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Accessibility of indoor swimming pools for persons with disabilities as an element of sustainable social development

Abstract

Research background and purpose: Ensuring equal access to public infrastructure is an important element of sustainable social development and inclusive management practices. In the context of sports management, accessibility of sports facilities for persons with disabilities remains a significant social and organizational challenge. Despite growing awareness of inclusion, empirical evidence on the actual availability and adaptation of sports infrastructure in Poland is still fragmented. The purpose of this article is to analyse the accessibility of indoor swimming pools for persons with disabilities in Poland, with particular emphasis on its role in supporting sustainable social development and inclusive policy planning.

Design/methodology/approach: The study is based on the analysis of secondary data derived from three complementary sources. First, demographic data from Główny Urząd Statystyczny (GUS, Statistics Poland) concerning the number of persons with disabilities were examined, with attention to differences in identification methods. Second, infrastructural data on the adaptation of indoor swimming pools to the needs of persons with disabilities were analysed. Third, a bibliometric analysis of scientific publications indexed in the Scopus and Web of Science databases was conducted to identify trends and research interest in accessibility and inclusive sports infrastructure. Descriptive and comparative analytical methods were applied.

Findings: The results reveal substantial discrepancies in the methods used to identify persons with disabilities, which affects the comparability of statistical data. The analysis indicates a gradual increase in the number of sports facilities adapted to the needs of persons with disabilities, suggesting positive developments in inclusive infrastructure management. Additionally, the bibliometric analysis demonstrates a growing scientific interest in accessibility, inclusion, and sustainable development within sports and public infrastructure research.

Value added and limitations: The article provides original value by integrating demographic, infrastructural, and bibliometric perspectives into a single analytical framework relevant for management and policy decision-making. The findings have practical implications for planning and managing investments in inclusive sports facilities and contribute to social value by supporting integration and equal opportunities. The main limitation of the study is its reliance on secondary data, which may be affected by differences in data collection methods and availability.

Keywords: *sustainable social development, accessibility, disability, sports infrastructure, indoor swimming pools*

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1. Introduction

Contemporary societies increasingly recognize the necessity of creating spaces accessible to all citizens, regardless of their physical, sensory, or cognitive abilities. This process is closely linked to the evolution of approaches to disability from the medical model, which focuses on individual deficits, to the social model, which emphasizes the role of environmental and institutional barriers in limiting the participation of persons with disabilities in social life. In this context, the accessibility of public infrastructure becomes not merely a technical issue, but an element of a broader strategy for managing social development and implementing the principle of equal opportunities. Within the social model of disability, it is assumed that it is not the individual's limitations that exclude them from participation in social life; rather, it is poorly designed space that restricts opportunities for social engagement. This reversal of perspective fundamentally changes the way public space is understood, as it should by definition be accessible to everyone, without the need to introduce additional regulations that would only then impose such an obligation.

One of the areas particularly significant from the perspective of social inclusion is sports infrastructure. Physical activity fulfils health-related, rehabilitative, and integrative functions, and participation in sport fosters the building of social relationships, strengthens a sense of agency, and counteracts exclusion. Access to sports infrastructure is therefore important not only at the individual level, but also at the systemic level it influences the level of social capital and the quality of life within local communities. It is space that constitutes the first arena where social engagement emerges. In the context of the Sustainable Development Goals, particular importance is attached to goals related to health and well-being, the reduction of inequalities, and the building of inclusive communities.

Despite growing awareness of the importance of accessibility, many sports facilities still do not fully meet the requirements of universal design. Architectural, organizational, and informational barriers limit the actual ability of persons with disabilities to use such infrastructure. This problem is particularly evident in older facilities, designed at a time when accessibility standards were not incorporated into investment processes. As a result, the accessibility of sports infrastructure becomes one of the key indicators of the implementation of the social dimension of sustainable development.

The concept of universal design, as defined by Ronald Mace and subsequently incorporated into Article 2 of the UN Convention on the Rights of Persons with Disabilities, refers to the design of products, environments, and services that are usable by all people, to the greatest extent possible, without the need for adaptation or specialized design (Mitrasinovic & Miodrag, 2008). Applied to sports infrastructure, universal design implies that facilities should be conceived from the outset to accommodate

the broadest possible range of users – including persons with mobility, sensory, and cognitive impairments – rather than relying on retrofitted accommodations. In this study, universal design serves as the normative benchmark against which the GUS-recorded category of “adaptation” is interpreted: adaptation, as measured in the available statistical data, captures only a partial and retrospective approximation of universal design, since it reflects compliance with minimum accessibility criteria for existing facilities rather than design-stage inclusivity. This distinction is revisited in the Discussion when interpreting the gap between formal accessibility statistics and substantive inclusiveness. In the academic literature, accessibility is most frequently analysed in the context of urban planning, public transport, or public buildings, whereas sports infrastructure remains relatively less often the subject of systematic quantitative research at the national level. Previous analyses have focused mainly on case studies of selected cities or on qualitative aspects of participation in sport. There is a lack of research combining demographic, infrastructural, and bibliometric perspectives in order to provide a comprehensive assessment of sports accessibility at the national scale. Consequently, a research gap exists regarding the linkage between the accessibility of sports infrastructure and the concept of social sustainable development in a systemic perspective.

