



Influence Of Lifestyle On Menarche Among Girls In Urban And Rural Area: A Comparative Study

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Abstract: Menarche is the first menstrual bleeding, marks the beginning of female puberty and the potential for future reproduction. Menarche happens between the ages of nine and sixteen, with 13 being the average age. The age at which menarche begins can be influenced by numerous elements includes genetics, diet, and body mass index. An early menarche is defined as menarching before the age of twelve and late menarche is defined as menarching before the age of fourteen. Many developed and developing nations have seen a decrease in menarcheal age over the past century. Consequently, this research was formulated to evaluate the influence of lifestyle and the age of menarche among girls in urban and rural area. The objectives of the study i) To assess the age of menarche of the subjects ii) To estimate the somatic status of the subjects, iii) To evaluate the dietary pattern of the subjects, iv) To assess the physical activity level of the subjects. The investigation was carried out in schools at rural and urban areas in Kannur district, Kerala, with the sample size of 120 individuals aged 10 to 13 years those who attained menarche. A questionnaire was constructed and validated which includes dietary pattern, menstruation and physical activity pattern. With the help of suitable statistical test, the result revealed that average age of menarche is 11.8 in rural area and 10.75 in urban area. The results indicate that majority of the urban subjects have higher education, occupation and income than rural area. Majority of them belongs to normal BMI age group. However, number of obese and overweight (41.6 percent) are greater in urban area. Majority of them follow a healthy dietary pattern including non-vegetarian diet (93.3 percent), number of meals per day with preferred food type is home – cooked foods (70 percent) in both rural and urban area. Nearly 60 percent of subjects skip meals in urban area while rural area result indicate only 23.3 percent. The obtained result shows that a healthy food consumption is followed by rural area while urban area shows consumption of junk food is higher when it compares with rural area. Among the study subjects, majority of their menstrual cycle is regular and severity of menstrual symptoms were found to be more in those who attained menarche early which is in urban area. The study however reflects the fact that average age of menarche is later in rural area than urban area due to various factors including higher income, high occupation and unhealthy food choices. Additionally, this analysis identifies menarcheal age declines in a secular manner than their mothers and a significant difference in the diet, physical activity and lifestyle pattern of the subjects from rural and urban areas.

Keywords: Dietary habits, menarche, physical activity, rural area, urban area

I INTRODUCTION

First menstrual cycle in the female body is referred as menarche. Menarche usually occurs between the ages of 10 and 16, with an average age of 12.4. The monthly shedding of the functional layer of the uterine endometrial lining is known as menstruation, and it occurs when ovulation and fertilization are absent. [Amy E. Lacroix et al, 2023] Periodic physiological changes occur during the menstrual cycle, which endures an average of 28 days and ranges from 21 to 37 days. [Hee Wook Weon, 2023]

Based on the time of the menstrual cycle, women experience a variety of menstrual symptoms, and each person experiences these symptoms differently. 80% to 90% of women experience symptoms of premenstrual

syndrome (PMS), among which are breast tenderness, weight gain, and sleep deprivation, according to a prior study finding on the severity and sequence of menstrual symptoms. [Hee Wook Weon, 2023]

A person's menarche is influenced by various factors. Those include weight, height, Body mass Index (BMI), socio-economic and genetic factors [Jannatul Maowa malitha et al. 2020], genetics, race, environment, diet, level of physical activity, location, parental occupation, parental death, consumption of tea, physical and psychological stress and smoking. [Fahimeh Ramezami Tehrani. et al. 2014].

Early menarche onset is the term used to describe girls who, attain menarche onset between the ages of 12 and 13 years old, which is younger than the average or median menarche age depending on their ethnicity. [Ngan Thi Kim Nguyen et al. 2020]. It is more likely in individuals who live with stepparent, in foster care or in stressful environments. A higher socioeconomic status and urban lifestyle are associated with earlier menarche. The likelihood of having an overweight or obese BMI was 1.7 times higher in those menarched early. [Carwile JL et al. 2015]. Moreover, it is also caused by consuming more animal protein and less vegetable protein between the ages of three and five. This risk is also increased by obesity, sugar-sweetened beverages, and formula feeding in the initial several months of life. [Amy E. Lacroix et al, 2023]. There exists some evidence that consuming higher amount of milk, may raise the chance of an early menarche or a lower menarche age [Andrea S Wiley and Plos One.2011]. People who consume more than 1.5 sugar-sweetened beverages a day were found to menarche approximately 2.7 months earlier than those who drank less than two sugar-sweetened beverages per week. [Carwile JL et al. 2015]

Menstruation at or after the age of 15 is regarded as a late menarche. In adolescents with low body mass, eating disorders, malabsorption and starvation can all cause a delay in menarche. Menarche requires at least 17 per cent of body fat, and regular menstruation requires at least 22 per cent body fat. Menarche is usually delayed in athletes, elder sisters and girls who are developing normally because of anomalies in the female genitourinary tract. [Amy E. Lacroix et al, 2023].

