

SPORT INFRASTRUCTURE IN TETOVO: AN EVALUATION OF EXISTING CONDITIONS, CHALLENGES AND FUTURE DEVELOPMENT POTENTIAL

Hazra MERXHANI¹, Getoar ABDURAMANI², Fjolla IBRAIMI³, Albin HALITI⁴

¹Department of Architecture, Faculty of Applied Sciences, University of Tetovo

²Department of Architecture, Faculty of Applied Sciences, University of Tetovo

³Department of Architecture, Faculty of Applied Sciences, University of Tetovo

⁴Department of Architecture, Faculty of Applied Sciences, University of Tetovo

*Corresponding Author: e-mail: hazra.merxhani@unite.edu.mk

Abstract

This research examines the role of sports fields in primary and secondary schools, as well as open-access sports terrains and city stadiums in Tetovo, not only as physical infrastructure but as essential pillars of social well-being and sustainable urban development, as they play a critical role in the early development of children, combating negative phenomena such as obesity and addiction to technology, while promoting discipline and teamwork. Beyond the educational function, stadiums and sports fields serve as points of gravity for urban identity and social integration, they offer to citizens of all ages the opportunity for physical activity, which is directly linked to stress reduction and improved mental health.

The study places particular emphasis on evaluating the condition and functionality of these open sports spaces through SWOT analysis (Strengths, Weaknesses, Opportunities, and Threats), with the aim of assessing whether they meet the required standards for safe and effective public use. This evaluation highlights existing gaps in infrastructure, maintenance, accessibility, and safety. Investments in stadiums and sports fields are not seen only as a sports project, but as an investment in “human capital”, creating an environment where young talents can aspire to professional success and where the community finds healthy spaces for entertainment and socialization. The paper concludes that the modernization of this infrastructure is necessary to ensure a quality life and an active society in the city of Tetovo. Findings suggest that investments in sports infrastructure should be understood not merely as construction projects, but as long-term investments in human capital and public health. The modernization of this infrastructure is necessary to ensure a quality life, inclusive and sustainable society in the city of Tetovo.

Keywords: sports infrastructure, public health, urban development, construction projects, challenges.

Introduction

Sport is widely recognized as a key component of contemporary society, with significant potential to contribute to social development and cohesion. Nelson Mandela famously emphasized this role, stating that “Sport has the power to change the world, it inspires and unites people in a way that little else does” [1]. Physical activity is a fundamental element of a healthy lifestyle. Previous research has demonstrated that the built environment, particularly the availability of sports fields and facilities, has a positive influence on physical activity levels [2]. However, global data indicate that approximately one-third of adults and four-fifths of children do not meet recommended physical activity guidelines, with physical inactivity increasingly recognized as a major public health concern associated with rising rates of obesity and related diseases [3].

Regular engagement in physical activity is effective in preventing chronic conditions such as obesity, diabetes, and certain types of cancer [4]. In this context, residential and urban environments play an important role in shaping opportunities for active lifestyles, particularly through access to sport and recreational spaces. Recent studies highlight that children spend a significant proportion of their outdoor time in public open spaces rather than in schoolyards,

making urban public spaces increasingly important for physical activity [5]. Schools, in particular, function as important social and cultural hubs within urban environments. Although their form and organization vary across different cultural contexts, their role in the urban fabric is universally significant. School sports grounds and stadiums represent complex urban settings where multiple user groups and functions coexist. These spaces are used not only by pupils, teachers, and school staff, but also by wider community groups, each with different spatial needs and preferences that must be carefully balanced. Research on school environments in Tetovo has addressed issues of accessibility and inclusiveness [6], as well as the availability of sports facilities in primary and secondary schools [7]. However, comprehensive studies focusing specifically on stadiums and open sports grounds within schools in Tetovo remain limited. Given these considerations, the development and use of sports facilities is a valuable resource for promoting health and reducing risk factors among children and adolescents [8], as it encourages regular physical activity, supports social interaction, and contributes to the establishment of healthy lifestyle habits from an early age.

