



RURAL–URBAN DIFFERENCES IN PHYSICAL FITNESS AMONG SCHOOL ATHLETES

¹*Yashwant Shokhanda*, ²*Dr. Rakesh Kumar*

¹*Research Scholar*, ²*Research Supervisor*

¹⁻²*Department of Physical Education, Sabarmati University, Ahmedabad, Gujarat - 382481*

Abstract

This study examines rural–urban differences in five major components of physical fitness among school athletes: speed, agility, muscular strength, flexibility, and cardiorespiratory endurance. Rather than presenting invented primary data, the study uses a comparative analytical approach based on established physical-fitness theory and findings reported in peer-reviewed studies of school-age populations from different countries. The central argument is that place of residence can influence fitness, but it does not operate as a simple rural advantage or urban advantage. Rural settings may provide more habitual walking, active transport, outdoor play, household work, and lower sedentary exposure, which can support endurance and relative strength. Urban settings may offer better access to organized sport, specialist coaching, standard playing surfaces, fitness facilities, and competition, which can favor speed, agility, technique-dependent strength, and flexibility. Published evidence is mixed: studies in Spain, Austria, Mexico, Kenya, and other settings show that the direction and magnitude of rural–urban differences vary by age, sex, body composition, socioeconomic conditions, sport participation, and the fitness test selected. The study therefore treats residence as an environmental exposure that interacts with training opportunity, nutrition, school physical education, infrastructure, and lifestyle. A model methodology for a school-athlete comparison is also presented, including standardized tests such as the 30–50 m sprint, 4×10 m shuttle run, standing broad jump/handgrip, sit-and-reach, and 20 m shuttle run. The analysis concludes that schools should avoid assuming that one environment naturally produces fitter athletes; instead, targeted programming should address the specific deficits revealed by testing. Rural schools may particularly benefit from structured speed, agility, flexibility, and technical strength training, while urban schools may need additional aerobic activity, active transport, and opportunities for sustained outdoor play.

Keywords: rural athletes, urban athletes, school sport, physical fitness, speed, agility, strength, flexibility, endurance, adolescents

1. Introduction

Physical fitness is a multidimensional construct that reflects the capacity to perform physical activity efficiently and to meet the demands of sport and daily life. In school athletes, fitness is particularly important because it influences sport performance, injury resistance, movement competence, confidence, and long-term participation in physical activity. Five components frequently used in school and youth-sport assessment are speed, agility, strength, flexibility, and endurance. Although these qualities are partly influenced by growth, maturation, heredity, and training, they are also shaped by the environment in which children live and practice sport.

The rural–urban comparison is important because the daily movement ecology of children may differ substantially across locations. Rural children may walk or cycle longer distances, spend more time outdoors, participate in physically demanding household or agricultural tasks, and have fewer motorized or screen-based leisure options. At the same time, rural schools may have limited access to qualified coaches, synthetic tracks, indoor halls, strength-training equipment, rehabilitation services, and frequent inter-school competition. Urban children may experience the



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reverse pattern: greater access to facilities, coaching, clubs, and competitive pathways, but also heavier traffic, restricted open space, greater screen exposure, academic scheduling, and motorized transport. These contrasting influences make simple generalizations unreliable. A rural athlete can possess excellent endurance because of high habitual activity yet have less developed change-of-direction technique. An urban athlete can show superior sprint mechanics and agility due to coaching while having lower aerobic fitness because daily life is comparatively sedentary. Consequently, an analytical study must separate the different components of fitness rather than treat physical fitness as a single score.

The World Health Organization recommends that children and adolescents aged 5–17 years accumulate an average of at least 60 minutes per day of moderate-to-vigorous, mostly aerobic physical activity across the week, with vigorous aerobic and muscle- and bone-strengthening activity included on at least three days per week. These recommendations emphasize that school-age fitness is produced by both structured exercise and the broader pattern of daily activity. The rural–urban environment can therefore be viewed as one of several contextual factors affecting the opportunity to meet these movement needs. This study analyzes how rural and urban environments may be associated with speed, agility, strength, flexibility, and endurance among school athletes. It synthesizes findings from selected international studies, identifies mechanisms that can explain inconsistent results, presents a model comparative methodology, and develops practical implications for physical-education teachers, coaches, school administrators, and researchers.

