol consumption, while 76% did not.

- In the normal BMI category (36% of the sample), 23% were regular alcohol consumers, and 77% were not.
- Among the overweight individuals (48% of the sample), 25% reported regular alcohol consumption, while 75% did not.
- Within the obese group (16% of the sample), 25% were regular alcohol consumers, and 75% were not.

Based on this analysis, in this specific sample, there is no significant association observed between an individual's BMI and their regular alcohol consumption habits.

Regular consumption of Fast food: Research indicates a significant increase in eating out over the last forty years. Junk food, typically high in calories, various types of fats, sugars, simple carbohydrates, and sodium, significantly contributes to overweight and obesity.

Table 8 Relation between regular consumption of fast food and BMI

BMI	Fast food		Total
	Yes	No	
Normal	3	15	18
Overweight	11	13	24
Obesity	7	1	8
Total	21	29	50

Source: primary data

The chi-square test yielded a p-value of 0.002, which is below the 0.05 significance level. Therefore, we reject the null hypothesis, indicating a statistically significant relationship between BMI and regular fast food consumption in this sample.

Out of the 50 respondents, 42% reported regular junk food consumption, while 58% did not.

- In the normal weight category (36% of the sample), 17% regularly consumed fast food, and 83% did not.
- Among the overweight respondents (48% of the sample), 46% regularly consumed fast food, while 54% did not.
- Notably, within the obese group (16% of the sample), a high proportion (88%) reported

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regular junk food consumption, with only 12% not consuming it regularly.

This data strongly suggests a link between regular fast food consumption and being overweight or obese in this study.

The socio - economic profile of the respondents:
To analyze the socio - economic background of the participants in our study, we primarily focused on three key indicators: their employment status, marital status, and gender.

A) Occupation: A correlation is often observed between occupation and BMI, as employed individuals with their own income may have more purchasing power for various food choices. Conversely, unemployed individuals typically depend on the income of family members.

In the study, it is examined that 40 employed individuals with personal incomes and 10 unemployed individuals (including students, housewives, and the elderly), for whom the income of their providers was considered.

Table 9 Occupation pattern of the respondents

BMI	Occupation		Total
	Employed	**Unemployed**	
Normal	13	5	18
Overweight	20	4	24
Obesity	7	1	8
Total	40	10	50

Source : Primary data

The chi-square test (p=0.569 > 0.05) indicates no significant link between occupation and BMI changes in this study. The sample comprised 80% employed and 20% unemployed individuals. Among those with normal BMI, 73% were employed. In the overweight group (48% of the sample), 84% were employed, and among obese individuals (16%), 88% were employed.

B)Marital status: Studies suggest a correlation between marriage and an increased risk of overweight and obesity. This could be attributed to several factors: married individuals, often being employed, may have more disposable income for increased food consumption. Additionally, marriage may coincide with increasing age, which can also contribute to weight gain.

Table 10 Marital status of the respondents

BMI	Marital status		Total
	Married	**Single**	
Normal	13	5	18
Overweight	19	5	24
Obesity	6	2	8
Total	38	12	50

Source: primary data

The chi-square test yielded a p-value of 0.871, which is greater than 0.05. Therefore, we accept the null hypothesis, indicating no significant association between marital status and BMI in this study. In the normal BMI group, 73% were married and 27% were single. In the overweight BMI group, 73% were married and 27% were single. In the obese BMI group, 75% were married and 25% were single.

C)Gender: Many common male occupations, such as engineering, accounting, and driving, involve prolonged sitting, increasing the risk of overweight and obesity. Similarly, women in sedentary professions like tailoring and accounting are also susceptible to these lifestyle-related health issues.

Table 11 BMI classification with gender as the base

BMI	Gender			
	Female	**Male**	**Transgender**	**Total**
Normal	7	11	0	18
Overweight	12	12	0	24
Obesity	3	4	1	8
Total	22	27	1	50

Source: primary data

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The sample of 50 respondents included 22 females, 27 males, and 1 transgender individual. The chi-square test yielded a p-value of 0.207, which is greater than 0.05. Therefore, we accept the null hypothesis, indicating no significant association between BMI and gender in this study, even though other research suggests males are more prone to overweight and obesity.

CONCLUSION

The findings indicate a clear link between different Body Mass Index (BMI) categories (normal, overweight, obese) and the specific consumption habits we investigated, reflecting trends in contemporary society. For instance, we observed statistically significant associations between BMI and the regular intake of items like bakery products and soft drinks. This highlights how modern dietary patterns, characterized by increased access and consumption of certain food types, are strongly implicated in influencing an individual's weight classification. Further exploration of these consumption patterns, considering factors such as frequency, portion sizes, and nutritional content, could provide a more nuanced understanding of their impact on BMI. Additionally, examining how these patterns intersect with other lifestyle factors, such as physical activity levels and sedentary behaviors, would offer a more comprehensive picture of the drivers of weight issues in today's society.

REFERENCES

1. Ahluwalia, Montek S. (2002), "State Level Performances Under Economic Reforms in India", in Anne O. Krueger (ed.), *Economic Policy Reforms and the Indian Economy,* Oxford University Press, New Delhi.
2. Akhil, Tandulwadiker (2004), *Asian hospital and health care management,* Vertical Talk, Hyderabad.
3. Ash, Russell (2008), *Whitaker's world of facts,* A and C Black publishers Ltd, London.
4. Ashokan, A. (2009), *Perspectives of Health Economics*, Serials Publications, New Delhi.
5. Elizabeth, K.E. (2007), "From the Marasmic to the obese", in C.C. Kartha (ed), *Kerala Fifty years and Beyond*, Gautha Books, T hiruvananthapuram.
6. *Enas, Enas A. and Sudesh, Kannan (2005),* How to beat the heart disease epidemic among South Asians, *Time Line, USA.*
7. *Gluckman, Peter and Hanson, Mark* (2006), *Mismatch, The lifestyle Disease Time bomb,* Oxford University Press, New York.
8. Harikumar,S. and Sudhakar, Dhanya. (2008), "Consumption Expenditure and Health Status: The case of Kerala", in Meera Bai M. (ed.), *Kerala Economy Slumber to performance*, Serials Publications, New Delhi.
9. Me Whiter, Alasairb and Clasen, Liz (1996), *Foods that Harm Food that Heal,* Reader's Digest Association Ltd, New York.
10. Padmavati, S. (1990), *Heart disease and layman,* National Book Trust, New Delhi.
11. Panicker, P.G.K. and Soman,C.R. (1984), *"Health status of Kerala, Paradox of Economic Backwardness and Health Development"* Centre for Development Studies, Thiruvananthapuram.