


REVIEW

Oral health and oral health-related quality of life among older adults receiving home health care services: A scoping review

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Objective: To map the literature on subjective and objective oral health indicators and oral health-related quality of life (OHRQoL) in older adults receiving home health care services (HHCS).

Background: The proportion of older adults in need of HHCS will increase in the coming years. Previous studies indicate that frail and dependent older adults are at increased risk for oral diseases, due to challenges with daily oral hygiene and regular access to dental services.

Materials and methods: Four databases were searched in November 2020 for relevant literature. Search terms included a comprehensive list of terms for adults 65 years or older receiving HHCS, clinical and subjective oral health indicators, and OHRQoL. The literature was reviewed based on inclusion and exclusion criteria.

Results: Of the 3114 sources identified, 18 were included. Data on oral diseases and symptoms among older adults receiving HHCS were limited and heterogeneous. Overall, older adults often lacked some of their natural teeth and often had removable dentures that needed repair. In addition, plaque, caries, xerostomia, and chewing and swallowing problems were common among the population group. Data on OHRQoL were scarce and indicated a positive association with a higher number of present teeth, while decayed teeth, root remnants, and dry mouth had substantial negative impacts on the daily activities of older adults receiving HHCS.

Conclusion: This scoping review show that older adults above 65 years receiving HHCS generally have poor oral health status and that there is a knowledge gap regarding their OHRQoL.

KEYWORDS

home health care services, older adults, oral health-related quality of life, oral health status

1 | INTRODUCTION

The World Health Organisation estimates that the proportion of people over the age of 60 in the world will almost double from the current 12%–22% by 2050.^{1,2} Due to costs and patient preferences,

over the past decade many countries have seen a shift away from hospitals and institutionalised care (e.g., nursing homes) for older adults to in-home comprehensive health and care services for older adults (e.g., home health care services [HHCS]). This has resulted in increased workloads for HHCS,¹⁻³ as care-dependent older adults

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living at home today are more likely to suffer from multiple comorbid diseases, including oral health problems, which are often neglected.⁴

Maintenance of good oral health is vital for the overall health and quality of life of older adults.^{2,5-7} Poor oral health can lead to impaired nutrition and severe pain, and it is associated with increased risk of systemic diseases such as pneumonia and cardiovascular disease.^{3,8} In addition to the somatic consequences of oral diseases, psychosocial aspects such as a reduced ability to speak and interact socially, also often impact the quality of life of affected individuals.^{8,9} A systematic literature review has found that a higher number of one's own teeth, a higher number of occluding tooth pairs, and implant-retained overdentures are positively associated with oral health-related quality of life (OHRQoL) in older adults, while xerostomia, orofacial pain, and poor chewing ability are negatively associated with OHRQoL.¹⁰

When older adults become frail and care-dependent, self-care including oral care often declines,¹¹ which puts them at high risk for developing oral diseases. Dependent older adults are more often and more severely affected by oral diseases,^{3,12} and institutionalised and medically compromised older adults have a higher prevalence of oral problems than do healthy older adults.¹³ Additionally, older adults in long-term care utilise dental care less frequently than does the general population.⁴ A study by Hoeksema et al¹⁴ assessing oral health status among newly institutionalised older adults revealed that their overall oral hygiene was poor, and their need of oral care was high at the time of admission. Hoeksema et al¹⁴ suggested that the oral decline started when the patients lived at home, where their ability to take care of their own oral hygiene was increasingly impaired over time. Czwikla et al⁴ found a higher prevalence of poor oral cleanliness, which is a known risk factor for developing oral health problems, among home health care recipients compared to nursing home residents.

As a significant proportion of care-dependent older adults live at home with a high risk for further functional decline, they comprise an important group for risk-adjusted prevention and adequate management of oral diseases, which can improve oral health outcomes and OHRQoL as well as reduce treatment costs, especially over the long term.¹⁵ However, the literature on oral health among care-dependent older adults has primarily focused on oral health in nursing home settings¹⁶ and not among older adults still living at home receiving HHCS, which is currently the preferred mode of care in many countries.^{2,5-7,17} Due to this existing gap in knowledge, the current review will focus solely on care-dependent older adults living at home. To our knowledge, no systematic or scoping review articles have been previously published that focus on oral health and OHRQoL in older adults receiving HHCS.

1.1 | Objectives

The main objective of the present scoping review was to summarise the literature on clinical and subjective oral health indicators and on OHRQoL in older adults receiving HHCS. The following research questions guided this scoping review:

1. What is the clinical and subjective oral health status in older adults receiving HHCS?
2. What is the OHRQoL of older adults receiving HHCS?
3. What is the association between clinical and subjective oral health status and the OHRQoL of older adults receiving HHCS?

2 | METHODS

The objectives, inclusion criteria, and methods of analysis for this scoping review were specified in advance and documented; the review follows the methodology of Peters et al.¹⁸ The Preferred Reported Items in Systematic Reviews and Metaanalysis (PRISMA)-ScR guidelines were used in the reporting of this study (see Appendix S1).

