Review

Navigating Multimorbidity in Older Adults: A Mapping Review

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Abstract

Introduction. Multimorbidity is an increasing global concern, particularly among older populations, affecting 55-98% of those aged ≥ 65 and above. This study aims to provide a comprehensive global overview of research on multimorbidity in older adults. It will assess the quantity and types of studies focused on the prevalence, patterns, determinants, risk factors, and consequences of multimorbidity, while also identifying key research gaps for future studies.

Methods. This mapping review study was conducted using the PubMed, Scopus and Web of Science databases in December 2024. Only full-text papers published in English were included. The search terms included 'aged', 'multimorbidity', 'multiple chronic conditions', 'prevalence', 'cost of illness', 'social determinants', 'risk factors', and 'Albania'. After filtering, all results were exported to Rayyan reference management software. Duplicates were removed, and the remaining papers were evaluated for suitability based on their titles and abstracts.

Results. After the full text screening the final set for data extraction includes seven observational studies on multimorbidity in older adults. Europe has the highest number of studies, with four, followed by Asia with three studies. Despite this, Asia has a greater coverage of studies on multimorbidity in older populations. North and South America are represented by two studies from each. Six of included studies examine the prevalence of multimorbidity, with four exploring its patterns and consequences, and one investigating its determinants and its risk factors.

Discussions. There are notable gaps in research on multimorbidity in older adults, particularly regarding its determinants, and risk factors. No studies on multimorbidity in older adults were found for Africa and Australia in the period 2019-2024.

Keywords: Multimorbidity, Older Adults, Patterns, Determinants, Risk Factors, Consequences

Introduction

The most common chronic condition experienced by older adults is multimorbidity, which refers to the coexistence of two or more chronic diseases in the same patient.[1] Multimorbidity has become a growing issue in many parts of the world, particularly among older populations, affecting 55-98% of those aged 65 and above.[2,3] The World Health Organization, Centers for Disease Control and Prevention, and National Institutes of Health classify individuals aged 65 or older as older adults.[4-8] In fact, in the United States, almost 3 out of 4 older adults have multimorbidity.[9] Aging represents the greatest risk factor for disease and brings with it the chronic uncontrol of multiple organ systems.[10]

The global prevalence of multimorbidity has steadily increased throughout the 21st century driven primarily by factors such as longer life expectancy, an aging population, lifestyle risk factors, advancements in global healthcare, rising average lifespans, and demographic shifts.[11-15] Moreover, low- and middle-income countries (LMICs) are not exempt from this growing burden.[16,17] For example, the World Health Survey reports that the average prevalence of multimorbidity across 28 LMICs is 7.8%.[18] Furthermore, the trend of high prevalence over the past two decades indicates that the global burden of multimorbidity continues to rise at a similar pace.[17]

With an aging population, the number of people affected by multimorbidity is expected to rise at a rate of more than 1% per year by 2030 as the global population continues to age.[19-21] This increase in multimorbidity is strongly associated with impaired functional ability, higher healthcare costs, poorer quality of life and an increased risk of mortality, all of which pose significant challenges to the healthcare systems worldwide.[22-24] Numerous studies have shown that multimorbidity in older people presents a considerable challenge to the healthcare system,[13,25-33] with several factors contributing to the complexity of managing multimorbidity.[34] For instance, individuals with multimorbidity generate four times healthcare spending per capita compared to those without chronic diseases, and those with high multimorbidity incur nearly 14 times the cost of those without multimorbidity.[35] This elevated healthcare burden is further reflected in the various areas of increased expenditure, as multimorbidity has been found to be associated with significant healthcare utilization, higher total costs, hospital costs, care transition costs, primary care use, dental care use, emergency department visits, and hospitalizations. Moreover, several studies demonstrated the significant costs of depression and of hospitalization, which are particularly pronounced in individuals with multimorbidity.[13,18,36] Multimorbidity is also associated with increased disability, diminished functional capacity, reduced health-related quality of life (HRQoL), higher rates of depression, the need for complex medication regimens, polypharmacy and greater socioeconomic costs.[13,18,27,37]