This article focuses on indoor swimming pools as a specific category of sports infrastructure. This choice is justified by several factors. First, activity in a water environment has a universal character and often constitutes one of the few forms of physical exercise accessible to persons with mobility impairments. Water reduces the load on the musculoskeletal system, enabling exercise for individuals who cannot participate in traditional forms of physical activity. Second, indoor swimming pools serve both recreational and rehabilitative functions, and thus their accessibility has therapeutic significance. Third, statistical data concerning this type of facility are relatively the most consistent and accessible within the resources of the Central Statistical Office, which allows for comparative analysis over time and across regions.

At the same time, the analysis of the accessibility of sports infrastructure cannot be conducted independently of data concerning the number of persons with disabilities. The scale of infrastructural needs is directly related to the size of the population of potential users. In Poland, the system for identifying persons with disabilities has undergone methodological changes, which complicates the unambiguous assessment of demographic trends. Definitional discrepancies and differences in data sources affect the interpretation of the scale of the phenomenon and are relevant for public policy planning.

In this context, the aim of the article is to analyse the accessibility of indoor swimming pools in Poland in the years 2010–2022 in relation to the needs of persons with disabilities, and to assess the significance of this accessibility for the implementation of the principles

of social sustainable development. The study covers three complementary areas: changes in the number of persons with disabilities and the methods of their identification, the degree of adaptation of sports infrastructure, and the position of accessibility issues within academic discourse.

The following research questions were formulated in the article:

1. *How did the number of persons with disabilities in Poland change in the years 2010–2022, and what factors influenced the methods of their statistical identification?*
2. *To what extent are indoor swimming pools in Poland adapted to the needs of persons with disabilities, and how did this accessibility evolve during the analysed period?*
3. *What position does the issue of sports accessibility for persons with disabilities occupy in national and international academic discourse?*

The contribution of this article lies in the integration of three analytical perspectives: demographic, infrastructural, and bibliometric within a single interpretative framework grounded in the concept of social sustainable development. Such an approach allows not only for the assessment of the scale of infrastructural adaptations, but also for the identification of systemic conditions and challenges related to planning inclusive public space. The article contributes to the literature in the fields of public management, social policy, and sustainability by highlighting the importance of accessible sports infrastructure as an element of a long-term social development strategy. More specifically, the study makes three distinct theoretical contributions. First, it demonstrates that infrastructure accessibility data, as systematically collected by national statistical offices, can function as a measurable and replicable indicator of the social dimension of sustainability at the national and regional level – an operationalisation that has not been explicitly proposed in prior Polish-language literature. Second, it shows that the reliability of demographic denominators (i.e. disability prevalence data) is a prerequisite for meaningful policy evaluation: when statistical definitions change across measurement points, the apparent trends in inclusion indicators may reflect methodological artefacts rather than genuine social progress. Third, the bibliometric component suggests that the growth of academic interest in sports accessibility is closely aligned with the post-2012 SDG policy environment, indicating that normative frameworks such as the CRPD and the 2030 Agenda shape research agendas in this field. It should also be underlined that formal physical adaptation of a facility does not guarantee actual inclusiveness: architectural compliance represents a necessary but not sufficient condition for full social participation by persons with disabilities.

2. Literature review

2.1 Persons with disabilities in Poland

The situation of persons with disabilities (PwD) in Poland continues to present significant challenges, both at the legislative and awareness levels (Szczygieł, 2024; Wojnowska-Radzińska, 2022). Furthermore, there is an emphasized need to improve social inclusion for persons with disabilities in Poland. In this context, scholars strongly highlight the shift from a “care-based” model toward a “support-based” one (Daszewska, 2022). It becomes essential to perceive disability within a social context. In this understanding, the individual is treated as a unique person, and human differences are regarded as natural. However, this perspective implies a need to rethink public space design, which should follow the principles of universal design rather than being created primarily for the largest group of users (Gałat, 2023).

The identification of persons with disabilities poses certain difficulties, as Statistics Poland (GUS) began systematically publishing data on PwD only in 2018. For earlier years, it was necessary to rely on alternative data sources. The number of persons with disabilities in Poland is presented in Table 1.

Table 1. **Number of persons with disabilities in Poland**

Year	Total	Data source	Definition of a person with a disability
2010	4,697 million	National Population and Housing Census 2011 (Statistics Poland)	Persons holding a disability certificate or recognized as unfit for work.
2014	3,801 million	Health Status and Health Behaviour of the Polish Population: EHIS 2014 Survey (Statistics Poland)	Persons reporting difficulties in performing daily activities, as diagnosed by a physician.
2018	2,5 million	Persons with Disabilities in 2018 (Statistics Poland)	Persons holding a disability certificate or recognized as unfit for work.
2022	2,3 million	Persons with Disabilities in 2022 (Statistics Poland)	Persons holding a disability certificate issued by disability adjudication boards or a certificate of incapacity for work issued by the Social Insurance Institution (ZUS).

Note: figures across years are not directly comparable due to different data collection methods and disability definitions

Source: author's work based on Główny Urząd Statystyczny (2012, 2015, 2019, 2023a)

The obtained data reveal significant differences in the number of persons with disabilities across the analysed years. The presented summary shows the number of persons with disabilities in Poland in selected years between 2010 and 2022, based on various statistical and research sources. It is important to note the difficulty in obtaining and comparing these data over time. This is primarily due to the differing methods of data collection and the definitions applied. The data for 2010 come from the National Population and Housing Census 2011 and include persons holding a disability certificate or recognized as unfit for work. In 2014, the basis is the EHIS survey, which classifies individuals according to self-reported difficulties in performing daily activities confirmed by a medical diagnosis, and therefore also includes part of the population without formal certification. The year 2018 relies on the Statistics Poland report Persons with Disabilities in 2018, which covers only those with a disability certificate or recognized as unfit for work, whereas the 2022 data refer to persons with certificates issued by disability adjudication boards or by the Social Insurance Institution (ZUS). Such a large variation in criteria from subjective assessments of limitations to survey data and administrative registers means that the presented figures describe partially different groups. As a result, obtaining a homogeneous statistical series and conducting trend analysis over time is difficult, and comparisons must be made with caution and awareness of methodological limitations.

