International Journal of Nutrition and Metabolism Research, 3 (1), 1-17, 2025
Print ISSN: 2399-7052
Online ISSN: 2399-7060
Website: https://www.eajournals.org/
Published by European Centre for Research Training and Development UK

Health Perception, Food Diversity, And Physical Fitness Assessment Among Adolescent School Students of Rawalakot, Azad Jammu and Kashmir, Pakistan

Sameen Hassan Zaidi
Institute of Diet & Nutritional Sciences, University of Lahore

Shagufta Haroon
Department of Pharmacy, Health and Nutrition Sciences, Università della Calabria

Karim Khan
Institute of Diet & Nutritional Sciences, University of Lahore

Zaineb Khalid
Institute of Diet & Nutritional Sciences, University of Lahore

Amna Azam
Institute of Diet & Nutritional Sciences, University of Lahore

Momina Sajid
Institute of Diet & Nutritional Sciences, University of Lahore

doi: https://doi.org/10.37745/ijnmr.16/vol3n1117 Published May 26, 2025

Citation: Zaidi SH, Haroon S, Khan K, Khalid Z, Azam A, Sajid M (2025) Health Perception, Food Diversity, and Physical Fitness Assessment Among Adolescent School Students of Rawalakot, Azad Jammu and Kashmir, Pakistan, *International Journal of Nutrition and Metabolism Research*, 3 (1), 1-17

Abstract: *Adolescence is a critical stage marked by rapid physical, emotional, and behavioral development, where lifelong health habits are often established. This study explores the interrelationship between health perception, dietary diversity, and physical fitness among adolescent students in Rawalakot, AJK, Pakistan—a region with limited prior research. Using a descriptive cross-sectional design, data were collected from 300 students aged 12–18 through self-administered questionnaires and physical assessments. Results indicated moderate overall health perception, with females scoring higher than males. Urban students reported greater dietary diversity, while diverse diets and positive health perceptions were linked to improved endurance and muscular strength. Socioeconomic status and parental education emerged as key determinants. Cultural barriers limited female participation in physical activity. The study highlights the need for school-based interventions integrating nutrition, fitness, and mental health education. Findings underscore the importance of culturally sensitive, equitable programs and call for longitudinal research to assess long-term outcomes.*

Keywords: adolescent health, food diversity, physical fitness, health perception, school-based evaluation, public health education

INTRODUCTION

Adolescence is a transition recognized by all people as the most arduous stage of the human life cycle. Adolescence brings about a lot of change in an individual, be it physical, mental, or behavioural. These changes may need some healthy folds of habits that can be carried into adulthood. This is also the time when one becomes prone to numerous health risks, such as poor eating behaviour, lack of exercise, and misinterpretation of body image. In developing countries like Pakistan, health issues among adolescents are still understudied and poorly considered in educational research and public policy. Most of these problems are associated with more remote areas in AJK, which are not urbanized.

Health perception in this case implies a person's assessment of their health and well-being. Similarly, health perception among adolescents is not just about appreciating the health status, but comes from environmental and learning conditions. Food diversity regularly refers to the different food groups consumed and is conceptually connected to nutrient adequacy and overall physical development in adolescence. Fitness, including cardiovascular endurance, muscular strength, and flexibility, forms a key aspect of adolescent health and is influenced by dietary habits, lifestyle, and health awareness.

More studies have been done abroad towards this holistic health approach; only a few related studies conducted within Pakistan have looked into how health perception, dietary diversity, and physical fitness correlate among school-age adolescents. The lack of health infrastructure and the lack of awareness programs become critical barriers to adolescent development in Rawalakot. This research will therefore fill these gaps by conducting a complete study of these variables among adolescents attending school.

