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Factors influencing accessibility of palliative care: a systematic review and meta-analysis

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Abstract

Background Palliative care is essential for enhancing quality of life in patients with life-threatening illnesses. However, its accessibility remains inconsistent across populations and regions. This review systematically examines and quantifies factors influencing accessibility of palliative care.

Methods We conducted a comprehensive literature search in PubMed, Web of Science, CINAHL, Embase, the Cochrane Library, CNKI, Wanfang, and VIP databases, covering the period from January 2014 to July 2024. The search aimed to identify observational studies on factors influencing accessibility of palliative care. Keywords related to accessibility were derived from the five dimensions defined by Penchansky and Thomas: availability, accessibility, accommodation, affordability, and acceptability. Study quality was assessed using the Joanna Briggs Institute (JBI) tools, and a meta-analysis was conducted using Review Manager 5.3.

Results A total of 20 studies were included in the analysis, with 15 using a retrospective design with secondary data analysis, two employing a cross-sectional design, and three using a cohort design. There were no studies on availability, one study on accessibility, two studies on affordability, one study on accommodation, and sixteen studies on acceptability. The influencing factor for accessibility is geographic location. The influencing factors for affordability and accommodation are mainly demographic characteristics, including race, religion, and employment status. The most influential factors for acceptability are categorized as sociodemographic, healthcare service, disease-related factors. Meta-analysis results indicated that female gender (OR = 1.18, 95% CI: 1.14–1.23), higher income level (OR = 1.11, 95% CI: 1.08–1.14), and larger hospital bed capacity (OR = 1.22, 95% CI: 1.14–1.32) facilitated accessibility to palliative care ($P < 0.05$). Conversely, residing in rural areas (OR = 0.80, 95% CI: 0.67–0.95) and being of African descent (OR = 0.78, 95% CI: 0.68–0.90) were barriers to accessibility ($P < 0.05$).

Conclusions This review highlights a relationship between key sociodemographic characteristics, healthcare service, disease-related factors and the accessibility of palliative care. However, the limited number of studies focusing on specific dimensions, such as availability, affordability, accessibility, and accommodation, creates gaps in understanding. Further research is needed to clarify the underlying mechanisms and potential causality of these associations. Recognizing the significant implications of limited accessibility of palliative care can help identify underserved populations and develop targeted interventions to improve the access to the service for these groups.

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Highlights

- Adopting a Comprehensive Framework to Evaluate Accessibility of Palliative Care: This study applies the Healthcare Supply-Demand Adaptation Model by Penchansky and Thomas. It considers five dimensions of accessibility: availability, accessibility, affordability, acceptability, and accommodation. This approach provides a holistic view of palliative care access.
- Exploring Barriers and Facilitators to Accessibility of Palliative Care: Key facilitators of palliative care accessibility include female gender, higher income, and larger hospital bed capacity. Barriers include rural residency and African descent. These findings offer new insights into accessibility patterns.
- Detecting Imbalance in the Number of Studies Across Five Dimensions: Acceptability is the most frequently discussed dimension in the literature. However, other dimensions, such as availability, affordability, accessibility, and accommodation, remain underexplored. This imbalance highlights an important gap in current research and emphasizes the need for deeper investigation into these underrepresented areas.
- Conducting Multi-Level Analysis of Influencing Factors: This study integrates meso-level factors, such as healthcare institutions, and micro-level factors, such as sociodemographic and cultural influences. This approach provides a more nuanced understanding of palliative care accessibility, addressing both systemic and individual barriers

Keywords Accessibility of Palliative Care, Availability, Affordability, Accessibility; Accommodation, Influencing Factors, Meta-analysis

Introduction

With the advancement of modern society and increasing life expectancy, greater emphasis is being placed on improving the quality of life at the end of life. The global burden of cancer continues to rise, with an estimated 20 million new cases reported in 2022 [1], and an aging population has contributed to the significant increase in morbidity and mortality rates of various chronic illnesses [2]. Given these challenges, ensuring a high quality of life during the end-of-life phase has become a critical issue in healthcare. In recent years, palliative and hospice care have increasingly been recognized as effective approaches to enhancing quality of life for individuals facing serious illnesses [3, 4]. These approaches are now regarded as key strategies in proactively addressing the challenges posed by an aging population [5]. In this study, the term "palliative care" is used broadly to include palliative and hospice care, as both share the common goal of improving quality of life for patients with serious illnesses, though they may differ slightly in timing and scope of services [6, 7].

In China, the government has successively introduced policies and measures to promote related work of palliative care service, such as the "Healthy China 2030 Plan," [8] "Basic Standards and Management Guidelines for Palliative Care Centers (Trial)," [9] and the "National Medium- and Long-Term Plan for Actively Responding to Population Aging," [10] among others. In response, various regions have actively implemented these policies. Currently, three batches of national palliative care pilot programs have been launched, encompassing 185 cities across the country [11]. However, despite these efforts, many patients and families still find that available services do not meet their expectations. Studies have identified several issues, including insufficient symptom management [12], limited personalized care [13], inadequate emotional and psychological support [14], and poor communication between healthcare providers and families [15]. This issue underscores a significant challenge: the limited accessibility of palliative care services, which hampers their ability to effectively address patient needs. To improve palliative care accessibility, it is essential to conduct an in-depth analysis of the influencing factors, identify existing barriers and develop targeted strategies.

In healthcare settings, accessibility refers to the alignment between service resources—such as geographic reach, availability, cost, time, and delivery methods—and the needs of the target population [16]. It is a key indicator of the equity and effectiveness of healthcare systems. This study applies the "Healthcare Supply–Demand Adaptation" model by Penchansky and Thomas, which divides accessibility into five dimensions: availability (the number and types of facilities), accessibility (distance and transportation options), accommodation (personalized care and patient satisfaction), affordability (economic capacity), and acceptability (acceptance of care philosophy and providers). This model is used to evaluate palliative care accessibility within the target population [17].

Numerous empirical studies have examined related factors, such as geographic location, socioeconomic status, healthcare infrastructure, and health literacy. For example, studies have shown that rural populations often face greater barriers to accessing hospice care due to limited healthcare facilities and longer travel distances [18].

However, these findings are often fragmented, necessitating a systematic review to integrate the evidence and provide clearer insights for improving palliative care accessibility.

Prior to this review, two systematic reviews on the needs of terminal patients and their caregivers were published in 2020 and 2023 [19, 20]. While previous studies have made significant contributions to understanding palliative care accessibility, there remain areas that warrant further exploration. First, accessibility involves multiple complex factors, including medical resource distribution, financial capacity, cultural influences, and family preferences. However, these factors have not always been addressed in a holistic manner, which may limit the applicability of findings for improving comprehensive services. Second, most studies have focused on cancer patients, potentially overlooking the unique needs of those with other terminal or chronic diseases. Expanding the scope to include a broader range of conditions could provide a more inclusive understanding of hospice care accessibility. Lastly, existing research has largely emphasized micro-level factors, such as patient needs and preferences, with less attention given to macro-level influences like healthcare policies and institutional structures, which are crucial for improving overall service effectiveness. This study conducts a comprehensive evaluation of palliative care accessibility by incorporating both micro- and macro-level factors. An inclusive approach is employed to cover patients with non-cancer terminal or chronic diseases, facilitating a broader understanding of accessibility needs. Furthermore, findings from diverse contexts are integrated to provide a holistic perspective on the factors influencing accessibility and strategies for improving palliative care services.

In summary, this study conducts a systematic review of previous literature, providing a comprehensive and multidimensional analysis aimed at offering robust guidance for improving the accessibility of palliative care services.

Methods

Literature search strategy

In accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines [21], a systematic literature search was conducted across databases including PubMed, Web Of Science, CINAHL, Embase, the Cochrane Library, CNKI, Wanfang, and VIP databases. Considering the significant development of palliative care over the past decade and the evolving nature of the influencing factors, only literature published between January 2014 and July 2024 was included. To ensure a comprehensive and accurate analysis, the search keywords were derived from the five dimensions of accessibility proposed by Penchansky and Thomas: availability, accessibility, affordability, acceptability, and accommodation [17]. The search terms included (palliative care OR hospice care OR terminal care OR end of life care) AND (health services accessibility OR utilization OR equity OR availability OR accessibility OR accommodation OR affordability OR acceptability) AND (barriers OR obstacles OR challenges OR difficulties). The search strategy varied slightly across each database (Appendix I). Reference lists from included articles were also reviewed to ensure no relevant studies were overlooked.

