Research Trends in Continuing Education and Lifelong Learning in Rural Settings: A Bibliometric Analysis, 2000–2025

Nasrulla Ahmed[1*], Mohamed Uwais[2], Asifa Abdulla[3]

Islamic University of Maldives

***Corresponding Author**

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ABSTRACT

Purpose: This study maps the development of research on continuing education and lifelong learning in rural settings from 2000 to 2025, focusing on publication growth, disciplinary patterns, influential institutions, geographical distribution, collaboration networks, and the intellectual structure of the field.

Design/methodology/approach: A quantitative bibliometric design was applied to English-language journal articles indexed in Scopus. Records were retrieved using a structured search of titles, abstracts, and keywords and analysed through Scopus analytical tools, Microsoft Excel, and VOSviewer. Performance analysis examined publication trends, subject areas, institutions, and countries, while science-mapping techniques assessed country co-authorship, author collaboration, and keyword co-occurrence.

Findings: Research output increased substantially, from 30 publications in 2000 to 122 in 2025, with especially rapid growth after 2020. Medicine and Social Sciences dominated the disciplinary landscape, followed by Nursing. The University of Toronto was the most productive institution, while the United States, Canada, Australia, and the United Kingdom accounted for most publications. International collaboration was extensive but uneven, with the United States, Australia, Canada, India, and several European countries acting as major hubs. The intellectual structure comprised five clusters centred on clinical continuing education, adult learning and community development, rural health workforce capacity, communication and palliative care, and maternal, newborn, and emergency-care education.

Research limitations/implications: The study was limited to English-language, Scopus-indexed journal articles and may therefore underrepresent non-English and locally published rural scholarship.

Originality/value: This study provides a comprehensive global mapping of rural continuing education and lifelong learning research across a 26-year period and integrates productivity, collaboration, and thematic analyses within a single framework.

Keywords: lifelong learning; continuing education; rural settings; adult education; bibliometric analysis; VOSviewe

INTRODUCTION

Lifelong learning has become a central organising principle for education in societies shaped by rapid technological change, globalisation, demographic ageing, and increasingly uncertain labour and social conditions. It encompasses purposeful learning across the lifespan and across formal, non-formal, and informal settings, including educational institutions, workplaces, households, and communities (Thwe & Kálmán, 2024). Within this broader framework, continuing education refers more specifically to organised opportunities

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through which adults and professionals renew, extend, or redirect their knowledge and competencies after completing their initial education. Such learning is not merely a mechanism for improving employability; it also supports personal development, active citizenship, social participation, health, and collective resilience (Goodwill & Chen, 2021). These functions are particularly significant in rural settings, where learning is embedded in distinctive economic activities, cultural practices, languages, and community relationships. Rurality can create geographical and institutional distance from universities, professional networks, specialised services, and digital infrastructure, yet it can also provide strong social capital, local knowledge, and community-based learning environments. Research involving older rural adults, for example, indicates that rural communities may function positively as settings for self-directed learning, while studies of local-language literacy show that lifelong learning acquires meaning through locally situated practices rather than through a universal model detached from place (Roberson & Merriam, 2005; Trudell & Cheffy, 2019). Similarly, lifelong learning initiatives combining formal, non-formal, and informal education have been associated with empowerment and livelihood development when integrated into the social and economic realities of rural populations (Carr et al., 2018). Continuing education and lifelong learning in rural settings should therefore be understood as an interconnected educational and development field concerned with how people sustain knowledge, capability, participation, and well-being throughout life under geographically and socially differentiated conditions.

Existing scholarship has developed around several intersecting areas rather than a single, unified research tradition. One major stream concerns continuing professional education for rural health and service workforces. Studies have documented the importance of tele-education, employer support, regional programmes, experiential learning, and professional networking for improving access to development opportunities among geographically dispersed practitioners (Curran et al., 2006; Moffatt & Eley, 2010). A second stream examines adult learning as a source of personal and community well-being. Formal, non-formal, and informal participation by older adults has been linked to social capital, active engagement, and community contribution, while self-directed learning helps rural adults negotiate changes in employment, health, family life, and later-life identity (Merriam & Kee, 2014; Roberson & Merriam, 2005). More recent evidence also suggests that structured lifelong learning programmes can enhance subjective well-being among rural adults (Wang, 2025). A third stream focuses on technology-enabled and distance learning. Mobile phones and other low-cost technologies have supported the empowerment of rural women, while mobile-assisted non-formal education has improved aspects of knowledge, satisfaction, and collaboration among marginalised adult learners (Balasubramanian et al., 2010; Intarat & Chanchalor, 2017). A fourth stream connects learning with livelihoods, agriculture, language, and local development. Farmer-training participation is shaped by educational opportunities, economic resources, previous training experiences, and perceived relevance; local-language literacy provides a foundation for continued access to both community and external knowledge; and culturally embedded learning is more effective than programmes based uncritically on models developed in other social contexts (Diouf et al., 2000; Trudell & Cheffy, 2019; Zhao et al., 2019). Collectively, these studies show that rural lifelong learning contributes to professional competence, healthcare access, empowerment, social inclusion, agricultural modernisation, and community resilience. However, the diversity of disciplines, populations, technologies, and geographical settings also means that the field's accumulated knowledge remains dispersed across separate bodies of literature.

The central research problem is therefore not only whether continuing education and lifelong learning benefit rural communities, but whether opportunities to participate in and benefit from them are equitably available, contextually appropriate, and sufficiently understood. Rural professionals and residents frequently encounter geographical isolation, travel and participation costs, limited institutional provision, and weak technological or telecommunications infrastructure, all of which restrict access to continuing education (Curran et al., 2006). Digital delivery can reduce distance and connect learners with information, educators, and professional communities, but it does not automatically eliminate inequality. Rural digital transformation continues to be constrained by infrastructure gaps, lower levels of digital competence, ageing populations, socioeconomic exclusion, gender disparities, and uneven motivation or confidence in using digital services (Andari, 2022). Reviews of remote education similarly show that technology must be aligned with pedagogical purposes, learner circumstances, and available infrastructure; in some settings, radio, printed materials, television, or mobile learning may be more realistic than sophisticated online platforms (Rozo-García & Ramírez-Montoya,

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2025). Moreover, technological access alone cannot replace local language, cultural legitimacy, social support, and community participation. Evidence from African farming and literacy contexts demonstrates that what adults learn, from whom they learn, and how learning is applied are shaped by local social norms and linguistic resources (Diouf et al., 2000; Trudell & Cheffy, 2019). Research on smart villages further cautions that technology-centred models are insufficient unless they incorporate governance, environmental conditions, community capacity, and stakeholder involvement (Muhtar et al., 2023). If these interconnected barriers remain insufficiently investigated, continuing education may reproduce rather than reduce rural disadvantage, limiting workforce retention, service quality, livelihood adaptation, well-being, and the capacity of communities to respond collectively to social, economic, technological, and environmental change.

Despite growing scholarly interest, the research landscape remains insufficiently consolidated. Existing reviews have generated important insights but have generally been bounded by region, educational sector, population, or a specialised theme. Do et al. (2021), for example, mapped lifelong learning research in Southeast Asia from 1972 to 2019 and identified increasing attention to e-learning, education for sustainable development, and the learning society; however, its regional design does not represent the global rural literature. Thwe and Kálmán (2024) reviewed lifelong learning within educational settings and found that theoretical and policy-oriented publications were more extensive than empirical research, with few mixed-method studies and considerable heterogeneity in research instruments. Other bibliometric investigations have concentrated on digital competence in rural areas, smart-village development, community learning and capacity building, or the empowerment of rural women (Andari, 2022; Hadiyati & Afandi, 2025; Muhtar et al., 2023). These studies demonstrate both the relevance and fragmentation of the field: education, health, technology, agriculture, ageing, gender, literacy, and rural development are frequently investigated through separate conceptual and disciplinary lenses. The available literature consequently provides limited evidence of a comprehensive global bibliometric study integrating continuing education and lifelong learning specifically within rural settings over the period from 2000 to 2025. In particular, insufficient attention has been given to simultaneously tracing publication growth, disciplinary composition, institutional influence, geographical concentration, country-level collaboration, author co-authorship, and the intellectual structure of the field. This gap restricts the ability of researchers and policymakers to identify where knowledge is produced, which rural regions and disciplines remain underrepresented, how international collaboration networks are organised, and which intellectual themes have shaped or are beginning to reshape scholarship in this area.

The present study addresses this gap by mapping the global development of research on continuing education and lifelong learning in rural settings between 2000 and 2025 through bibliometric performance analysis and science-mapping techniques. Bibliometric analysis is appropriate for this purpose because it can examine the longitudinal growth of publications, compare the contributions of countries and institutions, identify influential knowledge producers, and visualise relational structures through co-authorship and keyword networks (Do et al., 2021). Rather than evaluating isolated educational interventions, the study treats the literature as an evolving knowledge system and investigates how educational, professional, technological, health-related, and community-development perspectives have converged or remained disconnected. Specifically, the study seeks to examine annual publication trends; identify the principal subject areas associated with the field; determine the most influential contributing institutions; analyse the geographical distribution of publications; evaluate collaboration patterns among countries; investigate international co-authorship relationships among researchers; and map the intellectual structure of continuing education and lifelong learning research in rural settings. By integrating these dimensions within one analytical framework, the study is expected to clarify the historical trajectory and disciplinary boundaries of rural lifelong learning scholarship, reveal dominant and peripheral contributors, and identify thematic concentrations and emerging research directions. The findings may support researchers in locating underdeveloped areas of inquiry, assist institutions in establishing more inclusive international and South–South research partnerships, and provide policymakers and practitioners with a clearer evidence base for designing context-sensitive continuing education strategies for rural populations. In this way, the study contributes a systematic account of how the field has developed and establishes a foundation for future research that is more geographically balanced, conceptually integrated, and responsive to the diverse learning realities of rural communities. Hence, this study employed bibliometric performance analysis and science-mapping techniques to extract key bibliometric information from the selected articles by addressing the following seven research questions.

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Research Objectives

1. To examine publication trends in continuing education and lifelong learning research in rural settings from 2000 to 2025.
2. To identify the major subject areas associated with continuing education and lifelong learning research in rural settings.
3. To determine the most influential institutions contributing to continuing education and lifelong learning research in rural settings.
4. To analyse the geographical distribution of publications on continuing education and lifelong learning in rural settings.
5. To examine country-level collaboration patterns in continuing education and lifelong learning research in rural settings.
6. To investigate international collaboration and co-authorship patterns among authors in continuing education and lifelong learning research in rural settings.
7. To map the intellectual structure of continuing education and lifelong learning research in rural settings

METHODS

This section describes the procedures used to identify, refine, and analyse the literature on continuing education and lifelong learning in rural settings. The methodological process covered the selection of the research design, determination of the study boundaries, development of the database search, screening of retrieved records, and preparation of the final bibliographic dataset. Bibliometric indicators and network-mapping techniques were applied to examine changes in publication output, disciplinary contributions, institutional influence, geographical distribution, country-level collaboration, international author collaboration, and the intellectual structure of the field from 2000 to 2025.

