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REVIEW ARTICLE

Global Regional Disparities, Journal Distribution, and Temporal Trends in Orthopaedics and Sports Medicine Research (1996–2025): A SCImago-Based Bibliometric Analysis

Raju Vaishya,[1,*] Sudhir Shekhawat,[2] Abhishek Vaish,[3] Karthik Vishwanathan[4] and Murali Poduval[5]
[1]*Professor & Senior Consultant Orthopaedic Surgeon, Indraprastha Apollo Hospitals, Sarita Vihar, New Delhi 110076*
[2]*Head Statistician, Indraprastha Apollo Hospitals, Sarita Vihar, New Delhi 110076*
[3]*Senior Consultant, Orthopaedic Surgeon, Indraprastha Apollo Hospitals, Sarita Vihar, New Delhi 110076*
[4]*Professor Orthopaedics, Smt BK Shah Medical Institute and Research Centre, Sumandeep Vidyapeeth Deemed to be University, Vadodara, India*
[5]*Orthopaedic Surgeon, Thane, India*

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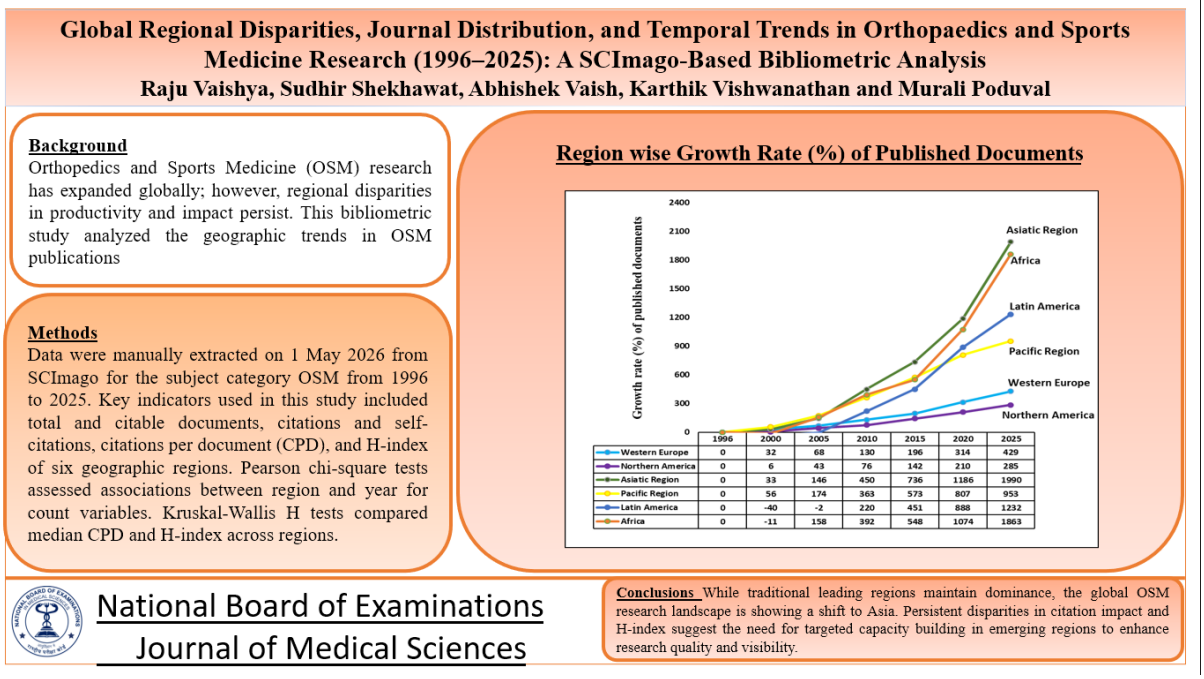
Abstract

Background: Orthopedics and Sports Medicine (OSM) research has expanded globally; however, regional disparities in productivity and impact persist. This bibliometric study analyzed the geographic trends in OSM publications. **Methods:** Data were manually extracted on 1 May 2026 from SCImago for the subject category OSM from 1996 to 2025. Key indicators used in this study included total and citable documents, citations and self-citations, citations per document (CPD), and H-index of six geographic regions. Pearson chi-square tests assessed associations between region and year for count variables. Kruskal-Wallis H tests compared median CPD and H-index across regions. **Results:** Total publications differed significantly across regions ($\chi^2(30)=6388.49$, $p<0.001$), over time. Western Europe and Northern America consistently led in research output and citations. Asiatic Region showed the most rapid growth, particularly after 2010. Significant regional differences were observed in median CPD ($H=12.90$, $p=0.024$) and H-index ($H=23.74$, $p<0.001$), with North America maintaining the highest cumulative influence. Analysis of journal distribution in 2025 demonstrated marked regional disparities in journal representation and their quartile rankings ($\chi^2(15)=42.07$, $p<0.001$). Western Europe and Northern America contributed the majority of Q1 journals. Pacific, Latin American, and African regions showed steady but comparatively smaller growth. **Conclusions:** While traditional leading regions maintain dominance, the global OSM research landscape is showing a shift to Asia. Persistent disparities in citation impact and H-index suggest the need for targeted capacity building in emerging regions to enhance research quality and visibility.

Keywords: Bibliometric analysis, Orthopedics and Sports Medicine, SCImago, Regional disparities, Global research trends

*Corresponding Author: Raju Vaishya
Email: raju.vaishya@gmail.com

Graphical Abstract



Key Highlights

- Western Europe and Northern America are the leaders in OSM research output and impact from 1996 to 2025, while the Asiatic Region exhibits the most substantial growth trajectory.
- Significant regional differences exist in citation impact and H-index, with North America's consistent superior cumulative influence.
- Emerging regions (Asia, Latin America, Africa) are narrowing quantitative gaps.

Introduction

Orthopedics and Sports Medicine (OSM) is a medical speciality focussing on musculoskeletal (MSK) disorders, trauma, and athletic injuries. With aging populations, increased sports participation, and rising trauma incidence, research output in this field has grown substantially. Bibliometric analyses are useful for quantifying scientific productivity, mapping research trends, and assessing impact [1].

Research productivity in medicine shows notable global disparities, with high-income regions leading while emerging economies show rapid growth. Prior studies have documented the overall expansion of OSM publications, with marked increases, especially from Asia [2]. The region-specific investigations have highlighted the rise of Asian research [3], European contributions [4], Italian productivity [5], and output from Africa/Nigeria [6]. Additional analyses have examined journal rankings, top-cited articles, and authorship patterns such as gender diversity. However, comprehensive long-term evaluations comparing major geographic regions (Western Europe, Northern America, Asiatic Region, Pacific, Latin America, and Africa) remain limited, particularly those extending into 2025. Most published research has targeted individual countries, shorter timeframes, or narrow topics. A wider regional investigation is required to understand evolving patterns in

productivity, citation impact, and self-citation behaviors amid globalization and differing research capacities.

This bibliometric study fills these gaps by utilizing manually extracted SCImago Journal Rank data (as of 1 May 2026) for the OSM category across 1996–2025. It systematically investigates temporal and regional variations in total documents, citable documents, citations, self-citations, citations per document (CPD), and H-index. Statistical methods include Pearson chi-square tests for count variables and Kruskal-Wallis H tests for continuous indicators. The findings are intended to help researchers, institutions, and policymakers understand the global evolution of OSM research, recognize the contributions of emerging regions, and support targeted efforts to address knowledge and infrastructure disparities [7].