2. Objectives of the Study

- To compare the likely patterns of speed, agility, strength, flexibility, and endurance among rural and urban school athletes.
- To analyze environmental, social, training, nutritional, and infrastructural factors that may explain rural–urban fitness differences.
- To synthesize relevant empirical evidence and identify areas in which findings are consistent or contradictory.
- To propose a scientifically appropriate methodology for a school-based rural–urban fitness comparison.
- To suggest practical interventions for improving the weaker fitness components in each setting.

3. Research Questions and Analytical Hypotheses

The study is guided by the following questions: Do rural and urban school athletes differ in specific components of fitness? Which components are most sensitive to habitual activity and which are more dependent on structured coaching? How do body composition, sex, age, sport participation, and school resources modify the relationship between residence and performance?

For a future primary study, the null hypothesis (H_0) would state that there are no statistically significant rural–urban differences in speed, agility, strength, flexibility, or endurance after accounting for relevant covariates. The alternative hypothesis (H_1) would state that at least one fitness component differs significantly by residence. Based on the literature, a directional expectation can be cautiously proposed: rural athletes may tend to perform better in endurance and some measures of relative or functional strength, whereas urban athletes may sometimes perform better in speed–agility and flexibility. However, the evidence is sufficiently mixed that these expectations should not be treated as universal predictions.

4. Conceptual Framework: Physical Fitness and Place of Residence

4.1 Speed



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Speed is the ability to move the body or a body segment rapidly and is commonly measured through a short sprint such as 30 m, 35 yards, or 50 m. Sprint performance depends on neuromuscular power, technique, stride mechanics, reaction, maturation, and exposure to high-intensity running. Urban athletes with regular coaching and access to marked tracks may gain technical advantages. Rural athletes may accumulate more running and active play, but habitual low-to-moderate intensity movement does not automatically produce maximal sprint speed.

4.2 Agility

Agility refers to rapid whole-body movement involving acceleration, deceleration, and change of direction, often in response to a stimulus. School studies frequently use shuttle runs or change-of-direction tests. Agility is influenced by speed, eccentric strength, balance, coordination, decision-making, and sport-specific practice. Organized games such as football, basketball, hockey, kabaddi, and court sports can strongly develop agility. Thus, the local sport culture may matter more than residence alone.

4.3 Muscular Strength

Strength is the capacity of muscles to exert force. In youth studies it may be assessed using handgrip dynamometry, standing long jump as a proxy for lower-body explosive power, bent-arm hang, medicine-ball throw, sit-ups, or other field tests. Absolute strength is influenced by body size and maturation; therefore, rural–urban comparisons should consider height, body mass, BMI, and preferably fat-free mass. A heavier urban sample may show greater absolute handgrip strength without necessarily possessing greater strength relative to body mass.

4.4 Flexibility

Flexibility is the range of motion available at a joint or series of joints. The sit-and-reach test is widely used to assess hamstring and lower-back flexibility. Flexibility is affected by sex, maturation, tissue characteristics, warm-up, sport type, stretching habits, and test familiarity. Environmental effects are indirect. Schools with structured warm-up and stretching routines may produce better flexibility scores regardless of whether they are rural or urban.

4.5 Endurance

Endurance, especially cardiorespiratory endurance, reflects the ability to sustain dynamic exercise using large muscle groups. Field measures include the 20 m shuttle run, 9- or 12-minute run, mile run, or distance run. Endurance is highly responsive to habitual moderate-to-vigorous activity, active transport, body composition, and regular aerobic training. For this reason, it is often the component most plausibly associated with differences in daily rural and urban lifestyles.

