Mapping the scientific research on geriatric nutritional assessment (2016–2025): A bibliometric analysis

doi: 10.6133/apjcn.202607/PP.0003
Published online: July 2026

Running title: Geriatric nutritional assessment: A bibliometric review

Lihua Ge BSc[1,2†], Yan Zhang PhD[1,2†], Ruxue Yan BSc[1,2], Junli Zhou BSc[3], Zhicui Yao MD[1,2]

[1]College of Nursing, Hebei University of Chinese Medicine, Shijiazhuang, China
[2]Hebei Key Laboratory of Health Care with Traditional Chinese Medicine, Hebei University of Chinese Medicine, Shijiazhuang, China
[3]Department of Pediatric Clinic, 980 Hospital of People's Liberation Army, Shijiazhuang, China
[†]Both authors contributed equally to this manuscript

Authors' email addresses and contributions:
LG: yjs20254075@hebcm.edu.cn
Contribution: Writing-Original draft, Visualization, Formal analysis, Data curation.

YZ: zhangyan@hebcm.edu.cn
Contribution: Visualization, Writing-review & editing, Supervision.

RY: yjs20244025@hebcm.edu.cn
Contribution: Data curation, Visualization.

JZ: 715849985@qq.com, ORCID iD: 0009-0001-6951-3803
Contribution: Supervision, Project administration.

ZY: yaozhicui@hebcm.edu.cn
Contribution: Conceptualization, Methodology, Funding acquisition, Project administration.

Corresponding Author: Dr Zhicui Yao, College of Nursing, Hebei University of Chinese Medicine, No. 3 Xingyuan Road, Luquan District, Shijiazhuang City, Hebei Province, 050200, P. R. China. Tel: +86 15931175599. Email: yaozhicui@hebcm.edu.cn

ABSTRACT

Background and Objectives: Nutritional assessment is a crucial strategy for preventing and managing geriatric syndromes. This study conducted a bibliometric analysis to clarify the research trajectory and evolutionary trends in geriatric nutritional assessment, identify its core research characteristics and cutting-edge directions, and provide an academic reference for research and clinical practice. **Methods and Study Design:** A literature search was conducted in the Web of Science Core Collection and Scopus databases on January 7, 2026, limited to English-language original research articles and reviews on geriatric nutritional assessment published between 2016 and 2025. 1725 documents from Web of Science Core Collection and 4458 from Scopus were finally included, and quantitatively analyzed using three bibliometric tools: the R bibliometrix package, VOSviewer, and CiteSpace. **Results:** The number of global publications in geriatric nutritional assessment showed a sustained upward trend from 2016 to 2024, with preliminary data indicating continued rapid growth in 2025. Three major research hotspots were identified in this field: the development of precision-oriented nutritional risk assessment tools; research on the association between nutritional status and multi-system geriatric syndromes; and targeted nutritional management based on conventional clinical prediction models. **Conclusions:** The field of global geriatric nutritional assessment has transitioned into a phase of rapid development, diversified integration, and precision orientation. Future research should focus on strengthening international, cross-regional cooperation, integrating interdisciplinary core teams, and accelerating the clinical translation of precision tools to better support elderly nutritional management and global healthy aging.

Key Words: geriatric nutritional assessment, bibliometrics, population aging, malnutrition, healthy aging

INTRODUCTION

Population aging is a global and structural trend; by the second half of this century, individuals aged 65 and above will become a major component of the global demographic structure.[1] All countries are required to promote active aging and ensure sustainable development through policy innovation, technological application, and social security reform.[1] A considerable proportion of older adults worldwide is likely to be affected by malnutrition.[2] Nutrition serves as the foundation for human growth and development, life

sustenance, and health; therefore, it is imperative to fully exert the role of nutrition in healthy aging.[3]

Nutritional status is directly associated with physical function, quality of life, and clinical prognosis in older adults, and constitutes a core component of safeguarding geriatric health.[4-7] Meanwhile, scientific and systematic nutritional assessment is crucial for the prevention and intervention of geriatric syndromes such as sarcopenia, frailty, and cognitive impairment.[8, 9] Early identification of malnutrition risk is clinically significant for the timely initiation and implementation of targeted nutritional interventions and for improving patient prognosis.[10, 11] As a key component of Comprehensive Geriatric Assessment (CGA), nutritional assessment has become a core part of the comprehensive management of older adults.[12, 13] Geriatric nutritional assessment has increasingly become a focal point of attention in both the academic community and society. Over the past decade, research in this field has experienced significant growth, characterized by the rapid accumulation of relevant data. The literature in this field is voluminous, scattered, and rapidly updated, making it challenging for researchers and practitioners to systematically grasp its overall knowledge structure, core developmental trajectory, research hotspots, cutting-edge trends, and the international collaboration landscape.

This study aims to conduct a comprehensive and systematic analysis of the literature on geriatric nutritional assessment published over the past decade by employing bibliometric methods. By constructing scientific knowledge maps involving collaborative, co-occurrence, and co-citation networks, it systematically delineates the global knowledge structure of this research field, identifies its core knowledge base and development trajectory, and explores the current research frontiers and future development trends. In doing so, it provides the academic community with a basis for accurately understanding research directions and identifying innovative breakthrough points, as well as offering objective, systematic academic evidence to relevant policymakers.

MATERIALS AND METHODS

Design

This study employed a systematic bibliometric analysis to comprehensively organize and present the field's research landscape in geriatric nutritional assessment. The analytical dimensions encompassed in this study were as follows: quantitative statistical analysis of publication output, mapping of geographic and institutional distribution, analysis of co-citation characteristics of journals and authors, construction of a keyword co-occurrence

network, tracking of the evolutionary path of research themes, and burst detection of references. The design, implementation, and reporting of this study were strictly conducted in full compliance with the relevant specifications stipulated in the Preliminary Guideline for Reporting Bibliometric Reviews of the Biomedical Literature (BIBLIO).[14]

Scientific publications search strategy

In this study, relevant literature on geriatric nutritional assessment was systematically retrieved from the Web of Science Core Collection (WoSCC) and Scopus databases on January 7, 2026, with a time frame from January 1, 2016, to December 31, 2025. Because the search was conducted on January 7, 2026, records published near the end of 2025 may not have been completely indexed in WoSCC or Scopus at the time of retrieval. The 2025 publication data presented in this study should be interpreted as a preliminary trend rather than a definitive annual count. The retrieval strategies for the two databases were as follows: For WoSCC: (TS=("old* people" OR "old* adult*" OR "old* person" OR "old* population" OR "elder* people" OR "elder* adult*" OR "elder* population" OR "aged people" OR "geriatric*")) AND TS=("Nutrition Assessment" OR "Assessments, Nutrition" OR "Assessment, Nutrition" OR "Nutrition Assessments" OR "Nutritional Assessment" OR "Assessment, Nutritional" OR "Assessments, Nutritional" OR "Nutritional Assessments"); For Scopus: (TITLE - ABS - KEY ("old* people" OR "old* adult*" OR "old* person" OR "old* population" OR "elder* people" OR "elder* adult*" OR "elder* population" OR "aged people" OR "geriatric*")) AND (TITLE - ABS - KEY ("Nutrition Assessment" OR "Assessments, Nutrition" OR "Assessment, Nutrition" OR "Nutrition Assessments" OR "Nutritional Assessment" OR "Assessment, Nutritional" OR "Assessments, Nutritional" OR "Nutritional Assessments")).

The literature was restricted to research articles and review articles, with the language limited to English. A total of 1725 articles were finally included from the WoSCC, and 4458 from the Scopus database. The search and selection workflow is illustrated in Figure 1. All available information was extracted, including titles, publication years, abstracts, keywords, authors, journals, and other relevant elements. The literature retrieved from the WoSCC database was exported in Plain Text format, while that from the Scopus database was exported in CSV format.

Data analysis

In this study, three bibliometric analysis tools were employed to conduct a systematic analysis of the field of geriatric nutritional assessment.

The bibliometrix package in R software (version 4.5.2) was used to analyze annual publication output, country distribution, international collaboration among corresponding authors, cited documents, and the publication volume and citation frequency of journals.

VOSviewer software (version 1.6.2) was used to analyze country- and institution-level collaborative networks, co-citation analysis of source documents, and keyword co-occurrence analysis. By setting the parameter threshold of minimum cluster size, small and non-significant clusters can be eliminated, thereby simplifying the clustering results generated by the VOSviewer clustering technique.[15] The specific parameter settings were as follows: (1) The national collaborative network included countries with a minimum of 6 publications; (2) Author co-occurrence analysis incorporated authors with a minimum of 5 occurrences; (3) The institutional collaborative network comprised institutions with a minimum of 10 publications; (4) Source co-citation analysis considered sources with a minimum of 189 citations; (5) Keyword co-occurrence analysis included keywords with at least 15 occurrences.