Selection criteria

This study reviewed articles that examined the use of palliative care by patients and their families from an accessibility perspective. Articles meeting the following inclusion criteria were included: (1) the study population consisted of patients receiving palliative care services; (2) participants were aged 18 years and above; (3) the study focused on factors related to the accessibility of palliative care; (4) the article was published in a peer-reviewed journal; (5) the study design was cross-sectional, cohort, or case–control; and (6) the full text was available. The following types of studies were excluded: (1) those focusing on populations other than patients; (2) studies where participants did not receive palliative care services; (3) studies not addressing factors related to palliative care accessibility; (4) reviews, qualitative studies, case studies, or study protocols; (5) non-English or non-Chinese literature; and (6) articles that did not pass the evaluation criteria recommended by the Joanna Briggs Institute (JBI). Additionally, studies that directly reported odds ratios (OR) and 95% confidence intervals (CI) or provided multivariate logistic regression coefficients (β) and standard errors (SE) were included in the meta-analysis.

Quality assessment

The quality of the included studies was assessed using the Joanna Briggs Institute (JBI) literature quality assessment tools. The criteria recommended by JBI for cross-sectional, cohort, and case–control studies included 8, 11, and 10 items with "yes", "no", "unclear" and "not applicable" as answers respectively. Overall appraisal results were categorized as "included", "excluded" and "seek further info".

Data extraction

The article selection process is illustrated in Fig. 1. Two researchers (SZY and MD) independently reviewed the titles and abstracts of each article to assess eligibility. Full texts of potentially eligible articles were retrieved for further evaluation. Subsequently, two researchers (SZY and MD) independently screened the full texts

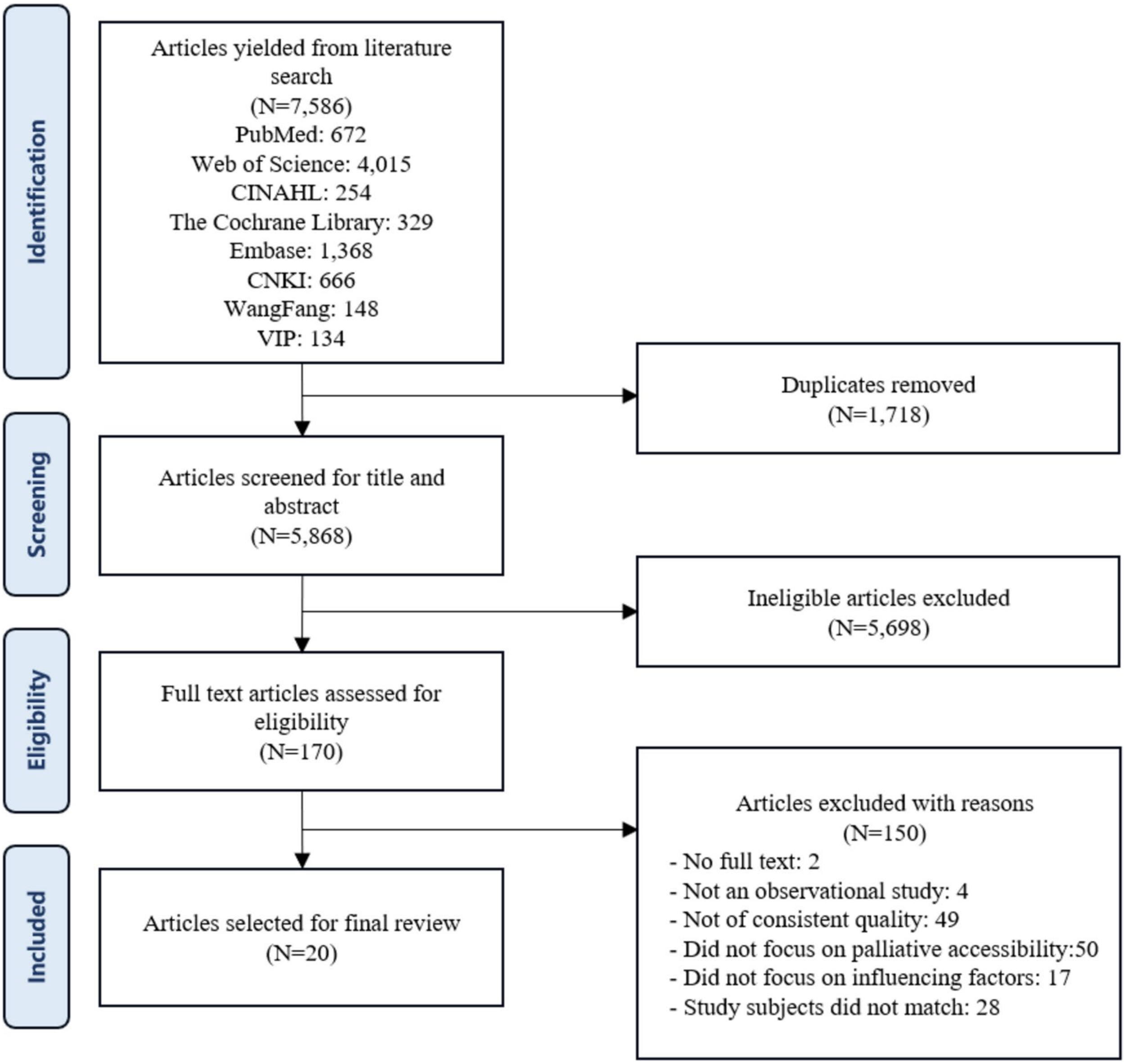


Fig. 1 PRISMA flow diagram

of all potential articles and discussed and reached a consensus on the eligibility of each article. In case of discrepancies, a third researcher (ZSQ) was consulted until agreement was reached. The article selection process resulted in a total of 20 final articles.

Data from the 20 eligible articles were independently extracted by two researchers (SZY and MD). Extracted data encompassed first author, study country, sample size, sample characteristics, year of publication, study type, influencing factors and measures of effect (OR and 95%CI, β and SE). A standardized data extraction form was used for data extraction. Researchers convened to discuss and resolve any disparities in data extraction.

Data synthesis and statistical analysis

Review Manager 5.3 software was used to analyze all data. First, a summary of the influencing factors identified in articles meeting the inclusion criteria was compiled. To address discrepancies, at least three OR values associated with the same factor were required for inclusion in the meta-analysis. If the heterogeneity test indicated significant heterogeneity ($P \leq 0.10$ and $I^2 > 50\%$), a random-effects model was used to combine OR and 95%

CI. Otherwise, a fixed-effects model was employed. A sensitivity analysis was conducted to explore the potential causes of significant heterogeneity and to assess the impact of key factors. Additionally, the leave-one-out method was used to evaluate the robustness of the included studies.

Results

Identification of studies

The study selection process is illustrated in Fig. 1. A total of 7,586 articles were identified across eight databases. Of these, 1,718 duplicate articles were excluded. After screening the remaining 5,868 articles, 5,698 were excluded based on the review of their titles and abstracts. The full text of the remaining 170 articles was reviewed. Ultimately, 20 studies met the inclusion criteria, with 16 studies included in the meta-analysis. The characteristics of each study are detailed in Table 1.

Description of studies

All the 20 identified studies were quantitative research. Among them, 15 utilized a retrospective design with secondary data analysis, two employed a cross-sectional design, and three used a cohort design. All included studies met the JBI quality assessment criteria. The research subjects in all studies comprised patients receiving palliative care services. Sample sizes ranged from 304 to 2,289,965 individuals. Eighteen studies were conducted in developed countries (USA, Australia, South Korea, Denmark, Canada), while two were conducted in developing countries (China, Ethiopia). The subjects were all aged 18 and above, encompassing races such as White, African American, Asian, Hispanic, and Native American, and included both cancer and non-cancer patients.