A secular trend in menarcheal age decline is known to cause numerous health issues. In 1955, the average menarche age in India was 14 years old. Data from the Indian Human Development Survey indicated that first menstruation have been declining secularly, with a reduction of almost one month every ten years. According to this study, the menarche age dropped from 13.83 years for women born in 1955–1964 to 13.62 years for those born in 1985–1989. Based mostly on retrospective research, studies on menarche ages in India indicate that the range is 11.8 to 13.86 years depending on the region. [Aishwarya Bajpai et al. 2023]

Need of the study:

It is essential to examine the menarcheal status of school-going girls and identify risk factors associated with early menarche onset to facilitate the implementation of appropriate corrective measures. This study aimed to determine the influence of lifestyle factors, including anthropometric measurements, dietary patterns, physical activity levels, and socioeconomic background, on the age of menarche among teenage girls in both urban and rural locations.

Aim:

The aim of this dissertation is to assess the influence of lifestyle on menarche among girls in rural and urban area.

Objectives:

- ❖ To assess the age of menarche of the subjects
- ❖ To estimate the somatic status of the subjects
- ❖ To evaluate the dietary pattern of the subjects
- ❖ To assess the physical activity level of the subjects

Hypothesis:

- ❖ There is a positive correlation between age of menarche and the life style
- ❖ Unhealthy dietary choices of the girls lead to early menarche

II RESEARCH MATERIALS AND METHODS

A comprehensive description of the procedures and the components used in the selected study mentioned in the following headings

2.1 Location and Sampling.

2.2 Data Collection using questionnaire.

2.3 Statistical Analysis.

2.1 LOCATION AND SAMPLING

Location

The present research was conducted in an urban setting at Ursuline Senior Secondary School and in a rural setting at St. Augustine's High School, Nelli Kutty, to compare the menarcheal status and associated factors among adolescent girls.

Sampling

Subjects were selected based on the following criteria through purposive random sampling

- Girls in the age range of 10 to 13 who experienced menstruation
- In this study, 120 girls have agreed to take part. Out of these 120 people 60 girls were from the rural areas and 60 were from the urban areas.

2.2 DATA COLLECTION USING QUESTIONNAIRE

The research design undertaken for the present study was the "survey method". A structured pre-designed questionnaire was prepared and administered to the subjects during the survey. The questionnaire was categorized into five parts, they were:

Part A:

General information: Information regarding the participants' name, age, date of birth, family type, and area of residence was acquired. Additionally, their socio-demographic status was assessed using the Kuppuswamy scale.

Part B:

Anthropometric measurements: The height and weight of the participants were measured in accordance with the WHO STEPS surveillance guidelines to identify girls at risk of undernutrition. The collected anthropometric data were analyzed using the CDC Growth Charts, specifically the BMI-for-age charts, which are recommended by the CDC for assessing underweight, normal weight, overweight, and obesity among children and adolescents.

PART C:

Dietary habits: Type of diet, general meal pattern, number of meals per day, number of meals skip per day, which meal is skipping, number of times skipping a meal, preferred food type, frequency of consumption of outside foods, food allergies, water intake per day were collected from each subject.

Food Frequency Table: A food frequency table was developed, incorporating key ingredients from several food groups. It has been broken down into seven sections: cereals, pulses, fruits, green leafy vegetables, roots and tubers, other vegetables, milk and milk products, sweets, and non-vegetarian foods. Additionally, a list of junk foods was included to assess the frequency of their consumption.

Dietary recall: To evaluate the dietary patterns of the participants, a three-day dietary recall method was conducted on 16.6% of the subjects from both rural and urban areas.

PART D:

Menarche: To study the subject's menstrual pattern, including age of menarche, mother's age at menarche, monthly menstrual cycle pattern, menstrual symptoms, awareness, hygiene practices and use of tablets were obtained.

PART E:

Physical activity: Information including participation in sports activities, outdoor and indoor physical activity duration, sleeping habits and screen time were obtained.

2.3 STATISTICAL ANALYSIS

Statistical Analysis: The gathered information was categorized, tabulated and then analysed. Statistical methods including mean, standard deviation and Chi-Square test were done.

