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A Comparative Study of Physical Fitness Levels Among Junior High School Students in Rural and Urban Areas

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ABSTRACT

Physical fitness is a fundamental indicator of adolescent health, yet geographic disparities often create significant gaps in fitness achievement. This study aims to analyze and compare the physical fitness levels of junior high school students in rural and urban areas within the Polewali Mandar Regency. Using a quantitative descriptive approach with a comparative survey design, the study sampled 60 students from four schools: Junior High School 1 Polewali, Junior High School 1 Anreapi, Junior High School 1 Wonomulyo, and Junior High School 4 Wonomulyo. Data were collected using the Indonesian Student Fitness Test (TKSI) Phase D, covering hand-eye coordination, sit-ups, standing broad jumps, T-tests, and Bleep tests. The findings reveal a significant difference in physical fitness between the two groups. Although both cohorts fall within the "moderate" category, rural students demonstrated superior fitness with a mean score of 17.43, compared to 15.90 for urban students. This research highlights how geographic environments influence physical activity, suggesting that rural settings may naturally facilitate higher physical engagement. These results serve as a critical reference for educators and policymakers to design targeted fitness interventions, particularly for urban school settings, to bridge the fitness gap among adolescents.

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1. INTRODUCTION

Adolescence represents a pivotal transition period characterized by rapid physiological growth and psychosocial maturation, where physical fitness serves as a fundamental indicator of both current and future health (Kumar et al., 2015; Mastorci et al., 2024). Beyond mere athletic performance, optimal fitness levels—encompassing cardiovascular endurance, muscular strength, and flexibility—are intrinsically linked to enhanced cognitive function and neural plasticity. Research consistently demonstrates that physically fit junior high school students exhibit superior academic concentration and emotional regulation, providing a natural buffer against the rising prevalence of mental health issues such as anxiety and depression (Chen et al., 2024; Li, 2023; Nie et al., 2025). Consequently, physical education must be recognized not as a peripheral

subject but as a core pillar of holistic adolescent development and long-term well-being (Habyarimana et al., 2022; Lundvall & Fröberg, 2023).

Despite these established benefits, global trends indicate a concerning "physical inactivity pandemic" driven by rapid technological advancements and shifting recreational patterns (Ramírez Varela et al., 2026). The modern adolescent environment is increasingly dominated by digital interfaces, where smartphones and social media have largely superseded traditional outdoor play (Morse & Emery, 2023). This sedentary behavior, characterized by prolonged screen time, poses a significant public health threat and has led to an erosion of the "active mobility" that once defined youth (Edwards & Larson, 2020). For educators and health practitioners, this phenomenon creates an urgent necessity for standardized monitoring to provide valid data, which is essential for designing interventions against the increasing early-onset risks of non-communicable diseases like type 2 diabetes and hypertension.

A significant, yet often overlooked, determinant of these fitness outcomes is the geographic and built environment, which acts as a "hidden curriculum" facilitating or hindering physical movement. Urban and rural settings offer starkly contrasting spatial characteristics that shape daily activity patterns (Matz et al., 2015; Ye et al., 2026). Urban environments typically provide modern sports infrastructure and better-funded facilities (Zulu et al., 2022); however, these advantages are frequently offset by high traffic density, safety concerns, and a critical lack of accessible green spaces. The resulting urban lifestyle often promotes physical passivity, where the convenience of motorized transportation and a fast-paced digital culture further entrench sedentary habits among students.

In contrast, rural environments present an "environmental paradox" regarding physical engagement. While students in outlying or mountainous areas may lack access to sophisticated fitness clubs or standardized equipment, their daily lives are often naturally more demanding due to the socio-economic realities of rural living. The vast open landscapes encourage informal exploration, while the necessity of manual labor and walking long distances over varied terrain to reach school facilitates higher levels of functional physical engagement. This study aims to analyze these environmental disparities by utilizing the modern Indonesian Student Fitness Test (TKSI) Phase D, providing a multidimensional comparison that is crucial for developing targeted, evidence-based physical education policies across diverse geographic regions.