The influencing factors of palliative care accessibility

The studies included in this analysis were categorized according to the five dimensions of palliative care accessibility. Specifically, there were no studies on availability, one study on accessibility, two studies on affordability, one study on accommodation, and sixteen studies on acceptability.

Accessibility

One study used the modified Monash model index, a tool that assesses geographic accessibility to healthcare services, and found that geographical location is a significant factor influencing the accessibility of palliative care. Patients in small rural towns have lower accessibility due to the greater distance from palliative care facilities [22].

Affordability

One study indicated that race and ethnicity significantly influence the costs of palliative care, with minority patients incurring higher medical expenses at the end of life [35]. Another study, incorporating sociological analysis, found that employment status significantly affects palliative care costs. Compared to retirees, elderly individuals who are still employed incur significantly lower medical expenses at the end of life [23].

Accommodation

One study found significant differences in satisfaction with palliative care services among patients with different religious beliefs and death locations. Families of patients who died in the ICU were more satisfied with the quality of end-of-life care compared to those whose loved ones died in other hospital wards. Additionally, the families of Muslim patients were less satisfied with the quality of end-of-life care compared to families of patients with other religious beliefs [24].

Acceptability

Research on the acceptability of palliative care is the most extensive and can be categorized into three main factors: sociodemographic factors, healthcare service factors, and disease-related factors.

Sociodemographic factors Age: Fourteen studies investigated the relationship between age and the acceptability of palliative care. Five studies found that older patients are less likely to accept palliative care [25, 28, 32–34]. Among these, four studies specifically noted that the acceptability rate significantly decreases in patients aged 85 years and older [25, 28, 32, 34]. However, seven studies showed that older age is independently associated with increased acceptability of palliative care [26, 29, 31, 36–39]. One study found that cancer patients demonstrate a higher acceptability rate of palliative care with increasing age compared to non-cancer patients [39]. Only two studies reported no significant relationship between age and the acceptability of palliative care [27, 30].

Gender: Twelve studies investigated the relationship between gender and the acceptability of palliative care. Nine of these studies consistently found that women were more likely to accept palliative care compared to men [25, 26, 28, 29, 32–34, 36, 38]. However, three studies reported no significant relationship between gender and the acceptability of palliative care [27, 30, 39].

Marital Status: Six studies investigated the relationship between marital status and the acceptability of palliative care. Two studies indicated that married individuals

Table 1 Description of studies included

Dimension	Article/ Country	Study design	Sample	Predictors	Quality Assessment	Type of service
Accessibility	Cerni (2023) Australian [22]	Retrospective analysis (data from IHIP)	3546 patients with cancer, who died between 2015 and 2019	Travel time, geographic location	Included	Palliative care
Affordability	Kim (2019) Korea [23]	Retrospective analysis (data from NHIC)	609 individuals aged 65 and older between 2011 and 2013	Labor status, income level, education level, marital status, gender, proximity to death	Included	Palliative care
	Chen (2020a) United States	Retrospective analysis (data from SEER Medicare database)	63,375 patients with non-small cell lung cancer and 26,819 patients with small cell lung cancer between 2000 and 2011	Race/ethnicity	Included	Hospice care
Accommodation	Nayfeh (2021) Canada [24]	Cross-sectional study	1,543 respondents between 2012 to 2019	Race/ethnicity, religion, religiosity, language/communication barriers, location of death	Included	End-of-life care
Acceptability	Yu (2023) China [25]	Retrospective analysis (data from NHI claims data, Taiwan's Death Registry, and the Taiwan Cancer Registry)	2,289,965 people who died between 2002 and 2017	Period, age, gender, poverty status, marital status, severe disease, CPR	Included	Hospice care
	Vallabhajosyula(2019) United States [26]	Retrospective analysis (data from NIS)	444,253 admissions for acute myocardial infarction-complicated cardiogenic shock between 2000 and 2014	AMI type, age, gender, race, primary payer, household income, hospital teaching status and location, hospital region, Charlson Comorbidity Index, comorbidities	Included	Palliative care
Acceptability	Teklemariam(2022) Ethiopia [27]	Facility-based cross-sectional study	304 systematically selected adult cancer patients receiving palliative care service in Tikur Anbessa Specialized Hospital	Educational status, occupational status, family size, monthly income	Included	Palliative care
	Rosenwax(2016) Australia [28]	Retrospective analysis (data from the Data Linkage Branch at the WA Department of Health)	12,817 deaths between 2009 and 2010	Age, gender, partner, accessibility index, IRSD of area of residence, residence at death	Included	Palliative care
	Murthy(2016) United States [29]	Retrospective analysis (data from NIS)	311,217 patients with intracerebral hemorrhage	Age, gender, race, health insurance, transfer, hospital geographic region, location, Modified Charlson Comorbidity Index	Included	Palliative care
	Kumar(2020) United States [30]	Prospective cohort study (using the National Health and Aging Trends Study)	1,868 community dwelling NHATS respondents between 2011 and 2017	Caregiving hours	Included	Hospice care
	Kim(2023) United States [31]	Retrospective analysis (data from NIS)	5,209 metastatic breast cancer patients between 2010 and 2014	Age, race, primary payer, severity of illness subclass, in-hospital death, surgery, chemotherapy, hospital status, region of hospital	Included	Palliative care

Table 1 (continued)

Dimension	Article/ Country	Study design	Sample	Predictors	Quality Assessment	Type of service
Acceptability	Huo(2019) United States [32]	Retrospective analysis (data from SEER Medicare database)	69,414 patients with metastatic non–small-cell lung cancer (NSCLC) between 2001 and 2013	Year of diagnosis, age, gender, race, census poverty, census region, chemotherapy, radiation therapy, hospice use, home care use	Included	Palliative care
	Hugar(2019) United States [33]	Retrospective analysis (data from SEER Medicare database)	7,303 patients diagnosed with muscle-invasive bladder cancer between 2008 and 2013	Age, gender, comorbidity, population of county of residence, geographic region, treatment	Included	Palliative care
	Gani(2017) United States	Retrospective analysis (data from NIS)	282,899 Patients admitted with primary diagnosis of gastrointestinal and/or thoracic cancer between 2012 and 2013	Age, gender, race, insurance, income zip quartile, Charlson Comorbidity Index, inpatient surgical procedure, Hospital Bed Capacity, Length of Stay, Postoperative Complication	Included	Palliative care
	Fukui(2017) United States	Retrospective analysis (data from SEER Medicare database)	2982 patients with primary liver cancer between 2002 and 2009	Age, race, Charlson Comorbidity Index, inpatient surgical procedure, history of radiosurgery therapy	Included	Hospice care
	Forst(2017) United States	Retrospective analysis (data from SEER Medicare database)	12,437 patients who diagnosed with malignant gliomas and subsequently passed away between 2002 and 2012	Age, gender, race, rural zip code, median household income, education	Included	Hospice care
Acceptability	Chen(2020b) United States	Retrospective analysis (data from NIS)	5,833 metastatic breast cancer (mBCa) patients receiving critical care therapies (CCT) between 2005 and 2014	Year interval, hospital type, primary diagnosis, metastatic sites, type of CCT, do not Resuscitate	Included	Palliative care
	Cagle(2019) United States	Prospective cohort study(data from HRS)	1,209 participants who died between the 2012 and 2014 survey waves	Age, region, dementia, self-rated health, cause of death	Included	Hospice care
	An(2014) Korea	Prospective cohort study	359 patient-caregiver dyads diagnosed with terminal cancer	Awareness of the patient's terminal status, religion, metastasis, ECOG performance status	Included	Palliative and hospice care
	Adsersen(2017) Denmark [34]	Retrospective analysis (data from Danish Palliative Care Database)	44,548 adults with cancer as the underlying cause of death between 2010 and 2012	Age, gender, diagnosis (cancer site)	Included	Palliative care

CI Confidence interval, *OR* Odds ratio, *PCP* Primacy care provider, *NIS* Nationwide inpatient sample, *SEER* Surveillance, epidemiology, and end results, *SES* Socio-economic status, *IHIP* Illawarra Health Information Platform, *NHIC* National Health Insurance Corporation were more likely to accept palliative care, while unmarried individuals had lower acceptability [25, 28]. Conversely, four studies found no significant association between marital status and the acceptance of palliative care [27, 30, 32, 38].