2.1 | Inclusion criteria

In this scoping review, we define "older adults" as persons 65 years and above, in agreement with the definition of the WHO.¹⁸ The included studies examined older adults aged 65 years and above (population) that lived in their own home and received help from care providers, or HHCS (context). Studies that included younger age groups in addition to older adults were included if the data specific to those aged 65 years and above could be extracted. Furthermore, we only included studies that addressed clinical or subjective oral health status, or OHRQoL (concept). No study design restrictions were applied; however, we limited the search to studies published in 2000 or later that are peer-reviewed journal articles, full-text conference papers, or editorials and that were written in English, Norwegian, Danish, or Swedish. Quality assessment of the sources as an inclusion/exclusion criterion was not conducted, as such an assessment is not normally performed in a scoping review.¹⁸

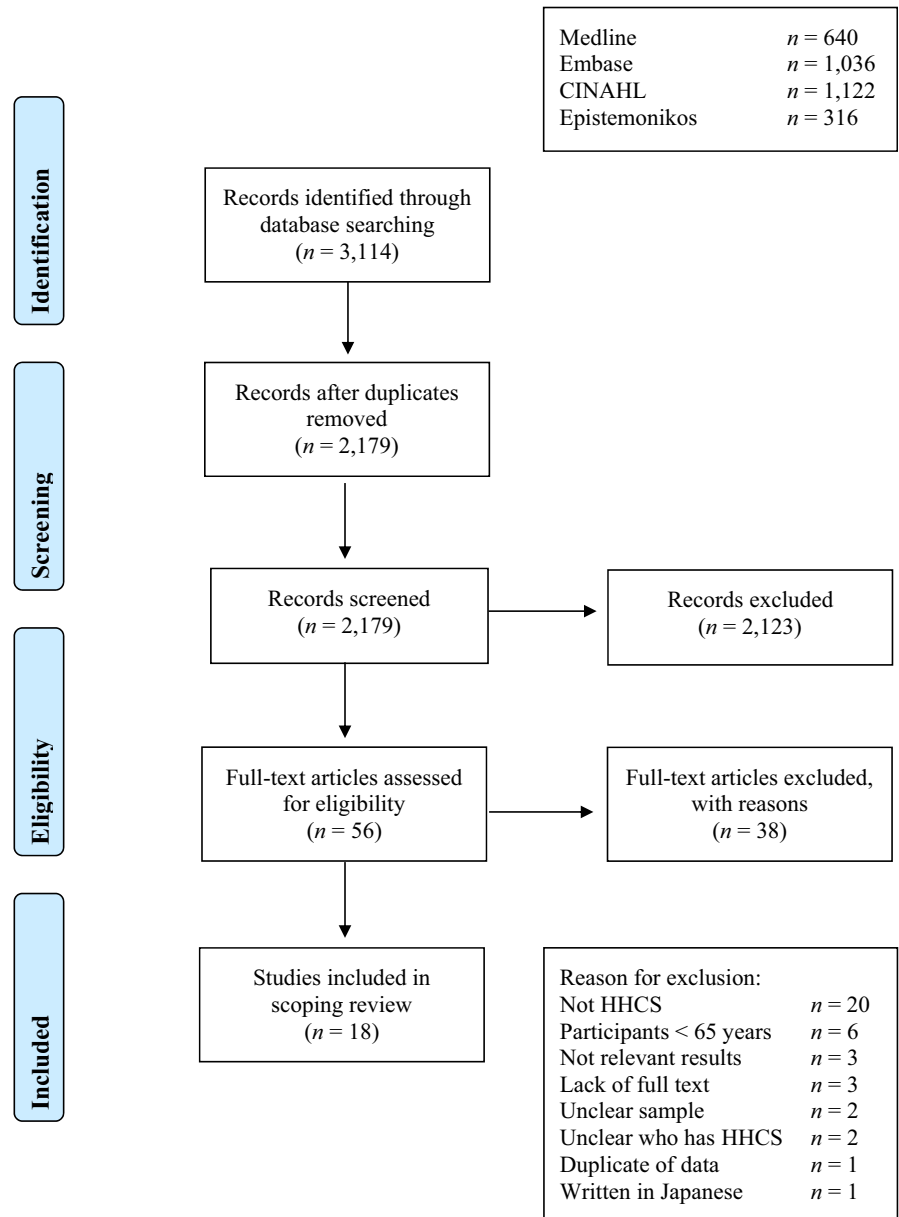
2.2 | Search strategy

A literature search was performed in collaboration with a medical librarian from the University of Oslo to identify the key search terms and the databases that were relevant to the objectives of the review. The following three electronic databases were searched: MEDLINE, CINAHL, and Epistemonikos. MeSH terms and keywords adapted to each database were used to ensure that all relevant literature was found with the search queries. The complete search strategy for the various databases is shown in Appendix S2. In total, 3114 sources were found in the databases.