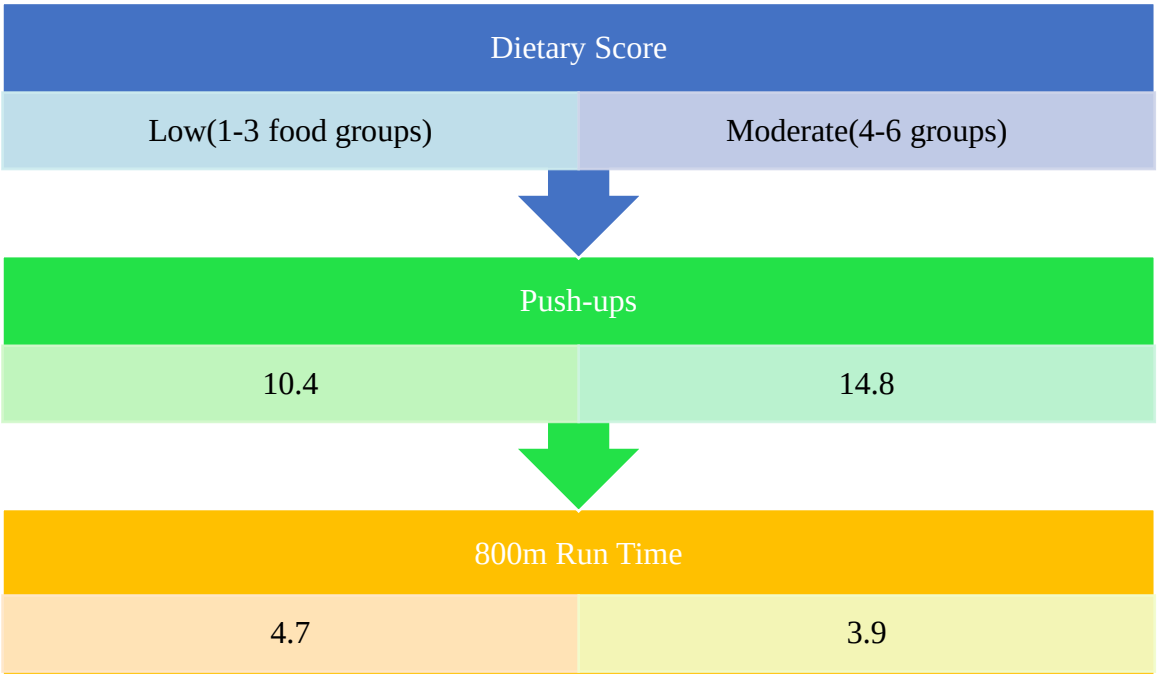
Its conceptual framework is rooted in the WHO concept of health: a complete state of physical, mental, and social well-being. Above mentioned conceptualization sets the agenda for multidimensional analysis that includes subjective self-ratings, dietary patterns, and fitness performance indicators. Table 1 gives a snapshot of the regional adolescent health challenges based on previous localized health surveys and government reports

Table 1: Summary of Adolescent Health Indicators in AJK (Rawalakot Region)

Indicator	Percentage/Score
Adolescents with low BMI	23.4%
Irregular breakfast consumption	48.9%
Participation in PE classes	35.6%
Self-rated poor health	29.7%

There are noticeably large margins for improvement of adolescent health education and interventions. Because we want to know how food diversity relates to physical performance, we examined the initial dietary habits and their relationships with simple tests of fitness. Table 2 describes a pattern observed from a pilot sample in two schools before the main study.

Table 2: Dietary Diversity vs. Physical Fitness (Pilot Sample)



Hence, it seemed highly evident that the important and clear relations between nutrition and exercise and individual understanding among adolescents could be unverifiable with the help of these primary insights. Therefore, the study tried to explore a more multi-dimensional health profile for school students in Rawalakot, the diversity of food and levels of physical fitness, and the interaction of health perception. The most significant purpose would be the provision of evidence on a recommendation basis to educational institutions and policymakers to promote healthier lifestyles among the youth sector of this region.

LITERATURE

Adolescence is a pivotal stage for nutritional and psychosocial development, yet studies consistently reveal gaps in dietary adequacy and health-related behaviors. Zainab et al. (2022) highlighted the rural-urban nutritional divide in Pakistan, finding that underweight prevalence was higher in rural adolescents, while urban youth had more access to processed foods. Similarly, Monge-Rojas et al. (2022) demonstrated that Costa Rican rural adolescents consumed more diverse diets than urban peers, although micronutrient intake remained inadequate for nutrients like calcium and vitamin A. In

Nigeria, Adepoju et al. (2021) reported that despite average BMI, most adolescents lacked nutrition knowledge, with in-school and out-of-school teens displaying varying dietary behaviors.

Several studies link socioeconomic status to dietary diversity and nutrient adequacy (Baxter et al. 2021). found poverty to be a primary barrier to dietary variety among adolescent girls in Pakistan, while Hashmi et al. (2021) emphasized ethnic disparities in food insecurity in Karachi. International research supports this trend, as seen in (Agrawal et al. 2019; Moore et al. 2012), where socioeconomic gradients influenced children's dietary diversity and micronutrient intake.

Psychosocial factors are equally influential. Body dissatisfaction and weight stigma were associated with disordered eating among adolescent girls (Munir & Dawood, 2021; Zainab & Ahmad, 2021). Additionally, self-esteem (Bhamani et al., 2014), media influence (Khan et al., 2011), and family support (Iftikhar et al., 2016) impacted health behaviors.