Research Design

The study adopted a quantitative bibliometric design to investigate the development of scholarship on continuing education and lifelong learning in rural settings. This design was selected because it enables systematic measurement and visualization of patterns within a large body of published literature. The analysis combined publication-performance indicators with bibliometric network mapping to assess the growth, productivity, influence, and interconnectedness of the research field.

Performance analysis was used to examine annual publication trends, subject-area distribution, institutional productivity, and geographical contributions. Science-mapping techniques were applied to identify collaboration networks among countries and authors and to reveal the intellectual relationships that have shaped research on continuing education and lifelong learning in rural communities. This approach provided both a descriptive overview of the literature and a structural representation of how the field has evolved between 2000 and 2025.

Scope and Coverage

The analysis focused on peer-reviewed research addressing continuing education and lifelong learning within rural settings. The study covered publications issued between 2000 and 2025, allowing long-term changes in research activity to be examined over a 26-year period.

The literature search was conducted in the Scopus database because it provides extensive bibliographic and citation information across a broad range of academic disciplines. The search was applied to article titles, abstracts, and keywords. Only publications written in English, classified as journal articles, and published in scholarly journals were retained. These criteria ensured consistency in the dataset and maintained a clear focus on peer-reviewed research relevant to rural continuing education and lifelong learning.

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Data Source and Search Strategy

Bibliographic data were retrieved from Scopus on 26 July 2026. A structured search strategy was developed using combinations of terms associated with continuing education, lifelong learning, adult learning, adult education, rural education, rural communities, rural populations, and related non-urban contexts.

Boolean operators were used to connect related concepts and broaden or narrow the search as appropriate. Alternative expressions and variations of the main concepts were included to improve the coverage of the search. The search was limited by publication period, language, source type, and document type. The complete search framework, including the topic, scope, search terms, extraction date, and screening stages, is presented in in Figure 1. And the search string is (TITLE-ABS-KEY ("lifelong learning" OR "lifelong education" OR "adult learning" OR "adult education" OR "continuing education") AND ALL ("rural area*" OR "rural communit*" OR "rural region*" OR "rural population*" OR "rural setting*" OR village* OR "remote area*" OR "remote communit*")) AND PUBYEAR > 1999 AND PUBYEAR < 2026 AND (LIMIT-TO (DOCTYPE , "ar")) AND (LIMIT-TO (LANGUAGE , "English")) AND (LIMIT-TO (SRCTYPE , "j"))

Data Extraction and Screening

The initial Scopus search identified 17,194 records. The retrieved records were reviewed against the predetermined eligibility requirements, including relevance to continuing education or lifelong learning, connection to rural settings, publication period, language, source type, and document type.

Records that did not satisfy the scope of the study were removed during the screening process. Publications outside the selected period, non-English records, non-journal sources, document types other than articles, and studies that did not sufficiently address the research topic were excluded. After the screening and refinement stages, 1,446 journal articles were retained for the bibliometric analysis.

The screening procedure created a focused dataset representing scholarly work on continuing education and lifelong learning in rural settings published from 2000 to 2025. The identification, exclusion, and final inclusion stages are summarised in Figure 1.

Data Analysis Tools and Techniques

The final bibliographic records were exported from Scopus in CSV format. Scopus analytical functions, Microsoft Excel, and VOSviewer were used to process, analyse, and visualise the dataset.

Scopus provided bibliographic information relating to publication years, authors, institutional affiliations, countries, subject classifications, author keywords, indexed keywords, citation counts, and source details. Microsoft Excel was used to organise the records, check the completeness of the dataset, standardise bibliographic information, calculate descriptive indicators, and prepare tables and figures relating to annual publication growth, subject areas, institutions, and geographical distribution.

VOSviewer was used to construct and visualise bibliometric networks. Country co-authorship analysis was conducted to examine cross-country research partnerships and identify major international collaboration centres. Author co-authorship analysis was undertaken to reveal collaborative research groups and connections among scholars. Intellectual-structure analysis was used to identify relationships among influential authors, publications, or cited sources and to map the major knowledge clusters within the field.

The combined use of these analytical tools enabled the study to examine the productivity, influence, geographical reach, collaborative structure, and intellectual development of continuing education and lifelong learning research in rural settings between 2000 and 2025.

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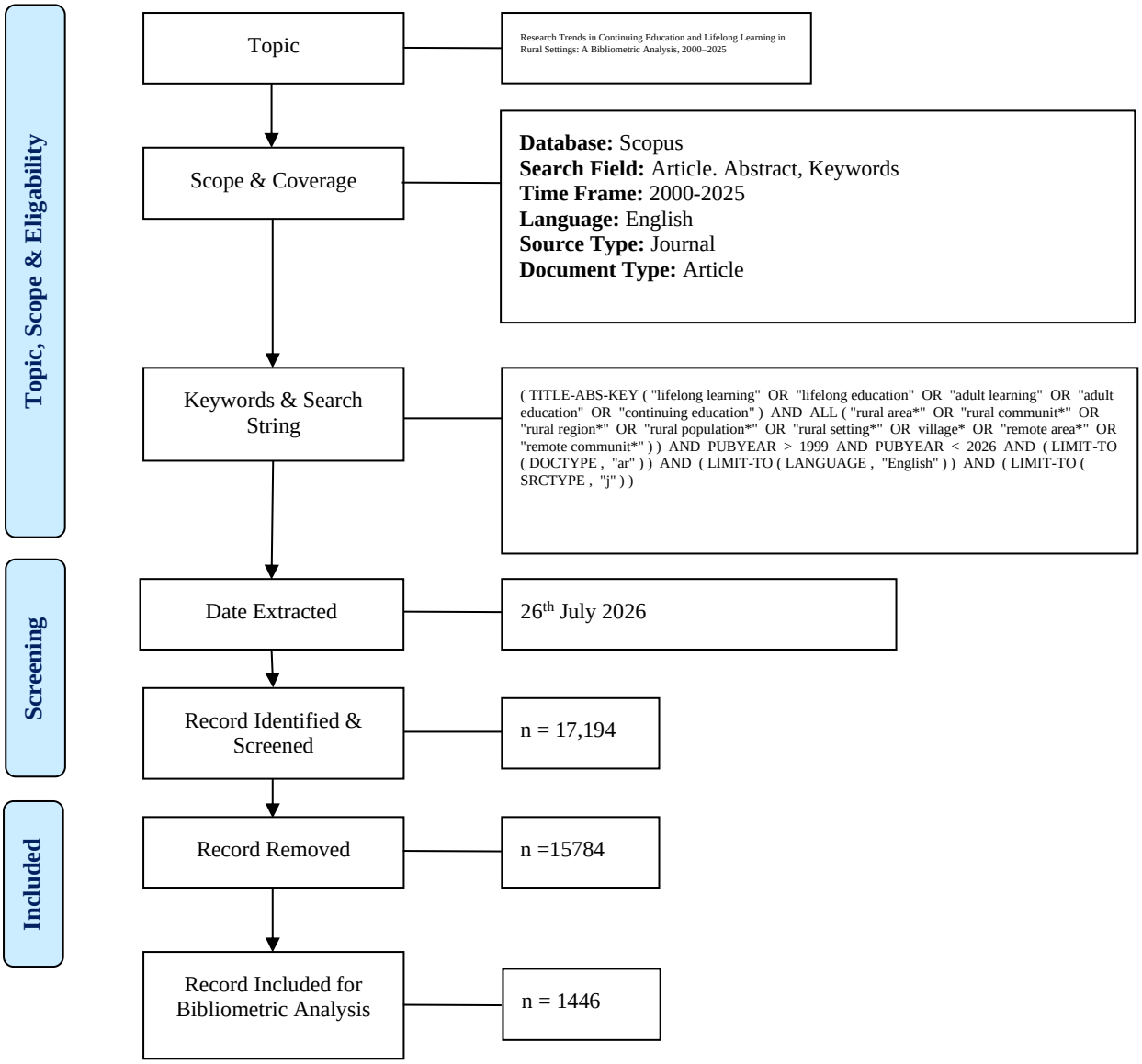

Figure 1. Flow diagram of the search strategy

Source: Zakaria et al. (2020)

RESULTS AND DISCUSSIONS

This section presents and discusses the principal findings of the bibliometric analysis of continuing education and lifelong learning research in rural settings published between 2000 and 2025. It examines the evolution of annual publication output, the disciplinary landscape of the field, and the influence of leading institutions. The geographical distribution of publications is analysed to identify the countries and regions contributing most significantly to this research area. Cross-country and international author collaboration networks are also explored to reveal patterns of scholarly cooperation. Finally, the intellectual structure of the field is mapped to identify influential authors, publications, and major knowledge clusters that have shaped the development of continuing education and lifelong learning research in rural settings.

Evolution of Continuing Education and Lifelong Learning Research in Rural Settings, 2000–2025

Figure 2 illustrates the annual publication output on continuing education and lifelong learning in rural settings between 2000 and 2025. The overall pattern demonstrates a substantial but non-linear expansion of scholarly interest across the 26-year period. Annual publication output increased from 30 articles in 2000 to 122 articles in 2025, representing an overall increase of approximately 306.7%. The compound annual growth rate was approximately 5.8%, indicating that research output expanded consistently over the long term despite several

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periods of decline and short-term fluctuation. A linear trend analysis further indicated an average increase of approximately 2.71 publications per year, with the trend accounting for approximately 77.7% of the variation in annual publication output.

The early period from 2000 to 2005 was characterised by relatively limited and unstable publication activity. The number of publications increased slightly from 30 in 2000 to 33 in 2001 before declining to 26 in 2002 and reaching the lowest level of the entire study period in 2003, with 23 publications. A gradual recovery subsequently occurred, with output rising to 27 publications in 2004 and 38 in 2005. The average annual output during this six-year period was 29.5 publications, and the period contributed only 12.4% of the total publications included in the annual dataset. This initial phase suggests that continuing education and lifelong learning in rural settings remained a relatively specialised area of investigation during the early 2000s.

A period of moderate consolidation was observed between 2006 and 2012. Publication output fluctuated within a comparatively narrow range, increasing from 36 publications in 2006 to 50 in 2007, followed by 49 in 2008. Output subsequently declined to 43 publications in both 2009 and 2010 before increasing slightly to 46 in 2011 and decreasing to 44 in 2012. The relative stability of publication output during this period indicates that the field had established a sustained scholarly presence, although it had not yet entered a phase of continuous or rapid expansion. The absence of pronounced annual growth also suggests that research development during this stage occurred incrementally rather than through a consistent upward trajectory.

A notable expansion emerged between 2013 and 2014. The number of publications increased from 44 in 2012 to 62 in 2013, representing an annual increase of approximately 40.9%. Output then rose further to 75 publications in 2014, which was the highest level recorded during the first 15 years of the study period. This sharp increase marked an important transition in the development of the field, demonstrating stronger scholarly engagement with continuing education and lifelong learning in rural contexts. However, this growth was not sustained immediately, as publication output declined to 59 articles in 2015 and 48 articles in 2016. The reduction from 75 publications in 2014 to 48 in 2016 represented a decline of 36.0%, illustrating that the development of the field remained subject to considerable annual variation.