III. RESULTS AND DISCUSSION

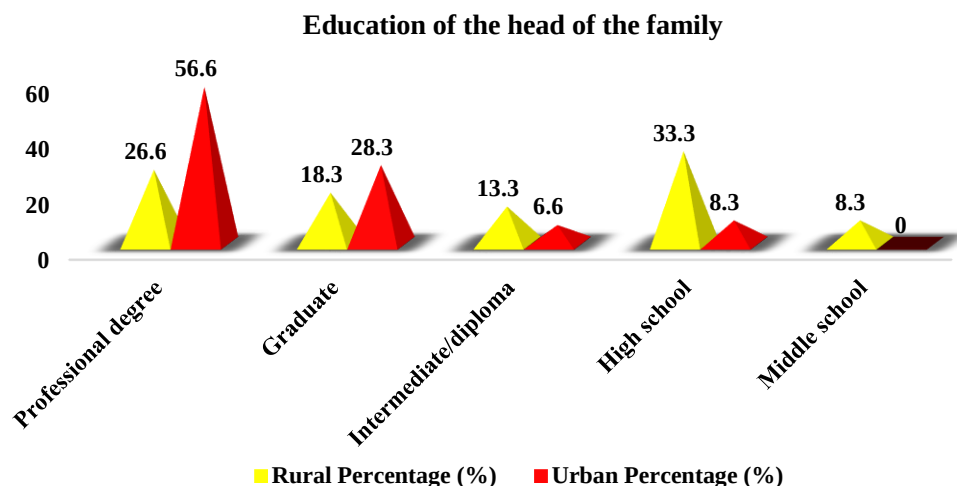


Figure 1. classification of respondents based on the education of the head of the family

The figure presents data on the educational qualifications of the heads of participants families. A study by Trupti Meher and Harihar Sahoo on the natural trend in the age of first menstruation among Indian women indicates that women with higher education tend to experience menarche at a later age compared to illiterate women.

The table highlights that in rural areas, 33% of the population has completed high school education, while 26.6% have obtained a higher education degree, including professional qualifications. This is followed by 18.3% who have completed graduation, 13.3% who have obtained an intermediate or diploma qualification, and 8.3% who have completed middle school education, which represents the lowest percentage. In urban areas, 56.6% of the population holds a professional degree, while 28.3% have completed a graduate degree. This is followed by 8.3% who have completed high school, while the lowest percentage (6.6%) has obtained an intermediate or diploma qualification. Notably, there are no individuals with an education level below primary school in either rural or urban areas.

The majority of participants belong to highly educated families, with no instances of education below the primary school level. Kerala, which has the highest literacy rate in India, provides universal education to all individuals regardless of caste, supported by a strong public education system and low dropout rates. In contrast to rural areas, a greater percentage of people in urban areas have higher levels of education. This disparity may be attributed to better access to primary schools within a 1 km radius in urban areas, whereas rural areas face challenges such as long distances to schools and a shortage of qualified teachers, particularly in subjects like mathematics, science, and English.

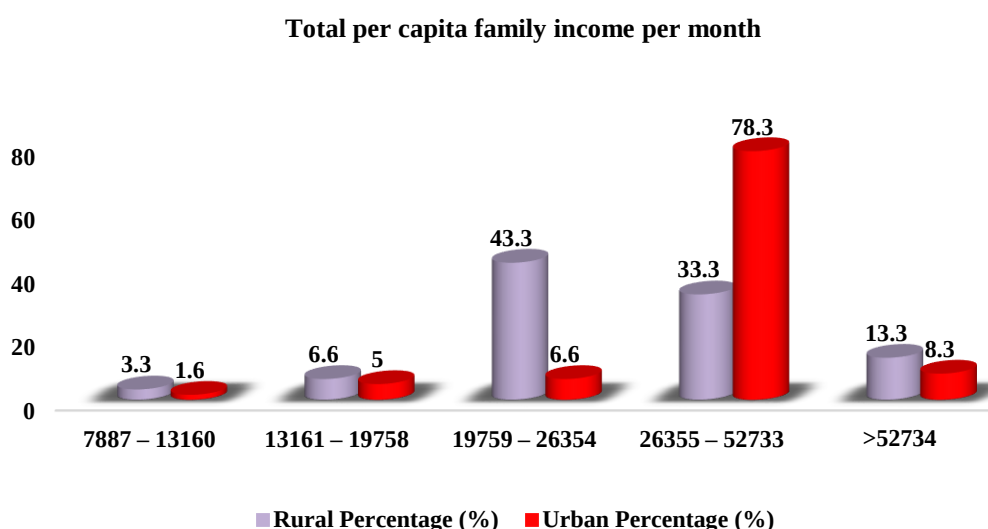


Figure 2. classification of respondents based on total per capita family income per month

The total per capita monthly income of each respondent's family is represented in the above graph. The Kuppuswami Scale (2019) classifies income levels into categories ranging from below Rs. 2,640 to above Rs. 52,374. A study by Mohammed Elshiekh et al. (2011) on the effect of socioeconomic status on the menarcheal age and the period of menstrual bleeding indicates that girls from higher economic status groups attain sexual maturity earlier (mean age 13.16 ± 1.15 years) compared to those from middle (14.01 ± 1.16 years) and lower (15.14 ± 1.70 years) economic groups.

