

**Analysis of Determinants of Students' Physical Conditions in Urban and Rural Environments**Raehan Fathur Farhanu^{1*}, Hijrah Maulidiah Afifah²¹²Faculty of Sports Sciences, Universitas Negeri Semarang, Semarang, Indonesia**Keywords**

physical condition;
physical fitness;
environmental
determinants; high
school students;
urban; rural

Abstract

This study aims to analyze the determinants of students' physical condition in urban and rural environments in Semarang. The study used a quantitative, correlational method. The study sample consisted of 67 students, consisting of 33 rural students and 34 urban students, selected using a purposive sampling technique. Data collection was carried out using the Neighborhood Environment Walkability Scale-Youth (NEWS-Y) questionnaire, anthropometric measurements, and the Nusantara Student Fitness Test (TKPN), which includes V Sit Reach, Sit Up, Squat Thrust, and PACER. Data analysis used descriptive statistics, normality and linearity tests, and Pearson Product-Moment correlation tests with SPSS version 26. The results showed that most students in both schools were in the category of sufficient physical fitness. Urban students had higher average TKPN scores than rural students across all test components. The results of the correlation test showed that the relationship between environmental determinants and students' physical condition was 0.110 in rural areas ($p=0.541$) and 0.080 in urban areas ($p=0.654$). These results indicate that the relationship between environmental determinants and students' physical condition is very low and insignificant. This study indicates that students' physical condition is influenced by various factors such as daily physical activity, nutritional status, modern lifestyle, and active lifestyle habits.

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INTRODUCTION

Physical education is an integral part of the education system, playing a vital role in supporting students' physical, mental, emotional, and social development (Raharjo et al., 2026; Sari et al., 2024). In the context of modern education, Physical Education is not only viewed as a movement activity but also as a means of character building, improving health, and enhancing students' quality of life (Hasan, 2024). Regular physical activity significantly improves physical fitness, motor skills, and students' readiness to undertake daily learning activities (Hasan et al., 2025). Therefore, Physical Education learning plays a strategic role in developing a healthy, active, and productive generation. However, technological advancements and lifestyle changes in the modern era have led to a shift in societal behavior, particularly among children and adolescents, who tend to prefer passive activities over active physical activity. This situation poses a serious challenge to maintaining students' physical condition in the school environment.

The development of digital technology has drastically changed students' daily activity patterns. Children today spend more time using electronic devices such as smartphones, computers, and digital games than engaging in outdoor physical activities (Yulianto, 2025). These lifestyle changes have led to reduced physical activity, contributing to students' low levels of physical fitness. Low physical activity is known to be associated with an increased risk of various health problems, especially those related to the cardiovascular system, body metabolism, and reduced general physical capacity (Supriadi et al., 2026; Syam, 2025). Students' physical condition plays a very important role in supporting learning activities and daily activities. Students who are in good physical condition and fitness tend to be better able to participate optimally in the learning process without experiencing excessive fatigue. Conversely, students with poor physical condition will tire more easily, have reduced focus, and show lower learning motivation (Chen & Qin, 2024; Zhao & Huang, 2025). Physical fitness includes important components such as endurance, strength, agility, speed, flexibility, coordination, balance, and accuracy, which, together, support the body's ability to perform physical activities effectively and efficiently. Therefore, students' physical condition is not only related to health aspects, but also affects the quality of learning and students' academic achievement at school.

Students' physical condition is influenced by two factors: intrinsic and extrinsic (de Freitas et al., 2025; Işıkgoz, 2025). Intrinsic factors include students' daily physical activity levels, nutritional status, health conditions, motivation, and healthy lifestyle habits. Meanwhile, extrinsic factors encompass the physical and social environment, such as the availability of sports facilities, open spaces for activities, community culture regarding sports, and support from family and school. A supportive environment will encourage students to be more active, while a less supportive environment can hinder the development of an active and healthy lifestyle.

The characteristics of urban and rural environments also have different influences on students' physical activity. In urban areas, sports facilities and infrastructure are generally more complete and easily accessible (Sholeh et al., 2025). However, urban life is often synonymous with the use of motorized vehicles, high levels of technology-based activities, limited open spaces, and dense residential areas. These conditions result in students having fewer opportunities for active movement or free play (Maulana et al., 2025). In contrast, rural areas generally have more open spaces, giving students greater opportunities to engage in physical activity freely. Furthermore, the increasing influx of technology and modernization into rural areas is also beginning to influence children's activity patterns (Pradana & Winarno, 2025). As a result, students in rural areas do not always have higher levels of physical activity than students in urban areas.