Economic Status: Seven studies investigated the relationship between economic status and the acceptability of palliative care. Six studies found that higher socioeconomic status was independently associated with increased utilization of palliative care, while poverty negatively impacted the use of these services [25–27, 32, 36, 38]. However, one study reported no significant association between economic status and the acceptability of palliative care [40].

Race: Nine studies investigated the relationship between race and the acceptability of palliative care. All of these studies were conducted in the United States, where racial disparities in healthcare access are well-documented. Six studies reported that individuals of African descent are less likely to accept palliative care compared to White individuals [26, 29–31, 37, 38]. Four studies reported that Hispanic individuals have significantly lower acceptance rates [26, 29, 30, 38]. Four studies indicated that Asian individuals also have significantly lower acceptance rates of palliative care [26, 29, 37, 38]. However, one study found that individuals of African descent were more likely to accept palliative care [32], and another study found that Hispanic individuals were more likely to accept palliative care [36]. Additionally, one study reported no significant association between race and the acceptability of palliative care [40].

Education Level: Four studies investigated the relationship between education level and the acceptability of palliative care. One study found that patients with formal education were significantly less likely to use palliative care compared to those without formal education [27]. Another study indicated that patients with higher education levels were more inclined to choose palliative care at the end of life [38]. Two studies reported no significant relationship between education level and the acceptability of palliative care [30, 39].

Residence: Urban residents were more likely to use palliative care compared to rural residents [25, 28, 29, 38]. Additionally, two studies found no significant relationship between place of residence and the acceptability of palliative care services [27, 32].

Other Factors: Two studies indicated that patients using home care services were more likely to accept palliative care. Additionally, the longer the duration of home care, the higher the likelihood of accepting palliative care [30, 32]. One study found that patients with larger families (three or more members) were more likely to accept palliative care [27]. One study indicated that employment status significantly affected the acceptability of palliative care [27]. Two studies found that religious affiliation significantly influenced the acceptability of palliative care [24, 41].

Healthcare service factors Treatment Regimen: Seven studies investigated the relationship between treatment regimen and the acceptability of palliative care. One study found that receiving Cardiopulmonary Resuscitation (CPR) in the last year of life was negatively associated with the acceptance of palliative care [25]. Two studies showed that the use of mechanical ventilation was positively associated with the acceptability of palliative care [26, 29]. Three studies indicated that patients who underwent surgery or chemotherapy/radiotherapy were significantly less likely to accept palliative care [31, 36, 37]. However, one study found that patients receiving chemotherapy/radiotherapy were more likely to accept palliative care [32].

Health Insurance: Five studies investigated the relationship between health insurance types and the acceptability of palliative care. Two studies found that patients with private insurance were less likely to accept palliative care [26, 29]. One study indicated that patients with Medicaid had lower acceptance of palliative care [29]. Another study showed that patients with Medicare or self-pay were also less likely to accept palliative care [31]. Conversely, one study found that patients with Medicare or other types of insurance were more likely to accept palliative care [36]. Only one study reported no significant relationship between insurance type and the acceptability of palliative care [40].

Hospital Bed Capacity: Four studies investigated the relationship between hospital bed capacity and the acceptance of palliative care. Two studies found that larger hospital bed capacity was associated with higher acceptability of palliative care [31, 40].

Hospital Location: Four studies demonstrated a significant correlation between the geographical location of hospitals and the acceptability of palliative care [26, 29, 31, 40]. Notably, palliative care acceptability was substantially higher in urban teaching hospitals [31, 40].

Disease-related factors Two studies found that having a history of severe illness was positively associated with the acceptance of palliative care [25, 28]. Four studies indicated that patients with more comorbidities were more likely to accept palliative care [26, 29, 33, 36], but one study found that having fewer comorbidities was positively associated with the acceptance of palliative care [37]. One study reported no significant relationship between comorbidities and the acceptance of palliative care [32]. Another study found that the awareness of the terminal status by patients and caregivers was significantly associated with the acceptance of palliative care [41]. Two studies indicated that patients with cancer or dementia were more likely to accept palliative care [30, 39].

Meta-analysis of Pooled OR and Heterogeneity test

A total of nine factors related to the accessibility of palliative care were included for quantitative analysis. The meta-analysis results showed that female gender (OR = 1.18, 95% CI: 1.14–1.23)(Fig. 2), high income level (OR = 1.11, 95% CI: 1.08–1.14)(Fig. 3), and larger hospital bed capacity (OR = 1.22, 95% CI: 1.14–1.32) (Fig. 4) were facilitating factors for the accessibility of palliative care ($P < 0.05$). Conversely, residing in rural areas (OR = 0.80, 95% CI: 0.67–0.95)(Fig. 5) and being of African descent (OR = 0.78, 95% CI: 0.68–0.90) (Fig. 6) were barrier factors for the accessibility of palliative care ($P < 0.05$). Marital status(Fig. 7), insurance type(Fig. 8), comorbidities(Fig. 9), and hospital teaching status(Fig. 10) were found to be unrelated to the accessibility of palliative care.

Heterogeneity tests were conducted for all studies, revealing high heterogeneity in most combined estimates(Table 2). The factor with the smallest heterogeneity ($P > 0.10$ and $I^2 \leq 50\%$) was income level, for which a fixed-effects model was used to summarize ORs (95% CI). For the remaining eight factors, heterogeneity tests were highly significant with I^2 ranging from 55 to 99%.

Sensitivity analysis

A sensitivity analysis was conducted using a one-by-one exclusion method to assess the impact of each study on the overall effect size. After excluding Gani et al. [36], being female remained a facilitating factor for the accessibility of palliative care [OR = 1.20, 95% CI (1.17, 1.22), $P < 0.00$]. Excluding Forst et al. [38] showed that marital status had no significant impact on accessibility [OR = 1.01, 95% CI (0.96, 1.06), $P = 0.74$]. Excluding Murthy et al. [29] confirmed that living in rural areas was a barrier to accessibility [OR = 0.86, 95% CI (0.78, 0.95), $P = 0.00$], while Medicaid showed no significant effect [OR = 0.97, 95% CI (0.90, 1.05), $P = 0.50$]. Excluding Hugar et al. [33] revealed that a comorbidity index of ≥ 3 had a significant effect on accessibility [OR = 0.96, 95% CI (0.93, 0.99), $P = 0.01$]. Excluding Vallabhajosyula et al. [26] confirmed the significant effect of urban teaching hospitals [OR = 1.45, 95% CI (1.18, 1.78), $P = 0.00$] and larger hospital bed capacity [OR = 1.19, 95% CI (1.14, 1.25), $P < 0.00$] on accessibility. The heterogeneity for race could not be resolved through exclusion.

Discussion

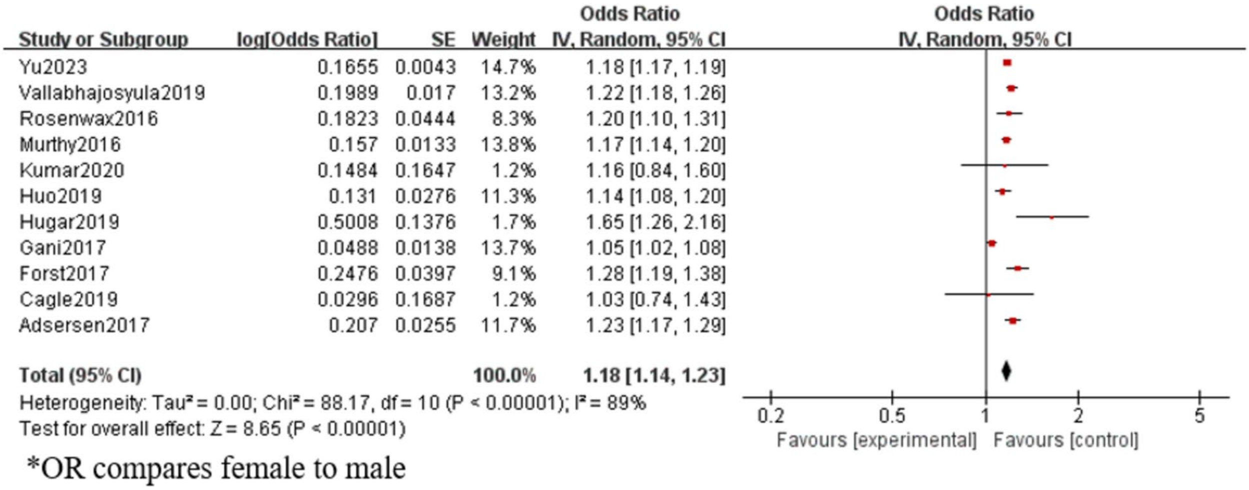
This study comprehensively explored the factors influencing the accessibility of palliative care across five dimensions: availability, accessibility, affordability, acceptability, and accommodation. Availability refers to whether the number and types of palliative care facilities meet the needs of patients. Accessibility concerns the spatial distance between patients and palliative care service locations, including transportation and travel time. Affordability is the extent to which the cost of palliative care services aligns with the income and payment capacity of patients or their families. Acceptability involves whether patients and their families can accept the philosophy, service content, and providers of palliative care. Accommodation relates to patient satisfaction with palliative care services, assessing whether the services meet individualized needs. The meta-analysis provided more detailed insights into specific significant factors within each category. Female gender, high income, and larger hospital bed capacity were found to be facilitating factors for the accessibility of palliative care, while residing in rural areas and being of African descent were identified as barrier factors.