A significant proportion of respondents in rural areas (43.3%) fall within the income range of Rs. 19,759 – Rs. 26,354. In contrast, the majority of respondents in urban areas (78.3%) have incomes ranging from Rs. 26,355 to Rs. 52,733. Only 3.3% of rural participants have incomes between Rs. 7,887 and Rs. 13,610, representing the lowest percentage in rural areas, while in urban areas, only 1.6% of respondents fall within this income bracket. Notably, no respondents from either rural or urban areas reported an income below Rs. 7,886.

The findings indicate a generally high-income level across both locations. Kerala's emphasis on high literacy rates and accessible education has contributed significantly to higher income levels by ensuring educational opportunities for all, regardless of caste or region. However, the rural population tends to have lower income levels compared to their urban counterparts, which may be attributed to the higher levels of education attained by the urban population.

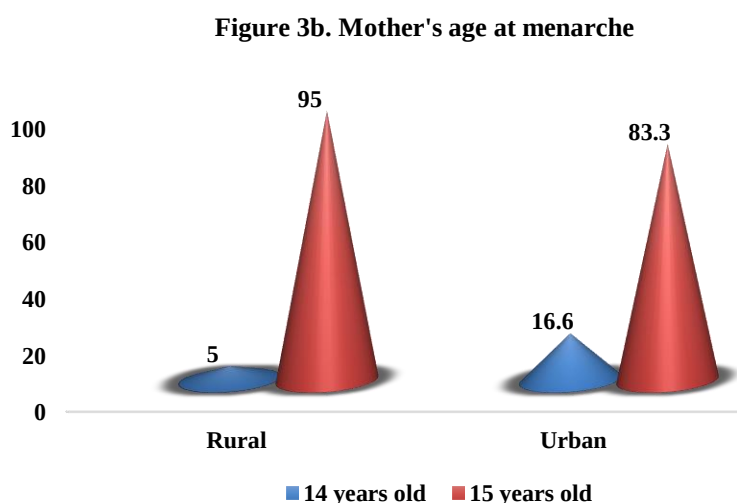
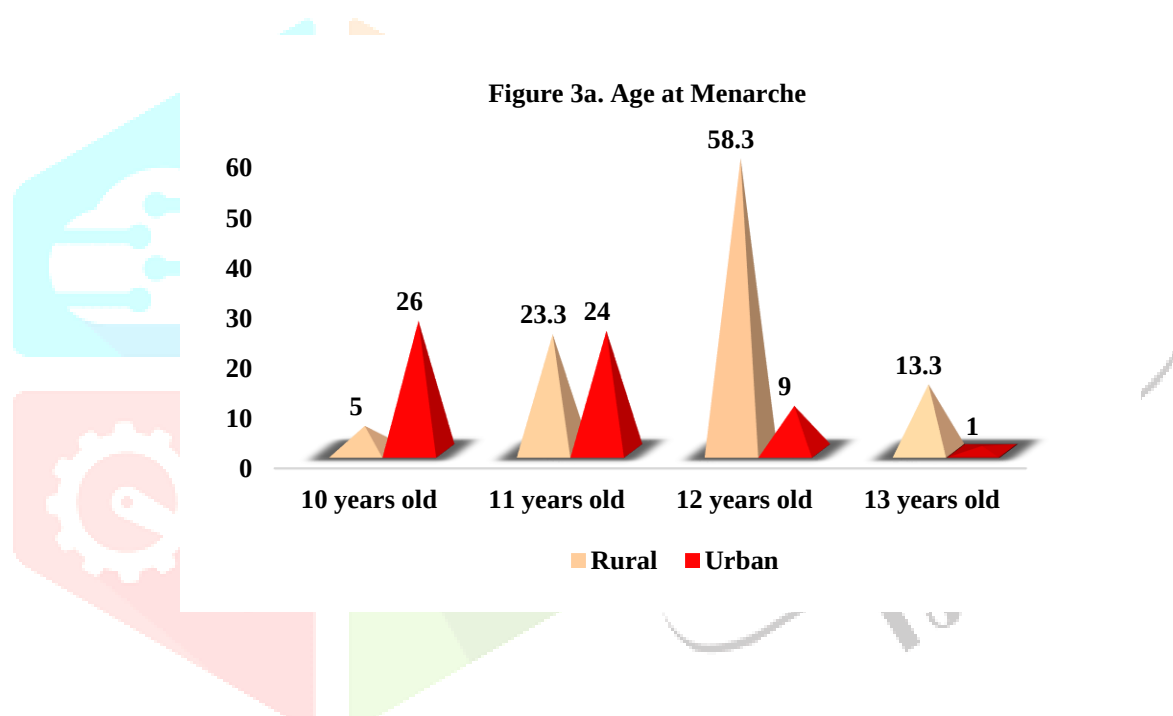


Figure 3. Classification of respondents based on age of menarche and mother's age at menarche

The global average age of menarche is approximately 12 years, and this has dropped in the last several years. In most developed countries, the standard menarche age has fallen down from 17 to 12 years old, according to studies.