2.3 | Study screening and selection

The PRISMA flowchart shown in Figure 1 describes the screening and selection procedure of the scoping review. Three reviewers

FIGURE 1 PRISMA flow diagram



(S.H.H., E.A.S.H., and R.S.-R.) used the Rayyan¹⁹ screening tool to independently screen the titles and abstracts of the retrieved articles to select studies eligible for full-text screening. S.H.H., E.A.S.H., and R.S.-R. disagreed on approximately 2.5% of the sources. Any discrepancies in study inclusion were resolved by consensus between the reviewers, before proceeding on to the next stage of screening. During the full-text reading, the screeners also conducted a follow-up using the reference lists, but no new sources were identified.

2.4 | Data extraction

For summarising and reporting the results, the following data from the chosen sources (i.e., those that made it through in the last screening round) were extracted: (i) study and population characteristics (author, year, country, design, aim, sample size, age of participants);

(ii) data reported (clinical or subjective, data source); and (iii) key findings that relate to this study's research questions. The findings were summarised in an extraction form that was developed for this scoping review (Tables 1–3). The charted data were then summarised and are reported in Section 3.

3 | RESULTS

3.1 | Literature search and screening process

In total, 3114 sources were identified in the literature search. After duplicates were removed, 2179 sources were initially screened. Sources that did not have a main focus on oral health status or OHRQoL and sources with baseline data from randomised controlled trials were nevertheless included in the further screening process

TABLE 1 Characteristics of clinical oral health indicators for population of older adults above 65 identified in the included sources (n = 4)

| Reference, year, country, design, data source | Aim | Population of interest (N), age | Results |
|--|--|--|---|
| Furuta et al, ²⁰ 2018, Japan, Prospective cohort study, Clinical examination | To examine whether mortality is related to the number of teeth and swallowing function in dependent older Japanese individuals receiving HHCS | N = 259, mean age 85 | Mean number of PT total sample 7.2 (SD 9.1) Mean number of teeth for dentate 13.1 (SD 8.5) ≤9 teeth: 68% Edentulous: 44.8% Denture use: 68% Dysphagia: 32% |
| Kaminska-Pikiewicz et al, ²¹ 2017, Poland, Cross-sectional study, Clinical examination ^a | To assess the condition of oral mucosa in seniors residing in Lublin's Nursing Homes or in home care | N = 123, all above 65 years, no further description of age | Pathological changes of oral mucosa: 34.96% Atrophic glossitis: 49.84% Candidiasis: 25.58% Prosthetic inflammation of oral mucosa: 16.28% Sublingual varices: 9.3% Inflammation of corners of the mouth: 4.65% |
| Stromberg et al, ¹¹ 2012, Sweden, Cross-sectional study, Clinical examination ^b | To investigate oral hygiene habits, clinical variables related to oral self-care and caries risk in elderly individuals living at home with moderate and substantial needs of HHCS | N = 151, mean age 82.9 (Substantial need for support) | Mean number of PT 9.8 (95% CI 8.3–11.4) High plaque scores: 42.7% Mean number DFT 11.3 (95% CI 10.1–12.5) Edentulous: 32.5% Removable dentures: 55.6% High mucosa scores: 22% Xerostomia: 19.2% |
| | | N = 151, mean age 84.4 years (Moderate need for support) | Mean number of PT 11.7 (95% CI 10.1–13.3) High plaque scores: 32% Mean number DFT 12.9 (95% CI 11.6–14.3) Edentulous: 31.8% Removable dentures: 54.3% High mucosa scores: 13.4% Xerostomia: 19.9% |
| Tuuliainen et al, ²² 2020, Finland, Cross-sectional study, Clinical examination | To describe oral health and oral hygiene in old home care clients and investigate how functional ability was associated with them | N = 269, mean age 84.7 years | Mean number of PT 15.6 (SD 7.6) ≥1 DT: 30% Root caries: 8% Plaque: 77% Plaque in at least 20% of teeth present: 74% BOP in at least 25% of teeth examined: 75% Edentulous: 46% Dentures: 69% Need denture repair: 58% |

Abbreviations: BOP, bleeding on probing; CI, confidence interval; DFT, decayed and filled teeth; DT, decayed teeth; HHCS, home health care services; PT, present teeth; SD, standard deviation.

^aOnly the subsample who are 65 years or older who were receiving HHCS at the time of study are included in this scoping review.

^bSame patient sample as Stromberg et al.²³

if they met our inclusion criteria. In total, the screeners agreed to include 18 sources in this scoping review. Figure 1 summarises the screening process.