Polewali Mandar Regency in West Sulawesi provides a unique and compelling laboratory for exploring this geographic disparity (Asis, 2019). The regency's topography is remarkably diverse, spanning from the bustling coastal urban centers of Polewali and Wonomulyo to the rugged, mountainous rural terrains of districts like Anreapi. This geographical diversity is reflected in the lifestyles of its youth. Students in the urban hubs are increasingly exposed to modern, sedentary urbanism and digital consumption. Meanwhile, their counterparts in the highlands maintain a more traditional, labor-intensive lifestyle. Initial observations in the region suggest a growing gap in sports achievement and general physical vitality between these two groups, yet

these disparities remain largely anecdotal and insufficiently documented by empirical research.

The primary challenge in addressing this gap is the lack of standardized, modern evaluation tools. Many previous assessments in the region have relied on outdated instruments or subjective observations that fail to capture the nuanced physical characteristics of the contemporary generation. Without precise comparative data, regional physical education policies remain generalized, often applying a "one-size-fits-all" approach that fails to address the specific needs of urban versus rural student populations.

This study is designed to fill this critical research void and is distinguished by several layers of novelty. First, unlike most previous fitness studies in Indonesia (Astuti et al., 2026; Ismoko et al., 2025; Jahrir, 2025), which utilized the Tes Kebugaran Jasmani Indonesia (TKJI)—an instrument developed decades ago—this study adopts the Indonesian Student Fitness Test (TKSI) Phase D (Maulana et al., 2024). The TKSI is a modern, government-validated instrument specifically recalibrated to reflect the physical norms and health standards of today's adolescents (Cahyaningrum et al., 2025; Jasmanedi et al., 2025; Ridha et al., 2024). By utilizing this updated protocol, the research ensures that the findings are not only accurate but also relevant to the current national education curriculum and modern physiological benchmarks.

Second, this study provides the first comprehensive empirical mapping of adolescent fitness profiles in the specific context of West Sulawesi. By categorizing sub-districts into distinct urban and rural cohorts, this research moves beyond generality to provide localized data that is crucial for regional development. Third, and perhaps most importantly, this study transcends the simplistic binary of "who is fitter." It employs a multidimensional analysis that deconstructs physical fitness into five critical components: hand-eye coordination (motor skill), core muscle strength (sit-ups), explosive power (standing broad jump), agility (T-test), and cardiorespiratory endurance (bleep test).

The goal of this comparative analysis is to reveal the underlying patterns of physical fitness distribution in Polewali Mandar. By identifying which specific components—such as endurance or agility—are deficient in urban versus rural students, the study provides a surgical level of insight for educators and policymakers. For instance, if urban students show high coordination but critically low endurance, schools can reform their recess periods or extracurricular programs to include more aerobic-intensive activities. Conversely, if rural students excel in endurance but lack specific motor skills due to limited facilities, interventions can focus on providing structured skill-based training.

In conclusion, this research bridges the gap between theoretical environmental health and practical physical education. It serves as a critical reference point for creating targeted, evidence-based fitness interventions. By understanding the profound impact of geographic location on the physical development of the next generation, we can begin to design school environments and community policies that ensure every student—

regardless of whether they live in a mountain village or a bustling city center—has the physical foundation necessary to thrive in the modern world.

2. METHOD

This study employed a quantitative approach with a comparative descriptive design to analyze the disparities in physical fitness levels between two distinct geographic groups. The research was conducted over a two-month period, from November to December 2025, in Polewali Mandar Regency, West Sulawesi. To ensure environmental representation, the study was situated in four public junior high schools: two schools representing rural areas (characterized by lower population density and agricultural landscapes) and two schools representing urban areas (characterized by higher infrastructure density and modernized lifestyles).

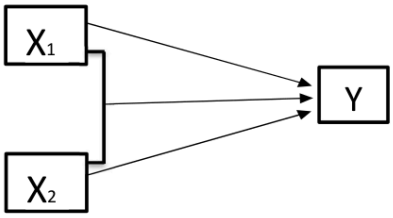

Figure 1. Comparative Research Design

The target population included all junior high school students in Polewali Mandar Regency. A total sample of 60 students was selected using a stratified random sampling technique to ensure equal representation from both environments. The participants were divided into two equal cohorts (1) Rural Group: n = 30 students. (2) Urban Group: n = 30 students. Inclusion criteria required participants to be in good health and willing to undergo a series of physical performance tests.