The age at menarche for each participant is presented in the figure above. In rural areas, 58.3% of girls came to menarche by the age of 12, accounting for nearly half of the total participants. In urban areas, the highest percentage of girls (43%) reached menarche at the age of 10, whereas only 5% of rural participants attained menarche at this age, making it the lowest percentage in rural areas. Additionally, 13.3% of rural participants experienced late menarche at the age of 13, whereas in urban areas, this percentage was significantly lower at 1.6%. The findings indicate that in urban areas, a greater proportion of girls attained menarche at 10 years of age, while in rural areas, the most common age was 12 years. In urban areas, the least number of women menarched at the age of 13, while in rural areas, it was 10.

Figure 3b represents the age at menarche of the participants' mothers. The majority of mothers in both city and village areas attained menarche at the age of 15 years which indicates 83.3% of mothers in cities and 95% of mothers in village's said they menarched at this age.

Urban girls menstruates earlier than rural counterparts, it can be attributed to higher education levels and socioeconomic status, which provide access to a diverse, calorie-rich diet that supports rapid growth and development. In contrast, rural girls often face limited healthcare access and lead more physically demanding lifestyles, which may delay menarche by one to two years. The findings highlight a substantial generational drop in menarche age, impacted by various factors such as lifestyle changes, dietary habits, improved nutrition, increased caloric intake, education, physical activity levels, and hormonal imbalances. Environmental factors, including sedentary lifestyles, exposure to endocrine disruptors, and climate change, also contribute to earlier puberty. Additionally, demographic factors such as socioeconomic status and education further influence this trend.

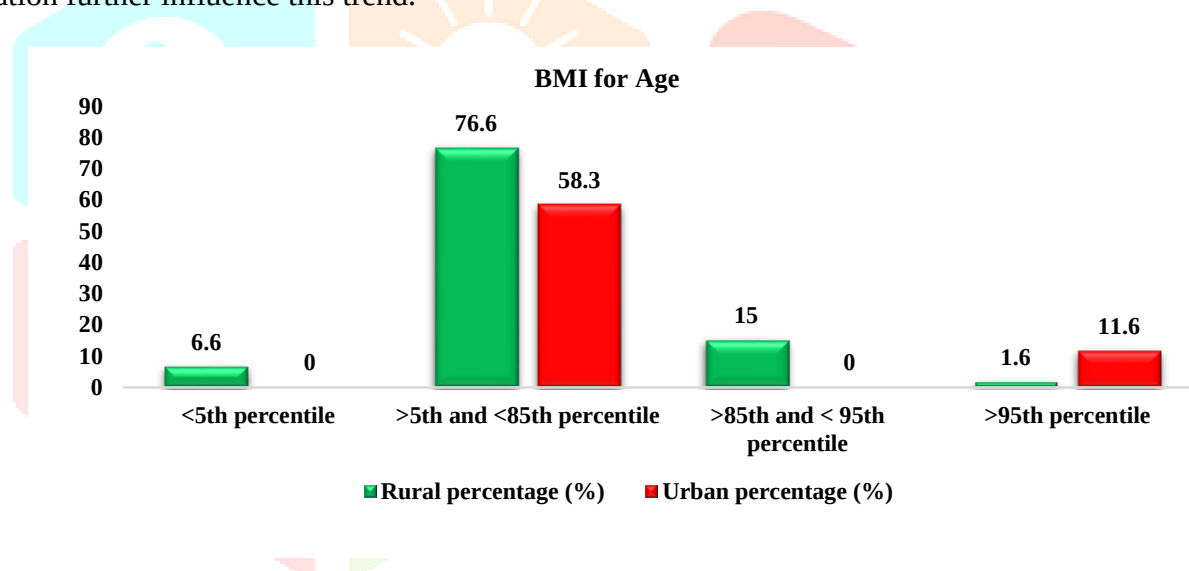


Figure 4. classification of respondents based on Weight for age and Height for age (Based on CDC growth chart – WHO)

Figure 4 illustrates that the proportion of individuals with a normal weight is the highest in both the countryside and the cities regions, with 76.6% in countryside areas and 58.3% in cities. The prevalence of underweight individuals is 6.6% in rural areas, whereas no cases of underweight were reported in urban locations. Conversely, the proportion of overweight and obese individuals is higher in cities compared to village. Specifically, 15% of girls in rural areas are overweight, while this percentage rises to 30% in urban areas. Similarly, obesity is noticed in 1.6% of rural participants, whereas 11.6% of urban participants are classified as obese.