Reported annual costs of multimorbidity per person ranged from I$800 to I$150,000, depending on disease combination, country, cost ingredients, and other study characteristics.[28,38] While multimorbidity may not be a completely new phenomenon, there is growing concern that contemporary care services are not adequately equipped to manage patients with multimorbidity.[39] In addition, research has indicated that more than half of older patients with chronic diseases have two or more comorbid conditions, which highlights the high prevalence of multimorbidity in this population group.[40] Several studies have also explored the prevalence of multimorbidity in different regions, such as South Asia and Iran, providing valuable insight into the associated risk factors and consequences of this health issue.[25,41]

Various studies have examined different aspects of multimorbidity in older adults including its prevalence, patterns, or determinants.[18,19,42-46] For clarity, (…) multimorbidity patterns refer to *"the simultaneous presence of multiple specific health conditions in the same individual"*.[47] Notably, multimorbidity patterns exhibit regional, temporal, age-related, and gender-based differences, suggesting substantial demographic and regional variation in the burden of multimorbidity.[17] It is well-established that multimorbidity is common in the elderly

and is influenced by a rage of factors, including socioeconomic and demographic conditions, lifestyle and family structure.[31] In this context, one study emphasizes the need for further research on the impact of multimorbidity and its social determinants, particularly in population groups where this issue remains underexplored, such as older individuals living alone or with limited social connections.[18]

Despite its profound impact on individuals and healthcare systems, there remains limited understanding of multimorbidity, with critical gaps in knowledge across nearly all key areas.[48] Given the significant consequences of multimorbidity, this mapping review aims to address these gaps by better understanding specific aspects of multimorbidity in older adults 65 and above worldwide, and by identifying key areas for future research.

Research Questions

1. How many studies have evaluated the prevalence, patterns, determinants, risk factors, and consequences of multimorbidity in adults aged ≥ 65 years globally between January 2019 and December 2024?
2. What literature gaps can be identified for further research?

Methods

Study Design

This is a mapping review study to identify all relevant published studies that address research questions. According to Booth (2016), *"a mapping review aims at categorizing, classifying, characterizing patterns, trends or themes in evidence production or publication"*.[49] Grant & Booth (2009) add that the point in conducting a mapping review is to "map out" and thematically understand the pre-existing research on a particular topic including assessing any gaps that could be addressed by future research.[50]

This mapping review is based on a systematic review registered in PROSPERO, an international prospective registry for systematic reviews with registration number CRD42025643208.

Inclusion and exclusion criteria

In this mapping review, we searched for all primary research, open access articles in English published between January 2019 and December 2024 that involved a population ≥ 65 years of age or older who had high rates of multimorbidity overall ≥ 50%.

Exclusion criteria

The exclusion criteria for the population were individuals under the age of 65 years.

Search Strategy and Study Selection

The search was carried out in 3 databases PubMed, Scopus and Web of Science.

The search strategy was developed on December, 2024 by two reviewers to systematically search the PubMed database using the Medical Subjects Headings (MeSH) terms 'aged AND multimorbidity OR multiple chronic conditions' AND 'prevalence OR cost of illness' AND 'social determinants OR risk factors OR 'Albania'. The term Albania was also used among the key terms with the aim of finding published articles on multimorbidity in the elderly in Albania.

We used an advanced search in PubMed with the combination of all the terms listed below, and no results were found.

[1] "Aged"[MeSH Terms]

[2] "Multimorbidity"[MeSH Terms] OR "Multiple Chronic Conditions" [MeSH Terms]

[3] "Prevalence"[MeSH Terms] OR "Cost of Illness" [MeSH Terms]

[4] "Social Determinants of Health" [MeSH Terms] OR "Risk Factors" [MeSH Terms]

[5] "Global Health"[Mesh] OR "Europe"[Mesh] OR "Balkan Peninsula"[Mesh]

[6] "Albania"[Mesh]

Then we used the strategy mentioned above to find as many articles as possible related to the topic of interest: #1 AND #2 AND #3 AND #4 OR #6 Filters: from 2019 – 2024 and 267 articles were displayed.

The search strategy used was: ("Aged"[MeSH Terms] AND ("Multimorbidity"[MeSH Terms] OR "Multiple Chronic Conditions" [MeSH Terms]) AND ("Prevalence"[MeSH Terms] OR "Cost of Illness" [MeSH Terms]) AND ("Social Determinants of Health" [MeSH Terms] OR "Risk Factors" [MeSH Terms])) AND (2019:2024[pdat]) OR ("Albania"[MeSH Terms]) AND (2019:2024[pdat])

Then the established strategy was adopted

for searching in the Scopus and Web of Science databases. The search returned 179 articles: 77 articles from Scopus (Medicine, Nursing, Pharmacology, Toxicology and Pharmaceutics) and 102 articles from Web of Science.