3.2 | Characteristics of included sources of evidence

All the included sources were peer-reviewed journal articles. Nine of the 18 articles were from Scandinavia (two from Sweden and seven from Finland); the remaining articles were from Belgium, Japan (two articles), New Zealand, the Netherlands, Poland, South Korea, and the USA (two articles). The majority of the articles (11 of 18) were published after 2016. Seventeen articles concerned oral health status: four of these reported data from a clinical examination, seven

reported subjective oral health data gathered from the participants, and six reported both clinical and subjective data. Three articles identified in the literature search concerned OHRQoL. Tables 1–3 show an overview of the included articles.

3.3 | Clinical oral findings

Ten of the eighteen included studies contained information on objective clinical oral findings. The sample sizes of examined individuals ranged from 64 to 302 participants, and clinical examinations were carried out by dental professionals. The articles reported data related to the number of teeth present; denture use; untreated caries; gingivitis and periodontitis; abscesses; plaque and calculus; hyposalivation; and oral mucosal conditions such as atrophic glossitis,

TABLE 2 Characteristics of subjective oral health indicators and OHRQoL for population of older adults above 65 years identified in the included sources (n = 8)

| Reference, year, country, design, data source | Aim | Population of interest (N), age | Results |
|---|---|------------------------------------|--|
| de Almeida Mello et al, ²⁸ 2019, Belgium | To explore the longitudinal associations between oral health and general health | N = 8359, mean age 81.2 years | Nonintact teeth: 13% ^a Chewing difficulties: 11% Dry mouth: 13.6% |
| Finland, Iceland, Germany, Italy, Netherlands | | N = 2501, mean age 82.7 years | Nonintact teeth ^b : 12.9% Chewing difficulties: 11% Dry mouth: 14.9% |
| New Zealand, Longitudinal cross-country database study (interRAI-HC), Database | | N = 15 012, mean age 83 years | Nonintact teeth ^b : 10.3% Chewing difficulties: 10% Dry mouth: 10.7% |
| Lee et al, ²⁹ 2016, South Korea, Cross-sectional study, Interview survey | To identify the prevalence of xerostomia and related factors among low-income older adults in South Korea | N = 9840, range 65–85 years | Dentures: 48% Complains on poor fit of dentures: 43% Gum bleeding or pain during the past year: 29% Chewing discomfort due to dental or periodontal problems: 76% Difficulty eating or chewing solid foods when compared to the previous 6 months: 26% Difficulty in swallowing liquids: 16% Xerostomia: 40% |
| Miura et al, ³⁰ 2010, Japan, Cross-sectional study (GOHAI), Self-reported questionnaire | To identify physical, mental, and caregiving factors that influence quality of life among frail elderly individuals residing in the community with their family | N = 100, mean age 83.98 years | Mean GOHAI score 48.59 (SD 12.76) OHRQoL was significantly related to dysphagia risk and communication activities of daily living |
| Nihtila et al, ³¹ 2019, Finland, Intervention study, Interview | To examine the effectiveness of tailored xerostomia and nutritional 6-month interventions on xerostomia among home care clients aged 75 years or over who were malnourished or at risk of malnutrition | N = 216, mean age 84 years | Edentulous: 47% Xerostomia: 57.4% |
| Saunders and Friedman, ¹⁶ 2007, USA, Cross-sectional study, Interview survey | To present descriptive information on oral health and oral health care of community-dwelling elderly persons with disabilities who are living at home | N = 641, mean age 79.1 years | 25 or more teeth: 12% Dentures: 77.4% Edentulous: 57% Frequently feeling of dry mouth: 58.8% Frequently trouble with swallowing food because of dryness of mouth: 16% Jaw pain: 5.2% Sometime experience of burning sensations in their mouth or tongue: 6.1% Need for dental treatment: 40% Xerostomia: 58.8% |
| Schluter et al, ³² 2020, New Zealand, Cross-sectional database study and longitudinal secondary data analysis (interRAI-HC), Database ^b | To describe the oral health status and dental service use of older adults with complex needs living within the community and aged residential care facility settings, and to determine associations between dental service utilisation and sociodemographic variables | N = 97 229, average age 81.9 years | Nonintact natural teeth ^b : 9.3% Dentures: 65.1% Chewing difficulties: 12.4% |
| Soini et al, ³³ 2004, Finland, Cross-sectional study, Interview survey | To assess the risk of malnutrition among elderly people living at home and receiving regular home-care services using the Mini-Nutritional Assessment and to study the characteristics of the instrument in this patient group | N = 178, age range 75–94 years | Dry mouth: 58% Chewing and swallowing problems: 36% |

(Continues)

TABLE 2 (Continued)

| Reference, year, country, design, data source | Aim | Population of interest (N), age | Results |
|--|--|---------------------------------|--|
| Viljakainen et al, ³⁴ 2016, Finland, Cross-sectional study, Interview survey ^c | To examine drug use and other factors associated with xerostomia in home care clients aged 75 years or older | N = 270, Mean age 84.5 years | Xerostomia in general: 55.6% Occasional xerostomia: 43.8% Continuous xerostomia: 12.4% |

Abbreviations: GOHAI, Geriatric Oral Health Assessment Index; HHCS, home health care services; OHRQoL, oral health-related quality of life.