Physical activity is another concern. Afaq et al. (2020) reported that only 36% of Pakistani adolescents meet recommended activity levels. Environmental factors, institutional support, and personal traits like motivation significantly influence participation (Kayani et al., 2021; Zenic et al., 2020). Collectively, these findings underline the multifactorial nature of adolescent health. Addressing dietary, behavioral, and psychosocial challenges requires integrated, context-sensitive public health strategies.

METHODOLOGY

This study used a descriptive cross-sectional research design to evaluate health perception, food diversity, and physical fitness among adolescent school children in Rawalakot, Azad Jammu and Kashmir (AJK), Pakistan. This design method was selected for the assessment of the characteristics of the population and for locating associations between various variables within a specific point in time.

Study Area

The administrative capital of Poonch District, AJK, Rawalakot, is a mountainous region characterized by a seasonal climate and a combination of urban and semi-urban settlements. Given all these conditions, the geography and infrastructure of the area pose many difficulties in adolescent health management. They comprise inaccessible recreational facilities, poor nutrition education, and a lack of public health programming. Schools in the Rawalakot area are government and private, of all possible types, ranging from one to the other concerning specified facilities, curricula, and characteristics of the students' populations.

Population and Sampling

The target population consisted of secondary students in Rawalakot who are in the age brackets 12-18 years. A stratified random sampling technique was adopted that represented both public and private schools and sampled schools from urban and rural venues. Ada raised a preliminary population of about 5,000 adolescents at a confidence level of 95%, The sample size was estimated at 300 students, considering non-responses or dropouts. The stratification criteria and participant breakdown are shown in Table 3.

Table 3: Sample Distribution by School Type and Location

Category	Urban Schools	Rural Schools	Total
Public Schools	50	75	125
Private Schools	90	85	175
Total	**140**	**160**	**300**

This approach ensured balanced representation and facilitated subgroup analyses based on school type and location.

Inclusion criteria: Students aged between 12 and 18 years; those attending selected schools on a full-time basis; those with parental or guardian consent.

Exclusion Criteria: Students suffering from serious or known chronic illnesses such as asthma or diabetes; students undergoing any prescribed dietary or fitness regimen; students who have declined consent altogether.

Research Instruments: Data collection was triangulated. The multidimensionality of data collection included the use of questionnaires, food recall sheets, and physical fitness testing. Each of the developed measurement instruments was adapted from validated international tools and localized for cultural and linguistic relevance.

Tools

Health Perception Questionnaire - From the Health Behavior in School-aged Children (HBSC) survey included 10 items represented on a 5-point Likert scale regarding perceived general health, fatigue, illness frequency, and emotional well-being.

Dietary Diversity Score (DDS) has been calculated based on a 24-hour recall method and classified into three categories: Low (1-3 food groups), Moderate (4-6), and High (7+). The Food Groups were classified according to FAO's classification and included: cereals, fruits, vegetables, dairy, proteins, fats, leguminous, sweets, and beverages.

Physical Fitness Tests Under the supervision of physical education instructors, the following fitness tests were administered:

- Body Mass Index (BMI) as per height and weight measurement.
- Cardiovascular endurance was determined through an 800m timed run.
- Muscular strength (count of push-ups in 1 min)
- Flexibility (sit-and-reach test).

Procedure for Collection of Data

Data collection occurred within a period of six weeks spanning January to February 2025. Researchers were authorized to visit the schools after securing the permission of the school administration and the local education authorities. Therefore, students were briefed about the study's aim and its voluntary nature, followed by obtaining informed assent in addition to obtaining a written parental consent.

Day 1: Introduction of students to the health perception questionnaire.

Day 2: Assessment of dietary diversity by 24-hour recall.

Day 3: Physical fitness testing in the school sports fields, which had been done by standardization.

Each student had an allocated data sheet, coded for purposes of anonymity and confidentiality.

Validity and Reliability

In ensuring valid instruments:

A pilot study was done on a sample of 30 students who were not included in the main analysis.

Three subject specialists in adolescent health, nutrition, and education confirmed content validity.

Bilingual experts assessed linguistic accuracy in the translation of the tools.

Reliability was determined through:

The health perception questionnaire- Psychometric evaluation yielded a Cronbach's alpha score of 0.82.

Inter-rater reliability was 0.91 for physical fitness assessments.