Screening Procedure

All results were exported to Rayyan (https://www.rayyan.ai/) reference management software.[51] The software Rayyan was used to support study selection and record decisions along the identification and screening processes. Formal screening of search results against eligibility criteria was done by two researchers, independently and blinded. The studies retrieved based on title and abstract according to inclusion and exclusion criteria. Disagreements are resolved by mutual consensus of the reviewers after reading the full texts. The kappa coefficient is 0.4615, which means that there is a moderate agreement between the two researchers. For the selection process, the PRISMA flowchart is used to highlight the identified studies, those that were screened, and those that were included.[52]

Of the 446 articles found and included in the screening process based on title and abstract according to inclusion and exclusion criteria, 34 duplicates were removed before screening, 392 records were excluded for different reasons (incorrect target population, absence of multimorbidity, theoretical approach, unsuitable study design, lack of full text, not relevant to research). After this first phase of the selection process, 20 studies were subjected to a more thorough evaluation and, thereafter, 13 studies were excluded. In the end, the remaining 7 articles were included, as they were appropriately judged on the inclusion criteria.

Data Extraction

After selecting the studies, we used the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework to guide the entire process (Figure 1). The following relevant data elements were manually extracted by both screeners: first author, year of publication, country, continent, sample size and aspects of multimorbidity studied.

Results

Search Results

According to the inclusion criteria, seven studies were selected for this review (Figure 1).

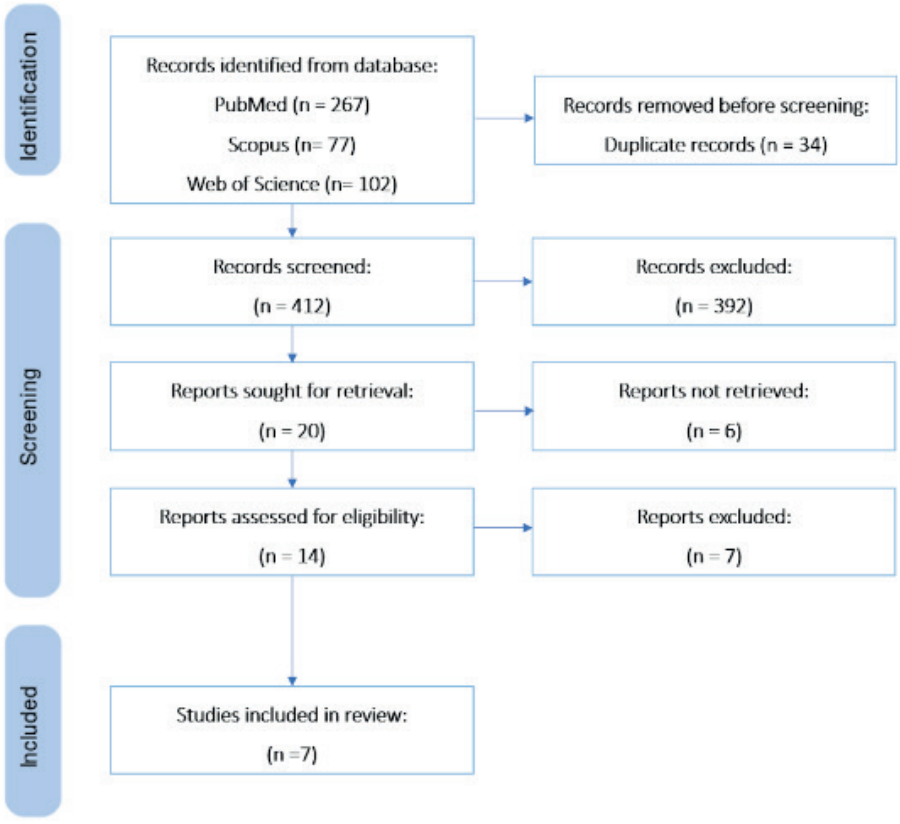

Figure 1. PRISMA flow diagram of studies screening and selection process.