CiteSpace software (version 6.4.R1) was utilized for citation burst detection analysis. By setting parameter thresholds, including time slicing, g-index, and scaling factor, high-impact documents were screened to construct a co-citation network. In contrast, documents with a sudden surge in citation frequency within a specific period were identified to reveal leading-edge trends and the evolution of research hotspots in the field.[16, 17] The specific parameter settings were as follows: (1) The entire analysis period was divided into 1-year time slices; (2) The g-index was set in threshold selection, and the scaling factor k was set to 25; (3) The γ value in the burst detection parameter panel was set to the default value of 1.0; (4) The minimum duration in the burst detection parameter panel was set to 2 years.

Owing to discrepancies in data formats between the WoSCC and the Scopus database, merging datasets from the two databases often leads to significant impairment of data validity due to inconsistent citation formats, missing data, and data errors, and may even result in partial invalidation of key analytical dimensions.[18] Therefore, we analyzed the datasets of the two databases separately and then conducted a comprehensive cross-database analysis to obtain more robust results. In addition, given the high quality of the literature indexed in the WoSCC, the core focus of subsequent analyses was the WoSCC dataset; the analytical results from the Scopus database were presented in the supplementary materials.[19]

RESULTS

Publications

Annual publication trends

Based on the predefined retrieval strategy, 1725 papers on geriatric nutritional assessment were retrieved from the WoSCC database, including 1598 research articles and 127 review articles. As shown in Fig 2, the number of publications in this field exhibited an overall upward trend from 2016 to 2024, with the growth rate being particularly pronounced in 2024. Preliminary data from the partially indexed 2025 literature showed a continued rapid growth trend, with 274 papers retrieved as of January 7, 2026. A total of 4458 papers relevant to this field were retrieved from the Scopus database, and their publication growth trend was consistent with that of the WoSCC (Supplementary Figure 1). These findings indicate a sustained increase in research attention to topics related to geriatric nutritional assessment.

Categories in Web of Science

Based on an analysis of the disciplinary categories of the source literature, the distribution of Web of Science (WoS) categories is broad and highly congruent with the research domain of geriatric nutritional assessment. Among the identified disciplinary categories, geriatric health-related fields constitute the core focus. Specifically, "Geriatrics & Gerontology" accounted for 550 publications, while "Gerontology" contributed 188. Collectively, these two core geriatric disciplines published 738 articles, accounting for approximately two-fifths of all publications across relevant categories. This finding underscores the intrinsic and robust link between geriatric nutritional assessment research and the broader field of geriatric health.

The core nutritional category, Nutrition & Dietetics, ranked first in publication volume, with 611 articles, accounting for roughly one-third of the total publications in the dataset, and thus represents the disciplinary cornerstone of this research area. Furthermore, disciplines closely related to the practical application of nutritional assessment in older adults, including general medicine, public health, and nursing, also contributed a substantial number of publications. This further underscores the field's comprehensive, practice-oriented nature, encompassing multiple dimensions, including theoretical exploration, clinical application, and public health promotion.

Journals

To determine the journals with the most prominent performance in terms of publication volume and citation impact within the domain of geriatric nutritional assessment, we used the Bibliometrix package in R to conduct bibliometric analyses and generate visualization figures with the ggplot2 package. Additionally, journal co-citation analysis was conducted using VOSviewer. Nutritional assessment research is distributed across 427 academic journals, as shown in Table 1 and Figure 3A. Nutrients (n = 168, impact factor [IF] = 5.0) is the journal with the highest publication volume in this field. Meanwhile, the analysis of the most frequently cited journals presented in Table 1 and Fig 3B reveals that Clinical Nutrition (citations = 3860, IF = 7.6) ranks first in total citations.

Actors

Authors

A total of 8903 authors contributed to the literature on geriatric nutritional assessment. Among them, the top 10 most productive authors each published 10 or more papers (Table 2), with Pinar Soysal ranking first in publication count, followed by Lee Smith and Dorothee Volkert. Table 2 also shows that Tommy Cederholm was the most frequently co-cited author in this field.

Using a threshold of at least 5 publications, 105 core authors were identified, and a co-authorship network was constructed using VOSviewer (Figure 4). The results showed that Pinar Soysal, together with Dorothee Volkert, Lee Smith, and other scholars, formed the largest and most active core cluster in the collaborative network. In addition, several collaborative sub-networks centered on authors such as Liang-Kung Chen and Tommy Cederholm were also observed. Overall, these findings indicate that a multi-cluster and cross-regional structure characterizes author collaboration in the field of geriatric nutritional assessment.

Countries / regions

An analysis of the countries associated with corresponding authors revealed that China topped the list with 303 publications, followed by Japan with 168, Spain with 113, Italy with 104, and Turkey with 89. As shown in Table 3 and Figure 2B, research endeavors in China were predominantly characterized by independent studies or domestic collaborations, whereas countries like Italy demonstrated a stronger inclination towards international cooperation.

Subsequently, 41 countries with at least 6 publications were included in the analysis, and an international collaborative network was constructed using VOSviewer. As depicted in Figure 5, the international collaborative network in geriatric nutritional assessment is highly active. Core countries displayed distinct functional roles within the network: the United States anchored the core of academic influence with the highest citation frequency, Italy served as the most active hub for cross-border collaboration, and China maintained its leading position in global publication output, as previously mentioned.

Furthermore, the research focus of geriatric nutritional assessment has experienced a significant geographical shift over time: it originated in the United States and Australia in the early stages, gradually shifted to Europe in the middle stages, and has recently expanded to East Asia and West Asia, with China and Turkey emerging as key players in this field.

Institutions analysis

The top 10 research institutions by publication volume are spread across six countries, with Chinese institutions securing three of the top 10 positions. This distribution pattern underscores the substantial research output volume and leading standing of Chinese institutions in the field. Subsequently, 52 institutions were selected based on a threshold of at least 10 published articles, and an institutional collaborative network was constructed using VOSviewer for visualization (Figure 6). Sichuan University (China) emerges as the most prolific institution, with 77 publications (n = 77), and maintains extensive and robust collaborative ties with numerous partner institutions. Meanwhile, Taipei Veterans General Hospital functions as a core hub within the collaborative network; its strong collaborative connectivity positions it as a key organizer and participant in international multicenter research initiatives.

Theme

Keywords

In this study, a total of 2547 author keywords were included after synonym merging using VOSviewer software. Table 4 presents the top 20 keywords by occurrence frequency, among which "aged", "malnutrition", and "nutrition status" rank as the three most frequent. These keywords are highly consistent with the research theme of geriatric nutritional assessment focused on in this study.

To clarify the clustering characteristics of keywords in this field, 61 keywords were selected using the screening criterion of an occurrence frequency of at least 15, and

VOSviewer software was used to generate a keyword cluster map (Figure 7). Six cluster modules with distinct colors were identified, each with a clear research focus and well-defined core characteristics: Module 1 (red nodes) focuses on the diagnosis, assessment and relevant clinical outcomes of malnutrition, including 17 keywords with the core ones being "malnutrition", "nutrition assessment" and "prognosis"; Module 2 (green nodes) centers on the associations between geriatric nutritional status and physical function as well as sarcopenia, involving 15 keywords with the core ones being "sarcopenia", "nutrition status" and "physical function"; Module 3 (blue nodes) addresses the correlations between nutritional status of the elderly and care settings as well as adverse events, covering 12 keywords with the core ones being long-term care, "fall" and "cognitive" "impairment"; Module 4 (yellow nodes) focuses on the integration of frailty and geriatric nutritional assessment, including 8 keywords with the core ones being "frailty", "comprehensive geriatric assessment" and "screening"; Module 5 (purple nodes) concentrates on the association studies between clinical outcomes and chronic diseases, involving 7 keywords with the core ones being "diabetes", "cancer" and "geriatric assessment"; Module 6 (cyan nodes) focuses on the cross-interactions between medications and nutrition, covering 7 keywords with the core ones being "mortality" and "polypharmacy".