The aim of this study was to evaluate global regional disparities, journal distribution, and temporal trends in orthopaedics and sports medicine research from 1996 to 2025 using SCImago-based bibliometric indicators, with particular emphasis on publication output, citation impact, self-citation patterns, and journal quartile representation across six major geographic regions.

Methods

Study design and data source

This bibliometric study utilized data manually extracted on 1 May 2026 from the SCImago Journal Rank database for the subject category "Orthopedics and Sports Medicine." Two parallel search pathways were used: (1) country rankings by region and year, and (2) journal rankings by region for the year 2025. The six geographic regions analysed were Africa, Asiatic Region, Latin America, Northern America, Pacific Region, and Western Europe. To allow standardized longitudinal comparisons and improve interpretability of temporal trends, data were collected at 5-year intervals: 1996, 2000, 2005, 2010, 2015, 2020, and 2025. This bibliometric study utilized data manually extracted on 1 May 2026 from the SCImago Journal Rank database (https://www.scimagojr.com/), as per the following search strategy:

A) *For Country Rankings:* SCImago website>>Country Ranking>>All subject areas>>Orthopedics and Sports medicine>>Region (Africa; Asiatic region; Latin America; Northern America; Pacific region; Western Europe)>>Year (2025)>>Download (Excel file)>>Data analysis.

B) *For Journal Rankings:* SCImago website>>Journal Ranking>>All subject areas>>Orthopedics and Sports medicine>>Region (Africa; Asiatic region; Latin America; Northern America; Pacific region; Western Europe)>>Year (2025)>>Download (Excel file)>>Data analysis.

Variables assessed

The extracted bibliometric indicators included total documents, citable documents, total citations, total self-citations, citations per document (CPD), and H-index. These variables were organized by geographic region and year to evaluate temporal trends in research productivity and scientific influence. In addition, the geographical distribution of OSM journals and their quartile

classifications (Q1–Q4) for 2025 were recorded to assess regional representation within indexed journals and journal quality strata. Post-hoc pairwise comparisons were not performed because the primary objective was to examine overall global regional disparities rather than individual inter-regional differences.

Statistical analysis

Categorical count variables, including total documents, total citations, and total self-citations, were analysed using the Pearson chi-square test of independence to examine the association between geographic region and publication year. Continuous bibliometric indicators that were non-normally distributed, including median CPD and median H-index, were compared across regions using the Kruskal–Wallis H test. All statistical tests were two-tailed, and a p-value of less than 0.05 was considered statistically significant. Statistical analyses were performed using IBM SPSS Statistics version 29.0 (IBM Corp., Armonk, NY, USA).

Results

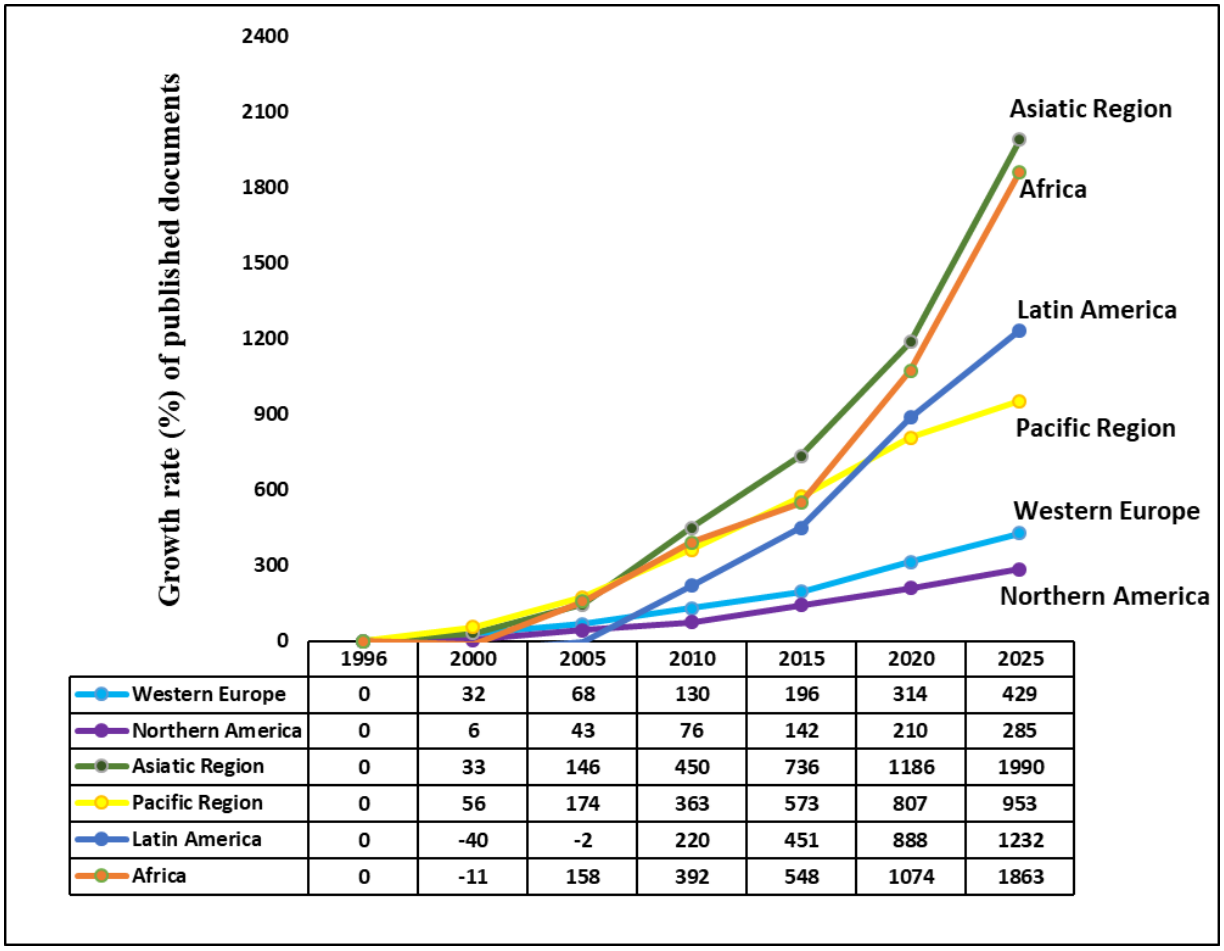
Published Documents

The distribution of total published documents differed significantly across geographical regions over the study period, from 1996 to 2025. There was a strong association between region and publication year ($\chi^2(30) = 6388.49$, $p < 0.001$). Western Europe and Northern America contributed the largest share of publications throughout all years, whereas the Asiatic region showed the most pronounced growth trajectory, particularly after 2010. Pacific, Latin American, and African regions contributed comparatively smaller but progressively increasing publication outputs (Table-1; Supplementary Figure-1).

