BMC Oral Health

RESEARCH

Open Access

Epidemiology and sociodemographic determinants of chronic temporomandibular disorders in South Korea: a nationwide population-based study

Younjung Park[1,2], Sora Yoon[3], Joon-Ho Yoon[4] and Jin-Joo Yoo[4*]

Abstract

Background To investigate the epidemiological prevalence and sociodemographic determinants of chronic temporomandibular disorders (TMD) in South Korea using a standardized case definition from national healthcare data, with emphasis on age, sex, socioeconomic status, and residential distribution.

Methods Data from the Korean National Health Insurance Service (2006 to 2019) were analyzed. Patients aged ≥ 20 years with three or more TMD-related visits (K07.6) were classified as chronic TMD. Sociodemographic factors included age, sex, income quintiles, and residential region. Treatment modalities were evaluated through associated diagnostic, medication, and procedural codes.

Results Standardized prevalence of chronic TMD increased from 6.28 per 10,000 in 2010 to 12.09 in 2016, stabilizing at 9.53 in 2019. Female predominance was observed (66%), though the female-to-male ratio decreased from 2.37 to 1.68 over the study period. The highest prevalence occurred in the 20–29 year cohort (0.21%), with higher rates among high-income groups. Additionally, 49.3% of cases were concentrated in metropolitan areas. Pharmacotherapy represented the predominant intervention (95.92%), while invasive procedures such as arthrocentesis (1.07%) and TMJ surgery (0.63%) were infrequently employed.

Conclusions This comprehensive analysis reveals distinct sociodemographic gradients and treatment preferences, providing valuable insights for healthcare planning, and highlighting the need for further research on TMD's relationship with socioeconomic factors.

Keywords Temporomandibular joint disorders, Temporomandibular joint diseases, Temporomandibular joint dysfunction syndrome

*Correspondence:
Jin-Joo Yoo
pearl2023@nhimc.or.kr
[1]Department of Orofacial Pain and Oral Medicine, Yonsei University College of Dentistry, 50-1, Yonsei-ro, Seodaemun-gu, Seoul 03722, Republic of Korea
[2]Institute for Innovation in Digital Healthcare, Yonsei University, 50-1, Yonsei-ro, Seodaemun-gu, Seoul 03722, Republic of Korea
[3]Research Institute, National Health Insurance Service Ilsan Hospital, 100, Ilsan-ro, Ilsandong- gu, Goyang-si, Gyeonggi-do 10444, Republic of Korea
[4]Department of Prosthodontics, National Health Insurance Service Ilsan Hospital, 100, Ilsan-ro, Ilsandong- gu, Goyang-si, Gyeonggi-do 10444, Republic of Korea

© The Author(s) 2025. **Open Access** This article is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License, which permits any non-commercial use, sharing, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if you modified the licensed material. You do not have permission under this licence to share adapted material derived from this article or parts of it. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit http://creativecommons.org/licenses/by-nc-nd/4.0/.

Background

Temporomandibular disorders (TMD) encompass a spectrum of conditions affecting the temporomandibular joint (TMJ), masticatory muscles, and associated structures such as the ligaments and surrounding connective tissues. The general population prevalence of TMD ranges from 5% to 12% [1], while among individuals seeking care for TMJ-related pain and dysfunction, approximately 3–7% are diagnosed with TMD [2]. However, a recent systematic review demonstrated that TMD originating specifically from the TMJ, a subset of all TMD cases, exceeds 30% [3]. Despite this high burden, international comparisons remain limited due to variations in diagnostic criteria and healthcare systems. Sociodemographic factors, particularly age and sex, have been widely examined [4–6], whereas the impact of socioeconomic status or residential environment has received less attention [6–8]. A recent review reported that TMD was more common among younger and divorced individuals, while findings for education, employment, and income were inconsistent [6]. Given these gaps, broader population-based studies are needed to explore how social and environmental factors influence TMD occurrence across different healthcare contexts.

