

# Gender Differences in Health Behaviors and Outcomes among Adolescent Populations across Regions

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## Abstract

**Background:** Biological, social and environmental factors all contribute to the formation of health patterns among adolescents. Sex, as well as region, impacts on issues related to physical activity, nutrition, mental health, and risk-taking behavior, among adolescents.

**Objective:** The present study sought to examine differences in health practices and outcomes between boys and girls in the country based on geographical location and key disparities based on socio-cultural and environmental factors. **Methodology:** This is a cross-sectional comparative study of 350 adolescents (10-19 years of age) from urban and rural areas. Health outcomes and health behavior were assessed through questionnaires. Data were analysed using comparative and correlation tests. **Findings:** The study found males engaged in more physical activity (62%) than females (48%) and females had better dietary behaviors' (54% vs 46%). Females reported higher levels of mental health problems (38%) compared to males (29%). Cultural differences showed higher rates of obesity in urban areas (26%) than rural areas (18%). Gender, health behavior and health status were significantly associated ( $p < 0.01$ ). **Conclusion:** There are marked gender and regional differences in health-related behaviours and health outcomes among adolescents, which suggest a need for gender-sensitive, region-specific public health strategies.

**Keywords:** Adolescents, Gender differences, Health behaviors, Health outcomes, Regional disparities, Public health

## 1. Introduction

### 1.1 Background

While there is growing awareness of the importance of adolescent health globally, gender gaps remain. Gender differences in behavior are apparent in areas relating to nutrition and physical activity, with men showing higher levels of physical activity and women being better eaters [6]. In addition, there are gender differences in mental health issues among adolescents; females have higher rates of anxiety and depression, while males exhibit more externalizing symptoms, including aggression and substance abuse [7]. Behaviors such as smoking, alcohol and other drug use, also differ according to gender and geographic locality [8]. Added to this are regional differences in access to resources, education and healthcare facilities. Although many studies have focused on adolescent health behaviors', to date there has been a lack of research that has integrated gender and regional factors.

### 1.3 Research Objectives

The present research will be focused on examining gender specific health behaviors' and health outcomes among adolescents across regions. The specific objectives are:

- To compare health behaviors' between men and women
- To assess health outcome by region
- To determine socio-cultural contributors

### 1.4 Research Gap

While current research emphasizes gender and regional health inequality amongst adolescents, there are gaps in knowledge. Most research examines gender-based disparities or regional disparities in isolation, rather than exploring how they interact to affect health behaviors' and outcomes. Moreover, most studies are based on cross-sectional data, making it difficult to infer causality [9]. Moreover, there is a lack of focus on diverse socio-cultural factors, especially in low- and middle-income settings, where socio-cultural norms exert strong influence on adolescent behaviors' [10]. Moreover, little attention has focused on how rapidly changing factors (such as exposure to electronic media) interact with traditional socio-cultural factors. These areas of need must be addressed to build on the evidence to support gender and culture-specific interventions aimed at promoting adolescent health.

## 2 Literature review

### 2.1 Gender and Health Behaviors

Emerging research shows distinctive gender differences in youth health behaviors', affected by biological as well as socio-cultural influences. Men typically engage in more vigorous physical activity and engage in more risky health behaviors' like substance use, with women engaging in healthier dietary behaviors', but reporting less activity [11]. This is often influenced by gender roles and expectations, which often perpetuate traditional gender roles influencing lifestyle and health choices [12]. Moreover, studies indicate that females are more likely to experience internalizing disorders (e.g. anxiety, depression) while males engage in more externalizing behaviors' [13].

### 2.2 Regional Differences

Geographic differences, between urban and rural, play an important role in adolescent health. City adolescents are better connected with health services and educational opportunities but are also more exposed to sedentary and unhealthy eating habits [14]. Rural adolescents might be more active because of their lifestyles but have less access to health facilities and health education [15]. Cultural influences and socioeconomic determinants also contribute to these differences, affecting health beliefs and practices, dietary patterns and risk factors among adolescents [16].