Imbalance in the number of studies across five dimensions

While retrieving and analyzing studies related to the five dimensions, it was found that there was a greater abundance of research on acceptability, whereas studies directly analyzing availability, accessibility, affordability, and accommodation are relatively scarce. Although these other dimensions are crucial, there was a lack of studies that directly analyze their impact. This scarcity can be attributed to several reasons. Evaluating availability, accessibility, affordability, and accommodation requires in-depth investigations into the distribution of medical resources, the conditions of healthcare facilities, service pricing, and the organizational methods for resource allocation. Such analyses demand complex fieldwork and robust data collection methodologies, which are time-consuming and costly. In contrast, the acceptability dimension, which often relies on surveys and interviews with patients and their families, is relatively easier to explore because it primarily involves gathering subjective feedback, which can be more readily available.

The challenges of studying the other four dimensions are further compounded by the nature of available data. Most included studies are retrospective, relying heavily on existing databases. These databases, while useful for analyzing service utilization rates, demographic trends, and patient satisfaction, often lack the granular data required to assess facility conditions, service affordability, and the geographic distribution of resources. Additionally, studies focused on availability and accessibility typically require collaboration with medical institutions to access detailed information on their infrastructure, geographic location, and resource availability, which may be restricted due to privacy or confidentiality concerns.

Furthermore, the dimensions of affordability and accessibility introduce additional layers of complexity as they require the integration of economic and social factors. Affordability considers not only the cost of palliative care but also the financial capabilities of the patients and their families, as well as the structure of health insurance and subsidies. Accessibility, on the other hand, is heavily dependent on geographical factors, including

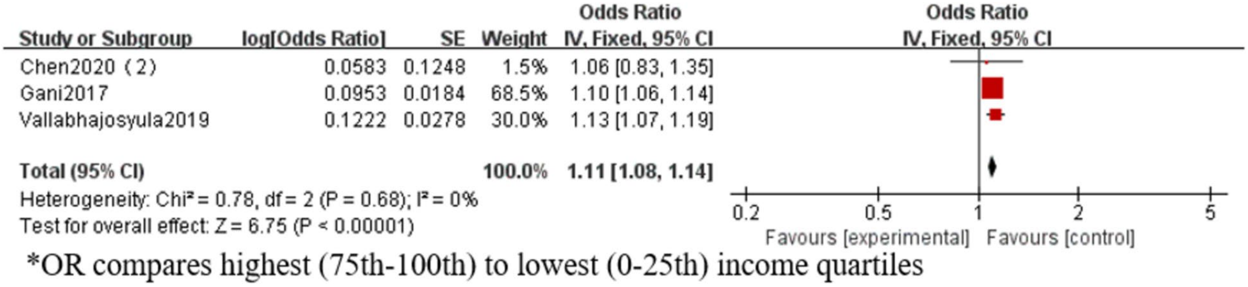


Study or Subgroup	log[Odds Ratio]	SE	Weight	Odds Ratio IV, Random, 95% CI
Yu2023	0.1655	0.0043	14.7%	1.18 [1.17, 1.19]
Vallabhajosyula2019	0.1989	0.017	13.2%	1.22 [1.18, 1.26]
Rosenwax2016	0.1823	0.0444	8.3%	1.20 [1.10, 1.31]
Murthy2016	0.157	0.0133	13.8%	1.17 [1.14, 1.20]
Kumar2020	0.1484	0.1647	1.2%	1.16 [0.84, 1.60]
Huo2019	0.131	0.0276	11.3%	1.14 [1.08, 1.20]
Hugar2019	0.5008	0.1376	1.7%	1.65 [1.26, 2.16]
Gani2017	0.0488	0.0138	13.7%	1.05 [1.02, 1.08]
Forst2017	0.2476	0.0397	9.1%	1.28 [1.19, 1.38]
Cagle2019	0.0296	0.1687	1.2%	1.03 [0.74, 1.43]
Adsersen2017	0.207	0.0255	11.7%	1.23 [1.17, 1.29]
Total (95% CI)			**100.0%**	**1.18 [1.14, 1.23]**

Heterogeneity: Tau² = 0.00; Chi² = 88.17, df = 10 (P < 0.00001); I² = 89%
Test for overall effect: Z = 8.65 (P < 0.00001)

*OR compares female to male

Fig. 2 Forest plot of the impact of gender on accessibility to palliative care

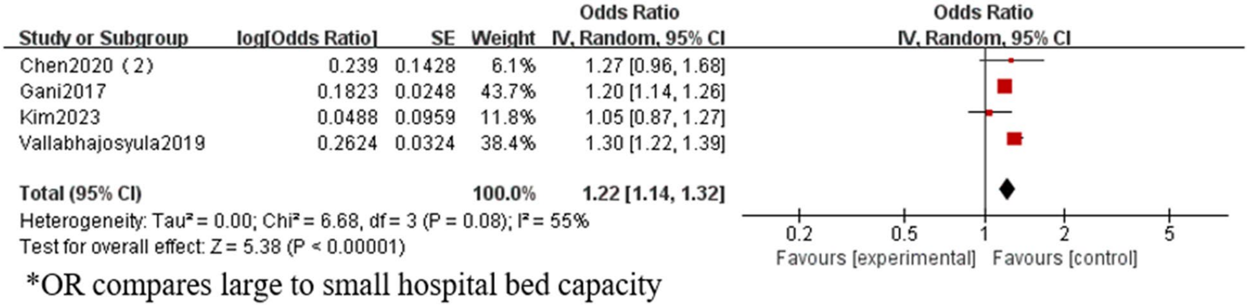


Study or Subgroup	log[Odds Ratio]	SE	Weight	Odds Ratio IV, Fixed, 95% CI
Chen2020（2）	0.0583	0.1248	1.5%	1.06 [0.83, 1.35]
Gani2017	0.0953	0.0184	68.5%	1.10 [1.06, 1.14]
Vallabhajosyula2019	0.1222	0.0278	30.0%	1.13 [1.07, 1.19]
Total (95% CI)			**100.0%**	**1.11 [1.08, 1.14]**

Heterogeneity: Chi² = 0.78, df = 2 (P = 0.68); I² = 0%
Test for overall effect: Z = 6.75 (P < 0.00001)

*OR compares highest (75th-100th) to lowest (0-25th) income quartiles

Fig. 3 Forest plot of the impact of income level on accessibility to palliative care



Study or Subgroup	log[Odds Ratio]	SE	Weight	Odds Ratio IV, Random, 95% CI
Chen2020（2）	0.239	0.1428	6.1%	1.27 [0.96, 1.68]
Gani2017	0.1823	0.0248	43.7%	1.20 [1.14, 1.26]
Kim2023	0.0488	0.0959	11.8%	1.05 [0.87, 1.27]
Vallabhajosyula2019	0.2624	0.0324	38.4%	1.30 [1.22, 1.39]
Total (95% CI)			**100.0%**	**1.22 [1.14, 1.32]**

Heterogeneity: Tau² = 0.00; Chi² = 6.68, df = 3 (P = 0.08); I² = 55%
Test for overall effect: Z = 5.38 (P < 0.00001)

*OR compares large to small hospital bed capacity

Fig. 4 Forest plot of the impact of hospital bed capacity on accessibility to palliative care the proximity of healthcare facilities and transportation options available to patients. This type of detailed socio-economic data is often difficult to obtain and quantify, particularly in regions where healthcare data infrastructure is underdeveloped.