5. Review and Analytical Synthesis of Literature

A classic comparison of schoolchildren in Oaxaca, Mexico, reported a complex pattern rather than a uniform advantage. Urban children were taller and heavier. After adjustment for age and body size, rural children showed greater grip strength, while urban children performed better in standing long jump and timed sit-ups. Differences in sprint speed and flexibility varied by age and sex, and endurance results also depended on subgroup. The authors suggested that activity habits, school physical education, and lifestyle could contribute to the observed differences (Peña Reyes, Tan, & Malina, 2003). A large Spanish study of 2,569 children and adolescents found that rural youth had higher cardiorespiratory fitness and better performance in several muscular-fitness measures, while urban youth performed better in speed–agility and flexibility. Rural participants also had lower body mass, BMI, and skinfold thickness. Importantly, the effect sizes were small to moderate, demonstrating that residence explained only part of individual variation (Chillón et al., 2011).



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Evidence from India has also suggested possible rural advantages in health-related fitness. A study comparing urban schoolchildren with rural counterparts reported that rural children were more flexible and demonstrated better cardiovascular endurance, alongside differences in physical-activity scores and anthropometric characteristics. This finding is useful because it shows that rural advantage is not restricted to endurance; nevertheless, it also illustrates why results should be interpreted within local cultural and school contexts rather than generalized globally. A cross-sectional study involving more than 18,000 children in Upper Austria found that urban residence was associated with lower physical fitness in most assessed domains after body-weight differences were considered. Flexibility was an exception, being better in urban children, while upper-body strength did not differ. The rural–urban gap also tended to become more pronounced with age. Such large-sample evidence supports the idea that living environment can matter, but it simultaneously shows component-specific effects (Drenowatz et al., 2020).

Research from western Kenya found marked rural–urban differences in body composition and endurance, with rural children showing lower body fat and faster mile times. Differences in strength and flexibility were less consistent. More recent Kenyan research has continued to examine health- and skill-related fitness across rural and urban children, reinforcing the need to analyze demographic and environmental influences together rather than assuming a single residence effect. A longitudinal study of primary-school children found that urban children showed better development in upper- and lower-extremity strength over four years, while continuous sports-club participation was associated with more favorable development of endurance and lower-extremity strength. This is a particularly important result because it indicates that organized sport participation may modify or even outweigh the effect of residential environment. A rural child with sustained club training may develop differently from a rural child without it, and the same applies in urban settings.

Studies of physical activity, overweight, and school environment also show that rural–urban patterns are not identical across countries. In some high-income settings, rural youth may face barriers such as long travel distances, fewer sports programs, and limited recreational infrastructure. In other settings, rural life may involve more active transport and outdoor work. Urban areas likewise contain both advantages and disadvantages: dense neighborhoods may support walking and access to clubs, while traffic, safety concerns, air pollution, screen-based recreation, and limited open space may reduce spontaneous activity. The literature therefore supports a contextual model. Residence is best treated as a marker for a cluster of exposures—built environment, transport, socioeconomic status, school resources, diet, culture, safety, technology use, and sport opportunity. When studies fail to measure these mediators, the label 'rural' or 'urban' can hide substantial within-group variation.

6. Comparative Evidence Matrix

Study/Setting	Sample	Fitness Domains	Main Rural–Urban Pattern	Analytical Meaning
Peña Reyes et al. (2003), Mexico	679 children, 6–13 y	Sprint, grip, jump, sit-ups, flexibility, distance run	Mixed; rural adjusted grip stronger; urban jump/sit-ups better; speed, flexibility and endurance varied	Residence effects depend on age, sex, body size and test.



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Chillón et al. (2011), Spain	2,569 youth	Endurance, speed-agility, flexibility, grip, hang, sit-ups	Rural better endurance and several strength measures; urban better speed-agility and flexibility	Supports component-specific rather than global fitness advantage.
Indian school comparison (2013)	650 children	Health-related fitness and activity	Rural group reported better flexibility and cardiovascular endurance	Local lifestyle and activity patterns may favor rural health-related fitness.
Drenowatz et al. (2020), Austria	18,168 children, 6–11 y	Endurance, power, speed, agility, flexibility, ball skills	Rural generally fitter; urban better flexibility; no upper-body strength difference	Large sample shows environment matters but not uniformly.
Western Kenya study (2016)	School-age children	Body composition, strength, flexibility, mile run	Rural lower body fat and faster mile; strength/flexibility less consistent	Endurance and adiposity may show stronger environmental signal.
Longitudinal study (2014)	172 children, 9–12 y	Endurance, speed, strength, flexibility, coordination	Urban showed stronger strength development; sports-club participation benefited fitness development	Training exposure can modify residence effects.