Research by Aziz et al., (2025) shows that school and residential environments, as well as daily physical activity levels, are associated with students' physical condition and fitness. Several studies have shown that students living in rural areas tend to engage in more daily physical activity than those in urban areas (Husni et al., 2024; Wardani et al., 2025). On the other hand, research by Wangi & Hita, (2026) found that the availability of more comprehensive sports facilities in urban areas can support more structured physical activity. However, most previous research has focused on a single aspect, such as physical activity or fitness, without examining

the overall environmental impact. Furthermore, comparative studies examining the determinants of students' physical condition in urban and rural environments are still relatively few, particularly in the Semarang area. The increasing tendency of children to lead sedentary lifestyles is a significant concern because it can negatively affect physical fitness and overall health behaviors. Physical fitness plays a crucial role in supporting student health, academic achievement, and optimal physical development. Based on these considerations, this study aims to examine the influence of environmental determinants in urban and rural environments on students' physical condition and to identify differences in their characteristics. These findings are expected to contribute to the development of knowledge in the fields of physical education and health sciences, particularly regarding the relationship between environmental factors and students' physical status. Furthermore, the results of this study can provide practical implications for physical education teachers, schools, and related stakeholders in developing school-based physical activity programs and curriculum strategies that encourage healthier behaviors and improve students' health-related fitness.

METHODS

Design This study used a quantitative correlational design to analyse the relationship between environmental determinants and urban & rural students physical fitness in Semarang. Data were collected from May 18–19, 2026. Study Population comprising students from urban and rural representation in two selected senior high schools. This research employed purposive sampling with the predetermined inclusion criteria of 67 students. Inclusion criteria: tenth-grade students who were physically and mentally healthy enough to comply with tasks voluntarily, obtain informed consent as mental health experts perceived them competent to do so and complete all assessment procedures.

This study investigated two major factors: environmental factors and students' physical fitness. Surveys, anthropometric measures and performance testing were among the methods employed to obtain data. Environmental determinants were assessed with the Neighborhood Environment Walkability Scale for Youth (NEWS-Y), which evaluates students' perceptions of sports facilities near home, presence of walking/bicycling paths nearby neighborhoods and schools, traffic safety around school/neighborhoods and barriers to safe access areas in their neighborhood/home. Anthropometric data (height, body weight and Body Mass Index) were compared to determine students' nutritional status. Physical fitness was measured using the Indonesian Ministry of Youth and Sports-developed Tes Kebugaran Pelajar Nusantara (TKPN). The TKPN consists of a number of benchmark measurements - flexibility (V-Sit and Reach), abdominal muscle endurance Sit-up, muscular and cardiovascular endurance Squat Thrust & cardiorespiratory Endurance Progressive Aerobic Cardiovascular Endurance Run (PACER). The raw scores obtained for each test item were then converted into standard TKPN scores according to applicable norms based on the participant's age and gender. Next, all standard scores for each component were added together to produce a total physical fitness score for each student. The TKPN norms used in this study are as follows:

Table 1. TKPN Norms

Category	Achievement Results
Excellent	> 4
Good	3 - 3,9
Fair	2 - 2,9
Poor	1 - 1,9
Very Poor	< 1

Data analysis was performed using SPSS version 26. Descriptive statistics were used to present the mean, minimum, maximum, and standard deviation. Prior to hypothesis testing, prerequisite analyses, including the Shapiro–Wilk normality test and linearity test, were conducted to ensure that the data met parametric assumptions. Hypothesis testing was conducted using Pearson's Product-Moment correlation to determine relationships among

variables, followed by linear regression to identify the contribution of environmental determinants to students' physical condition. Statistical significance was set at $p < 0.05$.