Moreover, the lack of comprehensive resources and policies in many countries regarding palliative care creates further barriers for researchers trying to analyze these dimensions. In many parts of the world, palliative care services are still in their infancy, with limited institutional support and policy frameworks. This gap complicates the ability to conduct meaningful research on the distribution and affordability of services.

Another consideration is the practical constraints faced by research institutions. Limited funding and resources often push researchers to focus on dimensions, like acceptability, that are easier and less resource-intensive to study. Studies on acceptability rely heavily on subjective

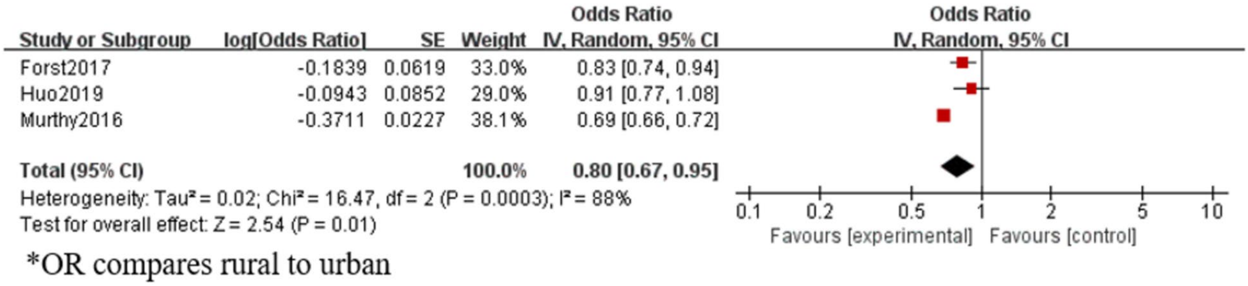


Fig. 5 Forest plot of the impact of place of residence on accessibility to palliative care

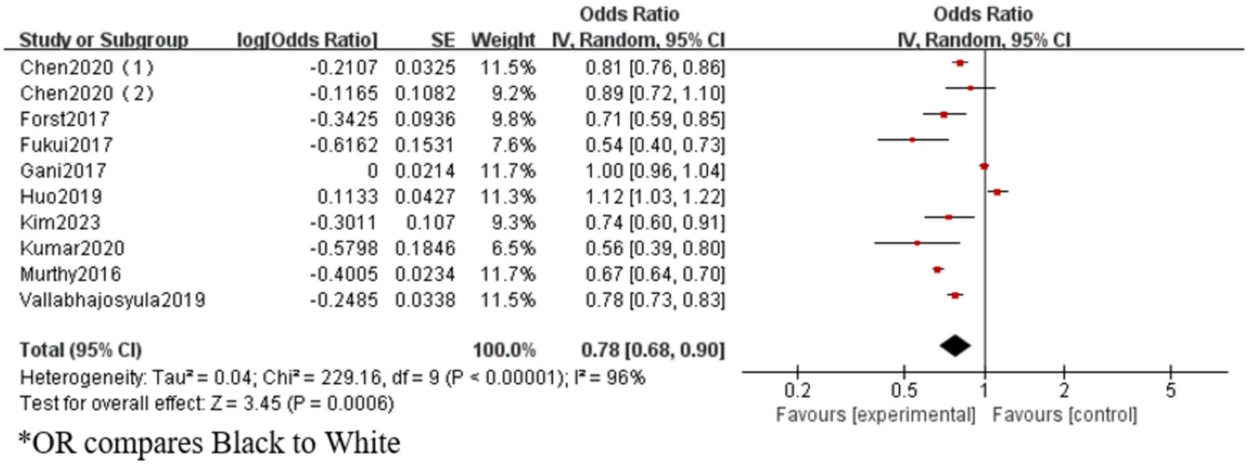


Fig. 6 Forest plot of the impact of race on accessibility to palliative care

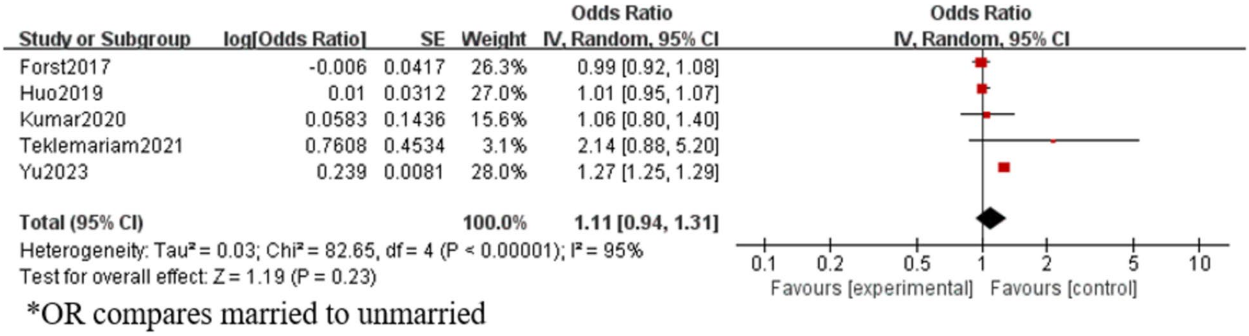


Fig. 7 Forest plot of the impact of marital status on accessibility to palliative care

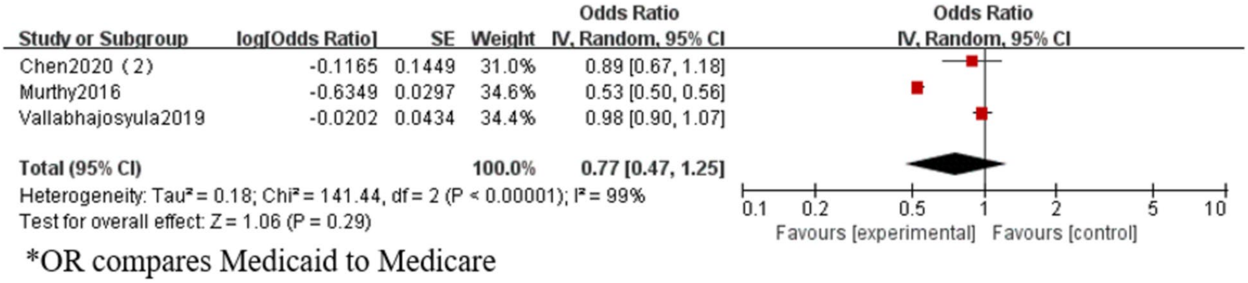


Fig. 8 Forest plot of the impact of insurance type on accessibility to palliative care

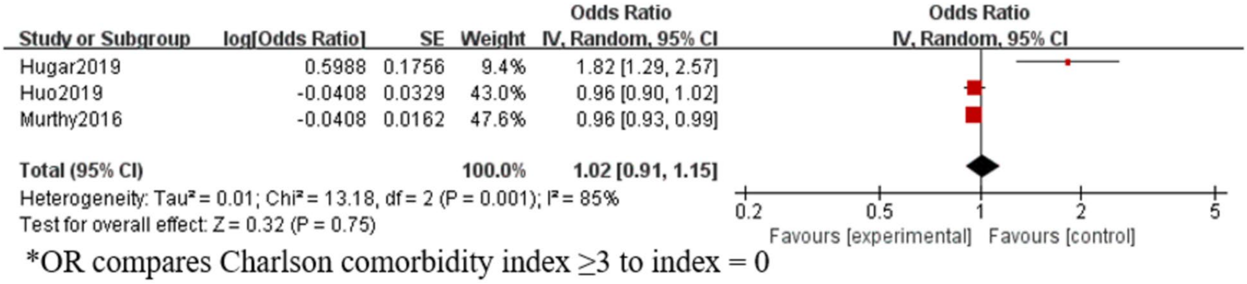


Fig. 9 Forest plot of the impact of comorbidities on accessibility to palliative care