^aNonintact teeth refer to broken, fragmented, or loose natural teeth.

^bOnly the subsample who are 65 years or older who were receiving HHCS at the time of study are included in this scoping review.

^cSame patient sample as Tuuliainen et al.²⁷

candidiasis of the mouth, prosthetic-related inflammation of the oral mucosa, denture stomatitis, and ulcers. The number of teeth present, the prevalence of edentulism, and the use of dentures were the most commonly reported conditions.

Eight articles reported the prevalence of edentulism.^{11,14,20,22,24-27} The proportion of edentulous individuals ranged from 24% to 67%, but the majority of the articles reported that fewer than 50% of older adults receiving HHCS were edentulous.^{11,14,20,22,25-27} Dentate older adults had on average 10–16 teeth^{11,20,22,24-27}; however, two studies reported that the majority of their participating older adults had ≤ 9 present teeth.^{20,27} Furthermore, most of the older adults who were edentulous had complete dentures, and only a small proportion had no dentures.^{14,22,24,25} For dentate older adults, at least 40% had partial dentures in addition to natural dentition.^{11,22,24} When the quality of dentures was assessed, as many as 58% of older adults with complete or partial dentures needed denture repair^{14,22,26} or had denture stomatitis (prosthetic-related inflammation of oral mucosa).^{21,24}

Four studies reported a high prevalence of untreated caries or a high mean number of decayed teeth in older adults receiving HHCS,^{11,14,22,26} while Hoeksema et al¹⁴ reported that 44% of participants had at least one fractured tooth. Few studies presented data on gingival and periodontal conditions^{11,14,21,22,24} or on plaque^{11,22,24} and calculus levels.²⁴ The available data showed a high prevalence of plaque (35%–77%)^{11,22,24,25} and deep (≥ 5 mm) periodontal pockets (64%).¹⁴ Hyposalivation was addressed by two articles, which reported that the prevalence was 20% and 53%.^{11,24} In addition, some studies also reported the following oral health indicators: oral mucosal conditions of atrophic glossitis, candidiasis, prosthetic-related inflammation of the oral mucosa, denture stomatitis, ulcers, and abscesses (see Tables 1 and 3 for further details).^{11,21,24}

3.4 | Subjective oral findings

Subjective oral health parameters were assessed and reported by 10 of the 18 included sources. The articles examining subjective oral health status reported both oral conditions (self-reported number of teeth and dentures) and oral symptoms, such as xerostomia, chewing and swallowing problems, gum bleeding, burning sensations, and pain (Tables 2 and 3 for further details).

Saunders and Friedman¹⁶ found that 43% of the older adult participants reported having no natural teeth, while 12% had 25 or

more teeth. de Almeida Mello et al²⁸ reported that 10%–13% of the study participants complained of broken, fragmented, or loose natural teeth. Dentures were common among older adults in four of the studies,^{16,29,31,32} and in one study, 43% of the participants complained about the poor fit of their dentures.²⁹

Xerostomia was one of the most frequently reported symptoms: the reported prevalence varied from 11% to 60% among the different studies, and five of seven articles reported that more than 50% of the participants complained of xerostomia.^{16,24,31,33,34} Chewing and swallowing problems were also commonly reported, albeit it at a lower prevalence compared to xerostomia. de Almeida Mello et al²⁸ found that 10%–11% of older adults had difficulty chewing; however, the majority of studies reported a prevalence rate for chewing and swallowing problems of around 30%.^{16,24,29,32,33} Two articles reported that older adults seemed to experience difficulty chewing and swallowing due to dental or periodontal problems that resulted in discomfort while eating and drinking.^{29,32} The self-reported symptoms of gum bleeding, pain, and burning sensations were seldom reported and at a relatively low prevalence.^{16,29,32}

3.5 | OHRQoL of older adults receiving home health care service

Three articles assessed the OHRQoL of older adults receiving HHCS; one of the studies used the Oral Health Impact Profile Instrument (OHIP-14), and the other two used the Geriatric Oral Health Assessment Index (GOHAI).^{14,23,30} All of the studies reported that the OHRQoL of older adults receiving HHCS was relatively good. Hoeksema et al¹⁴ used the OHIP-14 to compare OHRQoL between edentulous older adults and those with remaining teeth; the latter group had a lower OHIP-14 median score (a score of 1) compared to the former group (a score of 4), reflecting that older adults with remaining teeth had significantly better OHRQoL than edentulous older adults. Using GOHAI to measure OHRQoL (where a higher score reflects better OHRQoL), Stromberg et al²³ reported mean index scores of 56 (out of 60) for homebound older adults with substantial need of support and mean index scores of 57 (out of 60) for homebound older adults with moderate need of support, despite medical and oral health indicators being similar in the two groups. Stromberg et al²³ also reported that older adults with substantial needs for supportive care had a lower OHRQoL than older adults