The realization of sports infrastructure, from initial design concepts to the built environment, is a complex process influenced not only by citizens' needs but also by institutional capacity, planning frameworks, and governance structures [9]. Successful implementation of such projects depends on effective leadership and the active involvement of competent stakeholders advocating for investment in public sports infrastructure [10]. In the design process, it is essential to balance design intentions with material constraints in order to meet sustainability objectives [11]. Structure is a fundamental component in the realization of architectural form - not only as a technical framework, but also as an essential aspect of visual and spatial expression [12]. The selection of construction materials must comply with relevant legal regulations and technical standards to ensure safety, durability, and performance. Adherence to these requirements guarantees that sports facilities are structurally sound, environmentally responsible, and suitable for user needs [13]. Furthermore, effective integration and communication between indoor and outdoor sports infrastructure contribute to the development of a coherent, accessible, and inclusive system that supports seamless user experience across all facilities [14].

Research methodology and Mapping sport infrastructure in Tetovo

The main body of the manuscript is structured into several key sections. It begins with the research methodology, outlining the methods and approaches used for data collection and analysis. This is followed by a detailed mapping of sports infrastructure in Tetovo, focusing on the spatial distribution, accessibility, and condition of existing facilities. The analysis further examines the relationship between urban form, accessibility, and the use of sports spaces, highlighting key challenges and opportunities for improving physical activity environments. Finally, the discussion interprets the findings in relation to planning strategies and design principles for inclusive and sustainable sports infrastructure.

2.1 This research adopts a qualitative and analytical approach to evaluate sports infrastructure in Tetovo, focusing on three main categories: city stadiums, sports facilities in primary schools, and sports facilities in secondary schools. The methodology is based on the application of SWOT analysis (Strengths, Weaknesses, Opportunities, and Threats), a widely used strategic planning tool for assessing both internal and external factors that influence the performance

and development of infrastructure systems. SWOT analysis is particularly suitable for this study as it enables a structured evaluation of existing conditions while also identifying future development potential. The analysis is divided into two main components: internal factors (strengths and weaknesses), which relate to the current state, functionality, maintenance, and accessibility of the sports infrastructure; and external factors (opportunities and threats), which refer to broader environmental, social, economic, and institutional influences that may affect future development.

Data for the analysis were collected through field observations, spatial mapping, and review of existing infrastructure conditions. Each category - city stadiums, primary school sports fields, and secondary school sports fields, were analyzed separately using the SWOT framework. This approach allows for a comparative understanding of the different types of sports infrastructure and their specific challenges and potentials.

The application of SWOT analysis in this context serves as a preliminary yet effective tool for identifying key issues and strategic directions for improvement. It facilitates the evaluation of alternative development scenarios and supports decision-making processes related to planning, management, and investment in sports infrastructure. Furthermore, by integrating perspectives from urban planning and infrastructure management, the methodology provides a comprehensive assessment that goes beyond physical conditions, incorporating aspects of accessibility, usability, and long-term sustainability. As highlighted in previous studies [15], SWOT analysis contributes to a more inclusive and strategic evaluation process, generating outcomes that are beneficial for multiple stakeholders involved in the development of sports infrastructure.

2.2 This section presents the mapping and analysis of sports infrastructure in Tetovo, with particular emphasis on open-access terrains such as city stadiums and sports fields within primary and secondary schools. These facilities represent essential components of the urban environment, contributing not only to physical activity and education, but also to broader social interaction and community development. Within the urban area, there are five stadiums that serve as primary venues for organized sports activities and public events. In addition, the city includes thirteen educational institutions, consisting of seven primary schools and six secondary schools. The total number of students is estimated at around 9,400 in primary education and approximately 4,700 in secondary education. Each of these schools is equipped with open sports fields, which play a crucial role in the daily physical education of students, as well as in informal recreational use outside school hours. These school-based sports terrains, together with city stadiums, form a network of accessible spaces that support physical activity for different age groups across the city.

The mapping process aims to identify the spatial distribution and coverage of these sports facilities, providing insight into their accessibility and relationship with residential areas. Particular attention is given to the availability of open-access spaces, as these are key to promoting inclusive and continuous use by the wider community.