The majority of participants fall within the normal BMI range, which may be attributed to factors such as a strong emphasis on education and healthcare, high literacy rates, and a tropical climate that encourages outdoor activities. Additionally, increased health awareness in the region promotes responsible food choices and healthy lifestyle habits. However, obesity and overweight are more prevalent in urban areas due to various lifestyle, environmental, and socioeconomic factors. Urbanization often leads to dietary changes, increased consumption of processed foods and greater disposable income, which contribute to unhealthy eating patterns. In contrast, rural areas offer more opportunities for physical activity, access to fresh and locally sourced foods and stronger social networks that promote healthier lifestyles. Furthermore, disparities in education,

occupation, and healthcare accessibility also play a role in the differences in BMI distribution between rural and urban populations.

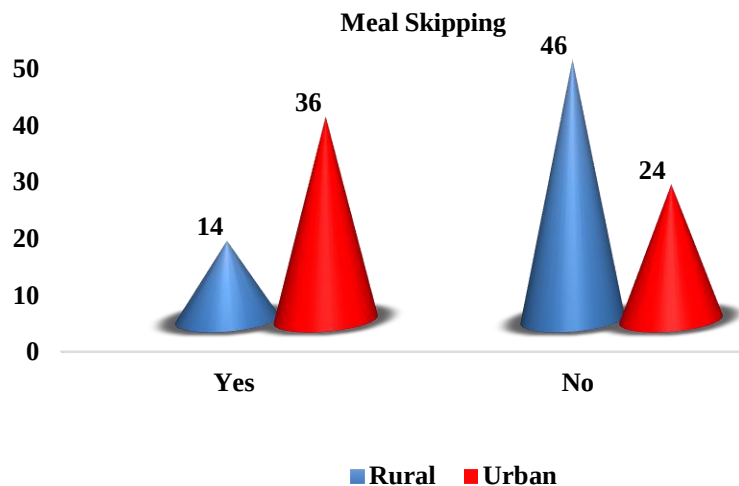
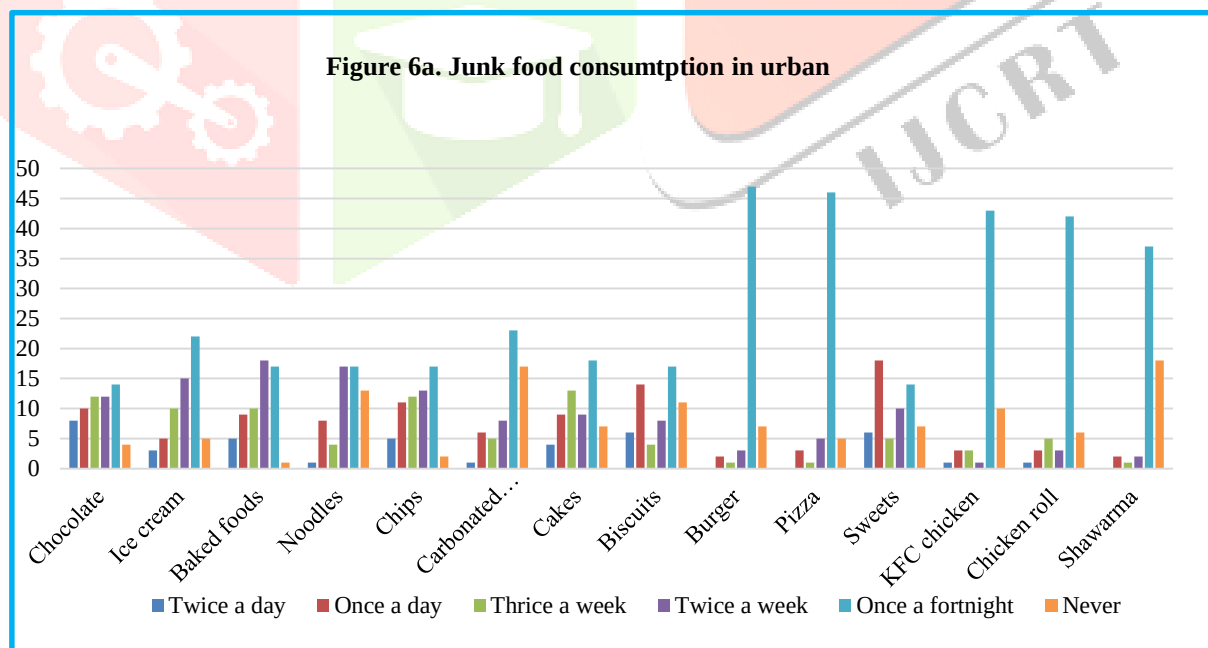


Figure 5. classification of respondents based on meal skipping

In rural areas, 76.6% of the participants do not skip meals, while 23.3% report skipping meals. In contrast, in urban areas, 60% of individuals skip meals, whereas only 40% maintain a regular meal pattern. This suggests that the majority of participants in rural areas adhere to a healthier dietary routine compared to those in urban places.