Table 1. Region wise and Year wise total published documents

Region	1996	2000	2005	2010	2015	2020	2025
Western Europe	3730	4909	6261	8575	11037	15438	19723
Northern America	4357	4613	6225	7674	10547	13509	16778
Asiatic Region	744	988	1830	4093	6222	9570	15551
Pacific Region	249	389	683	1153	1677	2259	2622
Latin America	225	136	221	721	1239	2224	2998
Africa	62	55	160	305	402	728	1217
Chi-square test, p-value	$\chi^2(30) = 6388.49$, $p < 0.001$						

Figure 1 depicts substantial regional variation in the growth of published documents between 1996 and 2025. The Asiatic Region exhibited the most pronounced increase, rising from baseline levels in 1996 to an exceptional 1990% growth by 2025. The African Region also showed remarkable expansion, despite an initial decline in 2000 (−11%). Growth accelerated sharply after 2005, reaching 1863% by 2025. The Pacific Region demonstrated sustained and consistent growth throughout the study period, achieving 953% growth by 2025. Latin America displayed early negative growth (−40% in 2000 and −2% in 2005), followed by a marked recovery after 2010. The region experienced rapid expansion thereafter, reaching 1232% growth by 2025. In contrast, traditionally dominant regions showed comparatively moderate increases. Western Europe recorded gradual yet stable growth, reaching 429% by 2025, while Northern America demonstrated the slowest relative increase **(**285%**).**



	1996	2000	2005	2010	2015	2020	2025
Western Europe	0	32	68	130	196	314	429
Northern America	0	6	43	76	142	210	285
Asiatic Region	0	33	146	450	736	1186	1990
Pacific Region	0	56	174	363	573	807	953
Latin America	0	-40	-2	220	451	888	1232
Africa	0	-11	158	392	548	1074	1863

Figure 1. Region wise Growth Rate (%) of Published Documents (Baseline: 1996)

Growth rate (%) was calculated using 1996 as the baseline reference year. The value for 1996 is therefore presented as 0% for all regions because it represents the starting point of comparison. Subsequent percentages indicate the relative change in the number of published documents compared with the 1996 publication output, calculated as:
*Growth Rate (%)=(Publications in Year X−Publications in 1996)*100 /Publications in 1996*

There was a significant association between geographical region and publication year for total citable documents ($\chi^2(30) = 6035.72$, $p < 0.001$). Western Europe and Northern America dominate overall citation output throughout the study period, while the Asiatic region exhibited the most rapid expansion in scientific productivity, particularly after 2010. Pacific, Latin American, and African regions showed steady but comparatively smaller increases (Table 2 and Supplementary Figure 2).

Table 2. Region wise and year wise total citable documents

Region	**1996**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**
Western Europe	3683	4626	5879	8154	10313	14314	18340
Northern America	4300	4371	5785	7180	9662	12473	15762
Asiatic Region	742	973	1793	3990	6001	9111	14716
Pacific Region	245	370	639	1099	1579	2113	2458
Latin America	224	136	212	699	1182	2119	2877
Africa	62	52	153	296	384	688	1171
Chi-square test, p-value	$\chi2(30)=6035.72$, $p < 0.001$						

Citations

A significant association was found between geographical region and year for total citations ($\chi^2(30) = 1.21\times10^7$, $p < 0.001$). Western Europe and Northern America consistently accounted for the highest citation volumes throughout the study period, whereas the Asiatic Region showed a marked increase after 2005. Pacific, Latin American, and African regions demonstrated progressive but comparatively lower citation accumulation. The decline in citation totals observed in 2025 most likely reflects incomplete citation accrual for recently indexed publications rather than a true reduction in scientific influence (Table 3 and Supplementary Figure 3).

Table 3. Region wise and year wise total citations

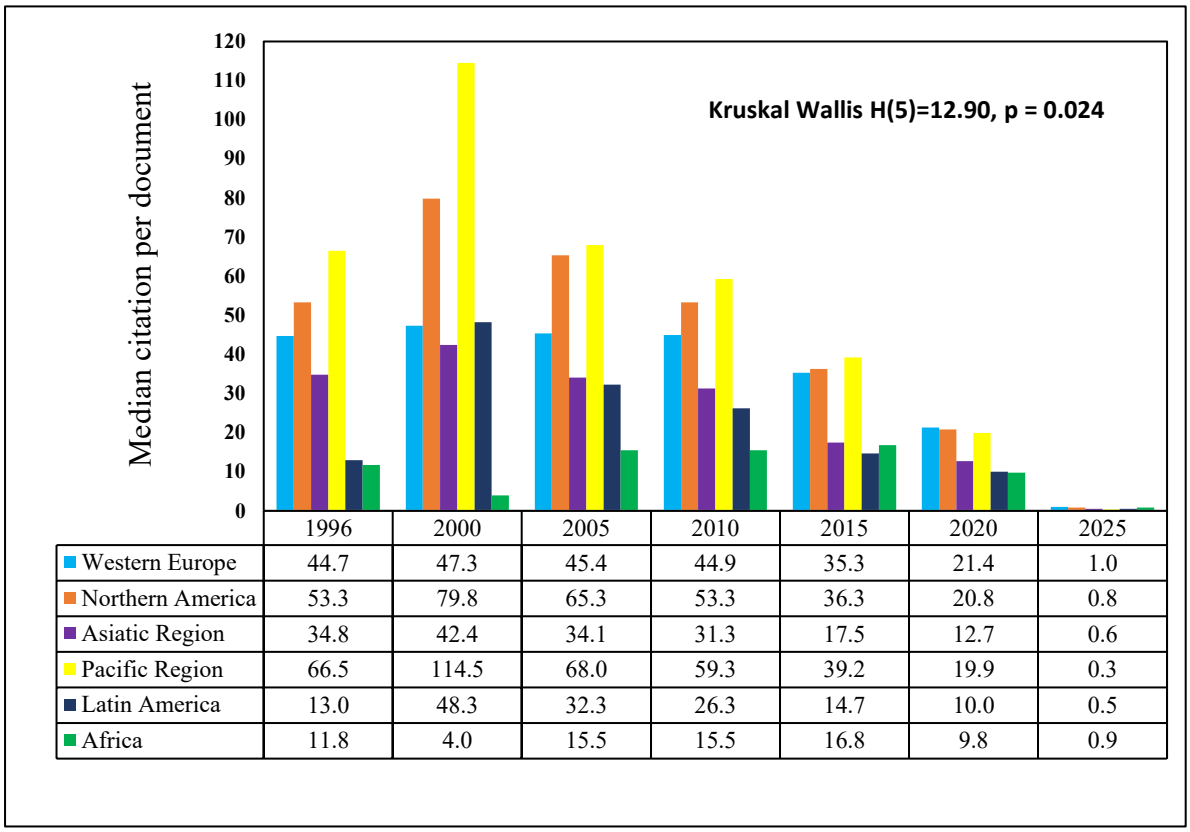
Region	1996	2000	2005	2010	2015	2020	2025
Western Europe	142387	230691	308529	385834	373514	377049	18768
Northern America	228354	316221	368504	370944	347744	244217	12009
Asiatic Region	29785	43003	71893	91403	112200	124580	9567
Pacific Region	17692	34891	48050	75284	75043	71457	2718
Latin America	1393	13239	8348	21191	27466	32548	2042
Africa	2234	3362	7173	9809	10496	27267	1088
Chi-square test, p-value	$\chi^2(30) = 1.21\times10^7$, $p < 0.001$						

A highly significant association was found between geographical region and year for total self-citations ($\chi^2(30) = 2.84\times10^6$, $p < 0.001$). Northern America contributed the largest proportion of self-citations throughout the study period, followed by Western Europe, while the Asiatic Region exhibited a marked increase after 2005. The reduction observed in 2025 likely reflects incomplete citation accumulation for recently indexed publications rather than a true decline in self-citation activity (Table-4; Supplementary Figure-4).