PARIMARY SCHOOLS, SECONDARY SCHOOLS, STADIUMS



Figure 1. Sport infrastructure in Tetovo

Figure 1 presents the spatial distribution of sports infrastructure in Tetovo, highlighting the location of city stadiums as well as sports fields within primary and secondary schools. The map offers a comprehensive visual representation of how these facilities are positioned across the urban territory, illustrating their relationship with residential areas, educational institutions, and main circulation networks. This spatial overview enables a clearer understanding of the accessibility and coverage of sports infrastructure for different population groups within the city. Furthermore, the mapping helps to identify patterns of concentration and potential gaps in the distribution of these facilities, which may affect equal access to sports and recreational spaces. Areas with a higher density of infrastructure can be distinguished from those with limited or no access, providing important insights for future planning and investment strategies.

[1]. Stadiums in the city of Tetovo:

- New City Stadium
- Old City Stadium
- Stadium at the Sports Center
- Stadium at secondary school Mosha Pijade
- Stadium "Dardanet"

[2]. Open sport infrastructure in primary schools:

- Kiril and Metodij
- Naim Frasheri
- Lirija
- Istikbal
- Bratstvo Migjeni
- Goce Delcev
- Andreja Savevski – Kikish

[3]. Open sport infrastructure in secondary schools:

1. Mosha Pijade
2. Nikola Shtejn
3. Kiril Pejcinoviq
4. 8 Shtatori
5. Gjimanzi 7 Marsi
6. Gjoce Stojceski

Results

This section presents a comprehensive analysis of sports infrastructure in the city of Tetovo, focusing on both stadiums and open sports facilities within primary and secondary schools. The aim is to evaluate the current condition, spatial distribution, accessibility, and functional capacity of these spaces, while identifying key challenges and opportunities for their future development. The analysis is based on a combination of field observations, spatial mapping, and qualitative assessment methods, providing a realistic overview of the existing situation. Special attention is given to the relationship between the built environment and the use of sports spaces, emphasizing the role of these facilities in supporting physical activity, social interaction, and community well-being. To ensure a structured and critical evaluation, a SWOT analysis is applied to each category of sports infrastructure. This approach enables the identification of strengths, weaknesses, opportunities, and threats, offering a clear framework for understanding both the current performance and future potential of these spaces. The findings are further supported by visual documentation, illustrating the physical condition and usability of the analyzed facilities

3.1 Stadiums in city of Tetovo: Below is presented the SWOT analysis for the stadiums in the city of Tetovo, which examines the current condition of these facilities, as well as their future development perspectives. The analysis provides an overview of the real situation on the ground, identifying both positive and negative aspects of the existing infrastructure.

In terms of strengths, the stadiums are characterized by attractive locations within the urban area, easy accessibility for both pedestrians and vehicles, and a relatively high level of daily and periodic use. They also offer multifunctional spaces and, in several cases, sufficient surface area to accommodate different types of sports and community activities.

However, several weaknesses are evident in the current situation. These include inadequate maintenance, visible physical degradation over time, and failure to meet international standards for sports infrastructure. Additionally, there are ongoing concerns related to ownership and privatization processes, with indications of interest in selling or repurposing these public spaces, which further threatens their long-term function as public sports facilities.

Table 1. SWOT Analysis of Stadiums in the City of Tetovo – Internal Factors

Strength	Weaknesses
Attractive urban locations	Poor maintenance and lack of regular upkeep
Easy accessibility for pedestrians and vehicles	Progressive physical deterioration
Multifunctional sports and community spaces	Do not meet international standards
Sufficient space for various activities	Outdated infrastructure and facilities

From an opportunity perspective, there is significant potential for transforming these stadiums into modern, attractive sports infrastructures that meet contemporary standards. Sustainable investment could improve the quality of life for citizens, strengthen urban development processes, and stimulate the revitalization of surrounding areas. Furthermore, upgraded facilities could support the organization of various sporting, cultural, and community events, increasing their social and economic value within the city.