7. Component-by-Component Rural–Urban Analysis

7.1 Speed: Why an Urban Advantage May Appear in Some Samples

Speed is highly trainable but requires exposure to maximal or near-maximal running. Daily walking, farm work, or moderate outdoor play can improve general activity levels without providing the neuromuscular stimulus required for sprint acceleration. Urban school athletes may have more frequent access to sprint drills, athletics coaching, strength and conditioning, and competition on consistent surfaces. These factors can improve starting technique, stride frequency, acceleration posture, and confidence during standardized tests.

However, an urban advantage is not inevitable. Rural athletes who regularly play field sports, run on varied terrain, or participate in athletics may develop excellent acceleration and lower-limb power. Differences can also be distorted by footwear, test surface, timing method, and body composition. Hand timing, for example, introduces measurement error that may be similar in size to the actual rural–urban difference. A rigorous study should therefore use electronic timing where possible or highly standardized dual-timer procedures.



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Analytically, speed should be interpreted together with lower-body power and maturation. A faster group may simply contain older or more biologically mature athletes. Researchers should record chronological age, sex, height, body mass, and preferably maturity status or age at peak height velocity estimates.

7.2 Agility: The Role of Structured Sport and Movement Variety

Agility combines physical and technical qualities. Urban schools often provide greater exposure to organized invasion games, court sports, cones, ladders, marked courts, and coaching feedback. Repeated practice of stopping, cutting, turning, and reaccelerating can improve performance in shuttle tests. This mechanism is consistent with studies in which urban youth outperform rural youth in speed–agility despite rural advantages in endurance.

Rural environments can nevertheless offer a different form of movement variability. Uneven ground, outdoor games, climbing, running around natural obstacles, and informal team play may enhance balance and general motor adaptability. Yet standardized agility tests reward familiarity with specific movement patterns. Thus, test performance may partly measure learned technique rather than a pure environmental difference in athletic potential.

For school practice, rural athletes should not be labeled less agile on the basis of one test. Coaches can use progressive change-of-direction drills, deceleration technique, small-sided games, and reactive tasks. Urban athletes, meanwhile, may benefit from unstructured outdoor movement that challenges adaptability beyond rehearsed drills.

7.3 Strength: Absolute, Relative and Functional Interpretations

Strength findings are especially sensitive to body size. Urban children in several studies have been taller or heavier, and higher body mass can increase absolute handgrip values. Conversely, excess fat mass can reduce performance in body-weight tasks such as pull-ups, bent-arm hangs, shuttle running, and repeated jumping. Rural children may therefore appear stronger in relative or functional tasks even when absolute strength is similar.

Different strength tests also represent different qualities. Handgrip assesses isometric force of the forearm and hand; standing long jump reflects explosive lower-body power; sit-ups involve trunk muscular endurance; medicine-ball throws assess upper-body power. It is scientifically weak to treat all these tests as interchangeable. The Mexico study, for example, found rural advantages in adjusted grip strength but urban advantages in standing long jump and sit-ups, demonstrating that 'strength' itself is multidimensional.

Training access can change the pattern. Urban athletes may have greater access to resistance equipment and supervised conditioning. Rural athletes may develop work-related functional strength through lifting, carrying, climbing, and manual tasks. For adolescents, safe, age-appropriate resistance training supervised by qualified personnel can improve strength in both settings without requiring sophisticated gym equipment.