Furthermore, 58 keywords were screened with a minimum occurrence frequency of no less than 40, and VOSviewer software was used to generate the keyword cluster map for in-depth analysis (Supplementary Figure 2). The findings indicated that current research on geriatric nutritional assessment focuses on several key research hotspots: (1) Standardized diagnostic and assessment tools for malnutrition, with a focus on the clinical application and standardized adaptation of such assessment tools; (2) Multi-system associations between nutritional status and geriatric syndromes, exploring the comorbidity characteristics and mutual influences of nutrition with sarcopenia, frailty and cognitive impairment; (3) Nutritional management practices in diverse care settings, covering community, nursing home, long-term care and other multiple application scenarios; (4) Correlations between nutrition and clinical outcomes as well as chronic diseases, analyzing the impacts of nutrition on the prognosis of elderly patients and the management of chronic diseases; (5) Integration of nutrition into comprehensive geriatric assessment, emphasizing the collaborative intervention of nutrition with rehabilitation and physical activity.

Based on the clarified clustering characteristics of keywords, this study further used the bibliometrix package in R to construct a temporal evolution map of research topics (Figure 8). This map was used to systematically trace the temporal evolutionary trajectory of specific

research topics in geriatric nutritional assessment and to clearly present the dynamic changes in the field's research focus. The results indicated that the period from 2016 to 2019 represented the initial exploratory stage of this field, with research focuses concentrated on specific clinical scenarios and basic intervention measures, including hip fracture patients, European consensus, randomized controlled trials, hospitalized patients, nutritional recommendations, and protein intake. This reflected the exploratory attention to nutritional management for specific geriatric populations, the standardization of clinical research design, and basic nutritional interventions in the early stage of the field's development, laying a solid, practical, and methodological foundation for subsequent research.

From 2020 to 2021, the field entered a period of in-depth exploration of core scientific issues, during which research priorities gradually shifted to the central questions in geriatric nutrition and health research. The occurrence frequencies of keywords such as the elderly, malnutrition, prevalence, mortality, and association analysis rose remarkably. Meanwhile, the prominent emergence of research themes including sarcopenia, frailty, and physical activity marked the expansion of research from a single focus on nutritional issues to a multidimensional interdisciplinary perspective of comprehensive geriatric health, with studies beginning to focus on the intrinsic correlations between nutritional status and geriatric physiological functions as well as overall health status.

From 2022 to 2025, the field exhibited distinct characteristics of cutting-edge expansion, with the gradual emergence of emerging keywords such as the Geriatric Nutritional Risk Index, intrinsic capacity, COVID-19, dehydration, prediction models, and the Prognostic Nutritional Index. This phenomenon reflected an emerging research trend in this field: shifting toward the development of precision assessment tools for geriatric nutritional risk and the construction of prediction models for clinical outcomes. These advances represent an initial step toward precision nutritional assessment, although they have not yet reached the level of true individualized assessment characterized by multi-omics data integration.

By synthesizing the findings of keyword cluster analysis and temporal evolution characteristics, this study explicitly identified three core research hotspots in the field of geriatric nutritional assessment: (1) the development of screening and assessment tools for geriatric malnutrition, as well as research on the correlations between such tools and various clinical outcomes, with the core objective of promoting the standardization and clinical translation of these assessment tools; (2) the extension of research from single nutritional indicators to the complex interrelations between nutritional status and comprehensive geriatric health issues (e.g., sarcopenia and frailty), focusing on exploring the mutual interaction and

comorbidity mechanisms between malnutrition and these geriatric syndromes, while analyzing the mediating or moderating effects of modifiable factors such as physical activity in this process, which highlights a multidimensional and systematic perspective of geriatric health assessment; (3) the integration of multidimensional data via prediction models to achieve precision stratification of nutritional risk and accurate prediction of clinical outcomes. On this basis, current research supports evidence-based risk stratification and targeted nutritional management across different clinical scenarios, while truly individualized nutritional assessment based on multi-omics integration remains an important future direction.

Co-cited reference analysis

The present study conducted a systematic bibliometric analysis of 45,601 co-cited references spanning 10 years and delineated the foundational literature in the field of geriatric nutritional assessment. When ranked by total citations, the top 10 core references each had at least 173 citations (Table 5). Among them, the study by Rubenstein LZ, published in the Journal of Gerontology Series A: Biological Sciences and Medical Sciences in 2001,[20] garnered 378 citations, establishing it as the core benchmark reference in this field. Meanwhile, this reference recorded a Total link strength of 1481, ranking it as the document with the highest cumulative connectivity to other core references in the field within the co-citation network constructed in this study, further validating the core academic value of this work.

Using a co-citation frequency cutoff of 50 or higher, this study ultimately screened out 52 key references and plotted a co-citation network diagram using VOSviewer software (Figure 9). The results show that the node corresponding to the aforementioned study by Rubenstein LZ is the central node,[20] confirming the extensive academic relevance of this literature in the field and its sustained, far-reaching impact on the development of subsequent related research.

Citation burst documents are those frequently cited by scholars in a specific research field over a given period. In this study, 25 highly cited references with prominent citation-burst characteristics were identified in CiteSpace using the top 25 cited references, a burst strength threshold of 2, and a minimum burst duration of 2 years (Figure 10). Among these references, the most influential is Malnutrition in Older Adults—Recent Advances and Remaining Challenges, published by Norman K in Nutrients in 2021,[21] which has a burst strength of 23.6 and a burst period from 2023 to 2025. As a comprehensive review in the field of geriatric nutritional assessment, this paper synthesizes existing research findings to construct a complete evaluation framework covering the dimensions of "definition-tool-indicator-

etiology". It also clarifies the relevant clinical norms, including the application criteria for the Global Leadership Initiative on Malnutrition (GLIM).

DISCUSSION

Currently, healthy aging has emerged as a core strategy and a broad consensus within the international community for addressing the challenges posed by population aging.[22, 23] As a globally recognized core pillar of healthy aging, geriatric nutritional assessment constitutes an essential component of standardized, evidence-based management tailored to the unique challenges faced by older adults, including physiological function decline, high comorbidity prevalence, high rates of malnutrition concealment, and impaired eating and metabolic capacity.[24-27] Against this backdrop, the bibliometric analysis of research on geriatric nutritional assessment can provide valuable insights into the field's developmental trends, disciplinary characteristics, and global research patterns, which are crucial for guiding future research directions and promoting the implementation of healthy aging strategies.

Statistical results showed that the annual publication volume in the field of geriatric nutritional assessment maintained a steady and continuous upward trend from 2016 to 2024, with particularly notable growth in 2024. Preliminary data from the partially indexed 2025 literature showed a continued rapid growth trend. This developmental trend is closely associated with the intensifying global population aging, as the growing elderly population has further highlighted the importance of geriatric nutritional assessment and driven increased academic attention to this field.[1]

At the disciplinary level, the close linkage of this field with geriatrics, nutrition and dietetics, general medicine, public health, and nursing indicates that geriatric nutritional assessment has moved beyond a narrow nutritional perspective and has developed into a practice-oriented area that connects clinical care, rehabilitation, long-term management, and healthy aging.

The journal distribution further underscores the field's translational nature. On the one hand, the concentration of publications in journals such as Nutrients and Journal of Nutrition, Health & Aging indicates that much of the literature is situated at the interface between nutrition science and geriatric care. On the other hand, the strong citation influence of Clinical Nutrition suggests that studies with greater academic impact are often those that link nutritional assessment with clinically meaningful outcomes and decision-making. Taken together, this pattern implies that the field values not only methodological development, but also the clinical applicability of assessment strategies in real-world geriatric practice.

From the perspective of contributors and collaborative networks, the field appears to have developed a multicenter yet still uneven international structure. China has emerged as the leading contributor in terms of publication volume, while the United States shows stronger citation influence, and Italy occupies a central position in international collaboration. This pattern suggests that publication productivity, academic influence, and collaborative centrality are not necessarily aligned in the same countries. It also implies that the next stage of development in geriatric nutritional assessment may depend not only on increasing publication output but also on strengthening cross-regional collaboration, multicenter validation, and the international comparability of assessment frameworks. The relatively multi-cluster structure observed at the author and institutional levels further supports the view that, although a collaborative foundation has already been established, deeper integration across research teams is still needed.