On the other hand, several threats may negatively impact their future development. If no strategic intervention is implemented, these spaces risk further deterioration and neglect, potentially becoming unsafe or socially problematic areas. There is also the risk of privatization

and construction of profit-oriented buildings, which would lead to the permanent loss of public sports space. Ultimately, such developments could contribute to the decline of sports culture and reduce opportunities for youth and community engagement in physical activities

Table 2. SWOT Analysis of Stadiums in the City of Tetovo – External Factors

Opportunities	Threats
Development of modern and sustainable sports infrastructure	Continued degradation and neglect of facilities
Improvement of citizens' quality of life	Risk of becoming unsafe or socially problematic areas
Contribution to urban development and regeneration of surrounding zones	Privatization and conversion into profit-oriented developments
Organization of sports, cultural, and community events	Loss of public sports spaces
Increased social and economic value of infrastructure	Decline of sports culture and reduced youth engagement

Below are presented photographs illustrating the real condition of the stadiums in the city of Tetovo. These images provide visual evidence of the current situation on the ground and confirm the findings and statements discussed in the analysis regarding the present state of the infrastructure. They clearly reflect both the functional aspects and the existing deficiencies, including issues related to maintenance, deterioration, and overall management of the facilities.



Figure 2. New City Stadium



Figure 3. Stadium "Dardanet"



Figure 4. Old City Stadium



Figure 5. Stadium at secondary school Mosha Pijade

3.2 Open sport infrastructure in primary schools of Tetovo: Below is presented the SWOT analysis for the open sport infrastructure in primary schools of Tetovo, examining the current condition of these facilities as well as their potential for future development. This analysis provides a realistic overview of the existing situation, identifying both positive aspects and existing challenges related to the functionality, accessibility, and maintenance of these spaces.

In terms of strengths, open sport facilities in primary schools are generally well distributed within residential areas, making them easily accessible for children. These spaces play an important role in supporting daily physical activity and are often integrated within school environments that function as community hubs. In several cases, they provide sufficient open areas for basic sports activities and informal recreation.

However, a number of weaknesses are evident. Many of these facilities suffer from inadequate maintenance, lack of proper equipment, and substandard playing surfaces. In some cases, they do not meet minimum safety or design standards, which limits their usability and quality. Additionally, restricted access outside school hours reduces their potential as community resources.

Table 3. SWOT Analysis of Open Sport Infrastructure in Primary Schools of Tetovo – Internal Factors

Strength	Weaknesses
Good distribution within residential areas	Poor maintenance and lack of regular upkeep
Easy access for children and local communities	Lack of adequate sports equipment
Integration within school environments	Substandard and unsafe playing surfaces
Support for daily physical activity	Limited access outside school hours
Availability of open space for basic activities	Do not meet design and safety standards

From an opportunity perspective, these spaces have strong potential to be improved through targeted investments and better management strategies. Their transformation into well-designed, safe, and inclusive sport environments could significantly enhance children's physical activity levels and overall well-being. Furthermore, opening these facilities to the wider community could strengthen social interaction and maximize their use beyond school hours.

On the other hand, several threats may affect their future. Continued neglect and lack of investment may lead to further degradation, making these spaces unusable or unsafe. There is also a risk that these areas may be repurposed for non-sport functions due to urban pressure and limited space. Such developments would reduce opportunities for physical activity among children and negatively impact long-term health and social outcomes.

Table 4. SWOT Analysis of Open Sport Infrastructure in Primary Schools of Tetovo – External Factors

Opportunities	Threats
Improvement through targeted investments	Continued deterioration and neglect
Creation of safe and inclusive environments	Risk of becoming unsafe spaces
Increased use by the wider community	Repurposing for non-sport functions
Promotion of healthy lifestyles among children	Reduction of physical activity opportunities
Strengthening social interaction	Urban pressure on open school spaces

Below are presented photographs illustrating the current condition of open sport infrastructure in selected primary schools in Tetovo. These images provide visual evidence of the situation on the ground and support the analysis by highlighting both functional aspects and existing deficiencies, particularly in terms of maintenance, equipment, and safety conditions.