Meal skipping is much more prevalent among urban girls, primarily due to time constraints, such as rushing to school or a lack of time to eat. Additional factors contributing to meal skipping in urban areas include concerns about weight, taste preferences, and busy schedules. In rural areas, however, meal skipping is more commonly influenced by factors such as financial constraints and illness.



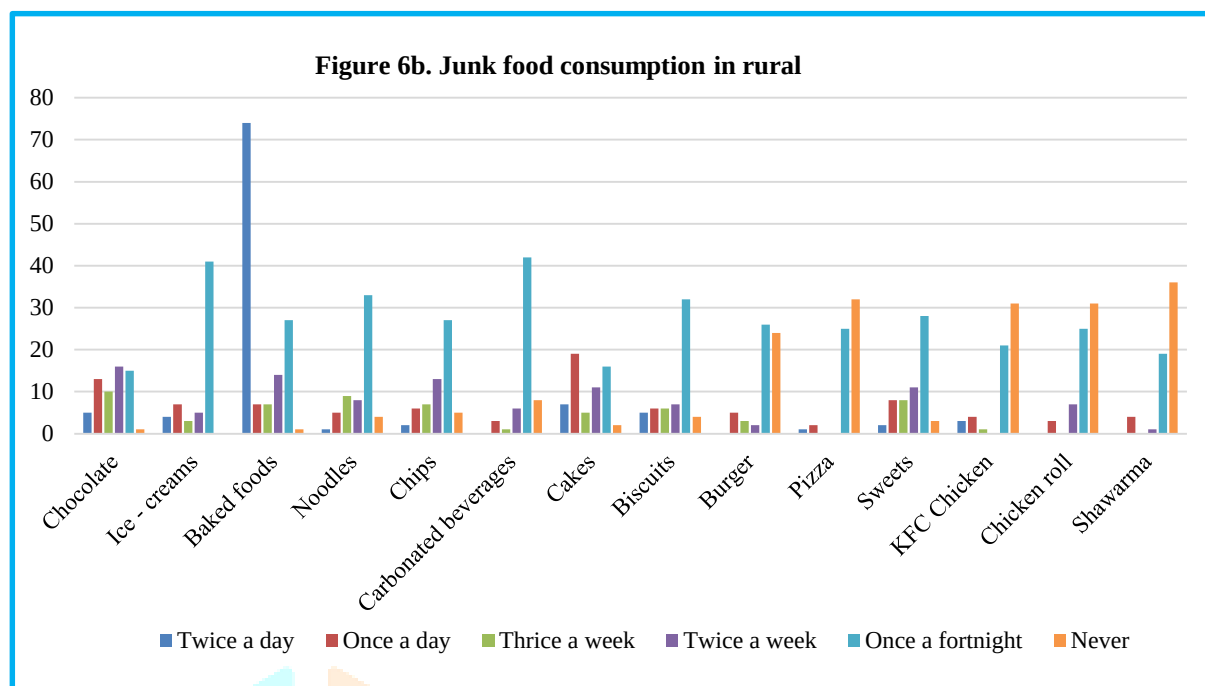


Figure 6. junk food consumption in urban & rural areas

Figure 6a illustrates junk food consumption patterns in rural areas, indicating that overall consumption is relatively low. Most girls take junk food once a fortnight. Specifically, 21.6% of individuals consume chocolate twice a day, while 8.3% consume it once a day. Furthermore, 25% of individuals eat chocolate once a fortnight. Ice cream consumption patterns reveal that 8.3% of individuals consume it three times a week, 5% consume it twice a week, and the majority (68.3%) consume it once a fortnight.

The consumption patterns of baked foods and noodles indicate that 45% and 55% of individuals, respectively, consume these items once a fortnight. Similarly, biscuits, chips, and carbonated beverages are also predominantly consumed once a fortnight, with 53.3%, 45%, and 70% of individuals following this pattern, respectively. Additionally, 46.6% of individuals consume sweets once a fortnight. Compared to other junk foods, the consumption of burgers, pizza, chicken rolls, shawarma, and KFC chicken is minimal, with the majority of the population either consuming them only once a fortnight or not at all.