The period from 2017 to 2019 reflected renewed but uneven growth. Publication output increased to 60 articles in 2017, declined to 53 in 2018, and subsequently rose to 59 in 2019. Although these figures remained below the 2014 peak, they were consistently higher than the annual levels observed during much of the 2000–2012 period. This pattern indicates that the field maintained a stronger publication base after 2013, even when annual output experienced temporary reductions. The fluctuations also demonstrate that the development of research on continuing education and lifelong learning in rural settings was not uniformly progressive but consisted of alternating periods of expansion, stabilisation, and contraction.

The most pronounced and sustained growth occurred during the final six years of the study period. Publication output increased from 59 articles in 2019 to 77 in 2020, representing an annual increase of approximately 30.5%. A slight decline was recorded in 2021, when the number decreased to 72 articles, followed by relative stability in 2022 with 73 publications. Output then increased to 78 publications in 2023 before rising sharply to 102 in 2024 and reaching a record high of 122 in 2025. The increase of 24 publications between 2023 and 2024 constituted the largest absolute annual increase in the dataset, while the additional 20 publications recorded in 2025 confirmed the continuation of this upward trajectory.

The 2020–2025 period produced 524 publications, accounting for approximately 36.7% of the total annual publication output. Furthermore, the eight-year period from 2018 to 2025 accounted for 44.5% of all publications recorded between 2000 and 2025. The concentration of publications in the latter years indicates that research attention has become increasingly focused on the role of continuing education and lifelong learning within rural communities. The average annual output increased from 29.5 publications during 2000–2005 to 79.5 publications during 2018–2025, demonstrating a substantial strengthening of research activity over time.

Across the complete study period, the annual data contained 1,428 publications, with an average of approximately 54.9 publications per year and a median of 49.5. The first half of the period, from 2000 to 2012,

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contributed 488 publications, representing 34.2% of the total output. In contrast, the second half, from 2013 to 2025, contributed 940 publications, accounting for 65.8%. This distribution confirms that nearly two-thirds of the research output was produced during the latter half of the study period.

Overall, the findings reveal three broad stages in the evolution of the field: an initial period of limited and fluctuating activity, a middle period of consolidation and intermittent expansion, and a recent period of accelerated publication growth. Although annual output did not increase consistently in every year, the long-term trajectory was clearly positive. The record publication levels observed in 2024 and 2025 suggest that continuing education and lifelong learning in rural settings have developed from a relatively specialised research area into an increasingly visible and established field of scholarly inquiry.

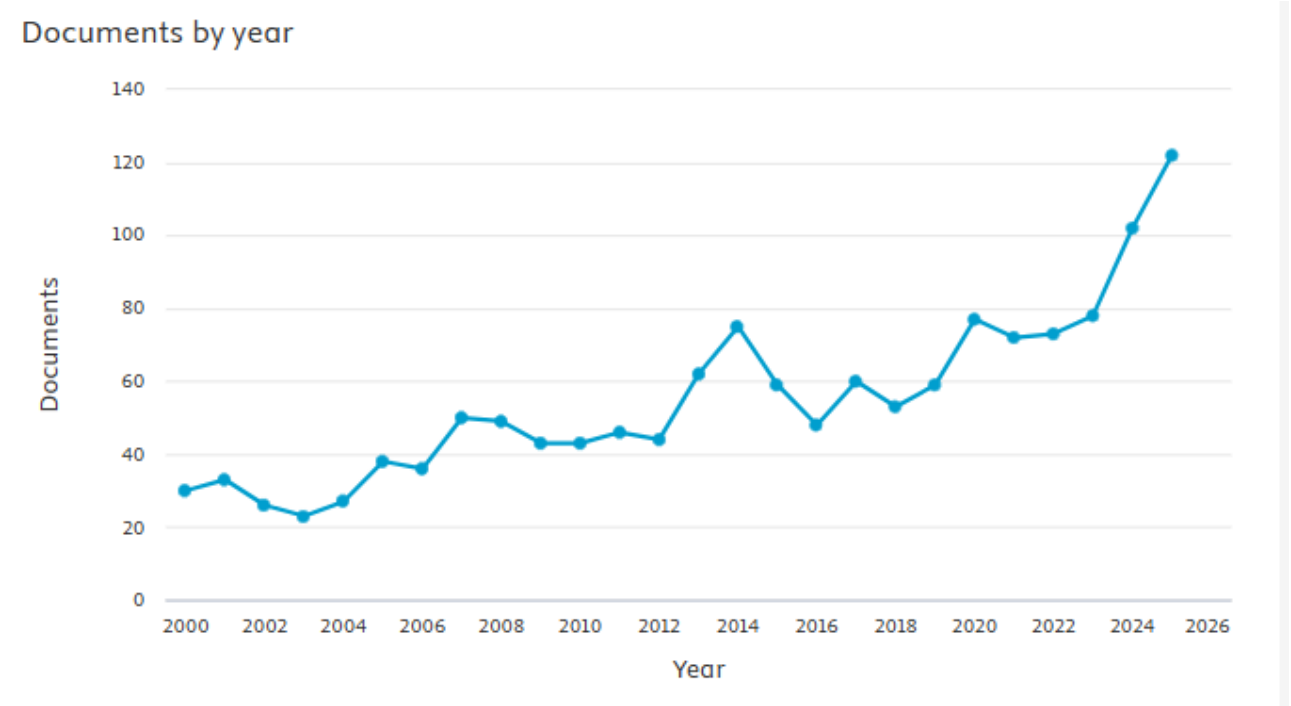

Figure 2 *Annual Publication Trends in Continuing Education and Lifelong Learning Research in Rural Settings, 2000–2025*

Disciplinary Landscape of Continuing Education and Lifelong Learning Research in Rural Settings.

Table 1. *Distribution of Publications on Continuing Education and Lifelong Learning in Rural Settings by Subject Area*

Subject area	Documents	Percentage (%)
Medicine	678	47.48
Social Sciences	626	43.84
Nursing	159	11.13
Environmental Science	84	5.88
Health Professions	79	5.53
Computer Science	62	4.34
Psychology	62	4.34
Arts and Humanities	61	4.27
Agricultural and Biological Sciences	45	3.15
Business, Management and Accounting	40	2.80
Economics, Econometrics and Finance	34	2.38
Biochemistry, Genetics and Molecular Biology	33	2.31
Pharmacology, Toxicology and Pharmaceutics	29	2.03
Engineering	26	1.82

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Multidisciplinary	24	1.68
Energy	19	1.33
Neuroscience	18	1.26
Immunology and Microbiology	17	1.19
Dentistry	16	1.12
Veterinary	11	0.77
Mathematics	10	0.70
Earth and Planetary Sciences	7	0.49
Decision Sciences	6	0.42
Materials Science	4	0.28
Chemical Engineering	3	0.21
Physics and Astronomy	3	0.21
Chemistry	2	0.14

Note. Percentages were calculated using the dataset total of 1,428 journal articles. Because Scopus may assign a single publication to multiple subject areas, the categories are not mutually exclusive and the combined percentages exceed 100%.

Table 1 demonstrates that research on continuing education and lifelong learning in rural settings is distributed across 27 Scopus subject areas, confirming the multidisciplinary nature of the field. Nevertheless, the distribution is highly concentrated within Medicine and Social Sciences. Medicine accounted for the largest share, with 678 documents representing 47.48% of the dataset, followed closely by Social Sciences with 626 documents, or 43.84%. The difference between these two leading areas was only 52 publications, indicating that the field is positioned strongly at the intersection of health-related professional education and broader social and educational inquiry.

The prominence of Medicine suggests that a substantial proportion of continuing education and lifelong learning research in rural settings is connected to the development of healthcare knowledge, professional competencies, service delivery, and workforce capacity. Rural communities frequently experience distinctive challenges related to geographical isolation, limited professional resources, restricted access to specialised services, and difficulties in retaining qualified personnel. The strong representation of medical research therefore indicates that continuing education is often examined as a mechanism for maintaining professional competence and strengthening the quality and accessibility of services in geographically dispersed settings.

Social Sciences represented the second-largest subject category and included 43.84% of the publications. As education is classified within the broader Social Sciences category in Scopus, this substantial contribution reflects the centrality of adult education, community learning, educational participation, social inclusion, rural development, and lifelong learning policy within the literature. The near-equivalent contributions of Medicine and Social Sciences reveal that rural lifelong learning is not limited to conventional educational institutions. Instead, it encompasses professional learning, community education, social development, and the continuing acquisition of knowledge across different stages of life.

Nursing was the third most represented subject area, with 159 publications accounting for 11.13% of the dataset. Its position further reinforces the strong health-related orientation of the field. Continuing professional development is particularly important for nurses working in rural and remote environments, where practitioners may be required to perform broader roles and work with fewer specialised resources than those available in urban healthcare systems. The substantial nursing contribution indicates sustained scholarly attention to professional learning, skills development, clinical competence, workforce preparation, and the continuing education needs of rural healthcare personnel.

Environmental Science and Health Professions also made visible contributions, accounting for 84 documents (5.88%) and 79 documents (5.53%), respectively. The presence of Environmental Science demonstrates that continuing education and lifelong learning in rural settings are linked to environmental awareness, sustainability, natural-resource management, climate-related adaptation, and community responses to

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environmental change. The contribution of Health Professions complements the findings for Medicine and Nursing and indicates that professional education extends across a broader range of health-related occupations.

Computer Science and Psychology each contributed 62 publications, representing 4.34% of the dataset. The presence of Computer Science highlights the technological dimension of rural continuing education, including digital learning systems, online education, information and communication technologies, and technology-supported access to learning opportunities. This contribution is particularly relevant to rural settings, where digital platforms may help overcome geographical distance while simultaneously raising concerns regarding connectivity, infrastructure, technological skills, and unequal access.

The contribution of Psychology indicates attention to the individual and behavioural dimensions of lifelong learning, including motivation, attitudes, participation, confidence, cognition, and adult learner engagement. Arts and Humanities accounted for a comparable proportion, with 61 documents representing 4.27%. This subject area reflects the cultural, historical, linguistic, ethical, and philosophical dimensions of education in rural communities. Together, Psychology and Arts and Humanities demonstrate that research in the field extends beyond measurable learning outcomes to include the personal, cultural, and social meanings attached to continuing learning.

Agricultural and Biological Sciences contributed 45 publications, accounting for 3.15% of the dataset. Although smaller than the health and social science categories, this contribution is particularly relevant to rural contexts because agriculture remains closely connected to livelihoods, food security, community development, and local economies. Continuing education within this area may support the transfer of agricultural knowledge, adoption of improved practices, development of technical competencies, and adaptation to environmental and economic change.

Business, Management and Accounting accounted for 40 publications (2.80%), while Economics, Econometrics and Finance contributed 34 publications (2.38%). These subject areas indicate that lifelong learning in rural settings is also associated with entrepreneurship, employability, organisational development, financial capability, workforce participation, and local economic advancement. Their representation suggests that continuing education is increasingly considered an instrument for strengthening human capital and improving economic opportunities within rural communities.