The keyword analysis suggests that geriatric nutritional assessment has gradually evolved from a narrow focus on malnutrition identification to a more integrated, clinically oriented framework. Nutritional assessment is increasingly linked to functional decline, geriatric syndromes, and prognosis, indicating that nutrition is no longer viewed solely as supportive care but as an important component of geriatric health management.[21]

A key implication of these findings is the continued importance of nutritional screening and assessment tools. This reflects the practical need for standardized, clinically applicable methods that capture the complex, multidimensional nature of nutritional risk in older adults, especially in the presence of multimorbidity, functional impairment, and dependency.28 Another important finding is the close connection between nutritional status and geriatric syndromes such as sarcopenia, frailty, and cognitive impairment. This suggests that nutritional problems in older adults should be understood from a systemic perspective, as they are closely intertwined with physical function, vulnerability, and loss of independence. In addition, the growing attention to prediction models and nutritional risk indices suggests that the field is moving toward more precise risk stratification and targeted nutritional management.[29] It is important to note that most current prediction models are based on conventional clinical and laboratory parameters, rather than multi-omics data. Therefore, this trend represents an initial phase of precision-oriented development, and true individualized nutritional assessment integrating genomics, metabolomics, and other omics technologies remains an important future direction for the field.

The co-cited reference analysis further clarifies the field's intellectual evolution. The central position of Rubenstein et al. and the Mini Nutritional Assessment highlights the long-

standing methodological importance of standardized nutritional screening tools.[20] At the same time, the prominence of references related to frailty phenotypes,[30] sarcopenia consensus,[31] comorbidity indices,[32] and cognitive assessment suggests that geriatric nutritional assessment has increasingly been incorporated into the framework of comprehensive geriatric evaluation.[33] Meanwhile, the strongest recent citation burst was observed for the Norman et al. review,[21] indicating that the field is moving from early tool exploration toward standardization, evidence synthesis, and clinical translation. In particular, the dissemination of the GLIM criteria appears to be promoting greater methodological consistency and international comparability in geriatric nutritional assessment research.[28]

Taken together, three major developmental directions can be identified in this field: first, the standardization, refinement, and clinical translation of nutritional screening and assessment tools; second, a deeper exploration of the interactions between nutritional status and multidimensional geriatric syndromes such as sarcopenia, frailty, and cognitive impairment; and third, the development of precision-oriented nutritional management strategies based on multidimensional clinical data integration and predictive modeling, with multi-omics-based individualized assessment remaining an important future direction. These trends suggest that geriatric nutritional assessment is evolving from a standalone screening activity into a key component of comprehensive geriatric care, with the ultimate goal of supporting early risk stratification, targeted intervention planning, and continuity of care for older adults.

This study also has several limitations that should be acknowledged. As a bibliometric analysis based on two major international databases, this study is inevitably subject to several limitations related to study design, data sources, and analytical methods. First, only English-language original articles and reviews were included in this study, which may have omitted important non-English studies, particularly those published in Chinese, Japanese, and Spanish. Notably, China ranks first in global publication output in this field, and the exclusion of Chinese-language literature may lead to an underestimation of the research contribution from Chinese scholars and a partial understanding of regional research characteristics. Second, although WoSCC and Scopus are widely used multidisciplinary databases for bibliometric analysis, PubMed, Embase, Chinese National Knowledge Infrastructure (CNKI), and other medical or regional databases were not included. The exclusion of these databases may have led to the omission of clinically oriented studies and regional publications, thereby limiting the global representativeness and external validity of the findings. Third, because of differences in data formats and citation rules between the two databases, the datasets were not

merged, and the Scopus data were used only for supplementary analysis. This may have affected the overall completeness and comparability of the findings to some extent. Finally, although synonymous terms were merged during keyword analysis, the definition and consolidation of certain professional terms may have a certain degree of subjectivity, which may have influenced the precision of the clustering results.

Conclusion

In conclusion, global research on geriatric nutritional assessment from 2016 to 2024 shows sustained growth. Preliminary data from partially indexed literature in 2025 indicate that this rapid growth trend continued. Increasing interdisciplinary integration, and a clear shift toward precision-oriented research. The field has progressed from malnutrition identification and basic tool exploration to a more advanced stage emphasizing multidimensional assessment, risk stratification, and targeted nutritional management. Future research should strengthen international and cross-regional collaboration, promote the validation and implementation of standardized assessment tools across different populations and care settings, and accelerate the integration of predictive models into clinical decision-making, and explore the application of multi-omics technologies to achieve truly individualized geriatric nutritional assessment.

SUPPLEMENTARY MATERIALS

All supplementary tables and figures are available upon request from the editorial office, and are also accessible on the journal's webpage (apjcn.qdu.edu.cn).

CONFLICT OF INTEREST AND FUNDING DISCLOSURE

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

This work was supported by the Science and Technology Program of Hebei Province under Grant No. 25357722K.

REFERENCES

1. United Nations. World population prospects 2024: summary of results. New York: United Nations; 2024.
2. Volkert D, Beck AM, Cederholm T, et al. ESPEN practical guideline: clinical nutrition and hydration in geriatrics. Clin Nutr. 2022;41:958-989. doi: 10.1016/j.clnu.2022.01.024

3. Rodriguez-Manas L, Murray R, Glencorse C, Sulo S. Good nutrition across the lifespan is foundational for healthy aging and sustainable development. Front Nutr. 2022;9:1113060. doi: 10.3389/fnut.2022.1113060

4. Tanaka K, Taoda A, Kashiwagi H. The associations between nutritional status, physical function and skeletal muscle mass of geriatric patients with colorectal cancer. Clin Nutr ESPEN. 2021;41:318-324. doi: 10.1016/j.clnesp.2020.11.009

5. Ge L, Li R, Yap CW. The interplay of nutritional status and physical function on health outcomes in older adults: a longitudinal study in singapore. Am J Clin Nutr. 2025;122:811-819. doi: 10.1016/j.ajcnut.2025.07.014

6. Komatsu T, Minamisawa M, Okada A, et al. Real-world practical experience of angiotensin receptor-neprilysin inhibitor in older japanese patients with chronic heart failure. JMA J. 2023;6:489-498. doi: 10.31662/jmaj.2023-0109

7. Khan J, Chattopadhyay A, Shaw S. Assessment of nutritional status using anthropometric index among older adult and elderly population in india. Sci Rep. 2023;13:13015. doi: 10.1038/s41598-023-39167-6

8. Liu C, Huang H, Chen M, Zhu M, Yu J. Machine learning based on nutritional assessment to predict adverse events in older inpatients with possible sarcopenia. Aging Clin Exp Res. 2025;37:48. doi: 10.1007/s40520-024-02916-2

9. Warne C, Forrester IT, Jones L, Morley JE. Editorial: screening for the anorexia of aging. J Nutr Health Aging. 2019;23:398-400. doi: 10.1007/s12603-019-1195-9

10. Xu Y, Shen P, Zhu J, et al. Comprehensive malnutritional index for predicting clinical outcomes in locally advanced rectal cancer receiving neoadjuvant chemoradiotherapy. Biomol Biomed. 2025;25:1079-1091. doi: 10.17305/bb.2024.11188

11. Wang M, Li Q, Wu J, Xu M, Yue JR, Cui WW. Global trends and hotspots in nutritional risk screening, assessment, and diagnosis: a bibliometric and visual analysis (1991-2024). Asia Pac J Clin Nutr. 2025;34:271-281. doi: 10.6133/apjcn.202506_34(3).0002

12. Ren C, Su H, Tao J, Xie Y, Zhang X, Guo Q. Sarcopenia index based on serum creatinine and cystatin c is associated with mortality, nutritional risk/malnutrition and sarcopenia in older patients. Clin Interv Aging. 2022;17:211-221. doi: 10.2147/CIA.S351068

13. Oumer A, Abebe T, Hassan K, Hamza A. Validity and predictive performance of mini nutritional assessment tool for institutionalized elders in ethiopia. Biomed Res Int. 2022;2022:6764657. doi: 10.1155/2022/6764657

14. Montazeri A, Mohammadi S, Pilehvar MH, Ghaemi M, Riazi H, Sheikhi-Mobarakeh Z. Preliminary guideline for reporting bibliometric reviews of the biomedical literature (biblio): A minimum requirements. Syst Rev. 2023;12:239. doi: 10.1186/s13643-023-02410-2

15. van Eck NJ, Waltman L. Manual for VOSviewer version 1.6.19. Leiden University, Centre for Science and Technology Studies (CWTS); 2023.