Physical fitness levels were measured using the Indonesian Student Fitness Test (TKSI) Phase D, a nationally validated instrument specifically designed for the adolescent age group. The battery consisted of five comprehensive test items: (1) Hand-Eye Coordination Test: To measure neuromotor synchronization. (2) Sit-Up Test (60 seconds): To assess abdominal muscular strength and endurance. (3) Standing Broad Jump: To evaluate lower-body explosive power. (4) T-Test: To determine agility and change-of-direction speed. (5) Bleep Test (20m Multi-Stage Fitness Test): To estimate maximal oxygen uptake (VO_2 max) and cardiovascular endurance.

Data collection was executed by a team of trained enumerators to ensure high levels of objectivity and procedural consistency throughout the testing phase. Each student's performance across the multidimensional battery was converted into standardized scores based on the Indonesian Student Fitness Test (TKSI) Phase D norms, allowing for a precise evaluation of fitness levels relative to national adolescent benchmarks. This structured approach ensured that the raw physical data were accurately translated into

comparable metrics, facilitating a rigorous assessment of the students' physical capabilities in both rural and urban contexts.

The resulting data were subjected to a comprehensive two-stage statistical analysis using SPSS software. First, descriptive statistics were employed to calculate the mean, standard deviation, and frequency distribution, providing a clear profile of fitness categories within the cohorts. Second, inferential analysis was conducted using an independent sample t-test to determine the presence of statistically significant differences between the rural and urban groups. Prior to the T-test, the data were rigorously verified for normality and homogeneity to ensure the validity of the results, with the significance level maintained at $p < 0.05$.

3. RESULTS AND DISCUSSION

Results

The results of data analysis show that the average physical fitness level of junior high school students in rural areas is 17.43, which is classified as moderate. Meanwhile, junior high school students in urban areas have an average score of 15.90, which is also classified as moderate.

The results of the difference test show that there is a significant difference between the physical fitness levels of junior high school students in rural and urban areas. Although both groups are in the same category, students in rural areas have higher physical fitness levels than students in urban areas.

Table 1. Descriptive Statistic Results

Statistics	Rural Public Junior High School	Urban Public Junior High School
Sample (n)	30	30
Mean (Average)	17.43	15.9
Standard Deviation	2.897	2.295
Variance	8.392	5.266
Range	9	9
Minimum	13	11
Maximum	22	20

The descriptive analysis revealed different physical fitness profiles between the two regional groups. Junior high school students in rural areas recorded a mean score of 17.43 with a standard deviation of 2.897 and a score range of 13 to 22. Meanwhile, students in urban areas achieved a lower mean score of 15.90, with a standard deviation of 2.295 and a minimum score range of 11 to a maximum of 20. The difference in variance of 8.392 in the rural group compared to 5.266 in the urban group indicates a more diverse distribution of fitness levels among students in rural areas.

The frequency distribution of fitness categories among rural students indicates that most of the sample fell into the "Fair" category (13 students (43.33%) and the "Good" category (12 students (40.00%). It was also noted that 2 students (6.67%) achieved the "Excellent" category, while only 3 students (10.0%) were in the "Poor" category.

Overall, these data reflect competitive physical performance in the rural group, with the highest frequency concentrated in the moderate to upper categories, with no students falling into the "Very Poor" classification.

Table 2. Distribution of Physical Fitness Data

No	TKSI Value	Category	Frequency	Percentage
1	22-25	Very Good	0	0.00%
2	18-21	Good	8	26.67%
3	14-17	Average	18	60.00%
4	10-13	Poor	4	13.33%
5	5-9	Very Poor	0	0.00%
Total			60	100%*

Frequency distribution analysis indicates that the physical fitness profile of junior high school students in urban areas is concentrated in the intermediate category. Most of the sample, 18 students (60.00%), fell into the "Fair" category, which is the highest frequency within this group. This finding indicates that most urban students have sufficient physical capacity to carry out daily activities but still need optimization to achieve higher fitness standards.

Furthermore, the data shows that 8 students (26.67%) fell into the "Good" category, while 4 students (13.33%) fell into the "Poor" category. Significantly, no students (0.00%) achieved the "Excellent" category or fell into the "Very Poor" category. This lack of achievement in the "Very Good" category underscores the urgency for educational practitioners in urban areas to design more intensive physical interventions to improve students' athletic performance to optimal levels.