RESULTS AND DISCUSSION

Table 2. Characteristics of Research Samples

Characteristics		Rural Students		Urban Students	
		N	Percentage (%)	N	Percentage (%)
Gender	Male	15	45,5	17	50
	Female	18	54,5	17	50
Age	15 years	14	42,42	15	44,12
	16 years	16	48,48	18	52,94
	17 years	3	9,09	1	2,94
Body Mass Index	Underweight	16	48,48	9	26,47
	Normal	15	45,45	17	50,00
	Overweight	0	0	3	8,82
	Obese	2	6,06	5	14,71

Based on **Table 2.** the total study sample consisted of 33 rural students and 34 urban students. Based on gender, the majority of rural students were female (18 students, 54.5%), while 15 (45.5%) were male. Meanwhile, among urban students, the number of male and female respondents was equal at 17 students (50% each). The majority of respondents in both schools were 16 years old: 16 (48.48%) rural students and 18 (52.94%) urban students. Based on body mass index (BMI), underweight was the most common among rural students (16 students (48.48%)), while in urban students, the majority of respondents were in the normal weight category (17 students (50.00%)). Furthermore, overweight and obesity were more common among urban students than among rural students.

Table 3. Classification of environmental determinant levels

Classification	Rural Students	Urban Students
Very Poor	0	0
Poor	1	2
Moderate	28	25
Good	4	7
Very Good	0	0

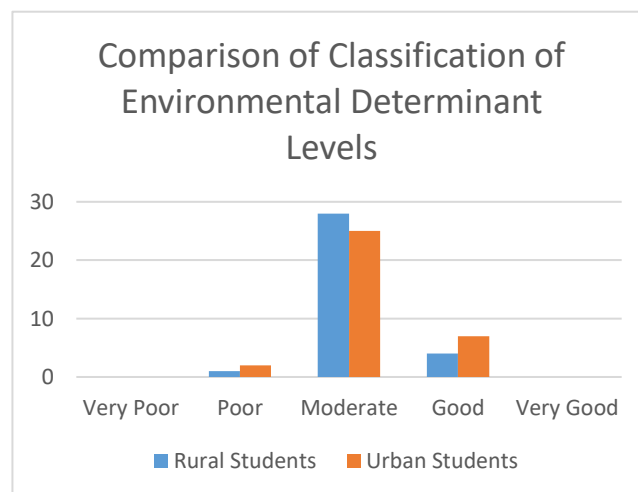


Figure 1. Comparison Of Distribution Of Environmental Determinant Levels

Based on **Table 3.** and **Figure 1.** the majority of students in both schools fell into the moderate category for environmental determinants. Among rural students, 28 were classified as moderate, 4 as good, and 1 as poor, with no students in the very poor or very good categories. Meanwhile, among urban students, 25 were classified as moderate, 7 as good, and 2 as poor, with no students in the very poor or very good categories. These results indicate that the majority of students in both schools had moderate levels of environmental determinants.

Table 4. Results of the TKPN Physical Fitness Test

Item Test	Rural Students			Urban Students		
	Min	Max	Mean $\pm$ Stdev	Min	Max	Mean $\pm$ Stdev
V Sit Reach	13	54	33,91 $\pm$ 10,5	20	47	37,85 $\pm$ 6,09
Sit Up	8	34	20,64 $\pm$ 9,4	9	38	23,68 $\pm$ 7,53
Squat Trust	5	20	12,76 $\pm$ 4,67	3	28	13,53 $\pm$ 4,82
Pacer	6	36	17,45 $\pm$ 11,14	7	45	22,12 $\pm$ 11,86

According to **Table 4.** urban students had higher average scores across all components of the TKPN test than rural students. The Sit-Reach V test averaged 37.85 ± 6.09 and 33.91 ± 10.5 , the Sit-Up test 23.68 ± 7.53 and 20.64 ± 9.4 , the Squat Trust test 13.53 ± 4.82 and 12.76 ± 4.67 , and the Pacer test 22.12 ± 11.86 and 17.45 ± 11.14 . These results indicate that urban students tend to have better physical fitness than rural students.

Table 5. Comparison of TKPN Category Results

Category	Rural Students		Urban Students	
	Frequency	Percentage	Frequency	Percentage
Excellent	0	0,00	1	2,94
Good	9	27,27	11	32,35
Fair	24	72,73	22	64,71
Poor	0	0,00	0	0,00
Very Poor	0	0,00	0	0,00
Total	33	100	34	100