### 2.3 Previous Studies

International research shows gender and regional inequalities contribute to health disparities among young people. Recent research (2022-2025) indicates that gender disparities in health exist in areas such as mental health, exercise and drug use [17]. But there is a critical need for more research. Much research is based on cross-sectional surveys, which do not track changes over time. Moreover, few studies examine the interaction of gender and region, especially in a wide variety of cultural settings [18]. Closing these gaps is crucial to inform interventions and policies to improve health outcomes among young people.

## 3 Methodology

### 3.1 Study Design

A cross-sectional comparative study design was used to study gender differences of health behaviors' and outcomes among adolescents in different geographical regions. This design allowed for data collection at one point in time and the comparative element allowed for examination of differences among groups of gender (male and female) and region (urban and rural). This approach is appropriate for detecting patterns, trends and relationships between variables like health behaviors and health outcomes.

### 3.2 Study Population

We focused on adolescents between 10 and 19 years of age from various regions for a diverse and representative sample shown in table 1. It calculated a sample size of 350 (using statistical calculations, 95% confidence level and 5% margin of

error). This involved a two-stage stratified sampling method, with participants categorized by region (urban/rural areas) and gender for equal representation.

Table 1: Inclusion and Exclusion Criteria

Criteria Type	Description
Inclusion	Adolescents aged 10–19 years
	Residents of selected regions
	Willing to participate with consent
Exclusion	Diagnosed chronic or severe medical conditions
	Incomplete or inconsistent responses

### 3.3 Data Collection Tools

A combination of questionnaires and health evaluations were used to collect data.

1. Health Behavior Questionnaire: A questionnaire was developed utilizing a standard format to measure physical activity, diet, sleep and risk-taking behaviors’ (such as smoking). The questionnaire used a Likert scale for scoring frequency and intensity.
2. Clinical/Health Outcome Assessment: Health outcomes were assessed using basic health measures like Body Mass Index (BMI), perceived mental health and well-being.
3. Interviews (Optional): Interviews were carried out with a sample of participants to understand the socio-cultural factors that might impact health-related factors and to explore other issues.

Table 2: Variables and Measurement Tools

Variable	Instrument Used	Measurement Type
Physical Activity	Health Behavior Questionnaire	Frequency scale
Dietary Habits	Health Behavior Questionnaire	Frequency scale
Mental Health Status	Self-report questionnaire	Likert scale
BMI	Height & weight measurement	kg/m <sup>2</sup>
Risk Behaviors	Questionnaire	Categorical

It adhered to ethical guidelines, with informed consent and privacy shown in table 2. Descriptive and comparative analyses were conducted using statistical software, allowing for the determination of gender and geographical disparities in adolescent health related behaviors’ and outcomes.

## 4 Conceptual frame work

The conceptual model of this research (figure 1) delineates the associations between gender, region and health among adolescents, including health related behaviors’, and takes into consideration the impact of socioeconomic and cultural factors as moderators.

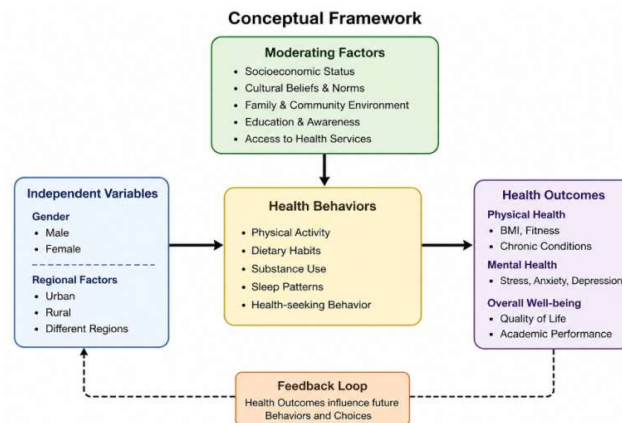


Fig.1. Conceptual model

Underlying gender (male/female) and geography as the independent variables underlie the first level. These variables regulate adolescents' lifestyles and resource accessibility, as well as their environmental exposures. For instance, traditional gender roles can shape physical activity and eating patterns and regional factors can shape health-care accessibility, nutrition, and education. These independent variables directly impact health behaviors', mediating variables.. Health behaviors include:

- a. Physical activity
- b. Dietary patterns
- c. Substance use
- d. Health-seeking behavior

Which in turn affects health, the dependent variables, including?