Study Characteristics

After the screening process, it turned out that studies on multimorbidity in older adults aged 65 years and older worldwide are few in number. After reading the full texts, the data and information from the 7 articles were extracted and organized into tables.

The main characteristics of the selected studies are reported below in Table 1. A total of 7 observational studies on multimorbidity in older adults were identified, including studies conducted across Europe, Asia, North America, and South America (Figure 2).

Europe has the highest number of studies

Table 1. Characteristics of included studies.

First author and year of publication	Country	Continent	Sample size	Aspects of multimorbidity
Yogesh et al, 2024	India	Asia	800	Prevalence, Patterns, Risk factors
Lutomski et al, 2023	Netherlands	Europe	12,755	Prevalence, Patterns, Consequences
Baré et al, 2021	Spain	Europe	740	Patterns
Turuba et al, 2020	Canada, Latin America and Albania	Europe, North America, and South America	1,360	Prevalence, Consequences
Bao et al, 2019	Cuba, Dominican Republic, Puerto Rico, Venezuela, Peru, Mexico, and China	North America, South America, and Asia	12,965	Prevalence, Consequences
Halonen et al, 2019	Finland	Europe	2,862 (mortality) 1,954 (LTC)	Prevalence, Consequences
Mitsutake et al, 2019	Japan	Asia	1,311,116	Prevalence, Patterns, Determinants

Figure 2. Territorial distribution of studies by countries in Europe, Asia and Americas.

on older adults with multimorbidity, with four studies, followed by Asia, with three studies, and then North America and South America, each with two studies. Europe has four studies, with a mix of countries represented: Finland, Albania, Spain and Netherlands.[53-56] In Asia, three studies are listed, two conducted in 2019,[57,58] with a more recent study from India.[59] Asia has a greater coverage of studies on multimorbidity in older populations, compared to other continents based on the study sample. Two studies from North America, cover multiple countries including Cuba, Dominican Republic, Puerto Rico, and Mexico,[58] and one study focuses specifically on

Canada.[54]

Two studies from South America are included; one covers Brazil and Colombia,[54] while the other also includes Venezuela and Peru.[58]

There is a notable lack of studies on multimorbidity in older adults in African, and Australian countries between 2019 and 2024.