TABLE 3 Characteristics of clinical and subjective oral health indicators and OHRQoL for the populations of older adults identified in the included sources (n = 6)

| Reference, year, country, design, data source | Aim | Population of interest (N), age | Results |
|---|--|---|---|
| Gluzman et al, ²⁶ 2013, USA, Descriptive study (GOHA), Clinical examination and interview survey ^{a,b} | To assess the oral health status, dental utilisation, and dental needs of homebound elderly care patients | N = 14, age range 65–74 years | Mean number of PT: 14 (SD 7.88) Mean number of DT: 2.29 (SD 2.09) Mean number of MT: 18 (SD 7.77) Mean number of FT: 3.79 (SD 4.81) |
| | | N = 26, age range 75–84 years | Mean number of PT: 11.54 (SD 6.55) Mean number of DT: 3 (SD 3.92) Mean number of MT: 20.46 (SD 6.55) Mean number of FT: 3.19 (SD 3.89) |
| | | N = 42, age 85 and older | Mean number of PT: 14.1 (SD 7.66) Mean number of DT: 3.31 (SD 3.3) Mean number of MT: 17.9 (SD 7.66) Mean number of FT: 5.57 (SD 5.86) |
| Hoeksema et al, ¹⁴ 2018, Netherlands, Cross-sectional study (OHIP-14), Clinical examination and interview survey | To assess oral health, health, and QoL of care-dependent community-living older people with and without remaining teeth who recently received formal HHCS | N = 103, median age 79 years | Remaining PT: 38% Caries, fractured teeth, or periodontal disease: 77% Caries (cavities): 53% Fractured teeth: 44% Periodontal pockets ≥5mm: 64% Edentulous with complete dentures: 62% 50% of the edentulous had poorly fitting upper dentures, 30% had poorly fitting lower dentures, and 2 participants had no dentures Median OHIP-14: 3 (interquartile range 1–6) Participants with remaining teeth had significantly better OHRQoL (OHIP-14) than edentulous participants |
| Nihtila et al, ²⁵ 2017, Finland, Intervention study (subjective–xerostomia), Clinical examination and interview survey | To investigate the effectiveness of a tailored preventive oral health intervention among home care clients aged 75 years or over | N = 151, mean age 84.4 years (Intervention group) | Dentate subjects: 60.3% Mean number of PT: 16.7 (SD 7.8) Mean number PT with plaque: 9.5 (SD 8.9) Functional dentition (≥20 teeth): 41.8% Removable denture: 39.1% Partial removable denture: 30.5% Occasional xerostomia: 48.3% Continuous xerostomia: 7.9% |
| | | N = 118, mean age 84.7 years (Control group) | Dentate subjects: 47.5% Mean number of PT: 13.6 (SD 7.2) Mean number PT with plaque: 9.2 (SD 7.5) Functional dentition (≥20 teeth): 24.1% Full removable denture: 47.4% Partial removable denture: 22.9% Occasional xerostomia: 36.4% Continuous xerostomia: 18.6% |
| Soini et al, ²⁴ 2003, Finland, Cross-sectional study (subjective xerostomia, chewing and swallowing problems), Clinical examination and interview survey | To describe the oral health of adults who are considered among the “frail elderly” and who are receiving HHCS; to determine their nutritional status using the Mini-Nutritional Assessment; to assess the relationship between oral health and Mini-Nutritional Assessment score | N = 51, mean age 83.7 years | Dentate: 33% Mean number of PT: 10.59 (SD 6.92) DT: 14% Plaque: 35% Gingivitis: 29% Calculus: 24% Denture stomatitis: 16% Ulcers: 10% Abscesses: 12% Edentulous: 67% Complete dentures: 51% Non-functional prostheses: 39% Unstimulated hyposalivation: 47% Stimulated hyposalivation: 53% Clinical signs of dry mouth: 48% Complains of xerostomia: 60% Chewing and swallowing problems: 29% |

(Continues)

TABLE 3 (Continued)

| Reference, year, country, design, data source | Aim | Population of interest (N), age | Results |
|--|---|--|--|
| Stromberg et al, ²³ 2013, Sweden, Cross-sectional study (GOHAI), Clinical examination and interview survey ^c | To describe the OHRQoL in homebound elderly dependent on moderate and substantial supportive care for daily living | N = 151, age range 66–100 years (Substantial need of support) N = 151, age range 66–98 years (Moderate need of support) | Median GOHAI score: 56 DT, root remnants, and dry mouth were negatively associated with GOHAI Median GOHAI score: 57 |
| Tuuliainen et al. ²⁷ 2020, Finland, Intervention study (subjective–xerostomia) Clinical examination and interview survey ^d | To investigate the associations of frailty status with oral cleaning habits and oral hygiene among home care clients aged 75 years and over | N = 231, mean age 84.4 years | Mean number of PT: 7.6 (SD 9.3) for frail and 11.2 (10.3) for non-frail ≥1 DT: 35.1% for frail and 28.1% for non-frail Edentulous: 48.3% of frail and 33.2% of non-frail Occasional or continuous xerostomia: 55.4% |

Abbreviations: DT, decayed teeth; FT, filled teeth; GOHAI, Geriatric Oral Health Assessment Index; HHCS, home health care services; MT, missing teeth; OHRQoL, oral health-related quality of life; PT, present teeth; SD, standard deviation.