Such an approach is particularly relevant in South Korea, where the entire population is covered by a single, mandatory national health insurance system that enables comprehensive analysis of healthcare utilization across demographic and regional groups. The National Health Insurance Service (NHIS) and the Health Insurance Review and Assessment Service (HIRA) maintain nationwide claims data, including diagnostic codes and treatment details, based on the Korean Standard Classification of Diseases (KCD), a Korean adaptation of the World Health Organization (WHO)'s ICD-10. Including treatment codes allows identification of patients who received active management for TMD, thereby improving the specificity of case definition. These anonymized data have been used in several population-based studies [9–11]. However, previous Korean studies on TMD prevalence relied on single-visit diagnostic entries, which may have included suspected or transient cases and thus overestimated the true burden [10, 11]. Therefore, the present study aimed to overcome this limitation by applying a stricter case definition to estimate the prevalence of chronic, clinically relevant TMD and to assess its sociodemographic and regional determinants.

However, despite extensive epidemiologic data on general TMD, the prevalence of chronic TMD remains underexplored. Chronic pain, as defined by the International Association for the Study of Pain (IASP), refers to prolonged or recurrent pain requiring ongoing care [12]. The International Classification of Orofacial Pain (ICOP) classifies TMJ pain by acuity, acute or chronic, using pain duration as a primary diagnostic factor [13]. A 2025 Korean study reported that chronic pain is more prevalent and imposes a greater clinical burden than acute or transient pain among TMD patients [14]. Reflecting these principles in a claims-based dataset, this study focused on chronic TMD cases, applying a refined claims-based case definition to estimate prevalence and describe the sociodemographic composition of patients requiring long-term management.

The aim is to utilize a nationwide customized database covering 14 years of data for all eligible adults aged 20 years and older to determine the annual prevalence of chronic TMD in South Korea, analyze temporal trends, and examine sociodemographic determinants, including age, sex, residential region, and income level.

Methods

Study population

This study utilized customized data from the NHIS database, including individuals aged ≥ 20 who visited clinics for TMD recorded as the primary or secondary diagnosis (up to five times) between January 1, 2006, and December 31, 2019. The study period ended in 2019 to avoid the influence of COVID-19 pandemic. The dataset included patient demographics such as age, sex, residence, and income quantile.

Case definition

Chronic TMD was defined as three or more visits for a TMD diagnosis during the study period, representing persistent or recurrent conditions consistent with chronic pain as described by the IASP and the ICOP [12, 13]. As claims-based data lack detailed clinical information such as symptom duration or visit intervals, no fixed time window was applied. Instead, the frequency of repeated TMD-related claims served as a pragmatic proxy for ongoing or recurrent care, approximating chronicity within the constraints of administrative data.

Under the KCD, TMD is primarily categorized under K07.6 and its subcategories (K07.60–K07.69), encompassing internal derangements, masticatory muscle disorders, and degenerative conditions. In South Korea, most TMD diagnoses and treatments are provided in dental healthcare settings by licensed dentists. Although some inter-provider variability may exist, the code K07.6 functions as a broad and standardized identifier that is routinely applied when patients present with TMD-related symptoms. More specific subdiagnoses can be added, but K07.6 is almost always included, ensuring comprehensive case capture. To enhance diagnostic accuracy within the inherent limitations of claims-based data, this study focused on the 4-digit code K07.6, excluding congenital anomalies or neoplasms, as it reliably represents patients seeking care for TMD-related complaints. Using NHIS data, we identified subjects with TMD diagnoses (K07.6)

recorded three or more times (as primary to fifth diagnoses) between January 1, 2006, and December 31, 2019 were included.

The primary analysis focused on the prevalence and sociodemographic distribution based on diagnostic codes. As a secondary analysis, treatment codes associated with K07.6, including diagnostic examinations, physical therapy, medication prescriptions, and TMJ arthrocentesis, were additionally examined to describe clinical management patterns. Cases were classified into mutually non-exclusive categories: K07.6 diagnostic code only; with additional TMD examination; physical therapy; medication (with or without physical therapy); arthrocentesis (with or without adjunctive therapy); and TMJ surgery (with or without adjunctive therapy). Specific codes used in this classification are provided in the supplementary materials (Table A.1, 2).