Figure 6b presents junk food consumption trends in urban areas. While junk food consumption remains relatively low, it is higher in cities compared to villages. In urban areas, 13.3% of individuals consume chocolate twice a day, while 16.6% consume it once a day. Furthermore, 23.3% consume chocolate once a fortnight. Ice cream is more frequently consumed in urban areas, with 39.6% consuming it weekly and 36.6% consuming it once a fortnight.

The consumption of baked foods and noodles follows a similar pattern, with the highest percentage of individuals consuming these items once a fortnight. However, noodles are more frequently consumed on a weekly basis by 34.9% of individuals. Biscuits, chips, cakes, and carbonated beverages are also predominantly consumed once a fortnight by 28.3%, 28.3%, 30%, and 38.3% of individuals, respectively. Additionally, a higher proportion of individuals (30%) consume sweets daily. Similar to rural areas, the consumption of burgers, pizza, chicken rolls, shawarma, and KFC chicken remains low, with more than half of the population consuming these items only once a fortnight or never.

Overall, junk food consumption is lower in rural areas compared to urban areas, with a higher percentage of individuals either never consuming it or consuming it only once a fortnight. Urban girls tend to consume more junk food than rural girls due to factors such as greater availability, accessibility, marketing influences, lifestyle differences, and socio-cultural factors. Economic aspects, including affordability and convenience, also play a role. Additionally, the higher employment rates in urban areas contribute to increased junk food consumption. These dietary habits may lead to obesity, weight-related issues, an increased possibility of long-term illnesses, nutritional deficiencies, and dental issues.

Table 1. Days dietary recall of respondents

Sl. No.	DAY 1		DAY 2		DAY 3	
	Rural	Urban	Rural	Urban	Rural	Urban
Energy	699.56	723.29	664.23	701.3	672.96	695.93
Protein	23.31	24.96	21.67	22.24	22.31	26.61
Fat	12.78	16.79	14.65	16.15	15.36	18.73
CHO	95.27	146.01	99.65	103.44	99.31	101.92

The table presents the nutritive value of the food consumed by the subjects over a three-day period, displaying the average intake of key nutrients, including energy, protein, carbohydrates, and fat. Urban areas follow greater nutrient intake than rural ones. Additionally, nutrient intake is higher on weekends compared to weekdays in both regions. The greater food consumption and higher nutrient intake observed in urban areas may be attributed to higher levels of education and occupational status. Furthermore, urban areas generally exhibit higher income levels compared to rural areas, which may also contribute to this trend.

IV. SUMMARY & CONCLUSION

Considering all findings, this study, *"Influence of Lifestyle on Menarche Among Girls in Urban and Rural Areas: A Comparative Study,"* concludes that a higher proportion of girls attain menarche at a younger age in urban regions compared than rural regions. The extensive data presented in this study provide a comprehensive overview of the surveyed girls, encompassing various dietary, health, and demographic factors. The analysis offers insights into key aspects such as age, income, education, and occupation of the head of the family, age at menarche, menstrual patterns, and lifestyle factors, including physical activity and sleep patterns. These factors collectively describe the variation in the age of menarche across different lifestyle conditions within the sample group. The findings indicate that the majority of urban girls attain menarche at the age of 10, whereas rural girls reach menarche at an average age of 12. This difference can be attributed to lifestyle factors, including family income and occupation, unhealthy eating behaviours particularly consuming junk food often, meal skipping, and a higher incidence of overweight and obesity in urban places. The higher education status of urban populations may also contribute to these differences. While urban areas exhibit higher levels of education, which can aid in adopting healthier dietary patterns and lifestyles, unhealthy eating habits such as junk food consumption, meal skipping, and above-normal BMI for age are still more prevalent in urban regions, likely influenced by higher income levels and occupational factors. Despite a higher percentage of girls attaining early menarche in urban areas, participation in sports activities is greater in rural areas. However, menstrual symptoms are more prevalent among girls who experience early menarche. Daily water intake is higher among urban girls, whereas rural girls consume comparatively less water. Although various factors influence the age of menarche, genetic factors appear to have minimal impact. The study also highlights a generational decline in the age of menarche, as mothers attained menarche at a later age than their daughters. This shift can be linked to improved lifestyle factors, higher income levels, better nutrition, increased caloric intake, and higher body fat percentages in the current generation. The dietary intake of the subjects is influenced by various factors, as urban girls have higher overall food consumption and nutrient intake than their rural counterparts. While it is essential to improve dietary choices among urban girls, efforts should also be made to enhance food consumption and nutrient intake in rural areas. Health interventions and awareness programs should be implemented to improve the overall nutritional status of adolescent girls in both urban and rural settings.

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