16. Niazi MA. Review of “CiteSpace: a practical guide for mapping scientific literature” by Chaomei Chen. Complex Adapt Syst Model. 2016;4:23. doi: 10.1186/s40294-016-0036-5

17. Chen C. Citespace ii: detecting and visualizing emerging trends and transient patterns in scientific literature. J Am Soc Inf Sci Technol. 2005;57:359-377. doi: 10.1002/asi.20317
18. Zhang L, Jin S, Qin C, Ma D, Ye J, Liu Q. Bibliometric analysis of traditional chinese medicine for viral infections through immune modulation (2015-2025). Front Immunol. 2025;16:1647900. doi: 10.3389/fimmu.2025.1647900
19. Wang Y, Lu Q, Ma H, et al. Mapping research landscapes: A bibliometric and visual analysis of ketogenic diet interventions in liver health (2013-2024). Front Nutr. 2025;12:1652271. doi: 10.3389/fnut.2025.1652271
20. Rubenstein LZ, Harker JO, Salva A, Guigoz Y, Vellas B. Screening for undernutrition in geriatric practice: developing the short-form Mini-Nutritional Assessment (MNA-SF). J Gerontol A Biol Sci Med Sci. 2001;56:M366-372. doi: 10.1093/gerona/56.6.m366
21. Norman K, Hass U, Pirlich M. Malnutrition in older adults-recent advances and remaining challenges. Nutrients. 2021;13:2764. doi: 10.3390/nu13082764
22. Amuthavalli Thiyagarajan J, Mikton C, Harwood RH, et al. The UN decade of healthy ageing: Strengthening measurement for monitoring health and wellbeing of older people. Age Ageing. 2022;51:afac147. doi: 10.1093/ageing/afac147
23. Rudnicka E, Napierala P, Podfigurna A, Meczekalski B, Smolarczyk R, Grymowicz M. The World Health Organization (WHO) approach to healthy ageing. Maturitas. 2020;139:6-11. doi: 10.1016/j.maturitas.2020.05.018
24. Meermans G, van Egmond JC. Malnutrition in older hip fracture patients: prevalence, pathophysiology, clinical outcomes, and treatment-a systematic review. J Clin Med. 2025;14:5662. doi: 10.3390/jcm14165662
25. Kang MG, Choi JY, Yoo HJ, et al. Impact of malnutrition evaluated by the mini nutritional assessment on the prognosis of acute hospitalized older adults. Front Nutr. 2022;9:1046985. doi: 10.3389/fnut.2022.1046985
26. Jiang S, Chen X, Ma L, et al. Evaluating the effect of nutritional support in geriatric inpatients classified by the glim criteria. J Nutr Health Aging. 2025;29:100585. doi: 10.1016/j.jnha.2025.100585
27. Ji T, Zhang L, Han R, et al. Management of malnutrition based on multidisciplinary team decision-making in chinese older adults (3m study): a prospective, multicenter, randomized, controlled study protocol. Front Nutr. 2022;9:851590. doi: 10.3389/fnut.2022.851590
28. Cederholm T, Jensen GL, Correia M, et al. GLIM criteria for the diagnosis of malnutrition - a consensus report from the global clinical nutrition community. Clin Nutr. 2019;38:1-9. doi: 10.1016/j.clnu.2018.08.002
29. Chhetri JK, Harwood RH, Ma L, Michel JP, Chan P. Intrinsic capacity and healthy ageing. Age Ageing. 2022;51:afac239. doi: 10.1093/ageing/afac239
30. Lorenzo-Lopez L, Maseda A, de Labra C, Regueiro-Folgueira L, Rodriguez-Villamil JL, Millan-Calenti JC. Nutritional determinants of frailty in older adults: a systematic review. BMC Geriatr. 2017;17:108. doi: 10.1186/s12877-017-0496-2

31. Chen LK, Liu LK, Woo J, et al. Sarcopenia in Asia: consensus report of the asian working group for sarcopenia. J Am Med Dir Assoc. 2014;15:95-101. doi: 10.1016/j.jamda.2013.11.025

32. Charlson ME, Pompei P, Ales KL, MacKenzie CR. A new method of classifying prognostic comorbidity in longitudinal studies: development and validation. J Chronic Dis. 1987;40:373-383. doi: 10.1016/0021-9681(87)90171-8

33. Folstein MF, Folstein SE, McHugh PR. "Mini-Mental State". A practical method for grading the cognitive state of patients for the clinician. J Psychiatr Res. 1975;12:189-198. doi: 10.1016/0022-3956(75)90026-6

34. Kaiser MJ, Bauer JM, Ramsch C, et al. Validation of the Mini Nutritional Assessment Short-Form (MNA-SF): a practical tool for identification of nutritional status. J Nutr Health Aging. 2009;13:782-788. doi: 10.1007/s12603-009-0214-7

35. Fried LP, Tangen CM, Walston J, et al. Frailty in older adults: evidence for a phenotype. J Gerontol A Biol Sci Med Sci. 2001;56:M146-156. doi: 10.1093/gerona/56.3.m146

36. Vellas B, Guigoz Y, Garry PJ, et al. The Mini Nutritional Assessment (MNA) and its use in grading the nutritional state of elderly patients. Nutrition. 1999;15:116-122. doi: 10.1016/s0899-9007(98)00171-3

37. Cruz-Jentoft AJ, Bahat G, Bauer J, et al. Sarcopenia: revised european consensus on definition and diagnosis. Age Ageing. 2019;48:16-31. doi: 10.1093/ageing/afy169

38. Guigoz Y. The Mini Nutritional Assessment (MNA) review of the literature--what does it tell us? J Nutr Health Aging. 2006;10:466-485; discussion 85-87.

39. Guigoz Y, Vellas B, Garry PJ. Assessing the nutritional status of the elderly: the Mini Nutritional Assessment as part of the geriatric evaluation. Nutr Rev. 1996;54:S59-65. doi: 10.1111/j.1753-4887.1996.tb03793.x

40. Bouillanne O, Morineau G, Dupont C, et al. Geriatric nutritional risk index: a new index for evaluating at-risk elderly medical patients. Am J Clin Nutr. 2005;82:777-783. doi: 10.1093/ajcn/82.4.777.

Table 1. Top 5 journals ranked by publication output and citation count

Sources†	Citation‡	IF	Articles
Nutrients	1902	5.0	168
Journal of Nutrition Health and Aging	3538	4.0	100
BMC geriatrics	1150	3.8	98
Clinical Nutrition	3860	7.6	53
Frontiers in Nutrition	261	5.1	49
Clinical Nutrition	3860	7.6	53
Journal of Nutrition Health and Aging	3538	4.0	100
Journal of the American Geriatrics Society	2176	4.5	7
Nutrients	1902	5.0	168
Journals of Gerontology Series A-Biological Sciences and Medical Sciences	1883	3.8	7

IF: impact factor
†Top 5 journals ranked by number of published articles in descending order
‡Top 5 journals ranked by total citation frequency in descending order

Table 2. Most prolific and co-cited authors in geriatric nutritional assessment

Rank	Author	Counts	Co-cited-authors	Citations
1	Soysal, Pinar	25	Cederholm, Tommy	1056
2	Smith, Lee	17	Chen, Liang-Kung	771
3	Volkert, Dorothee	14	Maeda, Keisuke	656
4	Chen, Liang-Kung	13	Soysal, Pinar	417
5	Cederholm, Tommy	12	Isik, Ahmet Turan	329
6	Peng, Li-Ning	12	Peng, Li-Ning	321
7	Isik, Ahmet Turan	11	Volkert, Dorothee	250
8	Bahat, Gulistan	10	Smith, Lee	248
9	Kuzuya, Masafumi	10	Kuzuya, Masafumi	213
10	Maeda, Keisuke	10	Bahat, Gulistan	207

Table 3. Most relevant countries by corresponding authors

Country	Articles	Articles (%)	SCP	MCP	MCP (%)
China	303	17.6	276	27	8.9
Japan	168	9.7	155	13	7.7
Spain	113	6.6	96	17	15.0
Italy	104	6.0	67	37	35.6
Turkey	89	5.2	77	12	13.5
USA	87	5.0	71	16	18.4
Brazil	71	4.1	58	13	18.3
Germany	63	3.7	50	13	20.6
France	51	3.0	38	13	25.5
Korea	51	3.0	43	8	15.7

SCP, Single Country Publication; MCP, Multiple Country Publication; MCP %, Multiple Country Publication percentage

Table 4. Top 20 author keywords with the highest frequency

Rank	Keyword	Occurrences
1	aged	656
2	malnutrition	588
3	nutrition status	259
4	frailty	230
5	sarcopenia	220
6	nutrition assessment	195
7	mini nutritional assessment	167
8	nutrition	159
9	mortality	105
10	ageing	96
11	geriatric nutritional risk index	82
12	geriatric medicine	81
13	depression	67
14	nursing home	63
15	cognitive impairment	61
16	geriatric assessment	61
17	deglutition disorders	55
18	quality of life	53
19	dementia	48
20	community	42

Table 5. Top 10 core co-cited references in the field of geriatric nutritional assessment