The decline in the number of persons with disabilities (PwD) in Poland raises doubts about the real nature of this trend. It seems that the observed decrease may largely result from changes in research methodology and the narrowing of definitional criteria rather than from an actual improvement in the health and social situation of this group. This should be compared with global trends indicating a growing number of persons with disabilities (WHO, 2011). According to the World Health Organization, the number of persons with disabilities worldwide has been steadily increasing. In the World Report on Disability published by WHO and the World Bank in 2011, it was estimated that over 1 billion people around 15% of the world's population experience some form of disability (World Health Organization & World Bank, 2011). In the most recent WHO statistics from 2023, this number has increased to about 1.3 billion, representing approximately 16% of the global population (World Health Organization, 2023). The main causes of this trend include population aging, an increase in chronic diseases, and improvements in diagnostics. WHO warns that persons with disabilities continue to face significant barriers to accessing healthcare, education, and social participation (World Health Organization, 2024). Based on the data presented in Table 1 and on Poland's population statistics, the proportion of persons with disabilities in the country can be estimated to range from 6.1% (2022) to 9.9% (2014). These differences may result from varying data collection methodologies as well as limitations related to certification procedures and definitions of disability in Poland.

2.2 Sustainable social development

Sustainable development is a multidimensional concept that traditionally encompasses three fundamental pillars: economic, environmental, and social. In the early stages of its development, particular emphasis was placed on balancing economic growth with environmental protection, focusing on reducing the negative impact of human activity on ecosystems and ensuring intergenerational justice in access to resources. Over time, however, it became increasingly evident that the durability of development processes cannot be achieved without incorporating the social dimension, which includes issues of equality, integration, quality of life, and civic participation.

With regard to the social dimension, it is crucial to ensure equal access for all members of society to basic resources and public services, such as education, healthcare, housing, transport, and recreational infrastructure. This access should be real rather than merely formal, which implies the need to take into account the diverse needs of different social groups, including persons with disabilities, older people, and those at risk of economic exclusion. Social sustainable development should simultaneously strengthen social cohesion and foster the building of social capital by increasing levels of trust, solidarity, and civic participation (Papadakis & Tzagkarakis, 2025).

An approach understood in this way enables the creation of inclusive societies capable of addressing global challenges such as growing social inequalities, rapid urbanization, migration, and environmental crises (Chen et al., 2022; Mensah, 2021). In the context of the so-called “permacrisis,” characterized by the coexistence of multiple economic, health-related, and geopolitical crises, the social dimension of sustainable development gains particular importance. Societies with higher levels of cohesion and lower degrees of exclusion are more resilient to systemic shocks and better prepared to adapt to changing conditions.

Initially, however, the social dimension of sustainability remained relatively underdeveloped compared to the economic and environmental pillars. Literature reviews indicate that for many years research was dominated by a focus on economic efficiency and the reduction of emissions and resource consumption, while issues of social equality and quality of life were treated as secondary (Colantonio, 2007; Mensah, 2021). Only in recent decades have theoretical concepts and measurement tools related to social sustainability been systematically developed, emphasizing its autonomous significance (Ly & Cope, 2023; Licht & Folland, 2024).

This shift results from growing awareness that social well-being is not merely a by-product of economic growth, but requires active public policy aimed at reducing inequalities and eliminating barriers in access to public services (Winston, 2021; Polèse & Stren, 2000). Social sustainable development therefore encompasses not only the redistribution of resources, but also the creation of conditions conducive to the full participation of individuals in social, cultural, and economic life. This implies the need

to design public space in an inclusive manner and to recognize the diversity of users' needs.

The importance of the social dimension of sustainable development has been clearly emphasized in the 2030 Agenda and the Sustainable Development Goals. These goals highlight the reduction of inequalities, the promotion of health and well-being, access to education, and the building of inclusive, safe, and resilient communities. In particular, goals related to health (SDG 3), reduced inequalities (SDG 10), and sustainable cities and communities (SDG 11) point to the necessity of ensuring infrastructure accessible to all social groups (Dugarova, 2015; Annarelli et al., 2024). Achieving these goals requires the integration of sectoral policies and the incorporation of social considerations into spatial planning and investment processes.

In this context, public infrastructure including sports infrastructure becomes one of the key instruments for implementing the social dimension of sustainability. The accessibility of sports facilities not only contributes to improving public health, but also enables the building of social relationships, strengthens a sense of belonging, and counteracts marginalization. Limited access to recreational infrastructure may, in turn, deepen existing inequalities and reinforce social exclusion. For this reason, the analysis of sports infrastructure accessibility should be regarded as an element of assessing the implementation of social sustainable development at both local and national levels.

Social development within the framework of sustainability therefore cannot be reduced to economic indicators or declarative strategies. It requires operationalization in the form of concrete institutional solutions, design standards, and monitoring mechanisms. The accessibility of public space for persons with disabilities constitutes, in this perspective, not only an expression of respect for human rights, but also a measurable indicator of the quality of public management and the maturity of the social system.