Table 3. Distribution of Physical Fitness Data for Urban Junior High School Students

No	TKSI Value	Category	Frequency	Percentage
1	22-25	Very Good	2	6.67%
2	18-21	Good	12	40.00%
3	14-17	Average	13	43.33%
4	10-13	Poor	3	10.00%
5	5-9	Very Poor	0	0.00%
Total			60	100.00%

Prerequisite Test

Normality Test

The normality test was conducted on each research data, namely physical fitness levels. The normality test was performed using the Kolmogorov-Smirnov formula and was carried out using the SPSS 26.00 computer program. This test examines the hypothesis that the sample comes from a normally distributed population. To accept or reject the hypothesis, the significance value is compared with 0.05. The criterion is to

accept the hypothesis if the significance value is greater than 0.05 (Sig > 0.05). The results of the normality test can be seen in Table 4 below.

Table 4. Results of Normality Test Calculations

No	Variable	Sig	Conclusion
1	Rural Public Junior High School	0.144	Normal
2	Urban Public Junior High School	0.2	Normal

From Table 4 above, the significance value of the physical fitness data group for rural public junior high schools is 0.144 and for urban public junior high schools it is 0.200. Because the significance value is greater than 0.05 (sig > 0.05), the hypothesis stating that the sample comes from a normally distributed population is accepted. Thus, it can be concluded that the normality of the distribution is fulfilled.

Homogeneity Test

Homogeneity testing was conducted to determine variance equality, or to test whether the data obtained came from a homogeneous population. Homogeneity testing used Levene's statistics. The decision criterion was accepted if the significance value was greater than 0.09 (Sig > 0.05). The results of the homogeneity test are as follows:

Table 5. Homogeneity Calculation Results

Group	Levene Statistic	Sig.	Description
Rural Public Junior High School Urban Public Junior High School	2.974	0.091	Homogeneity

The results of the homogeneity test of the research variables showed Levene's statistic value of 2.974, while the significance value of 0.091 was greater than 0.05. Because the Sig value was > 0.05, the hypothesis stating that the data was obtained from a homogeneous population was accepted, so it can be concluded that the data in this study came from a homogeneous population.

Data Analysis Results

Data analysis was performed using a t-test on data regarding the physical fitness levels of students at rural and urban public junior high schools. This test will examine the hypothesis: There is a difference in physical fitness levels between rural and urban junior high school students. To accept or reject the hypothesis, the t-count value is compared with the t-table value. The criterion is to accept the hypothesis if the t-count value is less than the t-table value at a significant level of 0.05. The t-test results are shown in the following Table 6.

Table 6. Results of the t-test Calculation

Variable	Mean	Calculate	Alpha	Description
Rural Public Junior High School	17.43	0.091	0.005	Significant
Urban Public Junior High School	15.9	0.091	0.005	Significant

Hypothesis testing using an Independent Sample T-Test revealed a statistically significant difference between the physical fitness levels of students in rural and urban public junior high schools. The calculated t-value was 2.273, substantially greater than the significance threshold of $p < 0.05$. This result provides strong empirical evidence to reject the null hypothesis, confirming that geographic background significantly influences the fitness profiles of students in these areas.

Descriptive data supported this inferential finding by showing a clear performance margin between the two groups. Students in rural junior high schools achieved a mean score of 17.43, while their urban counterparts only achieved a mean score of 15.90. This comparison indicates that, although both groups are in a competitive range, rural students have a higher physical capacity advantage than their urban counterparts.

The superior physical fitness levels of rural students, as indicated by the TKSI Phase D instrument, reflect the effectiveness of more intensive daily physical activity in a non-urban environment. The higher average scores in the rural group suggest that factors such as active mobility and use of green spaces play a crucial role in shaping their physical resilience. This finding underscores the need for more targeted intervention strategies for schools in urban areas to counteract the prevailing trend of a more sedentary lifestyle.

Discussion

The results of this study confirm a significant difference between the physical fitness levels of junior high school students in rural and urban areas, with rural students demonstrating an empirical advantage with an average score of 17.43 compared to urban students' 15.90. Although both groups technically fall into the "Moderate" category, the marginal advantage in the rural group reflects the significant impact of geographic background on adolescents' physical profiles, driven by the effectiveness of more intensive daily physical activity in non-urban environments. This is supported by the active mobility and utilization of green open spaces in rural areas, which play a crucial role in naturally developing students' physical resilience compared to the limited space in urban areas.