Table 4. Region wise and Year wise total self-citations

Region	1996	2000	2005	2010	2015	2020	2025
Western Europe	22572	33640	45081	63807	64705	61335	4802
Northern America	95237	120837	145745	145152	142668	92122	4800
Asiatic Region	5326	6872	11429	19406	26518	36539	3685
Pacific Region	2476	4393	6954	13488	13995	11568	707
Latin America	255	1606	2036	5686	6257	6351	365
Africa	144	284	632	774	916	1810	166
Chi-square test, p-value	$\chi^2(30) = 2.84\times10^6$, $p < 0.001$						

A statistically significant difference was found in median CPD among geographical regions (H = 12.90, df = 5, p = 0.024). Regions such as Northern America, Western Europe, and the Pacific exhibited higher citation impact during earlier years, whereas Asiatic, Latin American, and African regions showed comparatively lower citation density (Figure 2 and Supplementary Table 1).

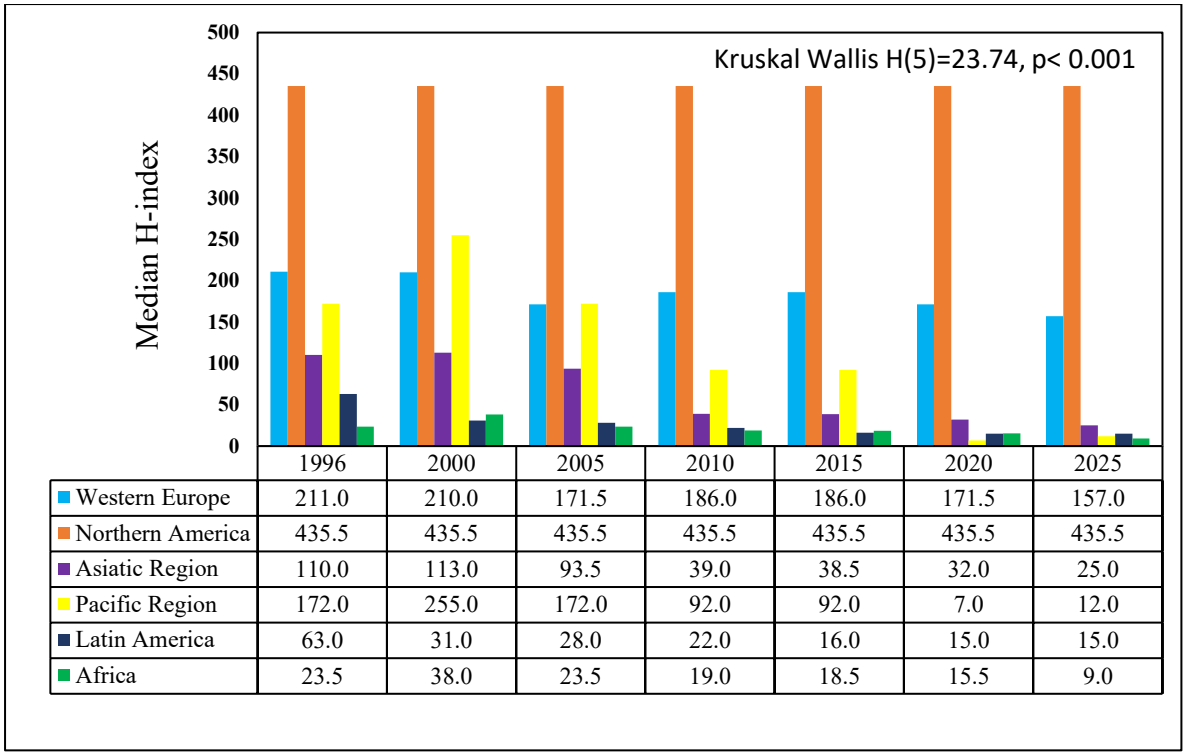


	1996	2000	2005	2010	2015	2020	2025
Western Europe	44.7	47.3	45.4	44.9	35.3	21.4	1.0
Northern America	53.3	79.8	65.3	53.3	36.3	20.8	0.8
Asiatic Region	34.8	42.4	34.1	31.3	17.5	12.7	0.6
Pacific Region	66.5	114.5	68.0	59.3	39.2	19.9	0.3
Latin America	13.0	48.3	32.3	26.3	14.7	10.0	0.5
Africa	11.8	4.0	15.5	15.5	16.8	9.8	0.9

Figure 2. Region wise and Year wise Median Citations Per Document

H-index

The distribution of median H-index values differed significantly across regions (Kruskal–Wallis H = 23.74, df = 5, p < 0.001). Northern America demonstrated the highest H-index throughout the study period. Western Europe and the Pacific region showed intermediate performance, whereas the Asiatic region exhibited a progressive decline over time. Latin America and Africa maintained comparatively lower H-index values across all years (Figure 3 and Supplementary Table 2).



	1996	2000	2005	2010	2015	2020	2025
Western Europe	211.0	210.0	171.5	186.0	186.0	171.5	157.0
Northern America	435.5	435.5	435.5	435.5	435.5	435.5	435.5
Asiatic Region	110.0	113.0	93.5	39.0	38.5	32.0	25.0
Pacific Region	172.0	255.0	172.0	92.0	92.0	7.0	12.0
Latin America	63.0	31.0	28.0	22.0	16.0	15.0	15.0
Africa	23.5	38.0	23.5	19.0	18.5	15.5	9.0

Figure 3. Region wise and Year wise Median H-index

Table 5. Region wise Distribution of in Orthopedics and Sports Medicine Journals in 2025 (N = 341)

Global Region	No. of Journals	Global Contribution (%)	Journals' Quartile Distribution			
			Q1	Q2	Q3	Q4
Western Europe	146	42.8%	43	42	37	24
Northern America	96	28.2%	34	28	23	11
Asiatic Region	39	11.4%	5	9	5	20
Latin America	9	2.6%	1	1	2	5
Pacific Region	2	0.6%	0	1	1	0
Africa	2	0.6%	0	0	1	1
Chi-square test, p-value			$\chi^2(15) = 42.07$, $p < 0.001$			

Regional Distribution and Quartile Analysis of Journals

Significant regional differences were observed in the distribution and quartile ranking of journals in 2025 ($\chi^2(15)=42.07$, $p<0.001$) (Table 5). Western Europe contributed the highest number of journals, followed by Northern America, and these two regions accounted for most Q1 journals. In contrast, the Asiatic Region contributed a greater proportion of Q3 and Q4 journals, whereas Latin America and Africa showed limited representation in indexed journals overall. These findings highlight persistent structural inequalities in journal visibility and high-impact

publication opportunities across global regions.

The journal distribution analysis highlighted structural inequalities in scientific publishing. Western Europe and Northern America accounted for the majority of indexed journals and Q1 journals in OSM. In contrast, the Asiatic Region, despite substantial publication growth, remained low in higher-quartile journals. Similar limitations were observed in Latin America and Africa, where relatively few journals were represented in SCImago rankings.