2.3 The importance of sports facility accessibility for persons with disabilities

Participation in sports activities plays a multidimensional role in the lives of persons with disabilities, extending far beyond the improvement of physical fitness. Regular physical activity contributes to enhanced overall performance, strengthens the musculoskeletal system, supports motor coordination, and promotes the maintenance of the highest possible level of functional independence. In many cases, it constitutes an element of the rehabilitation process; however, its significance is not limited solely to the medical aspect. Sport also fulfils a psychosocial function it strengthens a sense of agency, builds self-esteem, and counteracts social isolation. For many persons with disabilities, physical activity represents a space in which they can challenge stereotypes, redefine their identity, and experience genuine participation in community life.

Through participation in sport, persons with disabilities overcome various barriers both physical and social or symbolic in nature. Physical activity fosters the development of social relationships, the expansion of support networks, and the strengthening of social capital. This is particularly important in the context of counteracting sedentary lifestyles, which in the case of individuals with mobility limitations may lead to secondary health problems and a deterioration in quality of life (Bergier et al., 2013). Thus, access to sports infrastructure is not merely a matter of recreation, but an element of health, social, and inclusive policy.

Despite growing awareness of the importance of physical activity for this social group, many sports facilities still fail to meet accessibility requirements. Architectural barriers, such as the absence of ramps, elevators, properly adapted changing rooms, sanitary facilities, or devices enabling safe entry into swimming pools, significantly limit the ability of persons with disabilities to use infrastructure independently. This problem is particularly evident in older or historic facilities, where structural conditions and conservation regulations hinder modernization efforts (Hołownia & Kozak, 2024). Consequently, the formal existence of a sports facility within a given local government unit does not automatically imply its actual accessibility for all residents.

Studies conducted in selected Polish cities confirm the persistence of numerous barriers in access to sports services. Infrastructural limitations often coexist with organizational and informational barriers, such as insufficient staff training, a lack of transparent information about available adaptations, or a limited offer of activities tailored to the needs of persons with different types of disabilities (Maśliński et al., 2020). Accessibility should therefore be understood as a multidimensional category encompassing not only architectural aspects, but also organizational, communicational, and social dimensions.

Limited access to sports infrastructure contributes to the deepening of existing social inequalities by restricting opportunities for active participation in community life (Niedbalski, 2016). When public space fails to take into account the diverse needs of its users, mechanisms of exclusion and marginalization are reinforced. This is particularly problematic in the context of investments financed from public funds, which by definition should serve the entire local community. The lack of full accessibility undermines the inclusive character of such investments and reduces the social effectiveness of the resources allocated.

From the perspective of public management, ensuring the accessibility of sports facilities requires a strategic approach and long-term planning. It is necessary to incorporate the principles of universal design at the very stage of investment planning, as well as to systematically monitor the level of accessibility of existing infrastructure. The participation of persons with disabilities in consultation processes is also of significant importance, as it allows solutions to be better adjusted to the actual needs of users.

Accessibility should be treated as an element of the quality of public management and as an indicator of institutional maturity.

Enhancing the accessibility of sports infrastructure is directly aligned with the implementation of the Sustainable Development Goals. Sports facilities accessible to persons with disabilities contribute to promoting health and well-being (SDG 3), reducing inequalities (SDG 10), and building inclusive, safe, and resilient communities (SDG 11) (Kurniawan & Samudro, 2024). From this perspective, sports infrastructure ceases to be merely a component of recreational provision and becomes an instrument of social policy and a component of sustainable development strategies at both local and national levels.

It should also be emphasized that investments in accessibility generate long-term social and economic benefits. Enabling persons with disabilities to engage in regular physical activity may lead to reduced healthcare costs associated with inactivity and related health complications. At the same time, an inclusive sports environment fosters social cohesion and strengthens local bonds. For this reason, the accessibility of sports infrastructure should be perceived not as an additional cost, but as an investment in the durability and resilience of the social system.

Consequently, the degree to which sports facilities are adapted to the needs of persons with disabilities may serve as an important indicator of the implementation of the social dimension of sustainable development. The analysis of sports infrastructure accessibility therefore makes it possible not only to assess the conditions for participation in physical activity, but also to diagnose broader mechanisms of inclusion and exclusion operating within a given social system.

3. Methods

This study is quantitative and descriptive in nature, and it is based on secondary data derived from three main areas of analysis:

1. The number of persons with disabilities in Poland in the years 2010, 2014, 2018 and 2022.
2. The number of indoor swimming pools adapted to the needs of persons with disabilities, according to data from the Local Data Bank of Statistics Poland (GUS) for four selected years: 2010, 2014, 2018 and 2022. According to the methodology adopted by GUS, facilities are considered adapted if they take into account the needs of persons with mobility impairments, other types of disabilities, or multiple types of disabilities both for participants and for spectators. Due to the lack of detailed classification, this study adopts a general approach to facility accessibility, without distinguishing between types of disabilities.