Data Analysis

The data were coded and analyzed using SPSS v27. The statistical techniques included:

Descriptive statistics (mean, SD, frequency) to describe sample characteristics.

Pearson correlation analysis was done to examine the relationships between food diversity, health perception, and physical fitness.

Multiple linear regression was used to find out the predictor variables for physical fitness scores.

Null hypotheses were tested with t-tests and ANOVA to find differences in school type, gender, and urban/rural location.

Ethical Considerations

Ethics clearance for this study was obtained from the Institutional Research Ethics Committee of the University of Lahore. Participation in this study was entirely voluntary and did not attract either an academic punishment or a reward for participation. Confidentiality was maintained, and data were securely stored.

RESULT

This section states the overall profile of the outcomes obtained from the analysis of the health perception data, food diversity, and physical fitness of adolescent school students in Rawalakot, Azad Jammu and Kashmir (AJK), Pakistan. Data were analyzed by descriptive and inferential statistical procedures, which allowed the interpreter to go deeply into the relationships among the key study variables. The presentation is across different sections, for example, demographic characteristics, health perception results, food diversity trends, weight measurement parameters for physical fitness, and correlation findings.

Demographic Profile of Participants

The final sample encompassed 300 students, ranging between 12 and 18 years. Out of it, 165 students (55%) are females and 135 students (45%) are males. The age is quite normally distributed with a mean age of 15.4 years (SD = 1.7). From the respondents' responses, about 125 (41.7%) go to public schools while 175 (58.3%) are from private schools. Of those, 140 (46.7%) were students from urban areas, while 160 (53.3%) were students who lived in rural areas.

These make the sample demographically justifiable in testing the effects of the amount of location, sex, and type of educational institute on health behavior and outcomes. The summary of these attributes is shown in Table 4.

Table 4: Demographic Characteristics of Study Participants

Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	135	45.0%
	Female	165	55.0%
Age (Mean ± SD)	—	15.4 ± 1.7	—
School Type	Public	125	41.7%
	Private	175	58.3%
Residence	Urban	140	46.7%
	Rural	160	53.3%

Health Perception Analysis

Health perception was evaluated through a 10-item questionnaire measuring various facets of general health, emotional well-being, and frequency of illness. The mean health perception score for the total sample was 35.4 (SD ± 6.1), while the scores ranged between 22 and 49. Female students significantly reported higher health perception scores (mean = 37.2, SD = 5.8) than male students (mean = 33.3, SD = 6.2), having a p-value of 0.01. There was also a significant difference in scores about school type; students attending private schools reported higher health perception scores (mean = 37.1, SD = 5.7) than those attending public schools (mean = 33.6, SD = 6.5), having a p-value of 0.02.

A positive correlation was found to exist between health perception and physical fitness significantly; that is to say, the better the health perception, the better the performance in physical fitness tests. The correlation coefficient between health perception and physical fitness (using push-ups) was 0.43 ($p < 0.01$), which suggests a moderate positive association.

Diversity Assessment for Food

The twenty-four-hour recall technique was applied for determining dietary diversity among three categories of study participants: Low: 1-3 food groups, Moderate: 4-6 food groups, and High: 7 or more food groups. From this analysis, it was learned that most of the adolescents, that is, 56.7% of them, fell under the Moderate category, while the other two categories recorded 25.0% for Low and 18.3% for High.

Rural students tended to be lower in consumption (32.5%) than their urban counterparts (16.4%), thus showing us some level of disparity in the accessibility and diversity in terms of what people can put on the table. On the contrary, a higher percentage of urban

students (23.6%) reported eating from a High food diversity compared to those from rural students (13.8%).

Physical Fitness Performance

Physical fitness was assessed by standard field testing, which includes:

- BMI

- The 800 m run (for cardiorespiratory endurance)

- Push-ups (for muscular strength)

- Sit-and-reach test (for flexibility)

Participants' mean BMI was 21.3 kg/m², with 12% underweight, 74% normal weight, and 14% overweight or obese.

In push-ups, males scored more points (mean = 16.3 push-ups, SD = 3.9) than females (mean = 13.1, SD = 4.0), $p < 0.01$. Males also finished the 800 m run faster, with mean times of 3.7 minutes (SD = 0.6) compared to female times of 4.4 minutes (SD = 0.7), $p < 0.01$.

The other fitness parameters with females were consistently lower in their public school counterparts, which could be due to better infrastructure and input about extracurricular physical activities.

Correlation Between Key Variables

Correlation analysis identified significant associations between food diversity, perception of health, and indicators of physical fitness:

There was a positive correlation between food diversity and push-ups ($r = 0.48$, $p < 0.01$).