^aSame patient sample as Stromberg et al.¹¹

^bSame patient sample as Viljakainen et al.³⁴

^cThe study used GOHAI, but GOHAI scores are not reported. However, over 50% of the participants stated that they “often or always” had problems with 10 of the 12 oral health problem areas that comprise the GOHAI Questionnaire.

^dOnly the subsample who were 65 years or older and who were receiving HHCS at the time of the study are included in this scoping review.

with moderate needs for supportive care, despite medical and oral health indicators being similar in the two groups. In addition, Miura et al³⁰ found that OHRQoL was significantly related to dysphagia risk and communication activities of daily living.

3.6 | Association between OHRQoL and clinical or subjective oral health status

Two of the included studies reported an association between OHRQoL and clinical or subjective oral health status.^{14,23} Consistent with Hoeksema et al,¹⁴ Stromberg et al²³ found that OHRQoL showed the strongest correlation to the total number of teeth and in particular to specific questions that dealt with chewing capacity.

4 | DISCUSSION

The present scoping review summarised the literature on clinical and subjective oral health indicators among older adults receiving HHCS. Eighteen articles were identified for inclusion, indicating that the knowledge related to oral health in older adults receiving care assistance at home is limited. The included studies reported a variety of clinical and subjective oral health indicators, indicating a lack of standardised measurements of oral diseases among older adults with substantial care needs.

4.1 | Clinical and subjective oral health status in older adults receiving HHCS

Findings from the present review showed that only one-third of the eighteen studies presented clinical data on caries or periodontal conditions in older adult populations receiving HHCS. However, based on findings reporting high prevalence of untreated caries, deep periodontal pockets (>5 mm), high plaque scores, bleeding on probing, and gingivitis, it could be suggested that adults receiving home health care have poor oral health status and that they have substantial needs for dental treatment and for better daily oral hygiene measures.

Prevalence of edentulism and number of present teeth were the most-often reported findings in the included studies. Although the occurrence of edentulism in the general population has decreased over the last decades,^{35,36} the prevalence of edentulism and dentures remained high among older adults receiving HHCS.

Furthermore, three of the studies assessing quality of prostheses reported high proportions of older adults receiving HHCS who had non-functional or poorly fitting prostheses^{14,24} or were in need of denture repair.²² Thus, greater emphasis on ensuring adequate quality of prostheses is required among both dental professionals and professionals working in HHCS.

Between 33% and 60% of the older adults in the included studies had some natural teeth, with reported averages of 10–16 teeth present. According to the concept of shortened dental arch, retaining 20 teeth and functional occlusal contacts are necessary to

maintain adequate chewing function; thus, it might be questioned whether the numbers of remaining teeth were too low to ensure this function.

Available evidence from Japan suggests that adults over 80 years who retain functional dentition present more favourable oral and general health indicators, including activities of daily life and cumulative survival rate.³⁷ Although retaining natural teeth may lead to better oral health and OHRQoL, preserving natural teeth in functionally dependent and frail older adults may pose a challenge, given their decreasing ability to perform oral self-care. Specifically, high plaque and calculus scores were reported in several of the studies included in the present review, indicating that oral hygiene in older adults receiving HHCS is inadequate and that a greater focus is needed on daily oral care in this group. Hoeksema et al¹⁴ reported that 53% of older adults have poor oral hygiene; furthermore, Tuuliainen et al²⁷ reported that only 52.7% of frail participants brushed their teeth two or more times per day. Thus, caregivers involved in HHCS should place greater focus on daily oral care and consider providing assistance, when necessary, especially since Ek et al³⁸ found that oral health is a neglected part of nursing care. Additionally, studies that assessed oral mucosal conditions^{11,21,24} found pathological changes of oral mucosa in up to one-third of older adults, further emphasising the importance of follow-ups and regular dental examinations for older adults receiving HHCS.