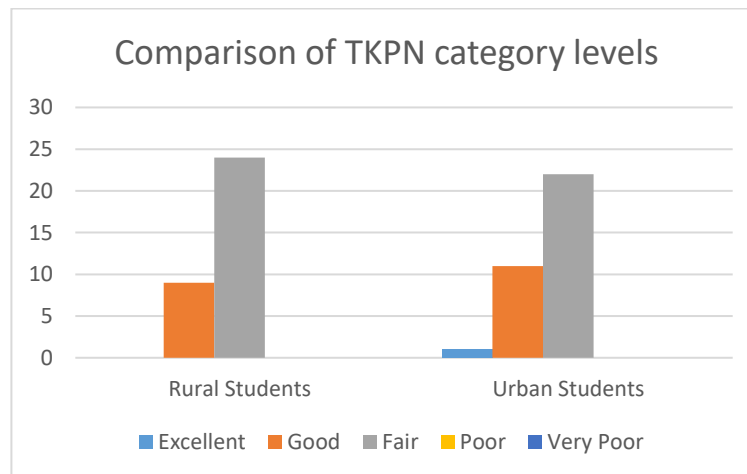


Figure 2. Comparison of Distribution TKPN Levels

Based on **Table 5.** and **Figure 2.** the majority of students in both schools fall into the fair physical fitness category. Among students in rural areas, 24 (72.73%) were in the fair category, and 9 (27.27%) were in the good category. Meanwhile, among students in urban areas, 22 students (64.71%) were in the fair category, 11 (32.35%) in the good category, and 1 (2.94%) in the excellent category. There were no students in the poor or very poor categories in either school.

Table 6. Distribution of Environmental Determinants with TKPN

Variable	Category	TKPN					Total
		Excellent	Good	Fair	Poor	Very Poor	
Determinants of the Rural Environment	Very Poor	0	0	0	0	0	0
	Poor	0	0	1	0	0	1
	Moderate	0	7	21	0	0	28
	Good	0	2	2	0	0	4
	Very Good	0	0	0	0	0	0
	Total	0	9	24	0	0	33
Determinants of Urban Environment	Very Poor	0	0	0	0	0	0
	Poor	0	0	2	0	0	2
	Moderate	1	9	15	0	0	25
	Good	0	2	5	0	0	7
	Very Good	0	0	0	0	0	0
	Total	1	11	22	0	0	34

Based on **Table 6.** the majority of students in both rural and urban areas had moderate environmental determinants, with a predominant fair TKPN level. In rural areas, 28 students with moderate environmental determinants included 7 with good TKPN and 21 with fair TKPN. Furthermore, in the good category, there were 2 students with good TKPN and 2 students with fair TKPN. Meanwhile, in urban areas, the moderate environmental determinants category included 1 student with excellent TKPN, 9 with good TKPN and 15 with fair TKPN. In the good category, 2 students had good TKPN, and 5 had fair TKPN. Overall, these results indicate that the majority of students in both areas had moderate to good levels of environmental determinants and TKPN, with TKPN results in urban areas tending to be slightly better than in rural areas.

Table 7. Prerequisite Test Results

Variable	Sig.	Description
QED Rural	0,200	Normal
QED Urban	0,200	Normal
TKPN Rural	0,200	Normal
TKPN Urban	0,200	Normal
QED*TKPN Rural	0,383	Linear
QED*TKPN Urban	0,428	Linear

Based on the prerequisite test, all study variables had significance values greater than 0.05, indicating that the data were normally distributed. Furthermore, the results of the linearity test indicate that the relationship between QL and TKPN is linear in both rural and urban areas, with significance values of 0.383 and 0.428 (>0.05), respectively. Therefore, the research data meet the prerequisites for parametric analysis.

Table 8. Results of the Pearson Product Moment Correlation Test

Item Test	Pearson Correlation	N	Sig. (2-tailed)
QL-TKPN Rural Students	0.110	33	0.541
QL-TKPN Urban Students	0.080	34	0.654

The Pearson Product-Moment correlation test shows that the relationship between QL and TKPN in rural areas has a correlation value of 0.110 with a significance value of 0.541 (>0.05). Meanwhile, in urban areas, the correlation is 0.080, with a p-value of 0.654 (>0.05). These results indicate that the relationship between QL and TKPN in both rural and urban areas is categorized as very low and not statistically significant. However, the correlation value in rural areas is slightly higher than in urban areas.