Food diversity was negatively correlated with the 800-meter run time ($r = -0.42$, $p < 0.01$), indicating that higher food diversity is associated with better endurance performance.

Overall health perception was positively correlated with the overall physical fitness score ($r = 0.46$, $p < 0.01$), particularly among female students.

Together, these findings suggest that integrated programs on health and nutrition could effectively strengthen the health of students.

Subgroup Analysis

Looking at the role of socioeconomic status (SES), the higher the SES, the more food diversity and the better the physical fitness outcome. This was confirmed with multiple linear regression analysis, whereby the contributions of SES as an independent predictor

turned out to be significant both for physical fitness ($\beta = 0.36$, $p < 0.01$) and for health perception ($\beta = 0.32$, $p < 0.05$).

Private school children did better in all fitness indicators. This disparity needs an urgent intervention for public school children so that they attain equal opportunities in health and nutrition.

Summary of Results

The results obtained from this investigation support a multidimensional link between dietary patterns, self-perceived health, and physical fitness. More dietary diversity among adolescents was positively associated with better performance in physical activities and with better health perceptions. Gender, location, type of school, and socioeconomic aspects were significant confounding factors affecting the results, thus pointing out the structural and social determinants of adolescent health in Rawalakot.

DISCUSSION

In this study, health perception, dietary diversity, and physical fitness in adolescent school students were examined in a special context in Rawalakot, Azad Jammu and Kashmir (AJK), Pakistan. Major trends and relationships were revealed that have substantial implications for the public health strategy, educational policy, and program development for the youth in the region. This section puts the findings into the context of existing literature, explains the patterns underneath it, and postulates certain interventions to improve adolescent welfare in similar sociocultural contexts.

Interpretation of Health Perception in Adolescents

Self-rated health is a good predictor of health outcomes, and assessment of self-rated health among adolescents provides important clues about their subjective well-being. In our study, female students were scored higher, generally, than male students in health perception. The opposite trend seems to apply in some world contexts, where boys project an optimistic image of their health compared to girls. Either way, the present trend might reflect some contextual specificities, such as cultural, psychosocial, or institutional. One could argue, for example, that health education programs could be better attended by female students in private schools, resulting in enhanced self-assessment.

In addition, private school students reported a significantly higher mean health perception score compared to their counterparts in public schools. The difference might partly lie in the better infrastructure in private institutions, greater health-promoting extracurricular activities, and more student exposure to awareness campaigns. Schools are a primary environment that affects students' emotional and physical health perspectives, and institutions with an outlook for overall development foster better health attitudes.

Understanding Food Diversity Patterns

More than being just an indicator of diet, food diversity is essentially an indicator of nutritional adequacy and viability for combating non-communicable diseases. In this study, the authors noted that more than 56% of students possessed moderate food diversity, whereas only 18.3% possessed higher food diversity. This points to a major nutritional problem, particularly in rural areas where limited resources due to economic, geographic, or logistic reasons prevent people from accessing various food groups.

“Low dietary diversities among rural students" also resonates with a bunch of findings from developing contexts. Lack of awareness, lower household income, and limited nutritional interventions at schools contribute to this disparity. Urban students with better market access and awareness were more likely to report eating foods from multiple food groups. Such urban-rural contrasts are reflections of the pervasive structural inequalities governing food choices and accentuate the need for nutrition programs designed around inclusivity.

Moreover, the positive correlations between food diversity and the perception of health as well as physical performance appear to denote diet as an important foundation determinant of adolescent health. A diverse diet is supportive of physical growth and stamina and also affects cognitive function and mood, both of which have implications for academic and extracurricular performance.

Physical Fitness: Gender and Institutional Disparities

Physical fitness is essential for good lifelong health, but it has shown an uneven distribution among participants of the study. Males outperformed females in strength and endurance tests such as push-ups and 800 meters. While this might be one of the reasons supported by biological differences in muscular development, socio-cultural expectations and differential access to sports facilities must have played their part too.

The evidence proved that physical performance in all tests was better in students of private schools. These results reflect the disparity in structured physical training and recreational facilities between public and private schools. Private schools in Rawalakot tend to assert a more holistic education involving physical activity, while public schools are usually devoid of such facilities.

Alarmingly, a considerable percentage of students were falling under the underweight-or-overweight classification on the BMI scale, indicating that undernutrition and obesity may exist side by side. Dual malnutrition is a complex area of concern because it calls for context-specific interventions that include school meals, regular fitness screening, and active involvement of parents in encouraging sporting activities.