Cited References	Citations	Total link strength
RUBENSTEIN LZ, 2001, J GERONTOL A-BIOL, V56, PM366, doi: 10.1093/GERONA/56.6.M366[20]	378	1481
KAISER MJ, 2009, J NUTR HEALTH AGING, V13, P782, doi: 10.1007/S12603-009-0214-7[34]	325	1299
FRIED LP, 2001, J GERONTOL A-BIOL, V56, PM146, doi: 10.1093/GERONA/56.3.M146[35]	272	1076
VELLAS B, 1999, NUTRITION, V15, P116, doi: 10.1016/S0899-9007(98)00171-3[36]	246	880
FOLSTEIN MF, 1975, J PSYCHIAT RES, V12, P189, doi:10.1016/0022-3956(75)90026-6[33]	232	1052
CRUZ-JENTOFT AJ, 2019, AGE AGEING, V48, P16, doi:10.1093/AGEING/AFY169[37]	187	765
GUIGOZ Y, 2006, J NUTR HEALTH AGING, V10, P466[38]	186	750
GUIGOZ Y, 1996, NUTR REV, V54, P0[39]	185	734
BOUILLANNE O, 2005, AM J CLIN NUTR, V82, P777, doi:10.1093/AJCN/82.4.777[40]	175	442
CHARLSON ME, 1987, J CHRON DIS, V40, P373, doi:10.1016/0021-9681(87)90171-8[32]	173	686

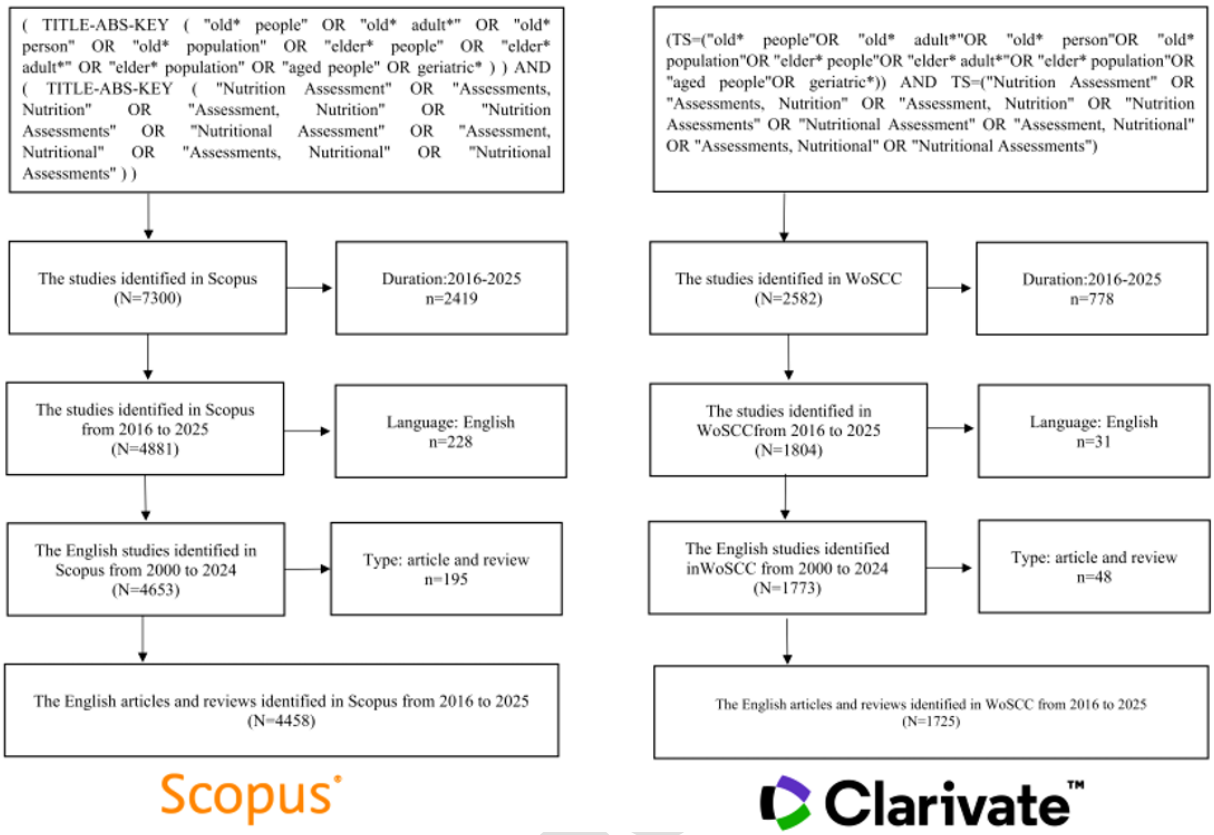

Figure 1. Search and selection workflow

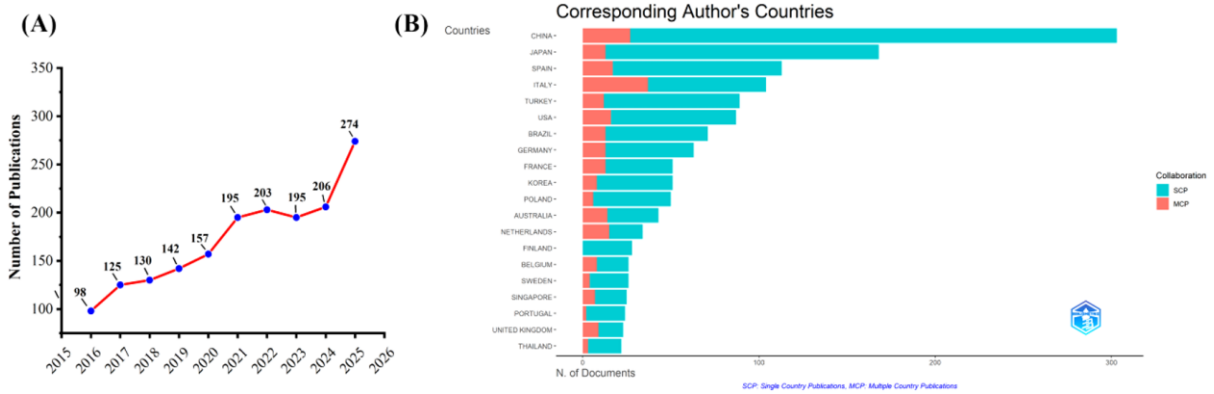

Figure 2. Annual publication trends and country-level collaboration. (A) Annual publication trends. (B) Country distribution and international collaboration of corresponding authors

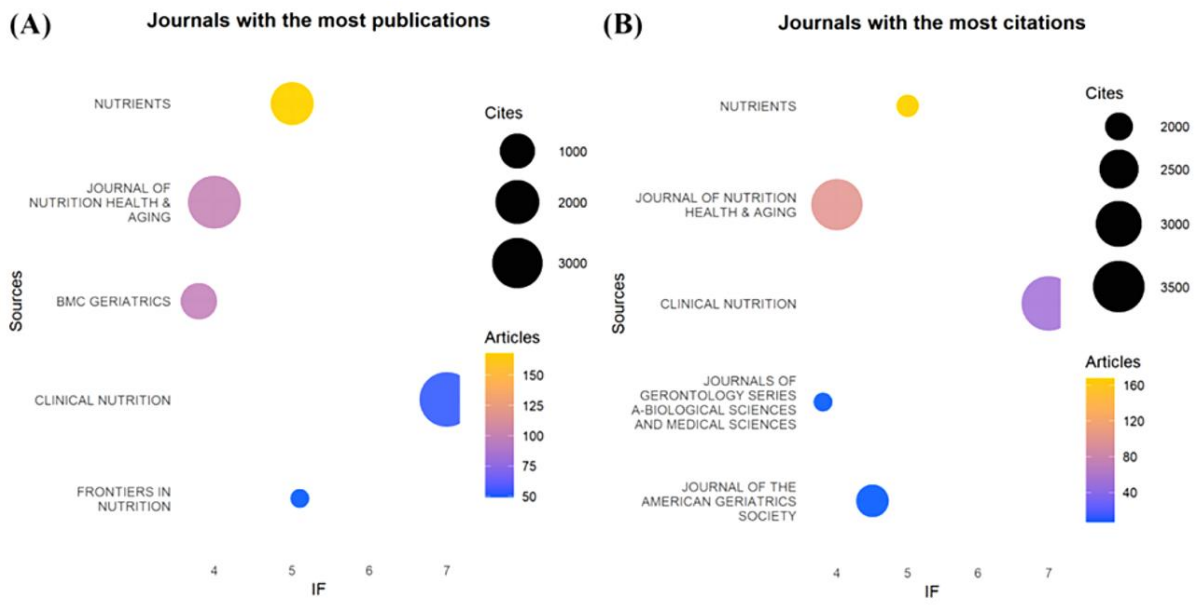

Figure 3. Journals with the most publications and journals with the most citations. (A) Journals with the most publications. (B) Journals with the most citations