Figure 6. Primary school – Naim Frasheri

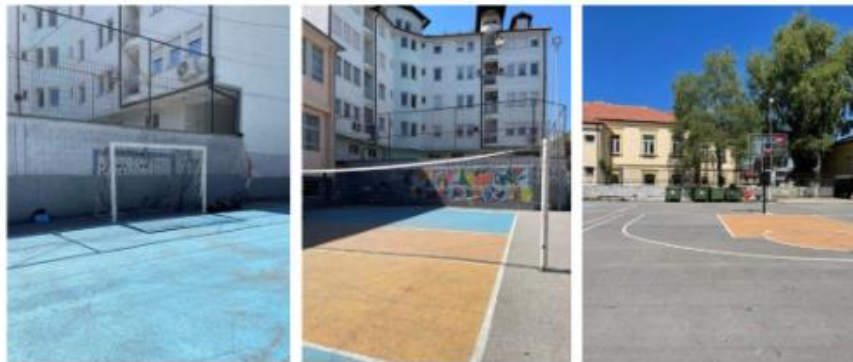


Figure 7. Primary school – Istikbal

3.3. Open sport infrastructure in secondary schools of Tetovo: Below is presented the SWOT analysis for the open sport infrastructure in secondary schools of Tetovo, examining the current condition of these facilities as well as their potential for future development. This analysis provides a comprehensive overview of the existing situation, focusing on functionality, accessibility, spatial organization, and the overall quality of these environments. In terms of strengths, open sport facilities in secondary schools generally offer larger and more developed spaces compared to primary schools. These areas are often designed to accommodate a wider range of sports activities and are used by a broader age group, including adolescents and, in some cases, the wider community. Their location within the urban fabric allows relatively easy access, and they play an important role in promoting regular physical activity and organized sports. However, several weaknesses are evident. Despite their larger scale, many of these facilities suffer from poor maintenance, outdated infrastructure, and lack of modern equipment. In some cases, the organization of space is inefficient, limiting optimal use. Safety standards are not always met, and access is often restricted outside school hours, reducing their potential as multifunctional community spaces.

Table 5. SWOT Analysis of Open Sport Infrastructure in Secondary Schools of Tetovo – Internal Factors

Strength	Weaknesses
Larger and more developed sport spaces	Poor maintenance and lack of regular upkeep
Capacity for multiple sports activities	Outdated infrastructure and equipment
Accessibility within the urban context	Inefficient spatial organization
Use by different age groups	Do not fully meet safety standards
Potential for organized sports and events	Limited access outside school hours

From an opportunity perspective, these facilities have strong potential for transformation into high-quality, multifunctional sports environments. Investments in modernization, improved design, and better management could significantly enhance their usability and attractiveness. Opening these spaces to the public and integrating them into the wider urban sports network could increase their social and economic value, while promoting healthier lifestyles among young people. On the other hand, several threats may hinder their development. Continued lack of investment and maintenance may result in further deterioration, reducing functionality and safety. There is also a risk of underutilization or mismanagement, which may limit their long-term sustainability. Additionally, urban development pressures may lead to the reduction or transformation of these spaces, negatively impacting opportunities for youth engagement in sports and physical activities.

Table 6. SWOT Analysis of Open Sport Infrastructure in Secondary Schools of Tetovo – External Factors

Opportunities	Threats
Modernization and infrastructure improvement	Continued degradation of facilities
Development of multifunctional sport environments	Reduced functionality and safety risks
Integration into the urban sports network	Urban pressure and potential space reduction
Increased community access and use	Decline in youth participation in sports
Promotion of active lifestyles among youth	Underutilization and poor management

Below are presented photographs illustrating the current condition of open sport infrastructure in selected secondary schools in Tetovo. These images provide visual support for the analysis, reflecting both the functional potential and the existing deficiencies, particularly in terms of maintenance, equipment, and spatial organization.