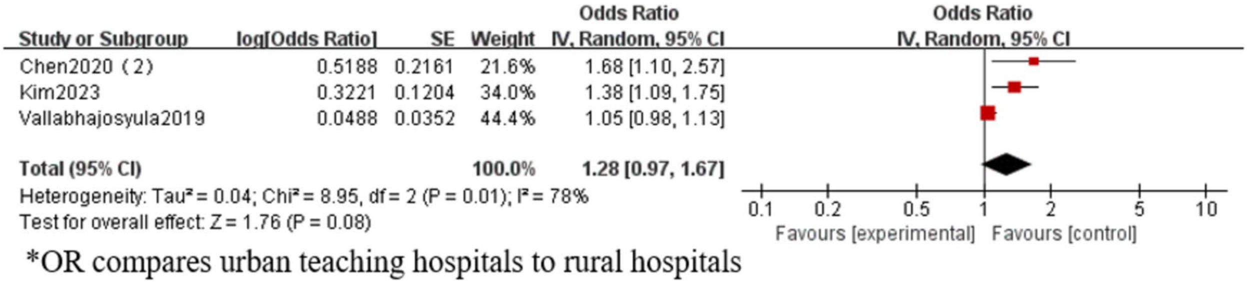


Fig. 10 Forest plot of the impact of hospital teaching status on accessibility to palliative care

Table 2 Results of Meta-analysis and Heterogeneity test

Influencing Factors	Number of included studies	Heterogeneity test results		Meta-analysis results		Sensitivity analysis
		I^2(%)	*P*	effect model	OR (95%CI)	OR (95%CI)
Gender	11	89	0.00	random	1.18(1.14,1.23)*	1.20(1.17, 1.22)*
Marital Status	5	95	0.00	random	1.11(0.94,1.23)	1.01(0.96, 1.06)
Residence	3	88	0.00	random	0.80(0.67,0.95)*	0.86(0.78, 0.95)*
Insurance Type	3	99	0.00	random	0.77(0.47,1.25)	0.97(0.90, 1.05)
Comorbidities	3	85	0.00	random	1.02(0.91,1.15)	0.96(0.93, 0.99)*
Hospital Teaching Status	3	78	0.01	random	1.28(0.97,1.67)	1.45(1.18, 1.78)
Hospital Bed Capacity	4	55	0.08	random	1.22(1.14,1.32)*	1.19(1.14, 1.25)*

* :$P < 0.05$

data from patient surveys and interviews, which are more accessible than the objective, infrastructural data needed to assess other dimensions. Additionally, the acceptability of palliative care is closely linked to cultural, social, and individual beliefs, which can be captured through relatively simple methodologies like questionnaires.

Finally, it is important to acknowledge that the scarcity of studies in availability, affordability, accessibility, and accommodation does not imply that these dimensions are any less critical. On the contrary, these factors are essential for the comprehensive evaluation of palliative care systems. Without detailed insights into how resources are distributed, priced, and organized, it is difficult to formulate policies that can effectively improve the overall accessibility of palliative care. Future research should aim to bridge this gap by focusing on field surveys and primary data collection that directly address these underexplored dimensions.

Factors influencing accessibility

The meta-analysis revealed that women have higher accessibility to palliative care. This may be due to women being more willing to seek and accept medical help and playing a crucial role in social support networks, which makes it easier for them to gain support from family and the community, thereby increasing the likelihood of accessing palliative care. This result aligns with existing literature, which highlights that women often have greater palliative care needs in the terminal stage due to factors such as frailty, dependency in activities of daily living, and longer life expectancy [42, 43].

High income levels are positively correlated with the accessibility of palliative care, reflecting the significant impact of economic status on the utilization of medical services. Patients with higher incomes not only have a greater ability to pay but may also possess private insurance and access to more medical resources [44], thereby enhancing service accessibility. In contrast, patients with lower incomes may struggle to obtain appropriate palliative care services due to insufficient payment capacity. Additionally, wealthier families typically have higher health awareness and knowledge about palliative care, which can stimulate a diverse range of palliative care needs, thereby increasing service utilization. Based on the above analysis, it is recommended that governments in low- and middle-income countries increase public funding for palliative care services, particularly providing subsidies and assistance to low-income families and expanding health insurance coverage to ensure that patients of all income levels can afford high-quality palliative care services. In high-income countries, where the public health system is more developed, the focus should be put on providing palliative care based on need rather than payment ability, encouraging and supporting the diversification of palliative care services. This includes offering a wider variety of service options, such as home care, community care, and day care, to meet the needs of patients from different income levels and enhance overall service utilization.

Patients residing in rural areas face lower accessibility to palliative care, highlighting issues such as the scarcity of medical resources, inconvenient transportation, and insufficient service coverage in these regions. Additionally, rural residents may have lower awareness and acceptance of palliative care, with cultural and traditional beliefs potentially affecting their utilization of services. Previous research indicates that educational deficiencies and cultural value differences hinder the widespread adoption of palliative care in rural areas [45]. To address these issues, it is recommended to strengthen the promotion of health concepts and advocate for the philosophy of quality living and dying across society. Special attention should be given to providing palliative care health education in rural areas to help residents understand the content and services of palliative care, enhance awareness, and increase their willingness to utilize these services. Elderly care institutions and community centers should be the main sites for palliative care education, with efforts made to broaden the service scope through scientific education. Moreover, the development of mobile healthcare and telemedicine technology can help mitigate the shortage of medical resources in rural areas. In the sensitivity analysis, the source of heterogeneity was found to be Murthy et al. This study focused on patients with non-traumatic intracerebral hemorrhage (ICH) and used data from the National Inpatient Sample (NIS), whereas the other two studies focused on cancer patients with data from the SEER-Medicare database. Differences in study populations and data sources likely contributed to the observed heterogeneity.

The analysis of the impact of the comorbidity index on the accessibility of palliative care showed that a comorbidity index of ≥ 3 did not significantly affect the accessibility of palliative care. However, after excluding the study by Hugar et al., the heterogeneity was significantly reduced, and the revised analysis indicated that a comorbidity index of ≥ 3 had a significant impact on the accessibility of palliative care. Further analysis revealed that Hugar et al.'s study used the Healthcare Financing Administration (HCFA) specialty code to identify palliative care, whereas the other studies used the International Classification of Diseases, Ninth Revision (ICD-9) code V66.7. The former may not fully capture all instances of palliative care. Differences in the methods of identifying and reporting palliative care likely contributed to the heterogeneity, masking the impact of the comorbidity index on palliative care accessibility. To ensure the accuracy of future results, it is crucial for research to reach a consensus on the identification and reporting methods of palliative care. It is recommended to adopt a more standardized and unified coding system.

Larger hospital bed capacity is a facilitating factor for the accessibility of palliative care. This indicates that larger hospitals generally have more resources and the capability to provide palliative care services. These hospitals often have more specialized medical teams and advanced facilities, enabling them to offer more comprehensive and high-quality palliative care. Therefore, it is essential to optimize hospital resource allocation and promote the active role of large hospitals in palliative care services. This requires reorienting the development model of hospitals away from profit-driven mechanisms that focus on expanding scale, increasing profitability, and maximizing patient throughput. Instead, hospitals should gradually return to their public welfare attributes and social responsibilities. Promoting the downward distribution of high-quality medical resources can expand the influence of hospitals, enhance their image of humanistic care, and increase patient recognition and satisfaction. Moreover, establishing and improving a medical service network that covers both urban and rural areas is crucial. This promotes cooperation and resource sharing among medical institutions at different levels. Large hospitals should actively assist primary healthcare institutions in enhancing their service capabilities. Regular training, technical support, and experience sharing can improve the professional skills and service levels of primary healthcare personnel, creating a healthcare network system centered around large hospitals and supported by primary healthcare institutions. This will improve the overall accessibility and quality of palliative care services.