Several specialised health and scientific areas were also represented, including Biochemistry, Genetics and Molecular Biology with 33 publications (2.31%), Pharmacology, Toxicology and Pharmaceutics with 29 publications (2.03%), Neuroscience with 18 publications (1.26%), Immunology and Microbiology with 17 publications (1.19%), Dentistry with 16 publications (1.12%), and Veterinary Science with 11 publications (0.77%). These categories demonstrate that continuing education in rural settings extends into specialised professional fields, although their contributions remain considerably smaller than those of Medicine, Social Sciences, and Nursing.

Engineering contributed 26 publications (1.82%), while 24 publications (1.68%) were classified as Multidisciplinary. Energy accounted for 19 publications (1.33%), and Mathematics contributed 10 publications (0.70%). The remaining subject areas—Earth and Planetary Sciences, Decision Sciences, Materials Science, Chemical Engineering, Physics and Astronomy, and Chemistry—each accounted for less than 1% of the dataset. Their comparatively limited representation does not necessarily indicate a lack of relevance; rather, it suggests that these disciplines currently occupy more specialised or peripheral positions within the literature.

Overall, the disciplinary distribution reveals an applied and problem-oriented research field dominated by health sciences and social sciences. The strong representation of Medicine, Social Sciences, and Nursing indicates that scholarship has primarily focused on improving professional capacity, educational access, community well-being, and service provision in rural environments. At the same time, contributions from environmental science, computer science, psychology, agriculture, economics, and other disciplines demonstrate that continuing education and lifelong learning are increasingly being examined as multidimensional processes connected to technological change, sustainable development, livelihoods, individual development, and rural transformation.

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Institutional Influence in Continuing Education and Lifelong Learning Research in Rural Settings

Table 2. *Most Influential Institutions in Continuing Education and Lifelong Learning Research in Rural Settings*

Institution	Documents	Percentage (%)
University of Toronto	24	1.68
The University of British Columbia	18	1.26
The University of Queensland	17	1.19
Pennsylvania State University	15	1.05
Monash University	15	1.05
James Cook University	14	0.98
The University of Sydney	14	0.98
University of Saskatchewan	13	0.91
The University of Newcastle, Australia	12	0.84
University of Calgary	11	0.77

Note. Percentages were calculated using the dataset total of 1,428 journal articles. One article may be linked to more than one institution because Scopus records all author affiliations; therefore, institutional categories are not mutually exclusive. In this table, institutional influence is operationalised through publication output rather than citation impact.

Table 2 presents the ten institutions with the highest publication output in continuing education and lifelong learning research in rural settings. The distribution indicates a geographically concentrated but institutionally dispersed research landscape. The University of Toronto ranked first with 24 publications, representing 1.68% of the complete dataset. It was followed by The University of British Columbia with 18 publications (1.26%) and The University of Queensland with 17 publications (1.19%). Pennsylvania State University and Monash University each contributed 15 publications (1.05%), while James Cook University and The University of Sydney each produced 14 publications (0.98%).

The University of Toronto's leading position demonstrates its comparatively strong and sustained engagement with scholarship at the intersection of rural learning, adult education, professional development, and continuing education. Nevertheless, its share remained below 2% of the total dataset. This relatively small proportion is analytically important because it indicates that the knowledge base is not dominated by a single institution. Instead, research activity is distributed across numerous universities and research organisations, reflecting a decentralised institutional structure.

The difference between the first- and tenth-ranked institutions was 13 publications, and the leading institution produced approximately 2.18 times the output of the tenth-ranked University of Calgary. Across the ten institutions, publication output ranged from 11 to 24 documents, with an average of 15.3 and a median of 14.5 publications. The narrow clustering of most institutions between 11 and 18 publications suggests that leadership in the field is shared among several contributors rather than concentrated within one exceptionally dominant centre.

A clear geographical pattern is evident among the leading affiliations. Five of the ten institutions were located in Australia: The University of Queensland, Monash University, James Cook University, The University of Sydney, and The University of Newcastle, Australia. Four were Canadian institutions: the University of Toronto, The University of British Columbia, the University of Saskatchewan, and the University of Calgary. Pennsylvania State University was the only institution from the United States represented among the ten leading affiliations. This distribution highlights the particularly strong institutional visibility of Australia and Canada in the literature.

The prominence of Australian universities is consistent with the rural and remote orientation of several institutions in the ranking. James Cook University and The University of Newcastle, Australia, for example,

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are represented alongside large metropolitan research universities such as The University of Sydney, Monash University, and The University of Queensland. This mixture suggests that the field attracts contributions both from institutions with direct regional engagement and from comprehensive universities with broad research capacity. Collectively, the five Australian institutions generated 72 affiliation-linked publications across the ranking.

Canadian institutions also occupied central positions, with the University of Toronto and The University of British Columbia holding the first and second ranks. The inclusion of the University of Saskatchewan and the University of Calgary further demonstrates that Canadian contributions are not confined to a single province or university. The four Canadian institutions accounted for 66 affiliation-linked publications in the top-ten list. Their strong representation suggests sustained scholarly attention to continuing professional education, community learning, rural service provision, and educational access across geographically dispersed populations.

The presence of Pennsylvania State University, with 15 publications, indicates a notable contribution from the United States; however, the absence of additional United States institutions from the top ten distinguishes the institutional pattern from fields commonly dominated by multiple American universities. Within this dataset, leadership appears more strongly centred in Canadian and Australian institutions. This pattern may reflect the relevance of rurality, distance, regional workforce development, and access to education within the research priorities of these national contexts.

The combined publication count of the ten institutions was 153, equivalent to 10.71% of the 1,428-article dataset when affiliation counts are compared with the corpus size. This value should not be interpreted as the proportion of unique articles produced exclusively by these institutions, because internationally or interinstitutionally co-authored articles may be assigned to more than one affiliation. Even so, the modest combined share supports the conclusion that institutional participation is broad and that a substantial majority of publications originated outside the ten highest-ranked affiliations.

The ranking also reveals the importance of collaboration and database indexing when interpreting institutional productivity. An institution receives publication credit whenever one or more affiliated authors participate in a study, regardless of whether it led the research. Scopus may also index a university, faculty, medical school, or affiliated centre as separate organisational units. The observed counts therefore reflect both independent productivity and participation in collaborative networks and should be interpreted as affiliation-level indicators rather than as a complete measure of institutional impact.

From a field-development perspective, the absence of highly concentrated institutional dominance may be advantageous because it allows diverse geographical, disciplinary, and community perspectives to shape the literature. At the same time, the concentration of leading institutions in Australia and Canada indicates an imbalance in the global institutional distribution. Universities located in low- and middle-income countries and in rural regions that may experience the greatest educational access challenges were not represented among the ten leading affiliations. This pattern points to the need for stronger research capacity, equitable partnerships, and greater institutional leadership from underrepresented regions.

Overall, the institutional profile demonstrates that continuing education and lifelong learning research in rural settings has developed through a distributed network of universities, with the strongest visible contributions emerging from Canada and Australia. The University of Toronto occupied the leading position, but no institution accounted for a sufficiently large share to exercise dominant control over the field. The findings therefore characterise the institutional structure as internationally connected, moderately dispersed, and shaped by multiple centres of expertise rather than by a single institutional hub.

Global Distribution of Continuing Education and Lifelong Learning Research in Rural Settings

Figure 4 presents the geographical distribution of publications on continuing education and lifelong learning in rural settings. The global pattern is markedly uneven and reveals a strong concentration of research output in a relatively small number of countries. The United States emerged as the dominant contributor with 475 publications, representing 33.26% of the article dataset. It was followed by Canada (n = 164; 11.48%),

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Australia (n = 152; 10.64%), and the United Kingdom (n = 118; 8.26%). Taken together, these four countries accounted for 909 publications, or 63.66% of the dataset, indicating that the field has been shaped predominantly by a small group of established research systems.

The scale of the United States contribution is especially noteworthy. Its output exceeded the combined publication volume of Canada, Australia, and the United Kingdom, the next three most productive countries. This concentration suggests that research on rural continuing education and lifelong learning has been anchored strongly in Anglophone scholarship. Beyond the leading four, the next tier of contributors comprised China (n = 62), South Africa (n = 56), India (n = 55), Spain (n = 30), and Brazil (n = 29). Although these countries contributed at a much lower level than the leading group, their presence indicates that the field has gained traction across both high-income and middle-income contexts.

When the country data were aggregated by continent and calculated using country-affiliation occurrences, North America accounted for the largest share of global output with 657 occurrences (35.36%), followed by Europe with 395 (21.26%) and Asia with 390 (20.99%). Africa contributed 194 occurrences (10.44%), Oceania 169 (9.1%), and South America 53 (2.85%). This distribution indicates that the geographical centre of the literature remains concentrated in North America, while Europe and Asia together form a second major axis of scholarly production. By contrast, Africa, Oceania, and especially South America remain less visible in the global record.

North America's leading position was driven overwhelmingly by the United States and Canada, while Europe displayed a broader but more dispersed pattern of contribution. In Europe, the United Kingdom was clearly dominant, but meaningful participation was also observed from Spain, the Netherlands, Germany, Greece, Sweden, France, Italy, Switzerland, and several Nordic and Eastern European countries. This indicates that European scholarship is not concentrated in a single national system but distributed across multiple research environments. Oceania was similarly concentrated, with Australia alone accounting for 89.94% of all Oceania-linked occurrences, while New Zealand contributed a modest but visible share.

Asia occupied an important position in the global distribution and almost matched Europe in overall geographical presence. The Asian contribution was also more internally diversified than may be expected. Within Asia, East Asia generated 124 country occurrences (31.79% of Asian occurrences), Southeast Asia 107 (27.44%), South Asia 86 (22.05%), and West Asia/Middle East 72 (18.46%). This pattern shows that research activity is distributed across several Asian subregions rather than being monopolised by a single national or subregional bloc. The strongest individual Asian contributors were China and India, followed by Thailand, Malaysia, Indonesia, Taiwan, Japan, Pakistan, Bangladesh, and Nepal.

The Asian profile is especially important because it signals that rural continuing education and lifelong learning are receiving growing scholarly attention in contexts characterised by large rural populations, educational inequality, rapid social change, and uneven access to formal learning infrastructures. East Asia's leading position reflects the combined weight of China, Taiwan, Japan, Hong Kong, and related systems, whereas Southeast Asia's strong showing demonstrates the contribution of Thailand, Malaysia, Indonesia, Viet Nam, the Philippines, and Singapore. The relatively close gap between East Asia and Southeast Asia suggests that the literature is not solely driven by the traditionally dominant East Asian research economies.

South Asia deserves particular attention. Although it ranked third within Asia, its aggregate contribution of 86 country occurrences remains modest when considered against the demographic scale and rural educational needs of the region. India was the clear regional leader with 55 publications and accounted for 63.95% of South Asian output. Pakistan (n = 11), Bangladesh (n = 9), Nepal (n = 7), Sri Lanka (n = 3), and Afghanistan (n = 1) contributed at much lower levels. This distribution suggests that South Asian scholarship in this field remains highly concentrated in India, with neighbouring countries still underrepresented. Given the importance of rural lifelong learning for literacy, workforce development, agricultural extension, women's empowerment, and community resilience across South Asia, the region appears to offer substantial scope for future research expansion.