- a. Physical health (e.g., BMI, fitness levels)
- b. Mental health (e.g., stress, anxiety, depression)
- c. Overall well-being

Overall, the model shows that health outcomes among adolescents are not determined just by individual behavior but are the result of interactions between gender, region, and broader socio-cultural factors. This framework offers a framework for examining inequalities and implementing interventions.

## 5 Results & Discussion

Here, we present the results on gender differences in health behaviors' and regional disparities in health among adolescents. The findings are presented in terms of demographic details, gender patterns of health behaviors, regional variations in health outcomes, and the inter-relationship of variables. Data was analysed using descriptive statistics and correlation. Distribution of participants and comparisons between variables are presented in tables, with differences in health outcomes and health behavior between gender and regions represented graphically.

### 5.1 Participant Characteristics

Table 2: Demographic Characteristics

Variable	Frequency (%)
Age 10–14	46%
Age 15–19	54%
Male	50%
Female	50%
Urban	52%
Rural	48%

The sample was well-balanced in terms of gender (table 2) and with slightly more older adolescents (15-19 years). The sample was well represented across regions, with comparable representation of both urban and rural areas.

### 5.2 Health Behaviors by Gender

Table 3: Health Behavior Patterns

Behavior	Male (%)	Female (%)
Physical Activity	62%	48%
Healthy Diet	46%	54%
Substance Use	35%	22%

Table 3 reports males were more active and more likely to engage in substance use and females practiced healthier eating habits. This is consistent with the gender differences in behaviour due to social roles and lifestyle factors.

### 5.3 Regional Differences in Health Outcomes

Table 4: Health Outcomes by Region

Outcome	Urban (%)	Rural (%)
Obesity	26%	18%
Mental Health Issues	34%	28%
Access to Care	68%	45%

Obesity and mental health issues were higher among urban adolescents, perhaps as a result of sedentary behaviors', and stress factors mentioned in table 4. But they also reported better access to health care services than adolescents living in rural areas.

### 5.4 Association between Variables

Table 5: Correlation Analysis

Variable Pair	Correlation (r)
Gender vs Health Behavior	+0.48
Region vs Health Outcomes	+0.51
Behavior vs Health Outcomes	+0.55

The findings reveal positive associations between gender and health behaviors, and region and health outcomes. There was a significant relationship between health behaviors and health outcomes, meaning health behaviors play a vital role in adolescent health.

### 5.5 Key Findings Visualization

The figure 2 visual highlights differences between males and females for health behaviors', and between regions for health outcomes.

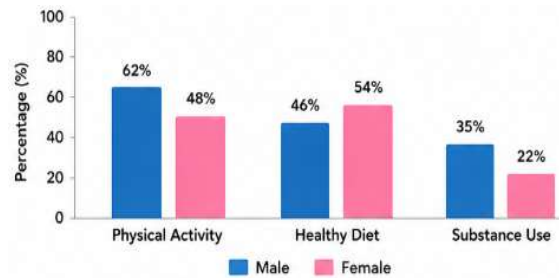


Fig. 2 Health behaviors by gender

This figure 2 compares male and female participation in key health behaviors. Males report higher physical activity (62%) and substance use (35%) than females (48% and 22%). Females show slightly better adherence to a healthy diet (54%) compared to males (46%). The data highlights clear gender-based differences in lifestyle patterns.