3. The significance of disability and accessibility issues in scientific discourse, determined on the basis of a bibliometric analysis of the Scopus and Web of Science databases. A search for scholarly publications was conducted using selected keywords such as “disability AND sport AND accessibility,” “inclusive sport infrastructure,” and “universal design AND social sustainability.” The following search strings were used: 1) in Scopus: (ALL (disability) AND ALL (sport) AND ALL (accessibility)); (TITLE-ABS-KEY (disability) AND TITLE-ABS-KEY (sport) AND TITLE-ABS-KEY (accessibility)); (ALL (inclusive) AND ALL (sport) AND ALL (infrastructure)); (TITLE-ABS-KEY (inclusive) AND TITLE-ABS-KEY (sport) AND TITLE-ABS-KEY (infrastructure)); (ALL (universal design) AND ALL (social sustainability)); (TITLE-ABS-KEY (universal design) AND TITLE-ABS-KEY (social sustainability)); 2) in Web of Science: disability (All Fields) and sport (All Fields) and accessibility (All Fields); disability (Topic) and sport (Topic) and accessibility (Topic); inclusive (All Fields) and sport (All Fields) and infrastructure (All Fields); inclusive (Topic) and sport (Topic) and infrastructure (Topic); universal design (All Fields) and social sustainability (All Fields); universal design (Topic) and social sustainability (Topic). In the initial phase of the search, there were no exclusions (including language-based ones). It was only in the second stage that a time frame for the search was introduced (from 2010, in line with the GUS data range). The analysis included the number of publications in subsequent years (2010–2025), treating it as an indicator of the growing academic interest in accessibility and the inclusion of persons with disabilities.

The data were compiled and interpreted in the context of global trends, including data from the World Health Organization (2011), which indicate a systematic increase in the number of persons with disabilities worldwide. The combination of demographic, infrastructural and bibliometric analyses allows for a multidimensional view of the presence and needs of persons with disabilities in the area of sports infrastructure, as well as their consideration in public policy and scientific research.

4. Results

The analysis is based on three sets of formulas referring to infrastructural aspects of the everyday functioning of persons with disabilities. The searches were conducted first using the All fields option, followed by AAK (Article title, Abstract, Keywords) in the Scopus database, and Topic (title, abstract, keywords-plus, and author keywords) in the Web of Science database. An added value of the presented results is the examination of changes observed during the period 12 August–31 August 2025. It should be noted that this 19-day observation is exploratory in character: short-term fluctuations in publication counts may reflect database indexing processes rather than genuine growth in academic output, and should therefore be interpreted with caution. The primary

evidence of increasing scholarly interest is drawn from the longer-term trends reported in Table 2. Due to limitations in presentation space, two tables (Tables 2 and 3) were prepared and discussed. They illustrate differences in the growth of the number of publications containing specifically defined formulas related to infrastructural aspects of the everyday functioning of persons with disabilities. The analysed timeframe corresponds to the availability of GUS data (2010–2022) and the end of the COVID-19 pandemic in 2023. In the next step, publications from 2024 up to the current date, 31 August 2025, were also examined.

Infrastructure accessibility as an indicator of social sustainable development. In this study, the accessibility of indoor swimming pools for persons with disabilities is treated as an empirical proxy for the social dimension of sustainable development, in line with SDG 3 (Good Health and Well-Being), SDG 10 (Reduced Inequalities), and SDG 11 (Sustainable Cities and Communities). Physical adaptation of sports facilities represents a measurable, institutionally reported indicator of inclusion and equal participation in public life. The choice of this proxy is analytically justified by the availability of consistent GUS data across the studied period and by its direct relevance to public management decisions regarding inclusive infrastructure. It is acknowledged, however, that formal physical adaptation does not fully capture actual accessibility: organisational, informational, and attitudinal barriers may persist even in formally adapted facilities. The present study addresses only the architectural dimension of accessibility, as this is the only dimension systematically recorded in GUS data. This limitation is discussed further in Section 5.

Table 2. **Bibliometric search results in Scopus and Web of Science for selected queries**

Date / Queries		Scopus				Web of Science			
		All fields	AAK			All fields	Topic		
			total	including 2010-2023	2024-present		total	including 2010-2023	2024-present
2025.08.12	disability AND sport AND accessibility	6 413	228	157	55	284	181	133	42
	inclusive sport infrastructure	2 583	62	31	28	83	37	24	13
	universal design AND social sustainability	35 225	288	198	73	405	240	182	50

2025.08.21	disability AND sport AND accessibility	6 445	229	157	56	287	183	133	44
	inclusive sport infrastructure	2 594	62	31	28	83	37	24	13
	universal design AND social sustainability	35 428	289	198	74	407	242	182	52
2025.08.31	disability AND sport AND accessibility	6 487	230	157	57	288	183	133	44
	inclusive sport infrastructure	2 632	64	31	30	84	38	24	14
	universal design AND social sustainability	35 784	293	198	78	407	241	182	51

Source: own compilation based on <https://bg.uek.krakow.pl/zasoby-online/scopus> and <https://bg.uek.krakow.pl/zasoby-online/web-of-science> [12-08-2025-31-08-2025]; green indicates an increase, and red a decrease in the number of publications between 21 and 31 August 2025

In Table 3, the changes in the number of publications that occurred between 12 and 31 August 2025 are presented.

Table 3. Changes in the number of indexed publications

Date / Queries		Scopus		Web of Science	
		All fields	AAK	All fields	Topic
			2024-present		2024-present
2025.08.31 - 2025.08.12	disability AND sport AND accessibility	74	2	4	2
	inclusive sport infrastructure	49	2	1	1
	universal design AND social sustainability	559	5	2	1

Source: own compilation based on <https://bg.uek.krakow.pl/zasoby-online/scopus> and <https://bg.uek.krakow.pl/zasoby-online/web-of-science> [12-08-2025-31-08-2025]

The conclusions drawn from Tables 2 and 3 indicate a growing interest in the topic of facilities enabling persons with disabilities to use sports infrastructure. In the Scopus database, greater publication activity containing the specified search formulas can be observed than in Web of Science. This applies both to the all fields option (where the differences are particularly pronounced) and to more detailed searches. The substantial gap between broad All fields searches and narrower AAK/Topic searches is expected and methodologically significant: the broader option retrieves documents in which the search terms appear anywhere in the record – including funding acknowledgements, affiliated institutions, and full text – thereby capturing a large number of loosely related publications. The AAK/Topic option, by contrast, limits retrieval to title, abstract, and keywords, and thus reflects publications whose core contribution is directly related to the searched concepts. For the purposes of assessing genuine scholarly engagement with sports infrastructure accessibility, the AAK/Topic results are therefore the more analytically relevant configuration. It is worth noting that it is primarily the last two years (2024–2025) in which the number of publications including the selected formulas has increased for example, comparing “disability AND sport AND accessibility,” with 133 publications for 2010–2023 and 44 publications for the 2024–present period in Web of Science, or, analogously, 157 and 57 results in Scopus.