Discussion

This bibliometric analysis of orthopaedics and sports medicine (OSM) research from 1996 to 2025 demonstrates persistent yet evolving regional disparities in scientific productivity and impact. Western Europe and Northern America maintained dominance across most bibliometric indicators throughout the study period, whereas the Asiatic Region exhibited the most rapid growth in publication output, particularly after 2010. Although emerging regions are narrowing the quantitative gap, citation impact, H-index, and high-quartile journal representation remain concentrated in historically dominant scientific regions.

Western Europe and Northern America maintained dominance throughout the study period, but the Asiatic Region demonstrated the most dynamic expansion, particularly after 2010, consistent with earlier observations of rising Asian contributions [2,3]. By 2025, the Asiatic Region had substantially narrowed the gap with traditional leaders, with total documents reaching 15,551 compared to 19,723 in Western Europe and 16,778 in Northern America. This trajectory aligns with broader economic and research infrastructure development in Asia, including increased funding, international collaborations, and a growing number of researchers [2,4]. Pacific, Latin American, and African regions showed steady but more modest increases, highlighting ongoing challenges related to resources, training, and publication opportunities in lower-resource settings [6,8].

Citation patterns broadly paralleled publication output, but notable differences in impact persisted across regions. Northern America, Western Europe, and the Pacific Region showed stronger citation density in earlier years, whereas the Asiatic, Latin American, and African regions generally had lower CPD values. The lower citation values recorded in 2025 are most plausibly explained by inadequate citation accrual time for recently indexed documents. Self-citation should also be interpreted cautiously: although elevated self-citation may inflate bibliometric indicators, it may also reflect continuity of scholarly work, expanding intra-regional collaboration, and the maturation of emerging research ecosystems. Accordingly, self-citation patterns are best interpreted alongside overall citation volume and other indicators of external scientific influence.

Self-citation analysis demonstrated significant regional variation ($\chi^2(30) = 2.84\times10^6$, $p < 0.001$), with Northern America recording the highest self-citation counts, followed by Western Europe, largely reflecting their greater publication output and mature research ecosystems. The Asiatic Region showed the most pronounced increase in self-citations after 2005, paralleling its rapid growth in research productivity and expanding intra-regional collaboration networks. Although elevated self-citation rates may inflate

bibliometric indicators and perceived scientific influence, they can also represent legitimate continuity of scientific inquiry and the maturation of emerging scholarly communities [1]. Importantly, self-citation patterns should be interpreted alongside overall citation volume, as established regions continued to demonstrate stronger externally validated citation impact despite high self-citation totals. These findings suggest that rising self-citation in emerging regions may reflect evolving research ecosystems rather than solely strategic citation practices, emphasizing the need for normalized self-citation and collaboration-adjusted metrics in future bibliometric analyses.

H-index findings also demonstrate global disparities (Kruskal-Wallis $H = 23.74$, $p < 0.001$). Northern America consistently achieved the highest median H-index (435.5 across years), followed by Western Europe and the Pacific which showed intermediate performance, whereas the Asiatic Region experienced a progressive decline in median H-index despite volume growth. This pattern suggests that while quantity has increased rapidly in Asia, building highly influential bodies of work comparable to North American standards would require time, international visibility, and high-impact dissemination [5]. Latin American [9] and African [6] regions maintained lower H-index values, consistent with smaller overall output and resource constraints.

These results extend previous bibliometric work in OSM. Vaishya and Vaish (2024) previously reported global growth up to 2021 [2]; the current study confirms continuation of these trends through 2025 and provides detailed regional comparisons. Country-level studies on Europe, Italy, and Asia similarly document rising productivity but varying impact [3,4,5,6]. The findings also align withearlier studies indicating the shift toward multipolar scientific production while highlighting persistent quality and visibility gaps [7].

Our findings align with and extend several recent bibliometric investigations in the field. For instance, the sustained leadership of Northern America and Western Europe in citation impact and H-index echoes patterns observed in journal-specific analyses, such as the 15-year review of sports medicine studies in The Journal of Bone and Joint Surgery [10] and earlier broad assessments of the orthopedic literature [11]. The rapid quantitative growth from the Asiatic Region complements studies documenting evolving journal rankings and rising Asian contributions [12]. At the same time, persistent disparities in citation density and cumulative influence are consistent with analyses of top-cited articles [13], subspecialty variation in citations [14], and factors driving high citability in Orthopedic papers [15]. Additionally, while our regional focus highlights macro-level productivity shifts, complementary work underscores important equity dimensions within the OSM literature. Gender disparities in authorship remain evident despite increasing numbers of women surgeons [16], with systematic reviews confirming ongoing challenges to gender diversity and equality in Orthopedic surgery authorship and leadership [17,18]. These patterns are particularly relevant in sports medicine, where diversity trends continue to evolve [19]. Integrating such insights signifies the need for multifaceted strategies that address not only geographic but also demographic equity to fully realize the global potential of OSM research.

The substantial percentage growth observed in the Asiatic Region should be interpreted in the context of the denominator effect, whereby percentage increases appear disproportionately large when baseline values are low [20-26]. Thus, the very high relative growth in publication output from Asia reflects both genuine expansion in academic productivity and the mathematical effect of lower starting values in 1996. This distinction is important to avoid overinterpretation of relative growth without parallel consideration of absolute output and citation influence.

The journal distribution analysis further supports the existence of structural inequalities in scientific publishing. Western Europe and Northern America accounted for most indexed journals and the majority of Q1 journals, whereas the Asiatic Region, despite substantial growth in research output, remained underrepresented in higher-quartile journals. The limited representation of Latin America and Africa may reflect disparities in research infrastructure, editorial access, mentorship, indexing exposure, and publication support systems. These findings support the need for stronger international collaboration, targeted capacity building, equitable research funding, and editorial initiatives that enhance visibility for underrepresented regions.

The *implications of these findings* are multifaceted:

- For policymakers and funding bodies in emerging regions, the data support investments in research capacity building, international collaborations, and open-access publishing to enhance visibility and citation potential.
- Established regions can leverage their strengths in high-impact research while fostering equitable partnerships.
- Journal editors and societies should consider initiatives to support authors from lesser represented regions, such as mentorship programs and special issues, to promote global equity in OSM knowledge generation.

The regional trends in academic productivity observed in this study appear to parallel patterns seen in the orthopedic healthcare market and clinical utilization landscape. North America continues to dominate both scientific output and orthopedic product consumption, whereas the Asia-Pacific region represents the fastest-growing sector globally, driven by expanding healthcare infrastructure, increasing surgical volumes, aging populations, and greater access to musculoskeletal care [27]. Recent bibliometric analyses have similarly documented the rapid rise of Asian orthopaedic research output and its growing global influence [3,27]. This parallel evolution suggests that bibliometric productivity may potentially correlate with clinical productivity and market growth, reflecting not only strengthening academic ecosystems but also broader healthcare development and rising utilization of orthopedic services. Such integration of scientometric trends with healthcare-market expansion may provide a unique framework for understanding the global evolution of orthopedic practice, innovation, and research.

Future bibliometric research in OSM should incorporate country-level analyses, field-weighted citation metrics, collaboration network mapping, and qualitative assessment of thematic research

priorities. Longitudinal follow-up beyond 2025 will help determine whether rapid growth in the Asiatic Region translates into sustained gains in citation impact and journal quality representation. Integration of altmetrics and clinical translation indicators may also provide a more comprehensive understanding of research value.