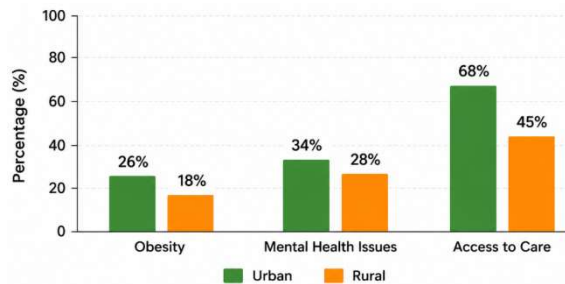


Figure 3: Urban-Rural Health Disparities

This figure shows differences between urban and rural populations. Urban areas report higher rates of obesity (26%), mental health issues (34%), and access to care (68%) compared to rural areas (18%, 28%, and 45%). The data indicates better healthcare access but also higher health risks in urban populations.

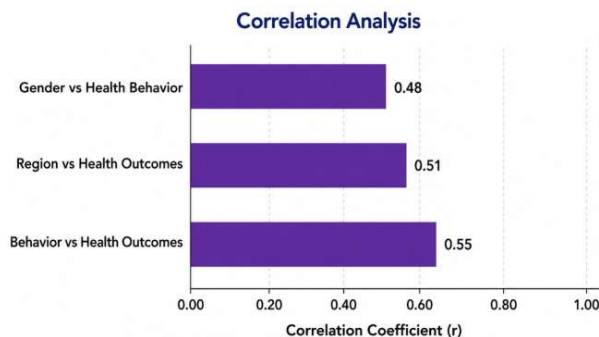


Fig.4. Association between variables

This figure 4 presents relationships between variables. Health behavior strongly correlates with health outcomes ( $r = 0.55$ ). Region also influences outcomes ( $r = 0.51$ ), while gender has a moderate effect on health behavior ( $r = 0.48$ ). The results suggest behavior is the strongest predictor of overall health outcomes.

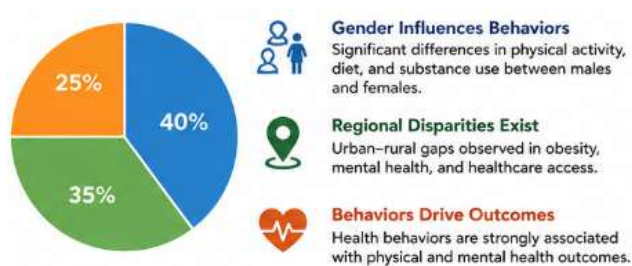


Fig.5. Overall summary

This figure 5 summarizes major findings. Gender influences health behaviors, with noticeable differences between males and females. Regional disparities exist, particularly between urban and rural healthcare access and conditions. Additionally, health behaviors significantly impact outcomes, reinforcing the importance of lifestyle choices in determining both physical and mental health status.

### 5.6 Discussion

Our study found that there are considerable gender and regional variations in health factors among adolescents. This research found that males were more active and engaged in more substance abuse, while females had better eating habits but were more susceptible to some health issues. Geographical differences highlighted urban adolescents' higher prevalence of obesity and psychological problems, despite their greater access to health care services than rural adolescents. The significant positive associations between health variables highlight the importance of healthy lifestyle behaviors'. Our findings are consistent with previous studies, highlighting the impact of socio-cultural and environmental factors. In summary, this study highlights the importance of gender- and region-specific approaches to better health and well-being of adolescents.

## 6 Conclusion and future scope

This research finds that gender and regional variations have a profound impact on adolescent health and health behaviors'. It shows that males tend to be more physically active and more apt to engage in risk-taking behaviors' while females have more healthy dietary behaviors' and may be vulnerable to certain mental health issues. Furthermore, regional variations suggest that urban adolescents have greater obesity and psychopathology burden despite their improved access to health services as compared to rural adolescents. These differences show the interplay between

genetic, societal and environmental determinants of health during adolescence. This study highlights the need for gender- and region-specific health care to address these disparities. Prioritizing good nutrition and exercise, and strengthening mental health services, are key to improving adolescent health. Future research should focus on longitudinal studies to investigate trends in gender and regional health inequalities over time. There is also a need to investigate the impact of digital culture, cultural factors and policy initiatives, and to assess specific programs to reduce inequities and enhance adolescent health worldwide.

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