Sociodemographic classification

Age groups were categorized into 10-year intervals at the end of each year: 20–29, 30–39, 40–49, 50–59, 60–69, 70–79, 80–89, and ≥ 90 years. Residential areas were classified into four regions: Seoul, metropolitan cities, small towns, and others. Income distribution was categorized into National Coverage Medical Benefits (NCMB) and four quartiles (First, Second, Third, and Fourth), with NCMB designating individuals receiving support under national criteria, while the Fourth quartile representing the highest income bracket.

Annual prevalence was calculated as:

$$Prevalence = \frac{Total\ number\ of\ chronic\ TMD\ cases\ in\ a\ given\ year}{Mid-year\ population\ aged \geq 20\ years}$$

National population data from 2006 to 2019 were obtained from the Korean Statistical Information Service (https://kosis.kr) to determine the ratio of patients with TMD to the total population. These datasets were chronologically organized by year and month, integrated, and analyzed statistically.

Statistical analysis

Differences in frequencies and proportions of general characteristics were assessed using cross-tabulation and Pearson's Chi-square test. Statistical analyses were performed with SAS Enterprise Guide 9.4 (SAS Inc., Cary, NC, USA). The National Health Insurance Ilsan Hospital Institutional Review Board approved the study design, data collection, and processing methods (IRB File Number: NHIMC 2025-04–002).

Results

Prevalence of TMD

Health insurance claims data from January 2006 to December 2019 were analyzed using the Korean NHIS customized database to estimate the prevalence of TMD in South Korea. Sociodemographic characteristics of affected individuals are summarized in Table 1.

To minimize overestimation, individuals diagnosed with TMD between 2002 and 2005 were excluded, and only those with at least three K07.6-coded TMD diagnoses between 2006 and 2019 were included. The annual number of patients increased from 30,418 in 2006 to 49,333 in 2019. The prevalence of TMD per 10,000 individuals, calculated using population data from the Korean Statistical Information Service, rose from 6.28 in 2010 to 12.09 in 2016, then stabilized in subsequent years. The Korean population increased by 6.9% (48,438,000 in 2006 to 51,765,000) in 2019, yet the prevalence stabilized, indicating a plateau in the disease burden (Fig. 1).

Table 1 Sociodemographic characteristics of patients with chronic temporomandibular disorder (2006–2019)

	n (people)	%
Sex		
Male	242,829	34.04
Female	470,644	65.97
Age		
20–29	209,798	29.41
30–39	121,846	17.08
40–49	115,412	16.18
50–59	113,327	15.88
60–69	82,717	11.59
70–79	56,874	7.97
80–89	12,954	1.82
≧90	545	0.76
Residential Area		
Seoul	163,534	22.92
Metropolitan city	187,985	26.35
Small town	312,945	43.86
Etc.	49,009	6.87
Level of income		
National Coverage Medical Benefit	37,740	5.29
First quartile	124,325	17.43
Second quartile	136,575	19.14
Third quartile	167,331	23.45
Fourth quartile	247,502	34.69
Total	713,473	100