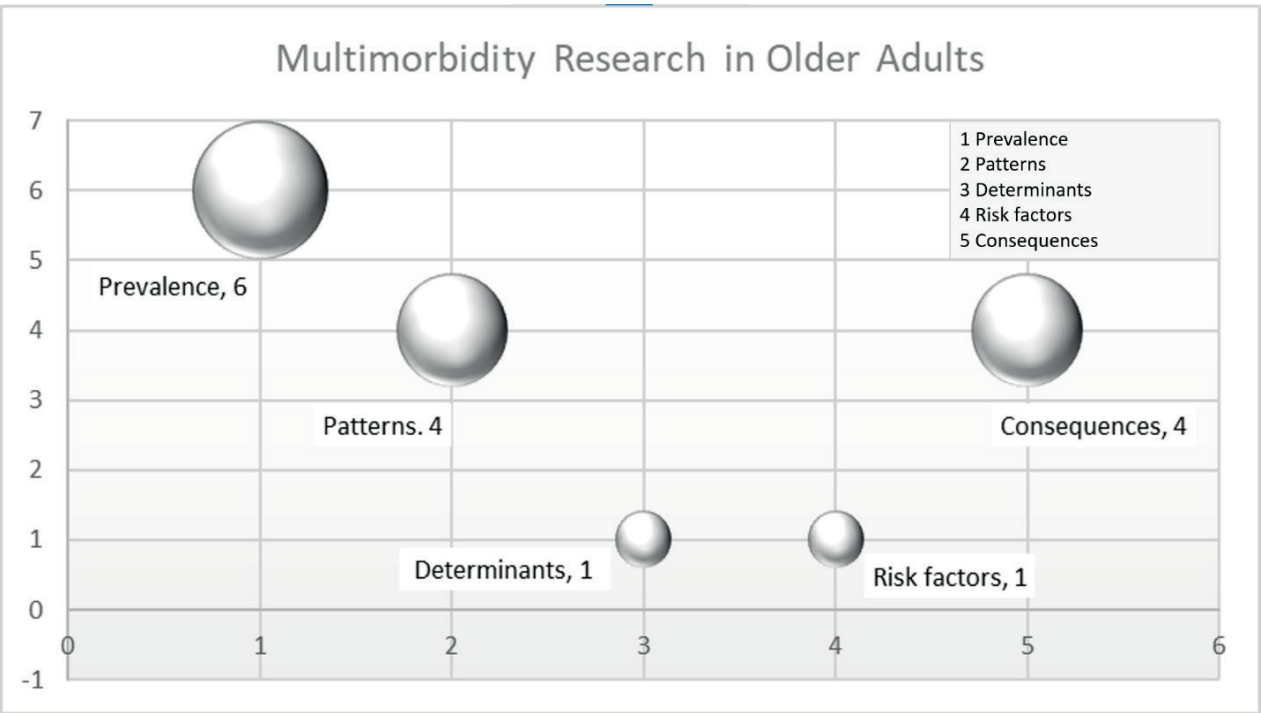

Figure 3. Multimorbidity Research in Older Adults

Six of the included studies examine the prevalence of multimorbidity in older adults (≥ 65 years), which is crucial for understanding how widespread the condition is across different populations and settings. Four studies examine the patterns and consequences of multimorbidity, while one investigates its determinants and its associated risk factors (Figure 3).

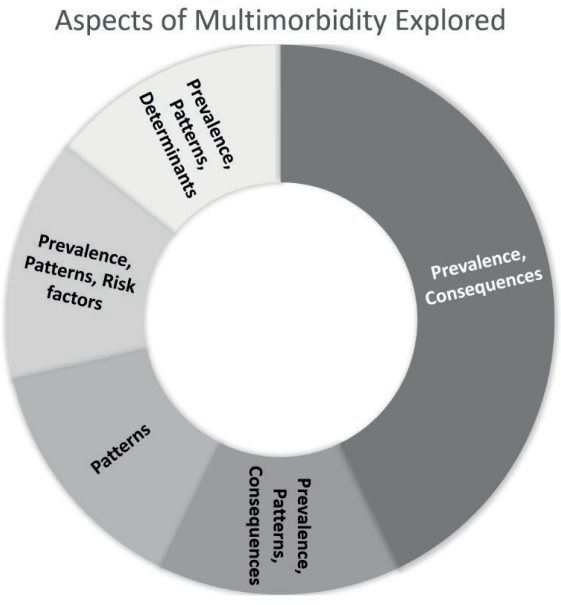

Figure 4. Aspect of multimorbidity.

Regarding the aspects of multimorbidity in the elderly studied simultaneously in each of the studies included in this mapping review, we can more clearly distinguish the more studied and the less studied aspects of multimorbidity, which guide us towards finding gaps in the literature.

Figure 4 illustrates various aspects of multimorbidity in older adults, studied between 2019 and 2024. The majority of studies focused on prevalence and consequences of multimorbidity. In contrast, combinations of prevalence with patterns and determinants, or risk factors, or consequences were addressed in only a single study each. Additionally, only one study specifically examined the patterns of multimorbidity in older adults.

Discussion

This study examined the quantity and types of research addressing the prevalence, patterns, determinants, risk factors, and consequences of multimorbidity in older adults aged 65 years

or above at a global scale from January 2019 to December 2024. Seven observational studies from diverse regions of Europe, Asia, North and South America indicate that multimorbidity in older adults is a widely recognized and studied phenomenon.

However, there is a noticeable regional variation in the number of studies, with Europe leading with four studies. This could be due to the higher concentration of healthcare resources and research infrastructure in European countries, as well as a greater focus on aging populations in this region. Europe's representation of diverse countries, including Finland, Albania, Spain, and the Netherlands, further enhances the robustness of the findings, allowing for cross-country comparisons within the continent. There is some evidence that supports these hypotheses.