Africa showed a meaningful but comparatively smaller research presence, led by South Africa (n = 56), Ethiopia (n = 22), Nigeria (n = 19), and Ghana (n = 15). These contributions are significant because they reflect

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scholarly engagement in regions where rural education and adult learning are closely tied to questions of development, equity, and access. South America, by contrast, remained weakly represented, with Brazil accounting for 54.72% of the continent's total occurrences. The limited output from Latin America suggests that the geographical spread of the literature remains incomplete and that important regional perspectives may still be underexplored.

Overall, the geographical distribution demonstrates that research on continuing education and lifelong learning in rural settings has achieved broad international reach but remains structurally uneven. The field is dominated by North American and Anglophone scholarship, yet Asia now constitutes a comparably important centre of contribution, with clear momentum across East, Southeast, and South Asia. The map therefore points to both maturation and imbalance: the literature has become global in scope, but its knowledge production remains concentrated in a limited set of countries and regions. Future research would benefit from stronger representation from South Asia, Africa, and Latin America in order to reflect more fully the diversity of rural learning contexts worldwide.

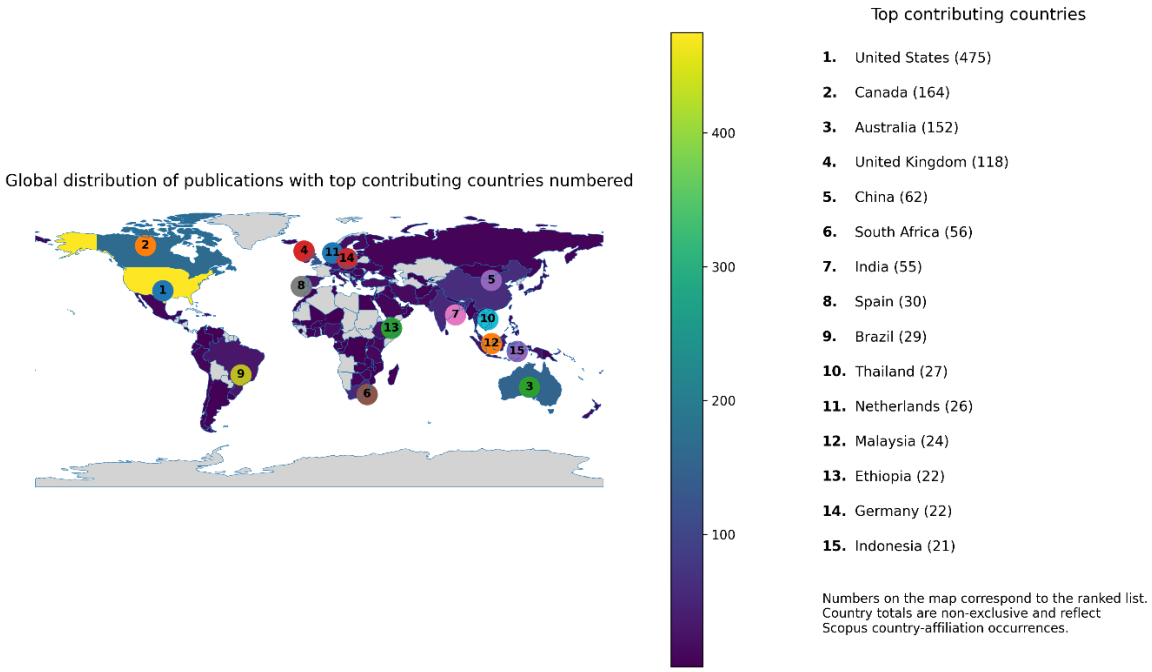

Figure 4.*Geographical Distribution of Publications on Continuing Education and Lifelong Learning in Rural Settings*

Cross-Country Collaboration in Continuing Education and Lifelong Learning Research in Rural Settings

Figure 5 illustrates the international co-authorship network among countries contributing to research on continuing education and lifelong learning in rural settings. A minimum threshold of three publications per country was applied. Of the 156 countries identified in the dataset, 77 met the threshold, while 75 countries formed the final connected network. The network comprised 11 collaboration clusters, 419 links, and a total link strength of 686, indicating a substantial level of international research cooperation.

The United States occupied the largest and most central position in the network, demonstrating its dominant publication output and extensive collaboration with countries across several clusters. Australia, Canada, India, the Netherlands, China, Thailand, Indonesia, Brazil, and Spain also appeared as influential contributors. Countries located near the centre of the network generally maintained broader and stronger international partnerships, whereas countries positioned at the outer edges had fewer or more specialised collaborative connections.

The red cluster primarily represented European collaboration and included countries such as the Netherlands, Germany, Italy, Belgium, Austria, Switzerland, Poland, and Finland. The green cluster connected several Asian

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and African countries, including Indonesia, Malaysia, Bangladesh, Japan, Taiwan, Mali, and Viet Nam. The blue cluster combined European and African contributors such as France, Norway, Turkey, Nigeria, and Zimbabwe. These clusters indicate that collaboration was influenced partly by geographical proximity, but also by shared research interests and institutional partnerships.

The yellow cluster connected China, Hong Kong, Singapore, Iran, Ghana, Greece, Ireland, and Portugal, reflecting collaboration across Asia, Europe, and Africa. The purple cluster linked Canada and India with Ethiopia, Botswana, Rwanda, the Philippines, Saudi Arabia, and Sweden. This cluster represents a strong North–South collaboration pattern in which established research systems worked with countries facing significant rural education and development challenges.

The turquoise cluster was largely Ibero-American and included Spain, Argentina, Chile, Ecuador, Honduras, Mexico, and Peru. The orange cluster was centred around Thailand and included Pakistan, Kenya, Uganda, Latvia, and the United Arab Emirates. Smaller clusters connected the United Kingdom with Cambodia, Iraq, and Sri Lanka; the United States with Brazil, Senegal, and South Korea; South Africa with New Zealand, Israel, and Tanzania; and Australia with Jordan and Nepal.

South Asian countries were distributed across different collaboration clusters rather than forming a single regional network. India belonged to the purple cluster, Bangladesh to the green cluster, Pakistan to the orange cluster, Sri Lanka to the cluster associated with the United Kingdom, and Nepal to the Australia-centred cluster. This pattern suggests that South Asian researchers collaborate more frequently with partners outside the region than with neighbouring South Asian countries. Although such international partnerships broaden research exposure, stronger intra-regional collaboration could support comparative studies addressing shared challenges in rural education, adult learning, digital access, and community development.

Overall, the network reveals a globally connected but uneven collaboration structure. A small number of countries, particularly the United States, Australia, Canada, India, and several European nations, functioned as major collaboration hubs. In contrast, many developing countries remained at the periphery of the network. Strengthening South–South and regional collaboration, particularly within South Asia, Africa, and Latin America, could produce a more balanced and contextually diverse body of research on continuing education and lifelong learning in rural settings

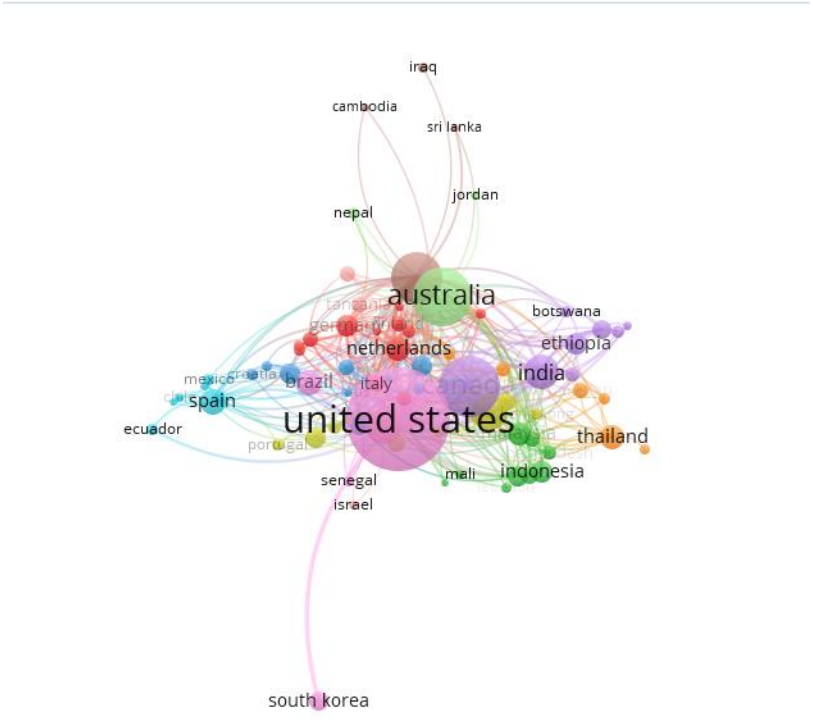

Figure 5 *Country Collaboration Network in Continuing Education and Lifelong Learning Research in Rural Settings*

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International Author Collaboration in Continuing Education and Lifelong Learning Research in Rural Settings

Figure 6 presents the author co-authorship network in research on continuing education and lifelong learning in rural settings. A minimum threshold of two publications and zero citations per author was applied. Of the 5,400 authors identified in the dataset, 226 met the threshold. However, the final connected network contained 20 authors organised into three collaboration clusters, with 71 co-authorship links and a total link strength of 106. These findings indicate that although many authors contributed more than one publication, only a relatively small group formed a clearly connected and recurring collaboration network.

The **red cluster (Cluster 1)** was the largest group, comprising nine authors: Vanina Dal Bello-Haas, Chandima Karunanayake, Julie G. Kosteniuk, Judith C. Kulig, Martha L. P. MacLeod, Debra G. Morgan, Megan E. O'Connell, Kelly L. Penz, and Norma J. Stewart. The size of this cluster suggests a well-established collaborative research group with sustained co-authorship relationships. The authors appear to form the principal core of the network, indicating repeated cooperation in studies related to rural professional development, healthcare education, community-based learning, and the continuing education needs of rural populations. The presence of nine interconnected authors also indicates that knowledge production within this cluster was organised through a relatively stable research team rather than isolated individual contributions.

The **green cluster (Cluster 2)** contained six authors: Carl D'Arcy, Julie Kosteniuk, Debra Morgan, Kelly Penz, Barbara Smith, and Norma Stewart. This cluster was closely connected to the red cluster because several author names appear in both groups with slightly different forms. For example, "Julie G. Kosteniuk" and "Julie Kosteniuk," "Debra G. Morgan" and "Debra Morgan," "Kelly L. Penz" and "Kelly Penz," and "Norma J. Stewart" and "Norma Stewart" may represent the same researchers recorded under different name formats. Their presence across two clusters suggests that these authors occupy important bridging positions within the collaboration network. They appear to connect different co-authorship groups and contribute to the continuity of research across related projects.

The **blue cluster (Cluster 3)** comprised five authors: Jill Bally, Shelley Kirychuk, Mary Ellen Labrecque, Gerri Lasiuk, and Michelle Pavloff. Although smaller than the other two clusters, this group represents another identifiable collaborative team. Its separate clustering indicates stronger co-authorship relationships among its five members than with authors in the red and green clusters. The group may represent a more specialised line of investigation within the broader field, particularly in areas related to rural health education, nursing, professional learning, or community-based continuing education.