Being of African descent is also a barrier factor for the accessibility of palliative care. This finding is consistent with previous research, indicating that racial disparities significantly affect the utilization of palliative care [46, 47]. Additionally, studies have reported that patients of African descent are more likely to seek intensive treatments such as mechanical ventilation, feeding tube insertion, dialysis, cardiopulmonary resuscitation, and multiple emergency room visits in the last six months of life, whereas White patients are more likely to choose hospice care [48]. This outcome is not only a result of individual choices but is deeply rooted in broader social structures and systemic biases. Discrimination within the healthcare system may erode trust in the medical system among African American patients, leading to reluctance in seeking palliative care or avoiding medical advice altogether. Furthermore, cultural differences play a significant role in how African American patients perceive end-of-life care. In many African American communities, there is a strong preference for family-centered care and aggressive treatment, even at the end stage. This cultural inclination often leads patients and families to reject palliative care in favor of invasive life-sustaining treatments. These cultural beliefs not only shape patients' preferences but also influence how healthcare providers discuss and recommend palliative care. Addressing these issues requires measures at both policy and practice levels. Continuous efforts are needed to reduce racial disparities in end-of-life care by better educating and training healthcare providers and fostering discussions about personal values and treatment preferences within the African American community regarding end-of-life care. However, in the sensitivity analysis, heterogeneity could not be eliminated using the one-by-one exclusion method, indicating the complexity of this issue. The persistent heterogeneity suggests that racial differences are influenced by multiple interconnected factors. This underscores the importance of recognizing and addressing the comprehensive, multidimensional impact of race on the accessibility of palliative care in research.

Implications for research

To better inform efforts to enhance the accessibility of palliative care, several important issues remain to be clarified in future research.

Firstly, future research should place greater emphasis on the role and influence of family caregivers in palliative care. As primary caregivers, family members significantly impact service acceptance, emotional support, and care quality. However, current research has predominantly focused on patients, with limited attention to caregivers. Future studies should explore the needs of family caregivers, such as emotional support, caregiving knowledge, and psychological well-being, as well as their role in decision-making processes related to palliative care. It is also important to investigate how educational programs for caregivers can enhance their understanding and acceptance of palliative care and improve their caregiving abilities. Additionally, research should examine the interactions between caregivers and healthcare teams to enhance communication quality, trust, and satisfaction with palliative care services. Incorporating the perspectives of family caregivers will provide a more comprehensive understanding of palliative care accessibility and contribute to more effective strategies for improving service delivery.

Secondly, future research should further refine the analysis of influencing factors across the dimensions of availability, accessibility, affordability, and accommodation. This will likely involve detailed investigations and data analyses at the macro (government), meso (healthcare institutions), and micro (patients and families) levels. At the macro level, research should focus on government policies, funding, and resource distribution to improve palliative care accessibility. Evaluating policy effectiveness and the government's role in optimizing resource allocation, especially in remote and rural areas, is essential for ensuring broader service coverage. At the meso level, studies should examine healthcare facilities' conditions, resource organization, and service delivery models, analyzing the roles of various healthcare institutions (such as general hospitals, specialized hospitals, and community health centers) in providing palliative care. Differences in resource allocation, team composition, service scope, and quality across these institutions are important areas for exploration. At the micro level, research should investigate how factors like economic capacity, health beliefs, social support, and cultural background of patients and families affect access to palliative care. Additionally, social support networks, including family members, community organizations, and volunteers, play a key role in providing emotional support and practical assistance, which warrants further study.

While this study addresses micro- and meso-level factors, there is insufficient emphasis on macro-level factors, particularly the role of national policies, funding disparities, and healthcare infrastructure in palliative care accessibility. National policies and funding disparities directly influence the allocation and coverage of palliative care services, while inadequate healthcare infrastructure often acts as a barrier to accessing high-quality services. Future research should place greater focus on these macro-level factors to better understand systemic barriers to palliative care accessibility.

Implications for practice

This study provides several actionable recommendations to improve palliative care accessibility. Policymakers should implement targeted financial support mechanisms, such as expanding health insurance coverage for palliative care services and providing direct subsidies for low-income patients. Additionally, expanding social support programs can help alleviate out-of-pocket expenses, especially in rural areas, thus improving accessibility for underserved populations. Healthcare providers should undergo specialized cultural competency training and adopt culturally appropriate communication methods when engaging with patients and families regarding palliative care. This approach will help address cultural barriers and ensure that communication is sensitive to the needs of diverse populations. Strategic investments in healthcare infrastructure are needed, particularly in rural and underserved areas. This includes increasing the number of palliative care beds in hospitals and nursing homes, expanding telemedicine services to bridge geographic gaps, and ensuring transportation options are available to facilitate patient access to palliative care centers. Governments and healthcare institutions should initiate public awareness campaigns to educate the public about palliative care options. In addition, creating online platforms and local community outreach programs can help reduce stigma and misinformation in rural and low-income areas. Finally, governments can create incentive programs to encourage healthcare institutions to enhance the quality of palliative care services. These programs should include funding for staff training, infrastructure improvements, and research into best practices for delivering palliative care.

Limitations

This meta-analysis has several limitations that should be acknowledged. First, most of the included studies employed retrospective secondary data analyses, which carry the barrier of selection bias and limit the ability to establish causality. Additionally, these data sources often lack detailed information on psychosocial factors and patient preferences. Moreover, there is a notable under-representation of studies from low- and middle-income countries. Most studies originated from high-income countries, particularly the United States. Due to significant differences in healthcare systems, resource allocation, and cultural contexts, the findings may not be generalizable across countries with varying healthcare infrastructures. Even within the United States, disparities based on race, geography, and socioeconomic status make it difficult to apply the results universally. Furthermore, the findings may not fully reflect the unique challenges faced by low- and middle-income countries (LMICs), which often encounter issues such as resource scarcity, financial constraints, and weak healthcare infrastructure, all of which impact the accessibility of palliative care services. Additionally, the lack of standardization in outcome measures across studies complicates the interpretation of results. Various studies used different definitions and cut-off points for key variables, such as accessibility and acceptability, contributing to inconsistent findings. Lastly, publication bias is a concern, as studies with significant findings are more likely to be published than those with null results. This bias can skew the overall effect estimates. Studies should integrate mixed-methods approaches to combine quantitative data with qualitative insights, use longitudinal designs to track changes in accessibility and long-term trends in palliative care utilization, and address publication bias by including more diverse geographic locations and standardizing outcome measures for a more comprehensive assessment of palliative care accessibility.

Conclusions

This systematic review and meta-analysis provides a comprehensive exploration of the factors influencing the accessibility of palliative care, encompassing five dimensions: availability, accessibility, affordability, acceptability, and accommodation. Our findings indicate that female gender, high income, and larger hospital bed capacity are facilitating factors, while residing in rural areas and being of African descent are barrier factors for accessing palliative care. In conclusion, improving the accessibility of palliative care requires a multifaceted approach that considers macro, meso, and micro-level factors. By addressing these diverse elements, we can better support terminally ill patients and their families, ensuring equitable and effective palliative care services.

Abbreviations

CI	Confidence Interval
OR	Odds Ratio
PCP	Primacy Care Provider
SEER	Surveillance, Epidemiology, and End Results
SES	Socio-economic Status
IHIP	Illawarra Health Information Platform
NIS	Nationwide Inpatient Sample
NHIC	National Health Insurance Corporation
HCFA	Healthcare Financing Administration
ICD-9	International Classification of Diseases, Ninth Revision
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
JBI	Joanna Briggs Institute

Supplementary Information

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Supplementary Material 1.

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Authors' contributions

Z.Y. S and M. D contributed equally to the study and manuscript. S.Q. Z, Z.Y. S and M. D designed the study, designed and run the literature search. All authors (Z.Y. S, M. D, S.Q. Z, Y.L, Q. X, W.Y. L, W.W. G, N. Z, Y. C, W.T. L, H.N. W and Y.C. J) acquired data, screened records, extracted data, and assessed the risk of bias. S.Q. Z, Z.Y. S and M. D did the statistical analyses and wrote the report. S.Q. Z, Y.L and Q. X served as co-corresponding authors, overseeing the project. All authors provided critical conceptual input, analyzed and interpreted the data, and critically revised the report. All authors read and approved the final manuscript.

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Data availability

Data is provided within the manuscript or supplementary information files.

Declarations

Ethics approval and consent to participate

Not applicable.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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