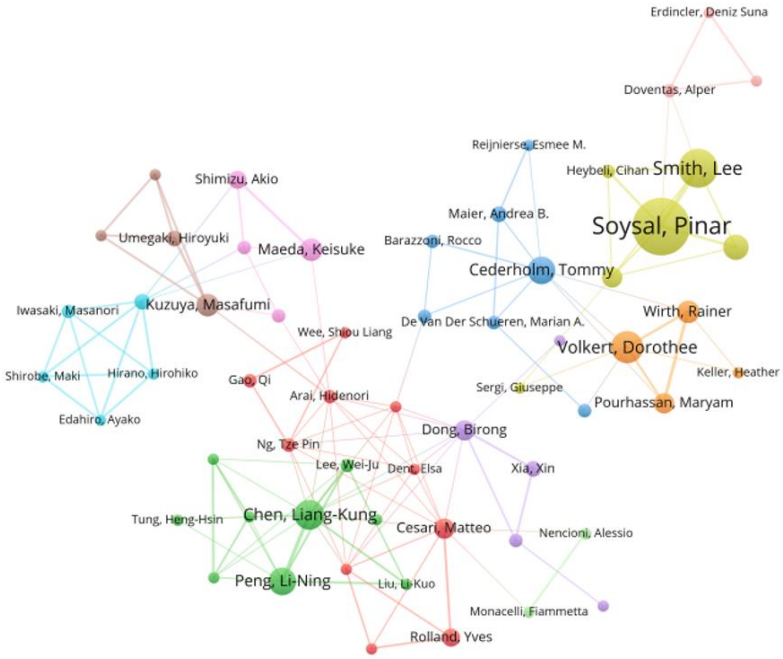

Figure 4. Co-authorship network

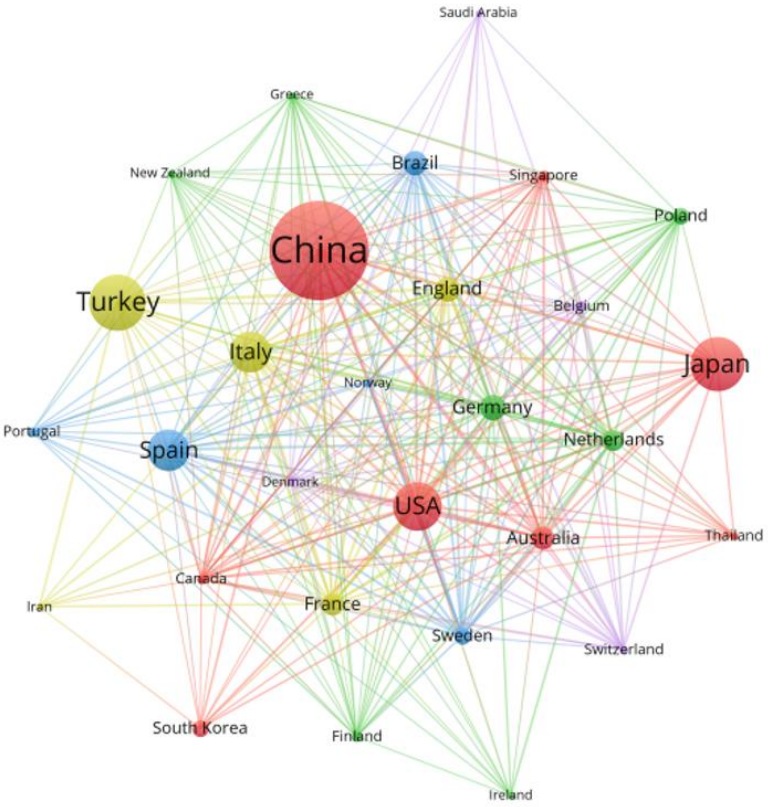

Figure 5. A collaborative network map of countries/regions that changes over time