The network demonstrates that international author collaboration in this field is concentrated within a limited number of recurring research teams. The 71 links indicate numerous co-authorship connections among the 20 authors, while the total link strength of 106 reflects the accumulated intensity of these relationships. Authors connected by thicker lines have collaborated more frequently, whereas shorter distances between authors represent closer co-authorship relationships. The coloured clusters identify groups of authors who collaborate more strongly with one another than with authors outside their respective clusters.

The close relationship between the red and green clusters indicates that the network is not composed of completely isolated groups. Instead, several central authors appear to connect the two clusters and facilitate knowledge exchange across collaborative teams. In contrast, the blue cluster appears more distinct, suggesting a specialised research group with fewer direct links to the other authors. This structure reflects a partially integrated network in which collaboration is strong within individual teams but less extensive across the wider international author community.

An important methodological issue is the presence of possible duplicate author-name variations. Differences in initials and name formats may have caused the same author to be represented as separate nodes and assigned to different clusters. Without author-name standardisation, the number of authors and clusters may be slightly overestimated, while the actual strength of collaboration among key researchers may be underestimated. Therefore, author names should be carefully cleaned and merged using a VOSviewer thesaurus file before the final analysis is reported.

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Overall, the findings indicate that author collaboration in continuing education and lifelong learning research in rural settings is characterised by a small but strongly connected core of researchers. The network is dominated by three collaborative groups, with the red cluster representing the largest team, the green cluster functioning as an interconnected group with several bridging authors, and the blue cluster representing a smaller specialised collaboration. Although the identified authors demonstrate sustained teamwork, the small size of the connected network compared with the total number of authors suggests that broader international collaboration remains limited. Expanding partnerships across countries, disciplines, and regions could strengthen knowledge exchange and improve the representation of diverse rural learning context

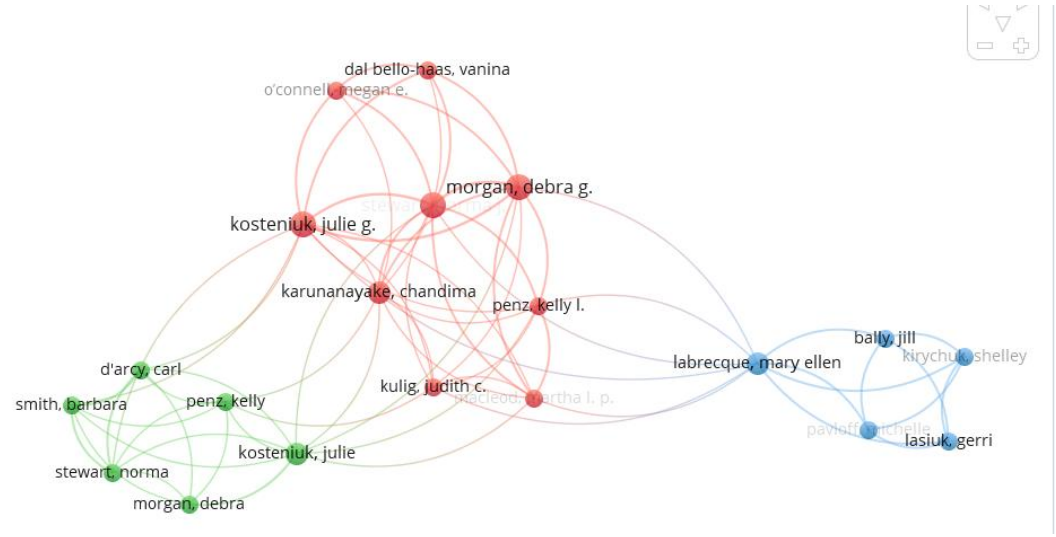

Figure 6 *International Co-Authorship Network in Continuing Education and Lifelong Learning Research in Rural Settings*

Intellectual Structure of Continuing Education and Lifelong Learning Research in Rural Settings

Figure 7 presents the keyword co-occurrence network representing the intellectual and conceptual structure of research on continuing education and lifelong learning in rural settings. A minimum threshold of 14 occurrences was applied. Of the 7,529 keywords identified, 296 met the threshold and were included in the analysis. The network was organised into five clusters, comprising 26,408 links and a total link strength of 138,232. These values indicate a highly interconnected knowledge structure in which educational, healthcare, professional-development, community-learning, and rural-development concepts frequently occur together. Larger nodes represent more frequently occurring keywords, thicker links indicate stronger co-occurrence relationships, and shorter distances reflect closer conceptual relationships.

The most prominent nodes were human, continuing education, adult, education, adult education, lifelong learning, rural health services, education, continuing, cross-sectional study, and healthcare delivery. The central placement of these terms demonstrates that the intellectual foundation of the field is strongly connected to adult and professional learning within rural healthcare and community settings. The prominence of medical and health-related terminology further indicates that continuing education in rural contexts has been studied more extensively as a means of strengthening professional competence and service delivery than as a purely educational or theoretical process.

Red Cluster: Clinical Continuing Education and Healthcare Delivery

The red cluster was the largest, containing 92 keywords. Its main concepts included continuing education, medical education, healthcare delivery, primary healthcare, professional development, staff training, practice guidelines, patient education, telehealth, telemedicine, and health-service accessibility. This cluster represents the application of continuing education to improve clinical knowledge, professional practice, healthcare quality, and access to services in rural and remote communities.

The dataset connects this knowledge area with the work of Arora and colleagues on Project ECHO and tele-mentoring for rural healthcare practitioners. Moffatt and Eley's research on telehealth for rural Australians also

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reflects the technological and service-access dimensions of this cluster. Similarly, studies by Goodyear-Smith and colleagues examined continuing medical education among general practitioners. Collectively, the red cluster demonstrates that professional education, telecommunication technologies, and evidence-based clinical practice constitute a major intellectual foundation of the field.

Green Cluster: Adult Learning, Lifelong Learning and Community Development

The green cluster contained 90 keywords and was organised around adult, adult education, adult learning, lifelong learning, learning, literacy, empowerment, higher education, distance education, e-learning, online learning, rural population, older adults, sustainability, and sustainable development. This cluster represents the broader educational and developmental dimensions of lifelong learning beyond formal professional training.

The cluster is reflected in the work of Merriam and Kee on lifelong learning and community well-being among older adults, as well as Roberson and Merriam's examination of self-directed learning among older rural adults. Gautam and Rai linked informal learning and digital literacy to the empowerment of rural women, while Prins examined adult literacy, community participation, social support, and learning in rural communities. Kratoo and Hounnaklang's study of elderly-school policy also demonstrates the relationship between lifelong learning, healthy ageing, and quality of life.

The strong presence of human, adult, and lifelong learning at the centre of the network suggests that this cluster serves as a bridge between education, health, community participation, and social development. It establishes lifelong learning as a process supporting individual well-being, social inclusion, digital participation, and community transformation across the lifespan.

Blue Cluster: Rural Health Workforce and Professional Capacity

The blue cluster consisted of 72 keywords, including education, education, continuing, continuing medical education, nursing education, rural health services, rural healthcare, clinical competence, curriculum, staff development, needs assessment, workforce, job satisfaction, and computer-assisted instruction. This cluster reflects concerns about the preparation, continuing development, and retention of professionals working in rural and medically underserved settings.

The work of Kosteniuk, Morgan, Stewart, Penz, MacLeod, and Labrecque is closely connected to this cluster. Their studies addressed continuing nursing education, rural nurses' educational priorities, access to information, organisational commitment, workforce retention, and the professional experiences of rural home-care nurses. Matsumoto and colleagues similarly examined rural physicians' job satisfaction, career intentions, and retention.

The intellectual knowledge represented by this cluster indicates that education in rural settings is closely linked to workforce sustainability. Continuing education is therefore conceptualised not only as a means of improving individual competence but also as an organisational strategy for reducing professional isolation, improving job satisfaction, and retaining healthcare workers in underserved communities.

Yellow Cluster: Communication, Qualitative Inquiry and Palliative Care

The yellow cluster included 26 keywords centred on palliative care, palliative therapy, interviews, semi-structured interviews, thematic analysis, interpersonal communication, social support, social work, quality improvement, and health personnel. This cluster represents a qualitative and relational dimension of rural continuing education, with emphasis on communication, professional experiences, social relationships, and patient-centred care.

This knowledge area is reflected in Shipman and colleagues' investigation of the palliative-care educational needs of general practitioners and in Glass and colleagues' comparative examination of hospice development. Research by Moynihan and colleagues on integrating paediatric palliative care also illustrates the use of professional education and collaborative models to improve specialised care. The cluster demonstrates that continuing education in rural settings involves not only technical knowledge but also communication skills, reflective practice, emotional support, and collaboration among professionals, patients, families, and communities.

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Purple Cluster: Maternal, Newborn and Emergency-Care Education

The purple cluster was the smallest, containing 16 keywords. Its central concepts included emergency health services, emergency medical services, midwife, midwifery, pregnancy, newborn, quality of healthcare, risk assessment, multicentre study, and standards. This cluster represents specialised continuing education designed to improve emergency, maternal, and newborn-care outcomes in rural and resource-constrained settings.

Shah and colleagues contributed to this knowledge area through studies of geriatric education for emergency medical-service providers. Lund and colleagues examined the influence of a safe-delivery mobile application on care quality and perinatal outcomes in Ethiopia. Nelissen, Ersdal, and colleagues investigated the retention of knowledge and clinical skills following simulation-based obstetric training. These studies demonstrate how continuing education, mobile learning, and practical simulation can improve the preparedness of frontline professionals and the quality of emergency and maternal care.

Overall, the five clusters reveal that the intellectual structure of the field is dominated by the intersection of continuing education, rural healthcare, adult learning, workforce development, and community well-being. The strong connections among the clusters show that lifelong learning in rural settings is not an isolated educational concept. Instead, it functions as a mechanism for improving professional competence, widening access to healthcare, empowering rural populations, supporting workforce retention, and strengthening community resilience.