7.4 Flexibility: A Component Strongly Shaped by Practice

Flexibility shows some of the most inconsistent rural–urban findings. Spanish and Austrian data have indicated better flexibility among urban youth, whereas an Indian comparison reported greater flexibility among rural children. These contradictions are plausible because flexibility is not determined primarily by total physical activity. It is strongly affected by sex, growth stage, sport specialization, warm-up routines, stretching frequency, and the exact test protocol. An athlete who is very active may still have limited hamstring flexibility, while a less aerobically fit athlete who practices gymnastics, dance, martial arts, yoga, or regular stretching may score highly. Therefore, flexibility should not be used as a broad indicator of how active a rural or urban child is. Researchers should standardize warm-up, reach-box dimensions, knee position, number of trials, and time of testing.

From an intervention perspective, both rural and urban schools can improve flexibility through short, consistent



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mobility programs integrated into warm-up and cool-down sessions. Dynamic mobility is particularly useful before activity, while static stretching can be placed after training or in separate flexibility sessions.

7.5 Endurance: The Strongest Candidate for a Lifestyle Effect

Cardiorespiratory endurance is the fitness component most consistently linked to total habitual activity. Walking and cycling to school, outdoor play, sustained games, and physically active chores increase energy expenditure and provide repeated aerobic stimulus. Where these behaviors are more common in rural communities, rural athletes may demonstrate superior shuttle-run or distance-run performance.

Body composition is also important. Running requires repeated movement of body mass, so higher adiposity increases the energetic cost of locomotion. Several rural–urban studies have reported lower body fat or BMI among rural youth, which can partly explain faster distance running. This does not mean that all urban children are less fit or heavier; rather, group averages can be influenced by transport, diet, screen time, neighborhood design, and socioeconomic factors.

Urban schools can counter reduced daily activity by deliberately increasing aerobic volume through small-sided games, interval running, active breaks, after-school clubs, and active transport initiatives. Rural schools should maintain endurance strengths while ensuring that aerobic dominance does not replace speed, power, mobility, and technical training.

8. Proposed Methodology for a Primary Analytical Study

8.1 Research Design

A comparative cross-sectional design would be suitable for examining rural–urban differences at a defined point in time. A stronger design would combine cross-sectional testing with a longitudinal follow-up across one academic year to examine whether fitness changes differently by residence and training exposure.

8.2 Population and Sample

The target population could include male and female school athletes aged approximately 12–17 years who have participated in organized school sport for at least six months. A balanced sample might include 200–400 athletes, with approximately equal numbers from rural and urban schools. Stratified sampling by sex, age group, and sport would reduce selection bias.

8.3 Inclusion and Exclusion Criteria

Participants should be medically fit for field testing and free from acute injury. Students with conditions that make maximal exercise unsafe should be excluded or tested only with appropriate medical clearance. Researchers should obtain institutional permission, parental/guardian consent, and student assent according to local ethical requirements.

8.4 Fitness Test Battery

Speed can be measured with a 30 m or 50 m sprint; agility with a 4×10 m shuttle run or another validated change-of-direction test; strength with handgrip and/or standing broad jump; flexibility with sit-and-reach; and endurance with the 20 m shuttle run or a standardized distance run. Using at least one clearly validated field test for each component improves comparability.

8.5 Standardization

Testing should be conducted at similar times of day, with identical instructions, warm-up, footwear guidance, surfaces, equipment, rest intervals, and trial numbers. Athletes should avoid strenuous exercise immediately before testing. Testers should be trained and, where possible, blinded to the study hypothesis.



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8.6 Additional Variables

Age, sex, height, weight, BMI, sport, years of training, weekly training hours, active transport, screen time, sleep, socioeconomic indicators, school facilities, and club participation should be recorded. These variables help distinguish a true residence association from confounding.

8.7 Statistical Analysis

Descriptive statistics should include mean, standard deviation, median where appropriate, and 95% confidence intervals. Independent-samples t tests can compare unadjusted group means when assumptions are met; Mann–Whitney U tests can be used for non-normal distributions. Multivariate analysis of covariance or regression is preferable because it can adjust for age, sex, body size, maturation, sport type, and training volume. Effect sizes such as Cohen's d should accompany p-values. A statistically significant result with a trivial effect size should not be overstated.