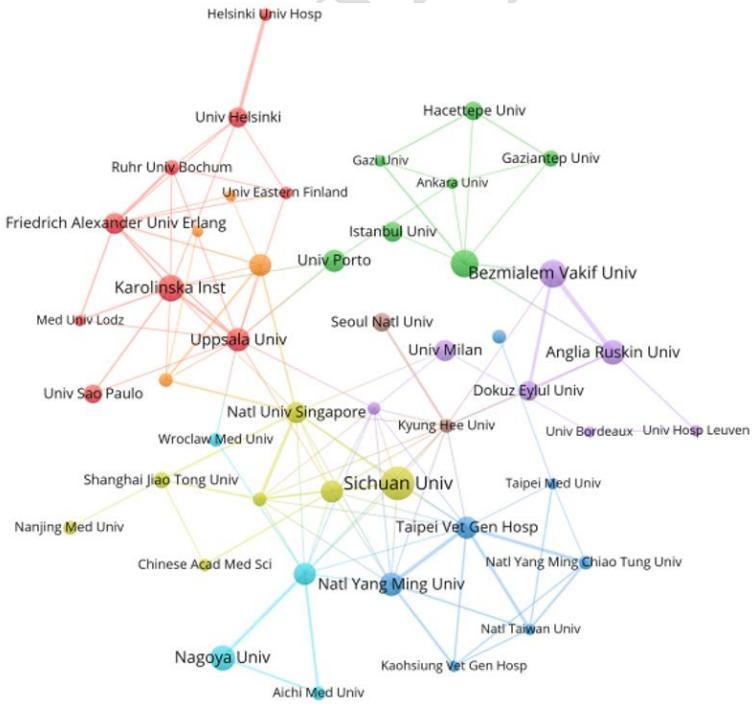

Figure 6. Institutional collaboration map

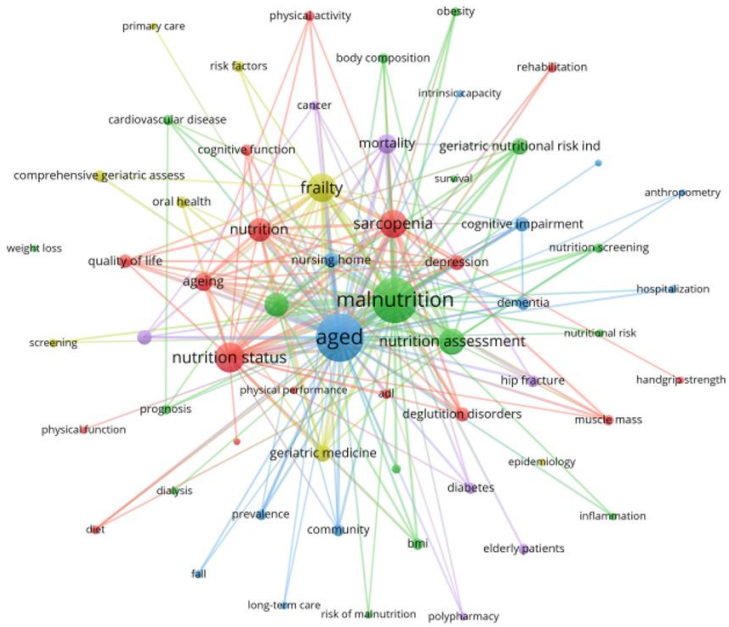

Figure 7. Keyword co-occurrence cluster analysis

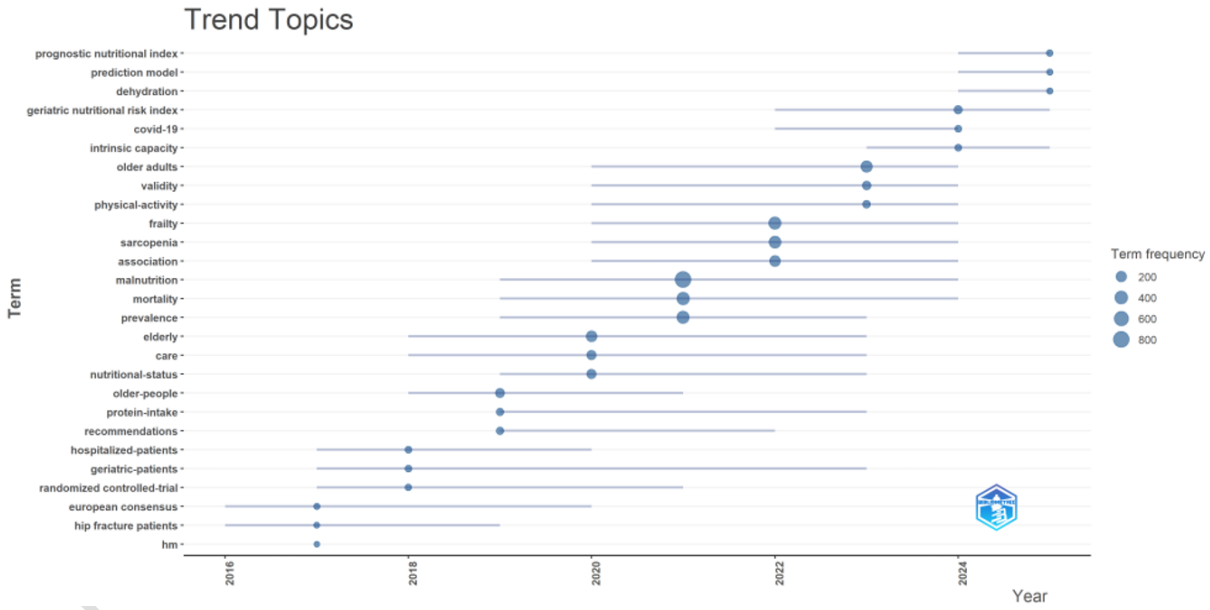

Figure 8. Temporal evolution of research hotspots in geriatric nutritional assessment

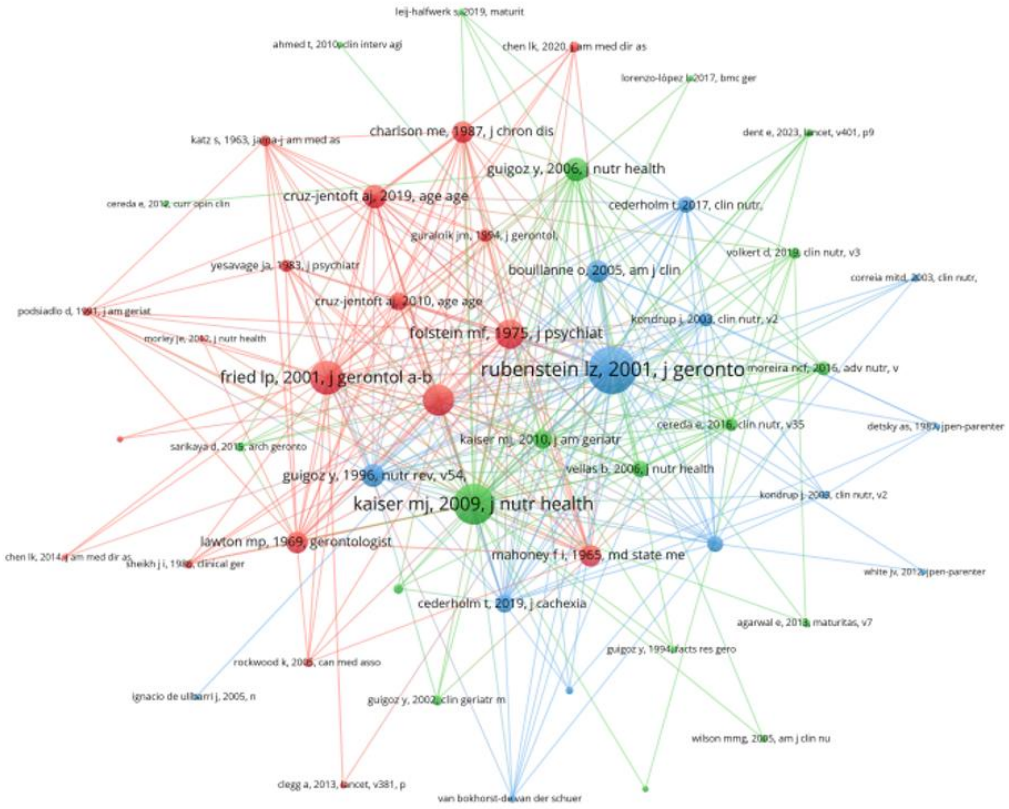

Figure 9. Co-citation network of references

Top 25 References with the Strongest Citation Bursts

References	Year	Strength	Begin	End	2016 - 2025
Cederholm T, 2015, CLIN NUTR, V34, P335, DOI 10.1016/j.clnu.2015.03.001, DOI	2015	17.6	**2016**	2020	
van Bokhorst-de van der Schueren MAE, 2014, CLIN NUTR, V33, P39, DOI 10.1016/j.clnu.2013.04.008, DOI	2014	9.4	**2016**	2019	
Chen LK, 2014, J AM MED DIR ASSOC, V15, P95, DOI 10.1016/j.jamda.2013.11.025, DOI	2014	9.0	**2016**	2019	
Bauer J, 2013, J AM MED DIR ASSOC, V14, P542, DOI 10.1016/j.jamda.2013.05.021, DOI	2013	8.1	**2016**	2018	
Bollwein J, 2013, J NUTR HEALTH AGING, V17, P351, DOI 10.1007/s12603-013-0034-7, DOI	2013	7.3	**2016**	2017	
van Bokhorst-de van der Schueren MAE, 2013, CLIN NUTR, V32, P1007, DOI 10.1016/j.clnu.2013.05.007, DOI	2013	7.2	**2016**	2018	
White JV, 2012, JPEN-PARENTER ENTER, V36, P275, DOI 10.1177/0148607112440285, DOI	2012	6.8	**2016**	2017	
Deutz NEP, 2014, CLIN NUTR, V33, P929, DOI 10.1016/j.clnu.2014.04.007, DOI	2014	7.5	**2017**	2019	
Boulos C, 2016, CLIN NUTR, V35, P138, DOI 10.1016/j.clnu.2015.01.008, DOI	2016	6.9	**2017**	2020	
Agarwal E, 2013, MATURITAS, V76, P296, DOI 10.1016/j.maturitas.2013.07.013, DOI	2013	6.7	**2017**	2018	
Moreira NCF, 2016, ADV NUTR, V7, P507, DOI 10.3945/an.115.011254, DOI	2016	18.7	**2018**	2021	
Cederholm T, 2017, CLIN NUTR, V36, P49, DOI 10.1016/j.clnu.2016.09.004, DOI	2017	14.1	**2019**	2022	
Cereda E, 2016, CLIN NUTR, V35, P1282, DOI 10.1016/j.clnu.2016.03.008, DOI	2016	10.5	**2019**	2021	
Lorenzo-López L, 2017, BMC GERIATR, V17, P0, DOI 10.1186/s12877-017-0496-2, DOI	2017	6.8	**2020**	2022	
Cederholm T, 2019, J CACHEXIA SARCOPENI, V10, P207, DOI 10.1002/jcsm.12383, DOI	2019	20.7	**2021**	2025	
Cruz-Jentoft AJ, 2019, AGE AGEING, V48, P16, DOI 10.1093/ageing/afy169, DOI	2019	18.6	**2021**	2025	
Volkert D, 2019, CLIN NUTR, V38, P10, DOI 10.1016/j.clnu.2018.05.024, DOI	2019	9.4	**2021**	2023	
Jensen GL, 2019, JPEN-PARENTER ENTER, V43, P32, DOI 10.1002/jpen.1440, DOI	2019	8.5	**2021**	2023	
Leij-Halfwerk S, 2019, MATURITAS, V126, P80, DOI 10.1016/j.maturitas.2019.05.006, DOI	2019	8.1	**2021**	2025	
Zhang ZY, 2017, NUTRIENTS, V9, P0, DOI 10.3390/nu9080829, DOI	2017	7.8	**2021**	2022	
Chen LK, 2020, J AM MED DIR ASSOC, V21, P300, DOI 10.1016/j.jamda.2019.12.012, DOI	2020	15.0	**2022**	2025	
Cruz-Jentoft AJ, 2019, LANCET, V393, P2636, DOI 10.1016/S0140-6736(19)31138-9, DOI	2019	9.8	**2022**	2023	
Dent E, 2019, J NUTR HEALTH AGING, V23, P431, DOI 10.1007/s12603-019-1176-z, DOI	2019	7.6	**2022**	2025	
Norman K, 2021, NUTRIENTS, V13, P0, DOI 10.3390/nu13082764, DOI	2021	23.6	**2023**	2025	
Volkert D, 2022, CLIN NUTR, V41, P958, DOI 10.1016/j.clnu.2022.01.024, DOI	2022	10.1	**2023**	2025	

Figure 10. Citation bursts