Table 4 presents information obtained from Statistics Poland regarding the accessibility of indoor swimming pools for persons with disabilities. Initially, in 2010, the data refer generally to persons with disabilities. Starting in 2014, the statistics distinguish between persons with disabilities who are exercising (PWD – exercising) and spectators (PWD – spectators). This change in the approach to disability may stem from Poland’s ratification of the Convention on the Rights of Persons with Disabilities in 2012, which aims to improve the situation of persons with disabilities (Ministry of Family, Labour and Social Policy, 2025).

Table 4. Number of Indoor Swimming Pools Adapted to the Needs of Persons with Disabilities (2010–2022) Part 1.

Name/ Indoor swimming pools	2010			2014					2018					2022				
	total	adapted to the needs of PWD	%	total	adapted to the needs of PWD – exercising.	adapted to the needs of PWD – spectators	exercising %	spectators %	total	adapted to the needs of PWD – exercising	adapted to the needs of PWD – spectators	exercising %	spectators %	total	adapted to the needs of PWD – exercising	adapted to the needs of PWD – spectators	exercising %	spectators %
Poland	433	305	70	521	374	262	72	50	579	443	303	77	52	608	500	345	82	57
Lower Sile- sian Voivo- deship	24	14	58	29	21	14	72	48	55	44	24	80	44	56	46	27	82	48
Kuyavian- -Pomera- nian Voivo- deship	18	12	67	25	22	15	88	60	28	25	17	89	61	39	34	27	87	69
Lublin Vo- ivodeship	13	7	54	19	11	9	58	47	21	13	8	62	38	27	20	17	74	63
Lubusz Vo- ivodeship	9	9	100	11	8	6	73	55	10	10	6	100	60	11	11	9	100	82
Łódź Voivo- deship	22	15	68	27	14	10	52	37	29	13	12	45	41	31	20	17	65	55
Lesser Po- land Voivo- deship	47	28	60	62	46	27	74	44	66	51	28	77	42	63	44	26	70	41
Masovian Voivode- ship	82	57	70	87	66	48	76	55	84	69	45	82	54	86	71	50	83	58

Table 4. Number of Indoor Swimming Pools Adapted to the Needs of Persons with Disabilities (2010–2022) Part 2

Name/ Indoor swimming pools	2010				2014				2018				2022			
	total	adapted to the needs of PWD	%	total	adapted to the needs of PWD – exercising.	adapted to the needs of PWD – spectators	exercising %	spectators %	total	adapted to the needs of PWD – exercising spectators	adapted to the needs of PWD – exercising	adapted to the needs of PWD – spectators	exercising %	spectators %	total	exercising %
Opole Voivodeship	13	9	69	16	10	8	63	50	20	15	12	75	60	19	17	89
Subcarpathian Voivodeship	33	21	64	40	28	19	70	48	39	37	27	95	69	47	43	91
Podlaskie Voivodeship	13	12	92	17	11	9	65	53	19	15	10	79	53	21	16	76
Pomeranian Voivodeship	20	13	65	21	15	11	71	52	23	14	13	61	57	30	27	90
Silesian Voivodeship	56	42	75	60	44	28	73	47	75	52	38	69	51	71	61	86
Holy Cross Voivodeship	21	18	86	28	22	17	79	61	26	23	15	88	58	28	27	96
Warmian-Masurian Voivodeship	11	8	73	21	15	10	71	48	23	18	12	78	52	22	18	82
Greater Poland Voivodeship	36	28	78	36	27	21	75	58	43	35	28	81	65	35	29	83
West Pomeranian Voivodeship	15	12	80	22	14	10	64	45	18	9	8	50	44	22	16	73

Source: own compilation based on GUS (daty). Green indicates the highest value and red the lowest in the column. Purple indicates a decrease in the number of objects between 2018 and 2022

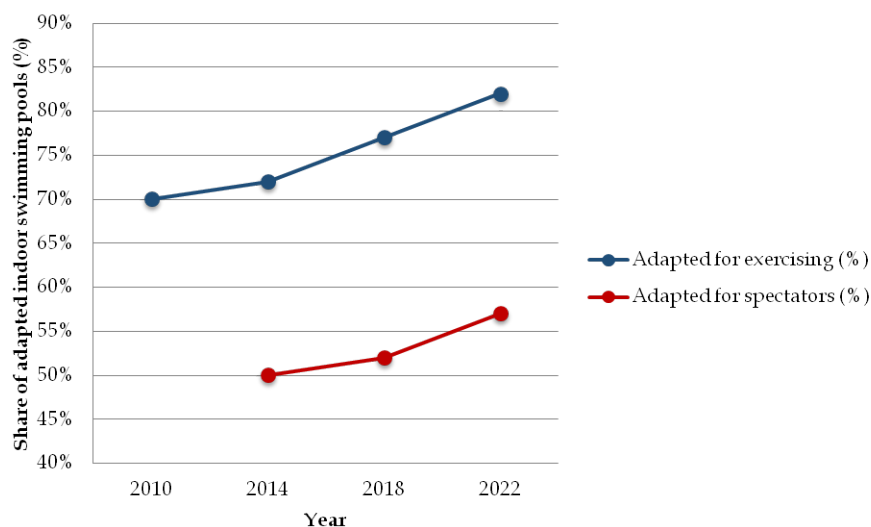


Figure 1. National adaptation rates of indoor swimming pools for exercising vs. spectator access, Poland 2010–2022.