The results of the study indicate that the majority of students in both rural and urban areas are in the category of adequate physical fitness, indicating that students' physical abilities are still sufficient to carry out daily activities, but have not yet reached optimal conditions. This condition is thought to be influenced by changes in the lifestyles of modern adolescents, who are increasingly engaged in daily activities such as smartphone use, social media, and digital games, resulting in relatively low physical activity outside PJO learning. As a result, the movement stimulus received by the body is insufficient to optimally increase cardiorespiratory endurance, muscle strength, and physical fitness. This study also found that urban students had higher average TKPN scores than rural students across all test components. These results indicate that students in urban areas are slightly better physically conditioned than those in rural areas. An additional contributing factor is the availability of more comprehensive sports and physical activity facilities, such as additional fields, fitness centers, and facilities within the faculty, which offer students greater opportunities to engage in physical exercise. However, this study yielded findings that contradicted those reported by Wardani et al. (2025), who showed that students in rural areas had significantly higher levels of physical activity due to more frequent outdoor activities and active mobility in their daily lives. These differences indicate that, in addition to regional characteristics, students' physical conditions are shaped by ongoing social changes and technological developments that also occur in urban and rural areas. Most students fall into the moderate category in both schools, indicating that students are not fully supported by the urban or rural environment for their development.

The results of the Pearson Product-Moment correlation test indicated that the relationship between environmental determinants and students' physical condition was very weak and not statistically significant in both rural and urban areas. The low correlation coefficient suggests that environmental determinants are not the sole factors influencing students' physical condition. Other factors, such as lifestyle, nutritional status, motivation to engage in physical activity, family support, and technological influences, may also contribute to students' physical fitness and overall physical condition. Physical condition results from a complex interaction among various internal and external factors, including nutritional status, sleep patterns, daily physical activity intensity, exercise motivation, family support, and students' healthy lifestyle habits. Therefore, although the environment supports physical activity, its influence on students' physical condition in this study was not strong enough to yield a statistically significant relationship. These results are in line with previous research, which stated that adolescent physical fitness is more influenced by the consistency of individual physical activity than by environmental factors alone (Y. Wang et al., 2023; Zhang et al., 2024).

The results of this study differ from several previous studies that found a significant relationship between the physical environment and students' levels of physical activity and fitness (Høyer-Kruse et al., 2024; Q. Wang et al., 2024). Research by Addas, (2025) found that environments with easy access to sports facilities, safe pedestrian paths, and green open spaces significantly increase adolescents' physical activity. Furthermore, this study employed an environmental perception approach using the NEWS-Y instrument, thereby significantly influencing the results. Different perceptions among individuals can make the relationship between environmental variables and physical condition statistically weak.

The slightly higher correlation values in rural areas compared to urban areas indicate that rural environments still have greater potential to support students' physical activity. Wider open spaces and relatively more natural environmental conditions provide students with greater opportunities for physical activity (Hidayat et al., 2025; Nurdiana, 2023). However, this potential appears not to have been optimally utilized by students. This is due to the lack of structured exercise programs, low awareness of physical activity, and increased use of digital technology among rural youth. These results indicate that a supportive environment alone is insufficient; fostering active lifestyle habits and motivating students to exercise regularly are also necessary.

Apart from environmental factors, nutritional status is also an influencing factor of students' physical health (Raharjo et al., 2026; Shahudin et al., 2024). The results of the research indicate a higher representative variation in underweight among rural students compared to urban students for overweight and obesity. Which showed the distinct nutritional patterns and lifestyle behavior existence between urban versus rural students. Low nutritional outcome is

associated with the decrease in muscular and cardiorespiratory endurance, as well as weight excess impairment to muscle an activity performance (especially component of aerobic endurance). Existing studies indicated that nutritional status is related to physical fitness performance, which may be due in part because body composition affects students' movement economy and muscular work capacity (Wirdati et al., 2025).

CONCLUSION

Based on the study's results, it can be concluded that students' physical condition in both urban and rural areas of Semarang is generally adequate. Urban students have slightly higher fitness scores than boys and girls in rural areas. The relationship between environmental factors and students' physical condition in both environments was also found to be very weak and statistically insignificant. This suggests that students' physical condition cannot be determined solely by environmental factors; rather, fitness is a function of several interrelated factors, including daily physical activity, nutritional status/lifestyle/digital technology use, motivation and family and school support. Rural areas have more open spaces for movement, and urban environments tend to offer a variety of sports. However, neither environment appears ideal for fostering optimal physical activity development among students. Therefore, students' physical condition should be further examined, including health and fitness education, motivation to be physically active, and the strengthening of families' and schools' roles in instilling physical activity habits.

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