9. Model Data-Analysis Framework

The following table illustrates how results should be interpreted in a real study. The entries are analytical expectations drawn from the literature, not fabricated observations from a newly collected sample.

Fitness Component	Possible Rural Pattern	Possible Urban Pattern	Key Covariates/Interpretation
Speed	Variable; may benefit from outdoor running	May benefit from sprint coaching and facilities	Maturation, power, sport type, surface, timing method
Agility	Movement variety from informal play	Potential advantage from structured multidirectional sports	Sport exposure, technique, coordination, test familiarity
Strength	Potential relative/functional strength advantage	Potential absolute/technical strength advantage with facilities	Body mass, fat-free mass, maturation, resistance training
Flexibility	Highly context dependent	Often better where structured mobility/stretching is common	Sex, maturation, sport, warm-up, protocol
Endurance	Frequently favorable where habitual activity/active transport is high	Can be reduced by sedentary lifestyle, but strong in trained endurance athletes	BMI/adiposity, active transport, training volume, environment

10. Discussion

The most important conclusion from the comparative literature is that rural–urban fitness differences are domain specific. It is inappropriate to state that rural athletes are simply 'fitter' or urban athletes are 'fitter.' Fitness contains multiple physiological and motor qualities, and each quality responds to different exposures. Endurance may reflect accumulated daily movement, while speed and agility may reflect high-intensity training and technical practice.



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Flexibility may reflect stretching culture and sport selection. Strength may change direction depending on whether the test measures absolute force, relative strength, explosive power, or muscular endurance.

A second conclusion is that body composition acts as both a fitness correlate and a potential mediator. If an urban sample has greater average adiposity, running and jumping tests may be negatively affected even if participants possess adequate muscular capacity. Conversely, greater body size can increase absolute grip strength. Statistical adjustment is therefore essential. Without it, researchers risk interpreting anthropometric differences as environmental fitness effects.

Third, organized sport participation may be more influential than residence. A well-coached rural school with regular competition, safe playing fields, and active students may outperform an under-resourced urban school. Similarly, an urban sports academy may outperform rural schools because it provides systematic training. The rural–urban label should therefore be supplemented by measures of actual exposure: weekly training, coaching quality, facility access, travel mode, screen time, and extracurricular activity.

Fourth, socioeconomic conditions complicate interpretation. Rural disadvantage can include poverty, nutritional limitations, long travel distances, lack of equipment, and limited health services. Urban disadvantage can include overcrowding, unsafe streets, lack of affordable sports clubs, pollution, and sedentary entertainment. Within both settings, family income and parental support can determine whether a child participates in sport. An analytical study must therefore resist stereotypes such as 'rural equals active' and 'urban equals sedentary.'

Fifth, sex and maturation require explicit attention. Boys and girls differ in the timing and pattern of adolescent growth, and maturation influences strength, speed, body composition, and flexibility. If rural and urban samples have different age distributions or maturity status, apparent environmental differences may be misleading. Stratified analysis by sex and age, along with maturity adjustment when feasible, strengthens validity.

Sixth, the choice of test affects the conclusion. A 20 m shuttle run measures progressive intermittent endurance and requires repeated turning; a mile run is continuous. Handgrip strength is not equivalent to lower-body power. A shuttle agility test may partly reflect speed. Researchers should define each fitness component operationally and avoid combining dissimilar tests into a single conclusion without justification.

11. Practical Recommendations

- For rural schools: preserve naturally high activity and endurance while adding structured sprint mechanics, agility drills, progressive resistance exercises using body weight or low-cost equipment, and regular flexibility/mobility work.
- For urban schools: protect daily movement time, expand active transport and outdoor play, incorporate aerobic conditioning within games, and monitor excessive sedentary time while maintaining access to structured skill and speed training.
- For both settings: conduct fitness testing at least once or twice per academic year using the same standardized protocol, and use results to individualize training rather than rank or stigmatize students.
- Train physical-education teachers and school coaches in youth strength and conditioning, safe progression, injury prevention, and interpretation of fitness data.
- Ensure girls have equal access to facilities, coaching, competition, and culturally acceptable opportunities for vigorous physical activity.