The European Union made significant investments in collaborative environment and health research over the past two decades through its Framework Programs for Research and Technological Development, including Horizon 2020, launched in 2014, to provide scientific evidence for policies aimed at protecting human health and the environment.[60] According to Heffner et al. (2019), while people live longer and generally healthier lives, they face more serious health issues in old age, which has led to political actions supporting the elderly by addressing their specific needs with public services.[61] Cristea et al. (2020) reported that, due to significant increases in life expectancy and a decline in birth rates, health systems in both developed and developing countries were still adapting their services for the aging population.[62]

Asia, with three studies, also contributes significantly to the global understanding of multimorbidity in older adults, offering a broader representation of multimorbidity in older populations compared to other continents based on the study sample. Two studies from 2019[57,58] provide earlier insights, while the recent study from India[59] adds contemporary data. This shift toward more recent research could indicate a growing recognition of the issue in rapidly aging countries like India, where multimorbidity is likely to become increasingly prevalent due to demographic transitions and evolving healthcare needs.

According to Yip et al (2019) the cost challenges associated with aging populations in Asian countries were intensified by hospital-centric, curative care-based healthcare systems that lacked effective coordination and integration of care. These systems were costly and inefficient for managing the growing prevalence of chronic health conditions and multimorbidity in aging populations.[63] South-East Asia (SEA) was home to the largest number of the world's older population. The high proportion of older individuals in SEA meant that the cost of providing them with healthcare services was high.[64] The demographic landscapes of India and Japan presented insightful case studies in contrasting population trends, as both countries confronted the challenges associated with aging populations, despite differences in their demographic structures and developmental paths.[65]

North and South America are represented by two studies each, with North America's research primarily focusing on Canada[54] and a multi-country study in Latin America, including Cuba, Puerto Rico, the Dominican Republic, and Mexico.[58] Similarly, South American studies, including one study covering countries like Brazil and Colombia,[54] and another study, and another study examining Venezuela and Peru,[58] reflect the unique healthcare challenges in these regions. The variation in the number of studies between regions might suggest differences in research priorities, healthcare infrastructures, and demographic patterns across continents. Multi-country studies offer diverse data representation, enabling more generalizable findings across regions, cultures, and socioeconomic contexts. They provide cross-cultural insights, facilitate the identification of global trends, and inform international policies.

The COVID-19 pandemic presented a major challenge to the global healthcare system,[66,67] exposing weaknesses in infrastructure, supply chains, and government preparedness.[68] Its rapid spread highlighted the urgent need for healthcare system modernization and adaptation.[68] Research during the pandemic revealed that older individuals and those with multimorbidity were at greater risk of severe complications, including hospitalization, ICU admission, and increased mortality.[69,70] The pandemic further emphasized the lack of standardized health advice and clinical guidelines for vulnerable populations, particularly in care homes where COVID-19 had a devastating impact.[71-75] It also demonstrated the fragility of the public health system, with

the focus on acute care compromising long-term chronic and mental health care.[75-77] The pandemic reshaped healthcare research priorities, underscoring the importance of addressing multimorbidity, integrating technology, and tackling health inequalities.[78] Key areas for improvement identified included targeting appropriate patients and caregivers, promoting self-management and healthy behaviors, and delivering integrated health and social care with a focus on interdisciplinary collaboration.[13]

It has also spurred the development of more comprehensive, flexible care strategies to meet the needs of vulnerable populations, ultimately influencing the future of multimorbidity management.

First, it's notable that six of the included studies address the prevalence of multimorbidity in adults aged 65 and older. A recent systematic review conducted by Chowdhury et al. (2023) among adults emphasizes that a high prevalence of multimorbidity indicates high mortality and increased healthcare utilization.[25] Prevalence studies on multimorbidity in the elderly are crucial for understanding the impact of this complex health needs, guiding public health planning, resource allocation, and the development of targeted interventions by providing data on trends and the burden of multimorbidity.

We identified four studies examining various patterns of multimorbidity in older adults. By referring to literature that highlights emerging patterns and common clusters of chronic diseases, policymakers, researchers, and clinicians can gain valuable insights into the care needs for the prevention and management of these complex conditions. This approach could save time and reduce costs for both healthcare providers and patients, ultimately improving public health and safety on a global scale.[79]

Additionally, only one study explores in depth the determinants of multimorbidity, highlighting the importance of understanding these factors, while the other studies treated them peripherally as part of broader statistical analysis. Another study addresses the associated risk factors of multimorbidity, including the specific conditions or behaviors that increase the likelihood of developing multimorbidity, and also identifies high-risk groups. Maybe the small number of studies can be explained by the fact that investigating the determinants and risk factors of multimorbidity is more complex and resource-intensive than studying its prevalence. This process requires, as it necessitates longitudinal data and in-depth analysis. In contrast, prevalence studies, which rely on readily available cross-sectional datasets, are often prioritized due to their ability to offer immediate, actionable insights for healthcare providers and policymakers.