Source: author's own elaboration

The total number of facilities in Poland and the degree to which they are adapted to the needs of persons with disabilities are increasing. In five voivodeships (Lesser Poland, Opole, Silesia, Warmia-Masuria, and Greater Poland), a decrease in the number of facilities between 2018 and 2022 can be observed. When conducting analyses, it is important to note that 100% adaptation has a different meaning when there are only 9 existing facilities (as in the Lubusz voivodeship, which has 100% accessibility for persons exercising) than when there are 50 or 60. It can be noted that both in Poland overall and in each voivodeship individually, accessibility for persons exercising is more visible. The smallest share of adapted indoor swimming pools in their total number in both categories is found in the Łódź voivodeship, while the highest (and changing over time) is observed in the Kuyavian-Pomeranian and Lubusz voivodeships. It is worth paying attention to the results from the Świętokrzyskie (Holy Cross) voivodeship: in 2014, 79% of facilities were adapted for persons exercising and 61% for spectators, whereas in 2022 these indicators increased to 96% and 64%, respectively. A negative example is the West Pomeranian voivodeship, where in 2022 only 36% of facilities ensured accessibility for persons with disabilities in the spectator area. A particularly noteworthy finding is the persistent and widening gap between adaptation rates for persons exercising and for spectators. At the national level, accessibility for exercising

increased from approximately 70% in 2010 to 82% in 2022, while accessibility for spectators rose only from 50% to 57% over the same period. This disparity suggests that investment in sports facility adaptation has systematically prioritised active participants over passive attendees, leaving spectators with disabilities – including family members, carers, and supporters – in a structurally disadvantaged position. From a public management perspective, this gap represents an unresolved inclusion deficit that warrants explicit attention in future investment planning and accessibility audits. The case of the West Pomeranian voivodeship, where spectator accessibility declined from 45% in 2014 to 36% in 2022, is particularly concerning. The available GUS data do not allow for a definitive explanation of this decline: possible causes include a net reduction in the number of adapted facilities, reclassification of existing facilities, or changes in GUS methodology. This ambiguity is itself a limitation of secondary data reliance and should be addressed in future research through facility-level data collection.

One of the key limitations of the conducted research was access to data. This includes both the data on the number of persons with disabilities, which have been comprehensively recorded by Statistics Poland only since 2018, and the information on the adaptation of sports facilities, which in the authors' opinion requires greater detail. Another challenge is the lack of data after 2022, which would significantly enrich the presented picture. This situation indicates an urgent need to increase the number of studies in the field of disability.

It is important to emphasize a certain novelty introduced in this study. Typically, publications report the number of items indexed in scientific databases based on the search results for a given day. They do not indicate increases within a specified time period. The three-week observations conducted here undoubtedly provide an impetus for further, longer-term analyses. However, the changes that occur in such a relatively short time suggest that the issue under discussion is becoming increasingly recognized and addressed. An interesting direction for further research would also be the analysis of accessibility for persons with disabilities in other types of sports infrastructure, such as stadiums, sports halls, or gymnasiums, which due to technical reasons could not be included in this study. Comprehensive information would make it possible to carry out a more holistic assessment of the accessibility of sports infrastructure in Poland.

5. Discussion

The analyses conducted allow for an in-depth interpretation of the obtained results in light of the concept of social sustainable development and contemporary debates on the inclusiveness of public infrastructure. The juxtaposition of demographic, infrastructural, and bibliometric data made it possible to capture the phenomenon of sports accessibility not merely as a technical issue, but as an element of a broader system of public management

and the state's social responsibility. Only through such an approach is it possible to adopt a comprehensive perspective on society.

With regard to the first research question, it should be emphasized that changes in the number of persons with disabilities in Poland between 2010 and 2022 are primarily methodological rather than demographic in nature. Differences in identification methods from census data, through survey research, to administrative registers mean that the analysed populations are not identical, which significantly complicates analysis and quantitative interpretation of the results. Consequently, the observed decrease in the number of persons with disabilities should not be interpreted as an unambiguous indicator of improved public health. The literature on social sustainable development highlights that reliable and stable measurement systems constitute a prerequisite for effective public policy (Mensah, 2021; Ly & Cope, 2023). The lack of data consistency limits the possibility of trend analysis, international comparisons, and the evaluation of public interventions. At the same time, it points to the need for extended analyses in this area, particularly in the context of Europe's ageing population, where an increasing prevalence of disability can be expected, not only congenital but also acquired throughout the life course.

Moreover, the clear discrepancy between national data and global trends indicated by the WHO, which report a systematic increase in the number of persons with disabilities worldwide due to population ageing and the rise in chronic diseases (World Health Organization, 2023), suggests that in Poland we are dealing rather with a redefinition of administrative categories than with an actual decrease in the scale of the phenomenon. From a management perspective, this implies the need to harmonize the identification system and ensure greater transparency of certification criteria, as infrastructure accessibility should be planned based on real social needs rather than fluctuating statistical indicators.