The prominence of cross-sectional studies, questionnaires, surveys, and qualitative interviews indicates that much of the existing literature is descriptive or exploratory. Although intervention studies involving telehealth, online learning, simulation, and mobile applications are present, further longitudinal and comparative research is needed to establish the sustained effects of continuing education on professional performance, community participation, and rural development. The network therefore reflects a mature but predominantly health-oriented field, while also identifying opportunities to expand research on digital inclusion, adult literacy, vocational learning, agricultural education, and lifelong-learning policy in rural communities

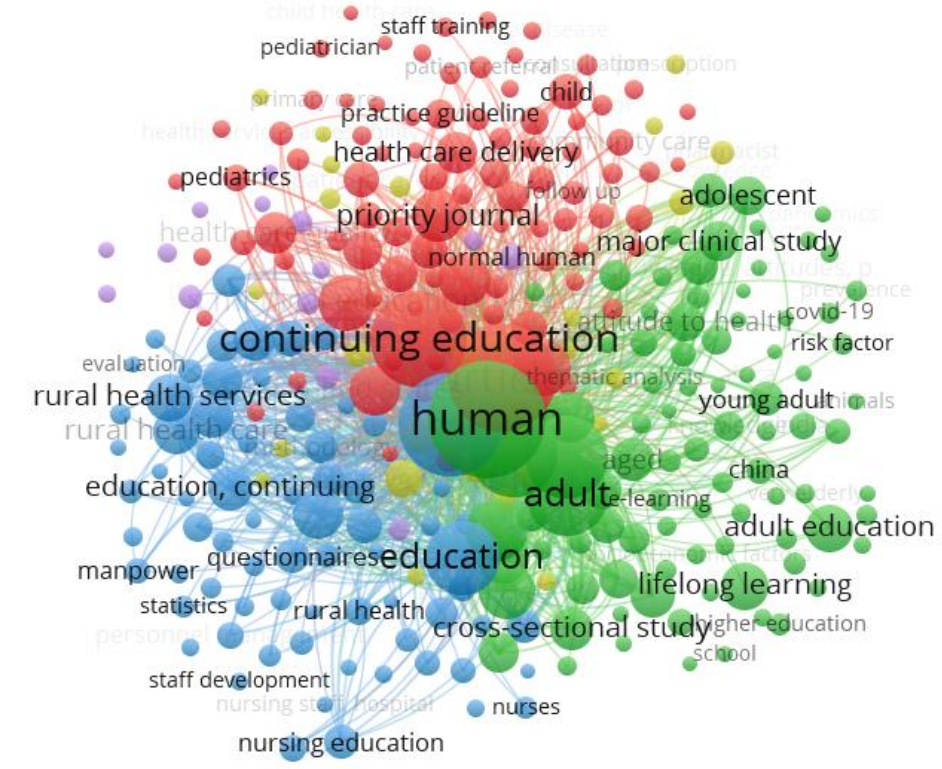

Figure 7. *Intellectual Structure of Continuing Education and Lifelong Learning Research in Rural Settings*

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CONCLUSIONS AND IMPLICATIONS

Summary

This bibliometric study provides a comprehensive overview of the global research landscape on continuing education and lifelong learning in rural settings from 2000 to 2025. The study examined the development of the field through publication trends, subject-area distribution, institutional productivity, geographical contributions, country-level collaboration, international author collaboration, and the intellectual structure of the literature. A quantitative bibliometric design was employed using journal articles indexed in the Scopus database. Scopus analytical tools, Microsoft Excel, and VOSviewer were used to organise the bibliographic data, calculate descriptive indicators, and construct collaboration and keyword co-occurrence networks.

The findings demonstrate that continuing education and lifelong learning in rural settings have developed from a relatively specialised area into an increasingly visible and multidisciplinary field of scholarly inquiry. Annual publication output increased from 30 articles in 2000 to 122 articles in 2025, representing an overall increase of approximately 306.7%. The field recorded a compound annual growth rate of approximately 5.8%, although publication growth was not consistent across every year. The early years were characterised by limited and fluctuating output, followed by a period of moderate consolidation and, more recently, accelerated expansion. The strongest growth occurred between 2020 and 2025, when 524 publications were produced. The record levels recorded in 2024 and 2025 indicate that rural continuing education and lifelong learning have gained increasing importance within global educational, professional, technological, health, and community-development discussions.

The subject-area analysis confirmed the multidisciplinary nature of the field. Medicine was the largest contributing area, with 678 publications, followed by Social Sciences with 626 publications and Nursing with 159 publications. The dominance of Medicine and Nursing demonstrates that a substantial proportion of the literature has focused on continuing professional education, rural healthcare delivery, workforce development, clinical competence, and access to specialised services. At the same time, the strong contribution from Social Sciences reflects the importance of adult education, community learning, social inclusion, rural development, educational participation, and lifelong learning policy.

Environmental Science, Health Professions, Computer Science, Psychology, Arts and Humanities, Agricultural and Biological Sciences, and Business, Management and Accounting also contributed to the field. These subject areas demonstrate that rural lifelong learning extends beyond formal education and healthcare. It is connected to digital participation, environmental sustainability, agricultural development, entrepreneurship, cultural knowledge, individual motivation, psychological well-being, workforce participation, and community resilience. Nevertheless, the comparatively limited representation of several non-health disciplines indicates that the intellectual development of the field remains strongly health-oriented.

The institutional analysis identified the University of Toronto as the most productive institution, followed by the University of British Columbia and the University of Queensland. Other leading contributors included Pennsylvania State University, Monash University, James Cook University, the University of Sydney, the University of Saskatchewan, the University of Newcastle, Australia, and the University of Calgary. However, no single institution accounted for a dominant share of the literature. The leading institution contributed less than 2% of the total dataset, indicating that research activity is distributed across a broad range of universities and research organisations.

A clear geographical pattern was evident among the leading institutions. Five of the ten most productive institutions were located in Australia, four were in Canada, and one was in the United States. The strong representation of Canadian and Australian universities reflects sustained scholarly attention to rurality, geographical distance, continuing professional education, regional workforce development, and access to services. However, the absence of universities from developing and lower-income regions among the leading institutions indicates continuing inequalities in research capacity, visibility, funding, and international knowledge production.

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The geographical distribution of publications was also highly uneven. The United States was the dominant contributor, followed by Canada, Australia, and the United Kingdom. Together, these four countries accounted for almost two-thirds of the total literature. This finding demonstrates that the field has been shaped primarily by well-established and predominantly Anglophone research systems. China, South Africa, India, Spain, and Brazil formed a second group of visible contributors, showing that research interest has also expanded across Asian, African, European, and Latin American contexts.

North America represented the largest continental contribution, followed by Europe and Asia. Although Asia had a substantial presence, publication output was unevenly distributed across its subregions. China and India were the leading Asian contributors, while countries such as Pakistan, Bangladesh, Nepal, Sri Lanka, and Afghanistan remained considerably less represented. Africa demonstrated meaningful participation through South Africa, Ethiopia, Nigeria, and Ghana, while South America remained the least visible region, with much of its output concentrated in Brazil. The findings therefore demonstrate that the literature has achieved broad global reach but remains geographically imbalanced.

The country-level collaboration analysis revealed an internationally connected network comprising 11 collaboration clusters, 419 links, and a total link strength of 686. The United States occupied the largest and most central position, while Australia, Canada, India, the Netherlands, China, Thailand, Indonesia, Brazil, and Spain also functioned as influential collaboration centres. The clusters reflected a combination of geographical proximity, historical relationships, linguistic connections, institutional partnerships, and shared research interests.

South Asian countries were distributed across separate international clusters instead of forming a unified regional research network. India, Bangladesh, Pakistan, Sri Lanka, and Nepal collaborated more visibly with countries outside South Asia than with neighbouring countries. This pattern demonstrates the value of international partnerships but also reveals limited intra-regional collaboration. Greater regional cooperation could support comparative investigations of common challenges relating to adult literacy, digital access, rural workforce development, community learning, educational inequality, agricultural education, and social development.

The international author collaboration network was more restricted than the country collaboration network. Although 5,400 authors were identified and 226 met the minimum threshold, only 20 authors formed the final connected network. These authors were organised into three collaboration clusters with 71 co-authorship links and a total link strength of 106. The largest cluster included researchers such as Vanina Dal Bello-Haas, Chandima Karunanayake, Julie G. Kosteniuk, Judith C. Kulig, Martha L. P. MacLeod, Debra G. Morgan, Megan E. O’Connell, Kelly L. Penz, and Norma J. Stewart.

The findings indicate that knowledge production is concentrated within a small number of recurring and strongly connected research teams. Several researchers functioned as bridges between collaborative groups. However, variations in author names and the use of initials may have resulted in the same researcher being represented as more than one node. This issue demonstrates the importance of carefully standardising author names before interpreting co-authorship structures. Overall, the small size of the connected author network suggests that collaboration is strong within particular teams but remains limited across the wider international research community.

The intellectual-structure analysis identified five major thematic clusters. The first and largest cluster focused on clinical continuing education and healthcare delivery, incorporating concepts such as medical education, professional development, primary healthcare, telehealth, telemedicine, patient education, practice guidelines, and healthcare accessibility. This cluster confirms the importance of continuing education as a strategy for improving clinical knowledge, professional competence, service quality, and access to healthcare in rural and remote communities.

The second cluster addressed adult learning, lifelong learning, and community development. It included adult education, literacy, empowerment, higher education, distance education, e-learning, online learning, older adults, sustainability, and rural populations. This cluster positioned lifelong learning as a process supporting

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personal development, social participation, digital inclusion, community well-being, empowerment, and sustainable development.

The third cluster focused on the rural health workforce and professional capacity. It included continuing medical education, nursing education, clinical competence, curriculum development, staff development, workforce retention, job satisfaction, needs assessment, and computer-assisted instruction. This cluster demonstrates that continuing education contributes not only to individual competence but also to organisational sustainability, workforce retention, professional confidence, and reduced isolation among rural practitioners.

The fourth cluster concentrated on communication, qualitative inquiry, social support, and palliative care. It highlighted the importance of interpersonal communication, professional experiences, patient-centred care, thematic analysis, reflective practice, emotional support, and collaboration among professionals, patients, families, and communities. The fifth cluster focused on maternal, newborn, and emergency-care education, incorporating midwifery, pregnancy, newborn care, emergency medical services, risk assessment, quality standards, mobile applications, and simulation-based training.

Collectively, these clusters demonstrate that the intellectual structure of the field is dominated by the intersection of continuing education, adult learning, rural healthcare, professional development, workforce capacity, and community well-being. The prominence of surveys, questionnaires, interviews, and cross-sectional studies indicates that much of the literature is descriptive or exploratory. Although interventions involving telehealth, simulation, online learning, and mobile technology are present, stronger longitudinal and comparative evidence is required to determine their sustained effects on professional performance, educational participation, community empowerment, and rural development.

Overall, the study concludes that continuing education and lifelong learning are important mechanisms for strengthening professional competence, widening access to services, improving rural workforce capacity, supporting social inclusion, and enhancing community resilience. However, the field remains characterised by geographical inequalities, disciplinary concentration, limited author-level collaboration, and a strong orientation towards healthcare. A more balanced research agenda should incorporate wider educational, economic, technological, environmental, cultural, agricultural, and community-development perspectives while increasing the participation of researchers and institutions from underrepresented rural regions.

Contribution of the Study

This study makes several important contributions to the literature on continuing education and lifelong learning in rural settings. First, it provides a comprehensive global bibliometric mapping of the field over a 26-year period. Previous studies have generally focused on particular countries, regions, populations, educational sectors, or specialised areas such as digital competence, rural women's empowerment, smart villages, healthcare education, or community learning. By integrating publication performance, disciplinary distribution, institutional influence, geographical output, collaboration structures, and intellectual themes, the present study provides a broader account of the development of the field.

Second, the study contributes empirical evidence regarding the longitudinal growth of rural continuing education and lifelong learning research. It identifies the transition from limited and unstable publication activity during the early 2000s to a period of consolidation and accelerated expansion. The substantial increase in publications after 2020 demonstrates that rural lifelong learning has become increasingly relevant in discussions of educational access, professional development, digital transformation, public health, sustainable development, and social resilience.