These findings align with previous studies showing that the residential environment is a determinant variable in adolescents' physical fitness achievements (Li et al., 2025; Wang et al., 2024). The advantage of rural students in this study reinforces the theory of the "environmental paradox," where the limited formal sports facilities in rural areas are often compensated for by a lifestyle that demands higher levels of functional physical activity (McDonald, 2015). In contrast, the lower performance of urban students confirms the global trend of the impact of sedentary lifestyles and a greater reliance on technology in urban centers, necessitating more structured and intensive physical intervention strategies to catch up on these fitness standards.

The frequency distribution analysis in this study revealed a stark difference in achievement of the highest fitness category between the two geographic groups. In the rural group, 6.67% of students achieved the "Very Good" category, while in the urban area, not a single student (0.00%) achieved this level. The absolute majority of urban

students, 60.00%, fell into the "Moderate" category, indicating that although they have sufficient physical capacity for daily activities, there are significant limitations in achieving optimal fitness standards.

These findings reinforce the indication that a sedentary lifestyle is far more prevalent in urban areas than in rural areas (Gülü et al., 2022; Regis et al., 2016). This phenomenon aligns with previous studies highlighting that modernization in urban areas is often accompanied by a decline in physical activity due to reliance on technology and a lack of active mobility (Correa et al., 2024; Muzayanah et al., 2022). Conversely, the more natural rural environment consistently supports higher physical achievement (Müller et al., 2024), as evidenced in this study by the more competitive distribution of fitness data in the middle to upper categories.

The validity of these findings is fully supported by the fulfillment of statistical prerequisite tests, where the data were proven to be normally distributed ($p > 0.05$) and have homogeneous variance (Sig. 0.091 > 0.05). The use of the TKSI Phase D instrument also provides a higher level of accuracy because it has been specifically adapted to the physical characteristics of today's modern adolescents. This strong methodological basis ensures that the differences in performance found accurately represent the physical condition of students in both regions.

Practically, the lack of achievement in the "Very Good" category in urban areas signals the urgency for education practitioners to immediately design more intensive physical interventions. Targeted intervention strategies in urban schools are urgently needed to compensate for limited space and the loss of natural physical activity. Thus, more targeted physical education policies are expected to narrow the physical fitness gap among adolescents, ensuring equitable physical growth regardless of their geographic background.

Theoretically, this study provides a scientific contribution in the form of baseline data on the physical fitness levels of adolescents in West Sulawesi, particularly in Polewali Mandar Regency, using the latest instrument. This study strengthens the relevance of using the Indonesian Student Fitness Test (TKSI) Phase D as a valid and reliable measurement tool to replace the outdated instrument (TKJI) in the context of modern physical education research (Astuti et al., 2026; Maulana et al., 2024). The results of this study enrich the literature on the influence of geographic factors (rural vs. urban) on students' physical achievement, demonstrating that the residential environment is a determining variable in adolescent motor development (Atmaja et al., 2025; Gallotta et al., 2022).

Practically, the findings of this study provide a strong empirical basis for the Education Office and regional policymakers to design more specific physical interventions that do not apply uniform standards across regions but instead adapt them to the unique characteristics of rural and urban environments. For educational institutions in urban areas, these results serve as a crucial reference in designing extracurricular programs or modifying more active break times to compensate for limited natural mobility and lack of access to green open spaces. Additionally, physical education teachers in rural areas can use this data to maintain students' already excellent

physical activity patterns and identify potential athletes in key fitness components. Finally, this fitness category distribution mapping serves as an objective evaluation tool for the physical education curriculum, helping teachers gauge the effectiveness of their learning based on the actual physical profiles of students in each school.

4. CONCLUSION

This study concluded that there was a statistically significant difference between the physical fitness levels of public junior high school students in rural and urban areas. Although the average achievement of both groups was in the "Moderate" category, students in rural areas showed physical superiority with an average score of 17.43, while students in urban areas obtained an average of 15.90. The distribution data showed that there were 6.67% of students in rural areas who were able to achieve the "Very Good" or Excellent category, while none of the urban students achieved this category (0.00%). This finding confirms that the characteristics of the geographic environment and more intensive daily activity patterns in rural areas contribute positively to students' endurance and physical performance compared to the tendency for a sedentary lifestyle in urban areas.

As a recommendation, teachers in urban schools need to design more intensive or varied physical exercise programs to catch up with the gap in student fitness levels compared to their rural counterparts. Further research is needed to examine specific factors (such as diet, duration of device use, or mode of transportation to school) that contribute to significant differences between rural and urban students. It is recommended to increase the sample size and the scope of the schools to allow for broader generalization of the research results.

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