With regard to the second research question, the results indicate a systematic increase in the number of indoor swimming pools adapted to the needs of persons with disabilities. This trend should be assessed positively, as it reflects the gradual incorporation of universal design principles into investment processes. At the same time, regional analysis reveals significant spatial disparities, confirming the thesis that the implementation of the social dimension of sustainable development is strongly dependent on local institutional and financial conditions (Polèse & Stren, 2000; Winston, 2021).

It is worth noting, however, that percentage indicators of accessibility do not reflect the quality of the solutions implemented or their functionality for different groups of users. The data from the Central Statistical Office do not differentiate the scope of adaptations or their adequacy to the specific needs of persons with various types of disabilities. This means that formal accessibility is not always equivalent to actual inclusiveness. The literature emphasizes that accessibility should be understood as the possibility of full and independent participation, rather than merely physical

entry into a facility (Chen et al., 2022; Licht & Folland, 2024). From this perspective, infrastructure development should be complemented by qualitative evaluation mechanisms and social consultations.

The third research question concerned the position of sports accessibility issues within academic discourse. The bibliometric analysis confirms a growing publication dynamic in the area linking disability, sport, accessibility, and sustainable development. This phenomenon reflects the broader trend of strengthening the social dimension of sustainability, which for many years remained less developed compared to the economic and environmental dimensions (Colantonio, 2007; Dugarova, 2015). The increase in publications in 2024–2025 suggests that the accessibility of sports infrastructure is becoming an increasingly important area of interdisciplinary research, encompassing public management, social policy, and urban studies.

Interpreting all the obtained results jointly, it can be stated that the accessibility of indoor swimming pools in Poland is developing gradually but unevenly, and its scale is difficult to assess precisely due to statistical limitations. At the same time, growing academic interest indicates that this issue is no longer treated as marginal and is increasingly analysed in the context of human rights, inclusiveness, and institutional responsibility. The accessibility of sports infrastructure should therefore be perceived as an element of social capital and as an indicator of the quality of public management at both local and national levels.

6. Conclusions

The conducted study confirms that the accessibility of indoor swimming pools for persons with disabilities in Poland is gradually improving; however, this process is uneven and requires further systemic action. The increase in the number of indoor swimming pools and the growing proportion of facilities adapted to the needs of persons with disabilities indicate the progressive implementation of inclusiveness principles in public investment planning. At the same time, the analysis has shown that greater attention was initially devoted to accessibility for active participants, while the needs of spectators with disabilities were taken into account to a lesser extent. In the long term, both dimensions should be treated equally, as full participation in social life includes not only physical activity but also the possibility of passive participation in sports events.

The results also indicate significant regional disparities. Some voivodeships achieve very high accessibility rates, while others despite relatively developed infrastructure show lower levels of adaptation. This means that infrastructural development does not proceed in a territorially coherent manner and remains strongly dependent on local investment strategies, the availability of financial resources, and the priorities of local authorities. It should also be noted that a high percentage indicator of accessibility has

a different meaning in regions with a small number of facilities than in voivodeships with a well-developed sports base.

An important conclusion arising from the study is the limited comparability of data concerning the number of persons with disabilities. The lack of consistent and stable methods for identifying this social group makes it difficult to precisely determine the actual scale of infrastructural needs. The coherence of statistical systems should be treated as a prerequisite for effective public policy planning in the field of accessibility.

The accessibility of indoor swimming pools should be perceived not only as a formal requirement resulting from legal regulations, but as a tool of social integration and an element of building social capital. Indoor swimming pools fulfil recreational, rehabilitative, and integrative functions, and their accessibility promotes the activation of persons with disabilities, counteracts social exclusion, and supports the implementation of the social dimension of sustainable development goals. Investments in infrastructural adaptation should be treated as long-term investments in public health, social cohesion, and equal opportunities.

A limitation of the study was the use of secondary data, which differ in methodology and level of detail, as well as the lack of data beyond 2022, which restricts the possibility of assessing the most recent investment trends. Furthermore, the analysis focused exclusively on indoor swimming pools, which although justified by the availability of consistent statistical data does not allow for a full assessment of the accessibility of the entire sports infrastructure. In the future, it would be justified to extend the research to other types of facilities, such as stadiums, sports halls, or gyms, and to complement quantitative analyses with qualitative research taking into account user experiences. In particular, qualitative methods such as in-depth interviews with persons with disabilities and facility managers, focus groups, or observation-based accessibility audits would allow researchers to assess actual rather than formal accessibility – capturing the organisational, informational, and attitudinal barriers that official statistics cannot measure. Mixed-method designs combining GUS-type secondary data with user-reported experience data would represent a methodologically robust direction for future research in this field. A comprehensive approach would enable a more holistic assessment of sports infrastructure accessibility in Poland.

In summary, despite positive trends, the accessibility of sports infrastructure for persons with disabilities still requires consistent legislative, investment, and organizational actions. Taking into account the diverse needs of persons with different types of disabilities and incorporating their perspective into planning processes should constitute a permanent element of local and national development policy. Inclusive sports infrastructure is not only an expression of the state's social responsibility, but also a significant component of the implementation of social sustainable development principles.

Authors' contribution

M.M./W.G.: article conception, theoretical content of the article, research methods applied, conducting the research, data collection, analysis and interpretation of results, draft manuscript preparation.

Declaration of Generative AI and AI-assisted technologies in the writing process

During the preparation of this work the authors did not use Generative AI and AI-assisted technologies in the writing process.

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