Third, the study contributes to the understanding of disciplinary development by demonstrating that the field is positioned strongly at the intersection of Medicine and Social Sciences. The results show that rural lifelong learning is not confined to conventional adult education. It includes healthcare workforce development, clinical education, nursing, technology-supported learning, environmental sustainability, psychology, agriculture, business development, cultural knowledge, and community participation. This multidisciplinary profile

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provides a foundation for developing more integrated theoretical and practical approaches to lifelong learning in rural environments.

Fourth, the study contributes to the understanding of global knowledge inequality. It identifies the countries and institutions that have shaped research production while revealing the limited representation of South Asia, Africa, Latin America, Small Island Developing States, and many lower-income countries. These findings are important because many underrepresented regions contain large rural populations and experience substantial challenges relating to educational access, digital connectivity, professional isolation, poverty, literacy, employment, agriculture, health services, and community development.

Fifth, the study contributes to the understanding of international research collaboration. The country collaboration analysis identifies major global research hubs and demonstrates the increasing internationalisation of the field. At the same time, it reveals that developing countries frequently collaborate with established research systems rather than with neighbouring countries experiencing similar rural challenges. This finding highlights the need for stronger regional and South–South partnerships.

Sixth, the study provides a structured representation of the author collaboration network. It demonstrates that sustained co-authorship is concentrated within a relatively small number of research teams, particularly those working in rural health, nursing education, workforce development, and professional learning. The analysis also identifies author-name inconsistencies as an important bibliometric issue that must be addressed through data cleaning and name standardisation.

Seventh, the study contributes conceptually by identifying five major knowledge clusters. These clusters demonstrate how continuing education and lifelong learning connect clinical education, healthcare accessibility, adult learning, community development, workforce retention, communication, palliative care, maternal health, emergency care, and technology-supported professional development. The thematic structure offers researchers a clearer understanding of the dominant knowledge areas and the relationships among them.

Finally, the study offers practical value to policymakers, universities, rural education providers, healthcare organisations, professional associations, development agencies, and community organisations. The findings provide evidence that can guide the development of context-sensitive, accessible, technologically appropriate, culturally responsive, and professionally relevant learning opportunities for rural populations.

Implications for Policy and Practice

The findings have important implications for the development of rural education and lifelong learning policies. Governments should recognise continuing education and lifelong learning as essential components of rural development rather than treating them as optional or isolated educational activities. Rural learning policies should be connected to health, employment, agriculture, digital transformation, social inclusion, environmental sustainability, ageing, gender equality, and community development.

The dominance of Medicine, Nursing, and Health Professions demonstrates the importance of continuing professional education for rural healthcare workers. Ministries of health, universities, hospitals, professional councils, and regional healthcare authorities should establish structured and continuous professional-development systems for practitioners working in geographically isolated areas. Such programmes should include tele-mentoring, mobile learning, online workshops, simulation, professional networks, workplace-based training, and access to updated clinical guidelines.

However, technology-based programmes should not assume that all rural learners have stable internet access, advanced devices, or high levels of digital competence. Policymakers should support flexible and multimodal delivery using online platforms, mobile phones, downloadable resources, printed materials, radio, television, community learning centres, and face-to-face activities. The delivery method should be selected according to local infrastructure, learner characteristics, language, affordability, and cultural context.

The prominence of distance education, e-learning, telehealth, telemedicine, and computer-assisted instruction demonstrates that digital technology can reduce geographical barriers. Governments and service providers should therefore invest in rural broadband, affordable internet access, digital devices, electricity, technical support, and digital-literacy programmes. Without these supporting conditions, digital education may reinforce rather than reduce existing inequalities.

Universities and educational institutions should strengthen their engagement with rural communities. Programmes should be developed through consultation with local residents, practitioners, employers, community leaders, women's groups, older adults, youth organisations, farmers, healthcare workers, and local authorities. Community participation can ensure that learning opportunities respond to actual needs instead of applying urban or externally developed models without adaptation.

The importance of literacy, empowerment, local knowledge, community participation, and rural populations within the intellectual structure suggests that programmes should be culturally and linguistically responsive. Learning materials should be offered in locally meaningful languages and should incorporate indigenous knowledge, community practices, local livelihoods, and rural experiences. Such an approach can improve participation, relevance, learner confidence, and the practical application of knowledge.

The findings also demonstrate the need to expand rural lifelong learning beyond healthcare. Ministries of education, agriculture, labour, economic development, environment, and social welfare should collaborate to provide programmes in adult literacy, digital competence, entrepreneurship, vocational education, financial literacy, agricultural innovation, climate adaptation, environmental protection, community leadership, and livelihood development.

The geographical and institutional concentration of research has implications for research funding and capacity development. International funding agencies and leading universities should establish equitable partnerships with institutions in underrepresented regions. These partnerships should move beyond data collection and include joint leadership, shared decision-making, research training, infrastructure development, co-authorship, funding access, and the strengthening of local publication capacity.

The limited intra-regional collaboration among South Asian countries suggests the need for regional research platforms, comparative projects, shared datasets, academic exchanges, and collaborative postgraduate supervision. Similar networks could be developed across Africa, Latin America, Southeast Asia, and Small Island Developing States. Regional partnerships may generate more contextually appropriate solutions than partnerships designed entirely around the priorities of high-income countries.

Educational and professional-development programmes should also include monitoring and evaluation systems. Policymakers and institutions should assess not only attendance and learner satisfaction but also changes in knowledge, skills, professional practice, employment, service quality, social participation, well-being, and community-level outcomes. Long-term evaluation is particularly important because the current literature remains heavily dependent on cross-sectional and descriptive research.

Limitations of the Study

Despite its contributions, the study has several limitations. First, the analysis was limited to publications indexed in the Scopus database. Although Scopus provides extensive multidisciplinary coverage, relevant publications indexed exclusively in Web of Science, ERIC, Dimensions, PubMed, Google Scholar, or regional databases were not included. The findings therefore represent the Scopus-indexed literature rather than the complete global body of knowledge.

Second, the study included only English-language journal articles. Research published in local and regional languages may contain important evidence regarding indigenous knowledge, community education, adult literacy, rural development, agricultural learning, and culturally embedded educational practices. The exclusion of non-English publications may have contributed to the dominance of Anglophone countries and institutions.

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Third, the analysis was restricted to journal articles published between 2000 and 2025. Conference papers, books, book chapters, reports, dissertations, policy documents, and other forms of grey literature were excluded. In rural education and community development, significant knowledge may be produced by governments, non-governmental organisations, development agencies, community organisations, and professional associations outside conventional academic journals.

Fourth, bibliometric analysis relies on publication metadata and does not directly assess the methodological quality, theoretical strength, practical effectiveness, or social impact of individual studies. A highly published or frequently connected country, institution, or author is not necessarily producing higher-quality or more practically influential research.

Fifth, Scopus may assign one publication to several subject areas, countries, or institutions. Consequently, subject-area, institutional, and country-affiliation categories are not mutually exclusive. Percentages may exceed 100%, and affiliation-linked counts should not be interpreted as representing unique publications produced exclusively by a particular discipline, institution, or country.

Sixth, variations in author names, initials, institutional affiliations, and keyword terminology may influence the structure of bibliometric networks. The author collaboration analysis identified possible duplicate representations of the same researchers. Although bibliographic information can be cleaned using a thesaurus file, name variations may still affect the number of nodes, collaboration clusters, links, and total link strength.

Seventh, the search strategy was developed using specific terms relating to lifelong learning, adult education, continuing education, rural areas, villages, and remote communities. Relevant studies using alternative terminology may not have been retrieved. At the same time, broad terms such as “continuing education” may capture studies that are professionally focused but only indirectly connected to broader lifelong-learning theory.

Finally, the manuscript currently reports different totals for the final dataset. The methodology states that 1,446 articles were retained, whereas the results and tables are primarily calculated using 1,428 articles. This discrepancy should be checked against the original Scopus dataset and corrected consistently throughout the abstract, methodology, flow diagram, tables, figures, results, and conclusion before submission.

Future Research Directions

Future bibliometric studies should incorporate multiple academic databases, including Web of Science, ERIC, Dimensions, PubMed, and relevant regional databases. Comparative analyses across databases could identify differences in disciplinary coverage, language representation, citation visibility, geographical distribution, and publication patterns.

Researchers should also include non-English literature and regional publications to develop a more globally representative understanding of rural lifelong learning. Studies focusing on local-language scholarship may reveal culturally specific forms of community learning, indigenous education, informal education, adult literacy, and knowledge transmission that are not adequately represented in international English-language journals.

Future investigations should combine bibliometric analysis with systematic literature reviews, scoping reviews, qualitative content analysis, and meta-analysis. Bibliometric methods can identify publication patterns and knowledge structures, while content-based approaches can examine theoretical foundations, research designs, intervention characteristics, participant experiences, educational outcomes, and implementation challenges.

Greater attention should be devoted to regions that remain underrepresented, particularly South Asia, Africa, Latin America, Small Island Developing States, and rural communities in low- and middle-income countries. Research should examine how geographical isolation, poverty, gender, age, disability, language, migration, employment, climate vulnerability, digital exclusion, and limited institutional capacity shape participation in lifelong learning.

The strong health orientation of the existing literature indicates the need for wider disciplinary expansion. Future studies should examine lifelong learning in relation to agriculture, vocational education, entrepreneurship, financial capability, literacy, climate adaptation, environmental sustainability, community leadership, local governance, cultural preservation, youth development, older adult education, and rural economic transformation.

Further research is needed to evaluate the effectiveness of digital and technology-supported learning in rural settings. Longitudinal, experimental, quasi-experimental, and mixed-method studies should examine whether tele-education, mobile learning, online programmes, artificial intelligence-supported learning, simulation, and blended delivery produce sustained improvements in knowledge, professional practice, employment, service quality, social inclusion, and community well-being.

Future studies should also investigate the conditions under which technology-based learning succeeds or fails. Relevant factors include internet connectivity, affordability, electricity, device availability, digital competence, learner motivation, language, instructional design, technical support, institutional readiness, and cultural acceptance. Such evidence can support the development of digital programmes that are practical and inclusive rather than technologically driven.

International collaboration research should move beyond identifying co-authorship patterns to examining the quality and equity of partnerships. Future studies could investigate who leads projects, controls funding, determines research priorities, owns data, receives authorship credit, and benefits from the resulting knowledge. Greater emphasis should be placed on South–South collaboration, regional networks, community participation, and locally led research.

Author and institutional data should be carefully standardised in future bibliometric studies. The use of ORCID identifiers, institutional identifiers, and comprehensive thesaurus files can reduce duplication and improve the accuracy of collaboration networks. Researchers may also examine gender patterns, early-career researcher participation, interdisciplinary mobility, and the role of community-based organisations in knowledge production.

Finally, future research should investigate the long-term contribution of continuing education and lifelong learning to rural transformation. Studies should examine whether participation improves professional retention, healthcare quality, literacy, employment, livelihood security, digital inclusion, active ageing, social capital, civic participation, environmental resilience, and community well-being. Longitudinal and comparative evidence will be essential for demonstrating how lifelong learning can contribute to equitable and sustainable development across diverse rural contexts

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