Figure 8. Secondary school – Kirił Pejcinovic



Figure 9. Secondary school – Nikola Shtejn

Conclusions

Based on the preliminary SWOT analysis conducted for open sports facilities in primary and secondary schools, as well as the city stadiums in Tetovo, it can be concluded that the existing sports infrastructure faces significant structural, functional, and managerial challenges. The findings clearly indicate that most school sports fields are in poor physical condition, with damaged playing surfaces, broken football goals, basketball hoops, and volleyball nets, many of which are partially or completely out of use. Despite these limitations, these spaces continue to be actively used by students, teachers, and even the local community, highlighting their high social value and lack of alternative facilities. The same situation is observed in the city stadiums, where infrastructure does not meet required standards. Key deficiencies include deteriorated stands for spectators, inadequate changing rooms, and overall lack of maintenance and modernization. These conditions significantly reduce usability, safety, and comfort for users.

However, the analysis also shows that both school-based sports areas and city stadiums possess strong potential for improvement. The availability of sufficient space, high levels of daily use, and community willingness to participate in maintenance represent important strengths that can support future development. In this context, modern approaches such as the “Open Schoolyard” concept demonstrate how school sports facilities can be integrated into public urban space, allowing controlled access for the community outside school hours and increasing their social value.

Overall, the study emphasizes that there is an urgent need for strategic and sustainable investment in sports infrastructure in Tetovo. Proper reconstruction and modernization of both school sports fields and city stadiums would not only improve physical conditions but also enhance public health, support youth development, and strengthen social cohesion. If appropriately managed, these spaces can evolve into multifunctional urban assets that contribute significantly to the city’s long-term sustainable development.

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HOW SWIMMING AFFECTS THE HUMAN BODY

Rrezearta NEZIRI, Anila BELLÇISHTA SHAQIRI

Abstract

This paper discusses the importance of physical activity and its impact on the human body, with a special focus on swimming as one of the most complete sports. According to the definition of the World Health Organization (WHO), physical activity includes any bodily movement that requires energy expenditure and is essential for maintaining physical and mental health. A lack of physical activity is associated with an increased risk of non-communicable diseases such as obesity, diabetes, and cardiovascular diseases, while regular participation provides numerous benefits for the body.

In this context, swimming is presented as a highly effective activity that activates almost all body muscles, improves endurance, flexibility, and coordination. It has a positive impact on the muscular system by strengthening and toning muscles, on the cardiovascular system by improving heart efficiency and blood circulation, and on the respiratory system by increasing lung capacity and breathing control. Swimming also helps prevent many diseases and is suitable for all age groups due to its low impact on joints.

In addition to physical benefits, the role of sport and swimming in improving mental health is also emphasized, as they reduce stress, anxiety, and enhance psychological well-being. In conclusion, the paper highlights that regular participation in physical activity, especially swimming, is essential for a healthy life and a better quality of living.

Introduction

World Health Organization (WHO) defines physical activity as any bodily movement produced by skeletal muscles that requires energy expenditure. Physical activity includes every movement, whether during leisure time, transportation, work, household activities, or sports. Moderate- and vigorous-intensity physical activity improves health. The most

common forms of physical activity include walking, cycling, sports, active recreation, and games, which can be practiced at any level of ability and enjoyed by everyone.

Physical activity is beneficial for health and well-being, while the lack of it increases the risk of non-communicable diseases and other health problems. Together,

physical inactivity and sedentary behavior contribute to the rise of these diseases and create a burden on healthcare systems.

Improving the level of physical activity brings health benefits and helps achieve global sustainable development goals. Sport is very important for the development and maintenance of human health because it includes exercises that strengthen the body, improve the functioning of organs, and increase physical endurance.

Physical activity has a positive impact on the muscular, skeletal, cardiovascular, and respiratory systems. One of the most beneficial sports for the human body is swimming. Swimming is considered a complete sport because it activates almost all the muscles of the body. In addition, exercises in water improve breathing and strengthen the heart. Sport has become an

essential element for maintaining public health in modern life conditions. In a busy lifestyle and with irregular nutrition, physical exercise is extremely important. The main benefits of sport for physical health include regulating body weight, strengthening muscles and bones, and preventing cardiovascular diseases and type 2 diabetes. Regular physical activity helps reduce the risk of obesity and related problems. It also improves the function of the respiratory and digestive systems.

Sport also positively affects mental health by reducing stress, anxiety, and depression through the release of endorphins. In modern society, physical activity is an effective solution for improving the quality of life.