Xerostomia, chewing difficulties, and swallowing problems were the most frequently reported oral symptoms in the included studies. While symptoms of dry mouth may lead to substantial discomfort and reduced quality of life,³⁹ a diminished ability to chew and swallow may also have a substantial impact on the nutritional status of older adults.³⁴ The prevalence of xerostomia symptoms in the included studies was somewhat higher than clinical data on hyposalivation. One possible explanation for the reported differences may be that xerostomia was assessed differently and that the populations of older adults in the studies were heterogeneous. Moreover, it has been suggested that due to the complex aetiology of xerostomia, the correlation between xerostomia and hyposalivation is relatively low.⁴⁰ In addition to the amount of unstimulated and stimulated saliva, the quality of the saliva and the ability to lubricate mucosal surfaces may play important roles in the subjective symptoms of dry mouth.⁴⁰

Both clinical and subjective findings from the present review reveal substantial treatment needs and a lack of adequate daily oral care among older adults receiving HHCS. One possible explanation for this might be a lack of access to regular dental care, which is supported by some included articles' reports of information about dental visiting habits among older adults receiving HHCS. For example, Schluter et al³² reported that only 25.3% of the participants in their study had received a dental examination within recent years. Furthermore, absent or inadequate daily oral care and poor oral hygiene might be a contributing factor to poor oral health among older adults receiving HHCS.

4.2 | OHRQoL of older adults receiving home health care services and the association between OHRQoL and clinical or subjective oral health status

Only three studies focused on OHRQoL among older adults receiving HHCS, and the number of participants in the included studies were small. The impact of poor oral health on the OHRQoL of older adults in the general population has been shown by some international studies^{4,41-43}; however, evidence regarding OHRQoL among older adults receiving HHCS is rather limited. The three studies presented in this scoping review showed that the OHRQoL of older adults receiving HHCS is relatively good, despite the high prevalence of oral diseases and participants' care needs.^{14,24,31} This could be explained by the findings of Tkatch et al,⁴⁴ which revealed that older adults with multiple chronic conditions perceived their overall health as good, as they had found this to be a coping mechanism for their conditions and/or disabilities.

Furthermore, one of the included studies proposed that the high OHRQoL among older adults receiving HHCS might be a result of the group's expectations, since OHRQoL is a subjective measure.²³ This is in line with other studies that have shown that high OHRQoL might reflect changes in expectations that occur with increasing age: older subjects are often more satisfied with their OHRQoL than younger age groups, regardless of their oral health status.⁴⁵⁻⁴⁷ The studies included in this scoping review were conducted in high-income countries (the Netherlands, USA, Japan, and Sweden) and included participants with different age ranges.^{14,23,30} Factors such as cultural background, age, gender, socioeconomic status, and degree of care required can have an impact on the OHRQoL,^{10,48,49} and generalizability of findings from the present review is limited to similar settings.

Consistent with the results of this scoping review, other studies have also found that remaining teeth can promote higher OHRQoL, independent of older adults' care needs.^{10,46,50} Overall, the scoping review revealed a knowledge gap regarding the oral health of older adults receiving HHCS and indicated a need for further examination of how oral health affects their OHRQoL.

4.3 | Strengths and limitations

The literature search identified 18 sources that met the inclusion criteria in the screening. The decision to only include literature written in Norwegian, Swedish, Danish, and English may have had an impact on the number of sources included, as there may be relevant sources published in other languages that were not identified. Substantial disparities in how the clinical and subjective oral health status parameters were assessed and reported in the included articles made it challenging to compile the findings. As all included studies were conducted in high-income countries with established home health care service programmes, the generalizability of the findings outside these settings is rather limited.

Although older adults receiving HHCS is a rapidly growing population group that faces increased tooth retention and oral disease risks, this group is often underrepresented in epidemiological studies of the general population. The results highlight a need for greater emphasis on oral conditions of care-dependent older adults living at home and for including oral health assessments and advice from dental professionals into the multidisciplinary conversation. Furthermore, standardised oral health assessment tools need to be developed for older adults receiving HHCS, and greater emphasis is needed on inter-professional collaboration and care plans that focus on maintenance of and support for daily oral care and the prevention of oral diseases, with the broader goal of improving general health.^{51,52}

5 | CONCLUSION

Overall, this scoping review mapping the literature on oral health status and OHRQoL in older adults above 65 years who receive HHCS shows that the topics have not been highly explored in the research studies conducted (mostly) in northern and western Europe.

The available studies reveal substantial treatment needs and a lack of adequate daily oral care among older adults above 65 years who receive HHCS. Although few studies in this review reported on OHRQoL, oral conditions have a substantial impact on daily activities, as oral symptoms related to dry mouth and chewing problems were prevalent.

AUTHOR CONTRIBUTIONS

Silje Havrevold Henni wrote the first draft of the manuscript and led the review process. All the authors determined the design and focus of the study. Silje Havrevold Henni, Rasa Skudutyte-Rysstad and Ewa A. Szyszko Hovden were involved in protocol development and literature search. Silje Havrevold Henni, Rasa Skudutyte-Rysstad and Ewa A. Szyszko Hovden conducted the screening of the sources and data extraction. All authors reviewed and edited the manuscript and approved the final version of the manuscript.

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CONFLICTS OF INTEREST

The authors declare that they have no conflict of interests.

DATA AVAILABILITY STATEMENT

The data that supports the findings of this study are available in the supplementary material of this article.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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