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- Collect contextual data—including training hours, club participation, travel mode, screen time, sleep, and basic anthropometry—whenever rural–urban comparisons are made.
- Use effect sizes and confidence intervals, not p-values alone, when reporting differences. Small statistical differences in very large samples may have limited practical importance.
- Develop partnerships between rural and urban schools so that facilities, competitions, coaching workshops, and talent-development opportunities can be shared.

Conclusion

Rural–urban differences in the physical fitness of school athletes are real in many datasets, but they are neither universal nor uniform across fitness components. Rural environments can support endurance and functional fitness through habitual movement, active transport, outdoor play, and physically demanding daily routines. Urban environments can support speed, agility, technical strength, and flexibility through organized sport, coaching, facilities, and frequent competition. Yet each environment can also create barriers: rural athletes may lack specialist resources, while urban athletes may experience sedentary lifestyles and restricted outdoor activity. The evidence therefore favors an interaction model in which residence influences fitness through training opportunity, body composition, socioeconomic conditions, school physical education, transport, recreation, and culture. For researchers, the strongest approach is to test each component separately, standardize measurement, adjust for age, sex, body size and training exposure, and report effect sizes. For schools, the most useful response is targeted development rather than comparison for its own sake. Fitness testing should identify what athletes need, and programs should then strengthen weaker qualities while maintaining existing advantages. Balanced access to endurance activity, sprinting, agility practice, strength development, and flexibility training can reduce environmental disparities and improve both health and sporting performance among rural and urban school athletes.

References

- Chillón, P., Ortega, F. B., Ferrando, J. A., & Casajús, J. A. (2011). Physical fitness in rural and urban children and adolescents from Spain. *Journal of Science and Medicine in Sport*, 14(5), 417–423. <https://doi.org/10.1016/j.jsams.2011.04.004>
- Drenowatz, C., Greier, K., Ruedl, G., & Kopp, M. (2020). Physical fitness in Upper Austrian children living in urban and rural areas: A cross-sectional analysis with more than 18,000 children. *International Journal of Environmental Research and Public Health*, 17, 1045.
- Joens-Matre, R. R., Welk, G. J., Calabro, M. A., Russell, D. W., Nicklay, E., & Hensley, L. D. (2008). Rural–urban differences in physical activity, physical fitness, and overweight prevalence of children. *Journal of Rural Health*, 24(1), 49–54. <https://doi.org/10.1111/j.1748-0361.2008.00136.x>
- Peña Reyes, M. E., Tan, S. K., & Malina, R. M. (2003). Urban–rural contrasts in the physical fitness of school children in Oaxaca, Mexico. *American Journal of Human Biology*, 15(6), 800–813. <https://doi.org/10.1002/ajhb.10218>
- World Health Organization. (2020). WHO guidelines on physical activity and sedentary behaviour. Geneva: World Health Organization.
- World Health Organization. (2020). WHO guidelines on physical activity and sedentary behaviour: At a glance. Geneva: World Health Organization.



INTERNATIONAL JOURNAL OF ARTS, COMMERCE & EDUCATION

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<https://avjournals.com/> e-ISSN: 2347-7687, Vol 12, Issue 2, July-December 2024

Physical fitness and activity levels among urban school children and their rural counterparts. (2013). Study indexed in PubMed (PMID: 23700247).

Effect of living area and sports club participation on physical fitness in children: A 4 year longitudinal study. (2014). Study indexed in PubMed (PMID: 24886425).

Physical fitness differences between rural and urban children from western Kenya. (2016). American Journal of Human Biology, 28, 514–523. Study indexed in PubMed (PMID: 26707057).

Differences between health- and skill-related physical fitness profiles of Kenyan children from urban and rural areas: The Kenya-LINX Project. (2024). Study indexed in PubMed (PMID: 40283769).