Strengths of this study include the 30-year study period, the use of standardized SCImago methodology, the broad regional comparison, and the inclusion of multiple bibliometric indicators together with journal quartile analysis. However, several limitations should be acknowledged. First, reliance on the SCImago database may underrepresent certain journals, particularly those that are regional, newly indexed, or non-English. Second, the analysis was conducted at an aggregate regional level and therefore does not capture country-level variation, subspecialty-specific patterns, or collaboration networks. Third, self-citation patterns were analysed quantitatively but not normalized in relation to collaboration structure or disciplinary citation behaviour.

Conclusion

The global orthopaedics and sports medicine research landscape is evolving, with rapid growth from the Asiatic Region occurring alongside the continuing dominance of Western Europe and Northern America. Despite major gains in publication volume, substantial disparities persist in citation impact, H-index, and representation in higher-quartile journals. Strengthening research infrastructure, international collaboration, editorial support, and access to high-visibility publication platforms will be essential to reduce these disparities and promote a more equitable global research environment.

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Conflict of Interest

The authors declare that they do not have conflict of interest.

Ethical Approval

No ethical approval was needed for this bibliometric review article.

Data availability

The raw data is available with the corresponding author.

Author's Contributions

RV, AV: Conceptualization, Methodology, Literature review, Manuscript writing, editing and final approval. SS: Methodology, Statistical analysis, Literature review, Manuscript writing, editing and final approval. RV, AV, KV, MP: Methodology, Literature review, Manuscript writing, editing and final approval.

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Use of AI tool: Author's declare that they have used ChatGPT 4.0 to edit the manuscript for grammar corrections and improving the readability. However, the final manuscript by the authors and take the full responsibility of its contents.

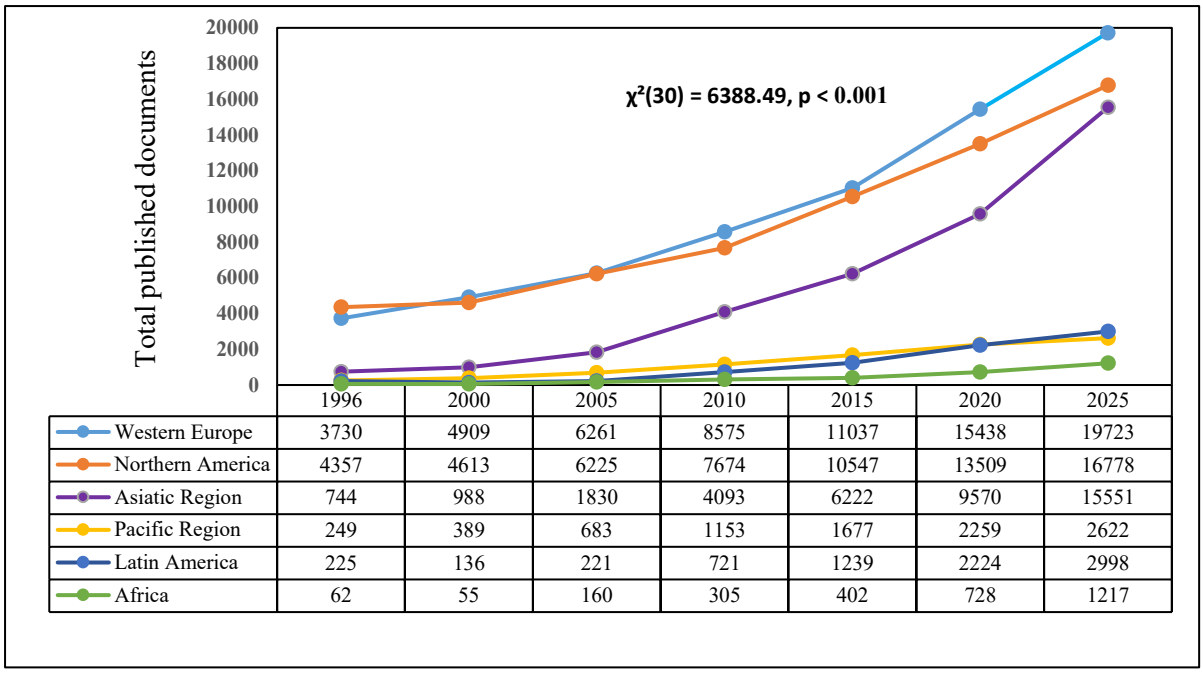
References

1. Donthu N, Kumar S, Mukherjee D, Pandey N, Lim WM. How to conduct a bibliometric analysis: An overview and guidelines. J Bus Res. 2021;133:285-296. doi:10.1016/j.jbusres.2021.04.070

2. Vaishya R, Vaish A. Global trend of publications in Orthopedics and sports medicine: 1996 - 2021. Chin J Traumatol. 2024;27(6):368-371. doi:10.1016/j.cjtee.2023.10.006
3. Paleti ST, Kambhampati SBS, Vaish A, Vaishya R, D'Ambrosi R. Rise of Asian research in Orthopedic and sports medicine: a bibliometric analysis from 1996 to 2022. Eur J Orthop Surg Traumatol. 2025;35(1):173. doi:10.1007/s00590-025-04294-5
4. Vaishya R, Vaish A, Schäfer L, Migliorini F. Publications and ranking in Orthopedics and sports medicine of European countries during the last three decades: A bibliometric analysis. J Orthop. 2024;58:96-101. doi:10.1016/j.jor.2024.07.002
5. Vaishya R, Vaish A. Bibliometric analysis of Italy's Orthopedics and Sports Medicine research output: Trends, impact, and comparative rankings (1996-2024). J Orthop. 2026;75:322-326. doi:10.1016/j.jor.2026.03.003
6. Ekwe KK, Vaish A, Vaishya R. Research Output in Orthopedics and Sports Medicine from Nigeria and Africa - A Bibliometric Analysis. Niger Med J. 2024;65(2):125-131. doi:10.60787/nmj-v65i2-386
7. Manoj Kumar L, George RJ, P S A. Bibliometric Analysis for Medical Research. Indian J Psychol Med. 2023;45(3):277-282. doi:10.1177/02537176221103617
8. Sabharwal S, Leung A, Rodarte P, et al. Peer-reviewed publications in Orthopedic surgery from lower income countries: A comparative analysis. SICOT J. 2024;10:6. doi:10.1051/sicotj/2023039
9. Vaishya R, Vaish A. Research output in orthopedics and sports medicine from Latin America. Resultados de la investigación en ortopedia y medicina del deporte en América Latina. Acta Ortop Mex. 2024;38(6):419-420.
10. Watters AB, Blitz J, Mortell T, et al. A 15-year bibliometric analysis of sports medicine studies in The Journal of Bone and Joint Surgery. JB JS Open Access. 2024;9(4):e24.00045. doi:10.2106/JBJS.OA.24.00045
11. Hui Z, Yi Z, Peng J. Bibliometric analysis of the orthopedic literature. Orthopedics. 2013;36(10):e1225-e1232. doi:10.3928/01477447-20130920-11
12. Vaishya R, Shekhawat S, Vaish A, Migliorini F. Evolution of journal rankings in orthopedics and sports medicine (2000-2024): A SCImago-based bibliometric analysis. Orthopadie (Heidelb). 2025;54(10):795-803. doi:10.1007/s00132-025-04683-y
13. Khatra O, Shadgan A, Taunton J, Pakravan A, Shadgan B. A Bibliometric Analysis of the Top Cited Articles in Sports and Exercise Medicine. Orthop J Sports Med. 2021;9(1):2325967120969902. doi:10.1177/2325967120969902
14. Zhang D, Blazar P, Earp BE. Subspecialty Variation in Academic Citations of Orthopedic Surgery Publications. Clin Orthop Surg. 2021;13(4):569-574. doi:10.4055/cios20263