A comprehensive understanding of all the determinants is essential for designing interventions that can reduce the risk of multimorbidity or delay its onset in vulnerable populations.

Research in this area is vital for identifying modifiable risk factors and informing preventative strategies. However, with only one study addressing the associated risk factors, there is a significant gap in understanding the predictors or underlying causes of multimorbidity. More research in this area could help identify at-risk groups and lead to earlier interventions to prevent the onset of multimorbidity.

Four studies focus on the consequences of multimorbidity, which are the impacts that having multimorbidity can have on individuals' health, quality of life, and healthcare utilization. Identifying and understanding these consequences underscores the urgency of addressing multimorbidity in public health policies.

In comparison with our study, we identified five systematic reviews or other types of review studies published between 2019 and 2024 that explored multimorbidity in older adults. Of these, three focused on the prevalence of multimorbidity in older adults,[10,15,80] one examined pattern,[10] three investigated determinants[10,31,81] and one looked into the consequence.[15] Four of these reviews specifically focused on older adults aged 60 and above,[10,15,31,81] while only one study focused on older adults aged 65 and above.[80]

Regarding studies that examined multiple aspects of multimorbidity simultaneously, two reviews were identified: one explored prevalence, patterns and determinants,[10] and the other examined prevalence and consequences.[15]

Notably, only one systematic review focused on older adults aged 65 and above, specifically exploring the prevalence of multimorbidity.[80] Furthermore, no systematic review published between 2019 and 2024 was found that assessed

all aspects of multimorbidity in this age group, including prevalence, patterns, determinants, risk factors, and consequences.

During the analysis of the articles included in this study, gaps that exist in the literature between 2019 and 2024 regarding some aspects of multimorbidity in older adults 65 years and above were also identified.

While there are several studies examining the prevalence, patterns and consequences of multimorbidity in older adults, research on the determinants, and risk factors of multimorbidity in this population remains limited, leaving significant gaps in the literature. No studies on multimorbidity in the elderly conducted in African and Australian countries were found between 2019 and 2024. This is the first mapping systematic review that assesses different aspects of multimorbidity in older adults aged 65 years and above including prevalence, patterns, determinants, risk factors, and consequences of multimorbidity between 2019 and 2024.

Strengths and Limitations

Among the strengths of this mapping review, we mention that:

- By searching three databases, the review increases the likelihood of capturing a diverse set of primary research studies, reducing the risk of missing relevant articles.
- Limiting the review to studies published within the last five years ensures that the review reflects the most up-to-date evidence, which is critical in fast-evolving fields like healthcare for older adults.
- Focusing on older adults 65 years and above ensures that the review is specifically relevant to an aging population, which may have unique healthcare needs and challenges.
- Using a systematic approach to gather and analyze primary research reduces bias and provides a more structured summary of the literature.
- All the papers were primary research studies. By focusing on primary research conducted within the last five years, the review offers the most recent findings and trends, ensuring relevance to current healthcare practices and interventions, especially for older populations.

Some of the limitations include:

- Searching only through databases may overlook grey literature (e.g., conference abstracts, theses, and non-academic reports), which could provide valuable insights.

The research included in this mapping review was only articles written in English. Restricting the review to English-language studies may introduce language bias, as research published in other languages and excluded from the review could provide additional relevant insights.

Implications for Future Research

We strongly encourage further research across a broader range of countries and continents to facilitate comparisons of data on the prevalence, patterns, determinants, risk factors and consequences of multimorbidity in older adults. Such an approach will provide more accurate insights into the global burden of multimorbidity and could inform the development of international policies and strategies for its prevention, control, and management.

Conclusions

Europe has the highest number of studies on multimorbidity in older adults, while Asia covers a broader range of research on multimorbidity within older populations compared to other continents. There is a notable lack of studies on multimorbidity in older adults in African and Australian countries between 2019 and 2024. While research on its prevalence, patterns and consequences exists, significant gaps remain regarding its determinants and risk factors. Addressing these gaps is crucial for advancing research and developing targeted interventions for older adults.

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