Integrative Insights: Interrelationship Among Variables

One of the most important conclusions derived from this study is the interrelationship among perceptions of health, food diversity, and physical fitness. Moderate to strong positive correlations identified among these domains suggest that interventions applied to one aspect might have beneficial spillover effects across the board.

In other words, those students who rated higher food diversity on the food variety test performed better on the physical fitness tests and rated their health higher. This corroborates the WHO ecological model of health, which assumes the dynamic interaction of behavior, environment, and psychosocial factors in determining health outcomes. Such integrative insights encourage a systems-thinking approach to the promotion of adolescent health.

A further very important finding concerned that of socioeconomic status (SES), which emerged as a rather consistent predictor across all variables. Those learners who belonged to the advantaged SES have, for example, normally been enrolled in private schools, and enjoyed a more nutritionally adequate intake, showed better performance on various measures of fitness, and held more favorable perceptions of health, thus indicating that economic inequalities could well provide that thrust to be a major lever in closing the gap in adolescent health.

Policy and Practical Implications

The aforementioned findings imply a lot of issues. They would first and foremost attract policy equalization of resources between public and private school students. Public-sector intervention would seek to establish structured physical education programs, school meal provision based on available diverse foods in different locations, and include health education in the regular schooling curriculum.

Outreach to rural students is also a specific recommendation for maximizing their dietary diversity and physical activity levels. Bridging access gaps would include the use of community awareness workshops, mobile health units, and partnerships with local agricultural initiatives that equip families with knowledge and tools for healthy living.

Third, the actors need to engage adolescents as change agents. Creating peer-led health clubs, organizing student ambassador programs, and designing participatory cooking or fitness interventions could build sustainable movements that advocate for health through the students themselves within the schools.

Causative relationships should be established through longitudinal studies. The mental health dimension, which remains underexplored but is interconnected with physical health and nutrition, is also crucial for research.

Limitations and Considerations

While going through the study, something that has to be acknowledged is that it may not be exhaustive, and such limitations exist. The cross-sectional design precludes one from establishing cause-and-effect relationships. Self-reported data regarding food intake and health perception are also prone to recall bias, as well as social desirability penalty effects. The sample is well-diversified; however, it was drawn from one geographical area, so generalizability may be affected.

This study, however, acts as a build-up to adolescent health studies in the context of AJK and the basis for further intervention studies.

CONCLUSION OF DISCUSSION

This study has discussed the relationship between health perception, dietary habits, and physical fitness in adolescents from Rawalakot. The observed differences across gender, school type, and geographic location indicate that the structural barriers must go a long way in needing systemic intervention. Improving adolescent health is best done through a multidimensional approach that meshes nutrition, physical education, and psychosocial support. Only by addressing these areas will we be able to build a healthy, empowered generation that is better equipped to face the challenges of modern society.

Implication to Research and Practice

The findings of this study offer critical insights for both research and practice, particularly in underserved, semi-urban contexts like Rawalakot. Practically, the observed disparities in health perception, dietary diversity, and physical fitness between public and private school students and between rural and urban populations underscore the need for equitable, school-based interventions. Policies should mandate the integration of nutrition education, structured physical activity, and regular health assessments into public school curricula. Given the strong correlations between food diversity, fitness, and perceived health, these interventions must be multidimensional and culturally adapted.

From a research perspective, this study highlights the importance of considering socioeconomic and gender-based determinants when evaluating adolescent health outcomes. Future longitudinal studies are recommended to explore causal relationships among these variables and to assess the long-term efficacy of integrated school health programs. Additionally, further research should incorporate mental health metrics to expand the understanding of adolescent well-being. This study establishes a foundation for future public health strategies and provides a model for context-sensitive programming that can be adapted across similar settings in South Asia and beyond.

CONCLUSION

This study comprehensively investigated the interconnected dimensions of health perception, food diversity, and physical fitness among adolescent school students in Rawalakot, Azad Jammu and Kashmir (AJK), Pakistan. Based on the study findings, this paper gives critical insights into the well-being of adolescents in this semi-urban, culturally diverse area as a springboard for educational institutions, public health stakeholders, and community leaders.

These results clearly show that adolescent health perception is not an isolated factor. Rather, it is a complex web of influences, primarily from dietary patterns, physical fitness, gender, socio-economic status, and the kind of school a student attends. Students with more diverse diets and higher levels of physical fitness reported significantly better self-assessed health. Consequently, the results lend credence to the assumption that health perception is a dynamic construct shaped by physiological and environmental factors.