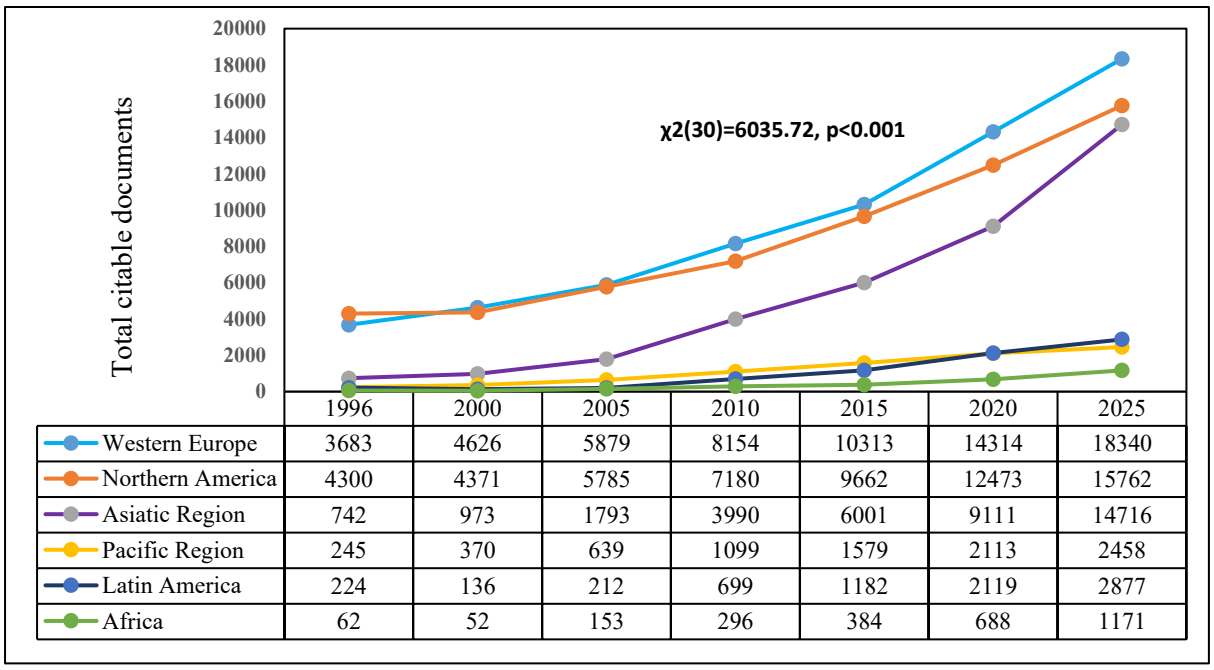
15. Lutter M, Rudolf H, Lenz R, Hotfiel T, Tischer T. What makes an Orthopedic paper highly citable? A bibliometric analysis of top orthopeadic journals with 10-year follow up. J Exp Orthop. 2023;10(1):78. doi:10.1186/s40634-023-00631-x
16. Brown MA, Erdman MK, Munger AM, Miller AN. Despite Growing Number of Women Surgeons, Authorship Gender Disparity in Orthopedic Literature Persists Over 30 Years. Clin Orthop Relat Res. 2020;478(7):1542-1552. doi:10.1097/CORR.0000000000000849
17. Zomar BO, Boparai T, You E, Jackson K, South N, Schaeffer EK. A Systematic Review to Assess Gender Diversity in Authorship Within the Orthopedic Surgery Literature. Indian J Orthop. 2025;59(10):1644-1654. doi:10.1007/s43465-025-01462-x
18. Pechlivanidou E, Antonopoulos I, Margariti RE. Gender equality challenges in Orthopedic surgery: a systematic review. Int Orthop. 2023;47(9):2143-2171. doi:10.1007/s00264-023-05876-w
19. Kamalapathy P, Barras LA, Diduch DR. Trends for Diversity in Orthopedic Sports Medicine. Clin Sports Med. 2024;43(2):213-219. doi:10.1016/j.csm.2023.06.009
20. Tu YK. Testing the relation between percentage change and baseline value. Sci Rep. 2016;6:23247. Doi:10.1038/srep23247
21. Vickers AJ. The use of percentage change from baseline as an outcome in a controlled trial is statistically inefficient: a simulation study. BMC Med Res Methodol. 2001;1:6.
22. Chen HA, Marmorstein H, Tsiros M, Rao AR. When more is less: the impact of base value neglect on consumer preferences for bonus packs over price discounts. J Mark. 2012;76(4):64–77.
23. Raghubir P. Is 1/10 > 10/100? The effect of denominator salience on perceptions of base rates of health risk. Int J Res Mark. 2008;25(4):327–334.
24. Li M, Chapman GB . Framing effects in percentages: large percentage of small subset vs small percentage of large subset. Organ Behav Hum Decis Process. 2013;122(2):190–199.
25. Casler SD. Why growth rates? Which growth rate? Specification and measurement issues in estimating elasticity values. Am Econ. 2015;60(2):72–84.
26. Alquist R, Israel R, Moskowitz TJ. Fact, fiction, and the size effect. SSRN Working Paper; 2018.
27. Grand View Research. Orthopedic Devices Market Size, Share & Trends Report (2024-2030). Accessed May 17, 2026. https://www.grandviewresearch.com/industry-analysis/orthopedic-devices-market