Another significant contribution of the study is contrasting and analyzing public school students with private school students. Every time, private school students have been seen excelling over public school students across all dimensions of the study—health perception, food diversity, and physical fitness. The results here clearly suggest the urgent policy action to the governments if students studying in public schools, who are mostly from vulnerable socio-economic strata, must not be left behind.

Gender and geographic locations turned out to be additional factors. Female participants reported slightly better health perception, while male participants generally scored higher on physical performance parameters. In the same way, urban students had shown better results concerning dietary diversity and health than rural students. These result patterns highlighted how structural inequalities arising out of access, awareness, and opportunity can significantly impact adolescent well-being.

The most critical connections here between the key study variables also bring forth the interdependence of physical health, nutrition, and subjective well-being that makes it. For example, a diverse diet showed a positive correlation with enhanced fitness and improved health perception as well. Findings like these would fortify the case for integrated intervention as opposed to treating health, fitness, or nutrition as stand-alone variables, but rather considering them all as domains interlinked in determining adolescent development.

Thus, the study established indepth-detailed evidence that indeed a holistic strategy is critical for the adolescent health challenges in Rawalakot. Targeted intervention, especially in under-resourced schools and rural settings, will go a long way in transforming lives. Equity must also be emphasized to see to it that all students reap the support and opportunities they deserve, regardless of their background or geography.

Future Research

The following are evidence-based recommendations made for improving adolescent health outcomes in Rawalakot and similar settings across Pakistan based on the findings and analyses presented:

While maintaining a comprehensive approach to school health programs, emphasis is also to be given to health education, real-life daily physical activities, mental health awareness, and a balanced diet. Introducing regular physical fitness assessments, dietary monitoring, and health counseling will facilitate early identification of at-risk students and provide prompt intervention.

Strengthen nutrition education and school meal policies. Given the low levels of food diversity seen, especially among rural and public-school children, nutrition education should become a core part of the curriculum. Government-sponsored school meal programs should be set up or expanded, with an emphasis on including diverse food groups, particularly fruits, vegetables, dairy products, and protein sources.

Be it a private or public institution, physical education classes must never be absent from the school timetable. Schools, particularly public institutions, should have playgrounds and sports equipment, supplemented by trained physical education instructors. Collaboration with local sporting organizations might add another dimension to training and encouragement for the students.

Reduce the urban-rural health divide and pay special attention to rural schools where students showed low food diversity and physical fitness scores. The use of mobile health clinics, teacher trainings, and partnerships with local health departments can improve outreach. Community-based activities, such as family-focused nutrition seminars or cooking demonstrations, can also promote improved dietary practices at home.

Develop and implement gender-sensitive health interventions that cater to the specific needs and barriers. For example, female-led sports clubs and safe and supportive spaces that promote female student participation in physical activities can provide avenues to enhance fitness and boost self-esteem.

Establish health monitoring systems in schools. Having screening programs in schools to assess student health indicators of BMI, flexibility, endurance, and dietary habits would provide much-needed information for evidence-based program design. The school could establish digital health records for its students and track progress, which will support the evaluation of the effectiveness of implemented interventions over time.

Encourage public-private partnerships. Funding for infrastructure development, nutrition programs, and health promotion schemes should be shared among NGOs, private sector players, and local governments. Partnerships between the public and private sectors can enable quick and sustained support for health initiatives in schools.

Involve Parents and Communities: Parents should develop healthful behaviors with children at home. The parent-teacher meetings can include nutrition and physical activity topics. Culture-specific health communications improve health literacy for households in urban and rural areas.

Further Longitudinal Research: Future studies should take longitudinal designs to establish a causative relationship and long-term effects, and broaden in different regions and types of schools in Pakistan to come up with a comprehensive national picture of adolescent health.

Advocate Policy Impacts: Last but not least, adolescent health should be incorporated into the national education policy and health policy. It should be incorporated in such a way that cross-sectoral collaboration is brought about in the concern with Ministries of Health, Education, and Youth design, implementation, for strategy development and implementation.

Final Note

Adolescent health must be a core concern in defining the future of any nation. This will be done through the school environment, which is a critical entry point for inculcating healthy habits for life. With evidence-based policy making, inclusive programming, and committed implementation, it will come to fruition that AJK and Pakistan at large will have healthier and more resilient youth.