SUPPLEMENTS



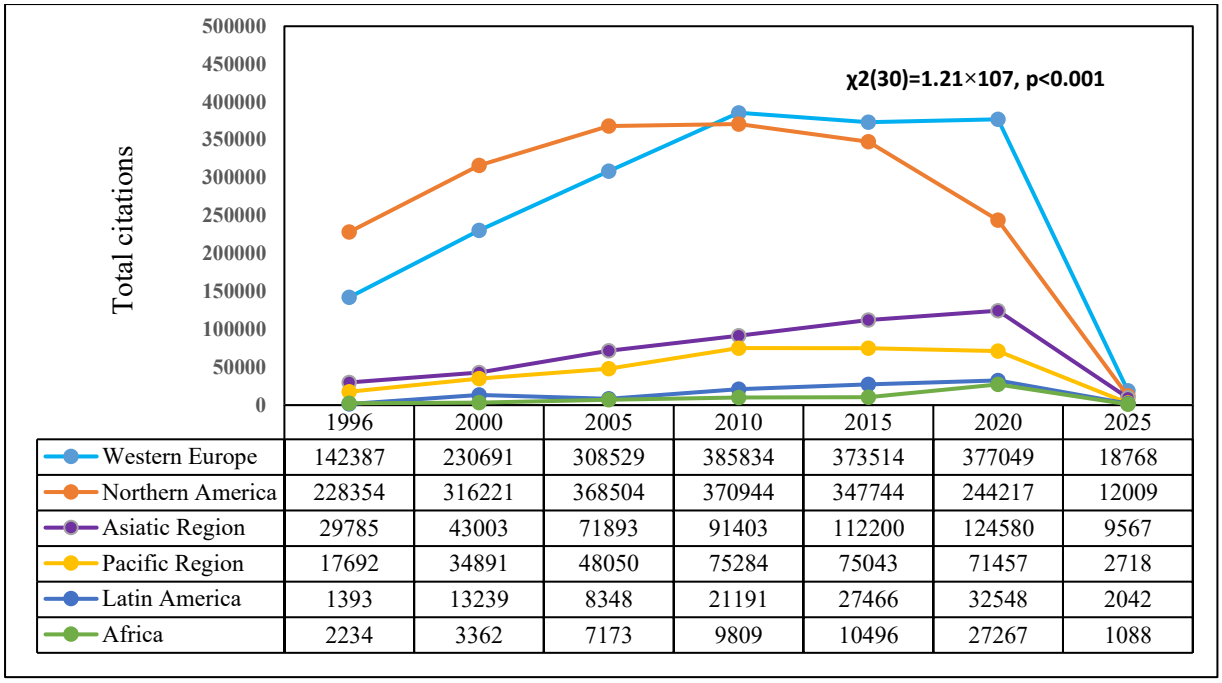
	1996	2000	2005	2010	2015	2020	2025
Western Europe	3730	4909	6261	8575	11037	15438	19723
Northern America	4357	4613	6225	7674	10547	13509	16778
Asiatic Region	744	988	1830	4093	6222	9570	15551
Pacific Region	249	389	683	1153	1677	2259	2622
Latin America	225	136	221	721	1239	2224	2998
Africa	62	55	160	305	402	728	1217

Supplementary Figure-1: Region wise and year wise total published documents



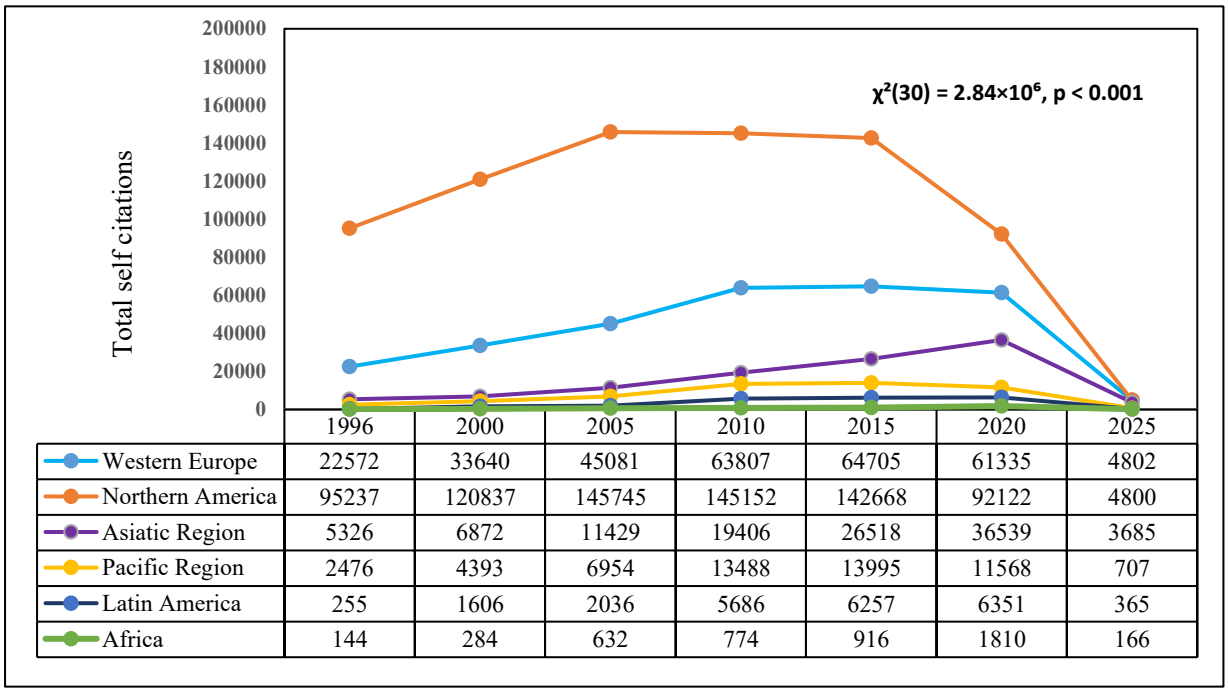
	1996	2000	2005	2010	2015	2020	2025
Western Europe	3683	4626	5879	8154	10313	14314	18340
Northern America	4300	4371	5785	7180	9662	12473	15762
Asiatic Region	742	973	1793	3990	6001	9111	14716
Pacific Region	245	370	639	1099	1579	2113	2458
Latin America	224	136	212	699	1182	2119	2877
Africa	62	52	153	296	384	688	1171

Supplementary Figure-2: Region wise and year wise total citable documents



	1996	2000	2005	2010	2015	2020	2025
Western Europe	142387	230691	308529	385834	373514	377049	18768
Northern America	228354	316221	368504	370944	347744	244217	12009
Asiatic Region	29785	43003	71893	91403	112200	124580	9567
Pacific Region	17692	34891	48050	75284	75043	71457	2718
Latin America	1393	13239	8348	21191	27466	32548	2042
Africa	2234	3362	7173	9809	10496	27267	1088

Supplementary Figure-3: Region wise and year wise total citations



	1996	2000	2005	2010	2015	2020	2025
Western Europe	22572	33640	45081	63807	64705	61335	4802
Northern America	95237	120837	145745	145152	142668	92122	4800
Asiatic Region	5326	6872	11429	19406	26518	36539	3685
Pacific Region	2476	4393	6954	13488	13995	11568	707
Latin America	255	1606	2036	5686	6257	6351	365
Africa	144	284	632	774	916	1810	166

Supplementary Figure-4: Region wise and year wise total self-citations

Supplementary Table-1: Region wise and Year wise Median Citations Per Document

Region	1996	2000	2005	2010	2015	2020	2025
Western Europe	44.7	47.3	45.4	44.9	35.3	21.4	1.0
Northern America	53.3	79.8	65.3	53.3	36.3	20.8	0.8
Asiatic Region	34.8	42.4	34.1	31.3	17.5	12.7	0.6
Pacific Region	66.5	114.5	68.0	59.3	39.2	19.9	0.3
Latin America	13.0	48.3	32.3	26.3	14.7	10.0	0.5
Africa	11.8	4.0	15.5	15.5	16.8	9.8	0.9
Kruskal–Wallis H test, p-value	H(5) = 12.90, p = 0.024						

Supplementary Table-2: Region wise and Year wise Median H-index

Region	1996	2000	2005	2010	2015	2020	2025
Western Europe	211.0	210.0	171.5	186.0	186.0	171.5	157.0
Northern America	435.5	435.5	435.5	435.5	435.5	435.5	435.5
Asiatic Region	110.0	113.0	93.5	39.0	38.5	32.0	25.0
Pacific Region	172.0	255.0	172.0	92.0	92.0	7.0	12.0
Latin America	63.0	31.0	28.0	22.0	16.0	15.0	15.0
Africa	23.5	38.0	23.5	19.0	18.5	15.5	9.0
Kruskal–Wallis H test, p-value	H (5) = 23.74, p < 0.001						