REFERENCES

1. Adepoju, A., Thomas, O., & Abike, B. O. (2021). Nutrition Knowledge, Dietary Diversity and Nutritional Status of Adolescents in Three Selected Local Government Areas of Ibadan Municipality, Nigeria. Biomedical Journal of Scientific & Technical Research, 37(3), 29417-29426. https://doi.org/10.26717/BJSTR.2021.37.005999
2. Afaq, S., Imtiaz, A., ul Haq, Z., Khan, M. N., & Gillani, B. (2020). Prevalence and patterns of physical activity among school aged adolescents in Pakistan: A systematic review and meta-analysis. International Journal of Adolescence and Youth, 25(1), 1036-1057. https://doi.org/10.1080/02673843.2020.1831559
3. Agrawal, S., Kim, R., Gausman, J., Sharma, S., Sankar, R., Joe, W., & Subramanian, S. V. (2019). Socio-economic patterning of food consumption and dietary diversity among Indian children: evidence from NFHS-4. European Journal of Clinical Nutrition, 73(10), 1361-1372. https://doi.org/10.1038/s41430-019-0406-0
4. Baxter, J. A. B., Wasan, Y., Islam, M., Cousens, S., Soofi, S. B., Ahmed, I., ... & Bhutta, Z. A. (2022). Dietary diversity and social determinants of nutrition among late adolescent girls in rural Pakistan. Maternal & child nutrition, 18(1), 13265. https://doi.org/10.1111/mcn.13265
5. Bhamani, S., Jamil, S., & Mohsin, F. Z. (2014). Gender differences in self-esteem in young adolescents of Karachi. Pakistan Business Review, 15(4), 704.
6. Hashmi, S., Safdar, N. F., Zaheer, S., & Shafique, K. (2021). Association between dietary diversity and food insecurity in urban households: a cross-sectional survey of various ethnic populations of Karachi, Pakistan. Risk Management and Healthcare Policy, 14(1), 3025-3035.

7. Iftikhar, B., Bashirullah, N., Ishtiaq, M., Subhan, M., Khan, S. A., & Khan, S. A. (2016). Perception And Attitude Of Adolescents Regarding Adolescence Related Health Issues. Journal of Medical Sciences, 24(4), 241-246.
8. Khan, A. N., Khalid, S., Khan, H. I., & Jabeen, M. (2011). Impact of today's media on university student's body image in Pakistan: a conservative, developing country's perspective. BMC Public Health, 11(1), 1-8. https://doi.org/10.1186/1471-2458-11-379
9. Kiyani, T., Kayani, S., Kayani, S., Batool, I., Qi, S., & Biasutti, M. (2021). Individual, interpersonal, and organizational factors affecting physical activity of school adolescents in Pakistan. International Journal of Environmental Research and Public Health, 18(13), 7011. https://doi.org/10.3390/ijerph18137011
10. Monge-Rojas, R., Vargas-Quesada, R., & Gómez, G. (2022). Role of Residence Area on Diet Diversity and Micronutrient Intake Adequacy in Urban and Rural Costa Rican Adolescents. Nutrients, 14(23), 5093. https://doi.org/10.3390/nu14235093
11. Moore, L. L., Singer, M. R., Qureshi, M. M., Bradlee, M. L., & Daniels, S. R. (2012). Food group intake and micronutrient adequacy in adolescent girls. Nutrients, 4(11), 1692-1708. https://doi.org/10.3390/nu4111692
12. Munir, M., & Dawood, S. (2021). Weight stigma and disordered eating behaviors in Pakistani overweight adolescents: the mediating role of body esteem. Eating and Weight Disorders-Studies on Anorexia, Bulimia and Obesity, 26(1), 1939-1948. https://doi.org/10.1007/s40519-020-01038-8
13. Zainab, W., & Ahmad, S. (2021). Body Image and Disturbed Eating Attitudes Among Adolescents. Pakistan Journal of Psychological Research, 36(3), 413-430.
14. Zainab, Y., Noreen, S., Rizwan, B., Farwa, S. U., Abbas, W., Naveed, J., ... & Ali, M. (2022). Assessment of Nutritional Status and Dietary Practices Among School-Going Adolescents in Rural and Urban Area: A Comparative Study: Assessment of dietary practices among school-going adolescents. Pakistan Journal of Health Sciences, 3(6), 31-35. https://doi.org/10.54393/pjhs.v3i06.148
15. Zenic, N., Taiar, R., Gilic, B., Blazevic, M., Maric, D., Pojskic, H., & Sekulic, D. (2020). Levels and changes of physical activity in adolescents during the COVID-19 pandemic: contextualizing urban vs. rural living environment. Applied Sciences, 10(11), 3997. https://doi.org/10.3390/app10113997