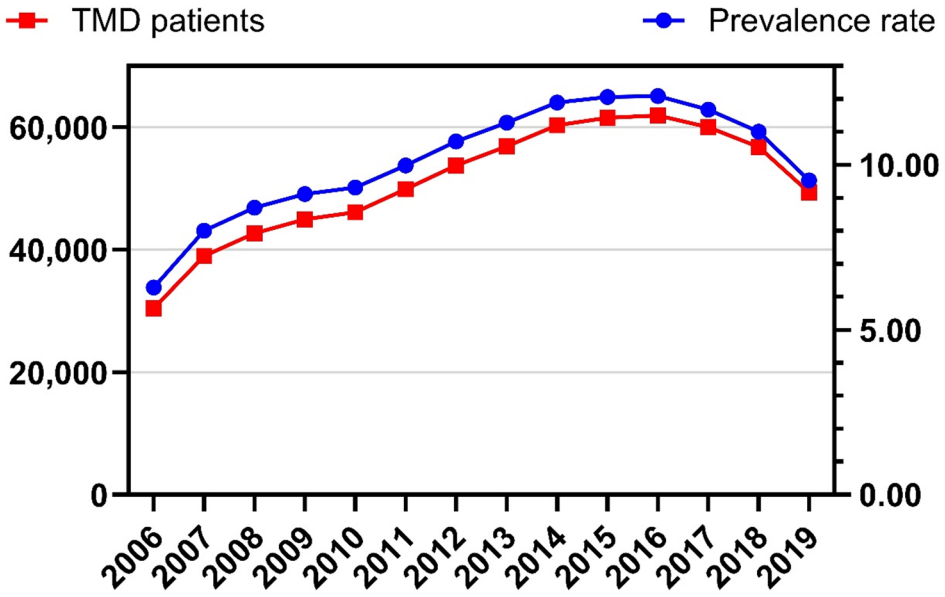

Fig. 1 Number of patients with TMD (red line) and prevalence per 10,000 population (blue line), 2006–2019. Despite a 6.9% population increase, prevalence plateaued after peaking in 2016. Abbreviations: TMD = temporomandibular disorders

Distribution of TMD patients by sex

Analysis of TMD cases from 2006 to 2019 revealed a female predominance with 34% male and 66% female distribution. However, the proportion of male patients increased over time, reducing the female-to-male ratio from 2.37 in 2006 to 1.68 in 2019 (Fig. 2).

Distribution of TMD patients by age

In 2019, the South Korean population was approximately 51.76 million, with 49,333 individuals, or 0.10% of the population, receiving clinical care for TMD diagnosed on three or more occasions. In the 20–29 age group, the proportion receiving treatment was 0.21%, indicating a higher prevalence of TMD among younger adults (Table 2). While the proportion of 20- and 30-year-olds in the total population remained relatively stable, the proportion of TMD-diagnosed patients within these age groups steadily decreased, from 58.1% in 2006 to 40.8% in 2019 (Fig. 3).

Distribution of TMD patients by level of income

From 2006 to 2019 (14 years), TMD prevalence exhibited a clear gradient across income-levels analysis, increasing from 5.3% among individuals receiving National Coverage Medical Benefits to 34.7% in the highest income bracket (fourth quartile). This indicates a consistently higher prevalence of TMD among higher income groups, a pattern that remained stable throughout the period (Fig. 4).

Distribution of TMD patients by region

Geographical analysis of South Korea from 2006 to 2019 revealed that 49.3% of TMD cases were concentrated in Seoul and other major metropolitan areas, indicating an urban predominance in chronic TMD diagnoses.

Co-claim data for TMD diagnoses: examination, physical therapy, medication, and arthrocentesis codes

Analysis of co-claims data for TMD diagnoses between 2006 and 2019 demonstrated that medication prescription was the predominant intervention (95.92%). Cases with only physical therapy, without medication, were rare (0.006%), and instances with only temporomandibular examination (0.001%) or diagnosis code without further intervention (0.003%) were exceedingly rare. Invasive treatments beyond medication, such as arthrocentesis (1.07%) and TMJ surgery (0.63%), were also infrequent (Table 3).

Discussion

This nationwide, 14-year analysis revealed stable annual prevalence trends of chronic TMD in South Korea, with distinct sociodemographic differences. The prevalence was consistently higher in females and middle-aged adults, and individuals in higher-income groups showed greater healthcare utilization for TMD across all study years. Regional differences were also evident, reflecting urban–rural disparities in access and awareness. These findings provide a comprehensive overview of long-term treatment patterns and population-level characteristics of chronic TMD.

Claims-based studies cannot directly verify clinical conditions, relying heavily on how researchers operationalize disease definitions using diagnostic, medication, and treatment codes. Although prior research has

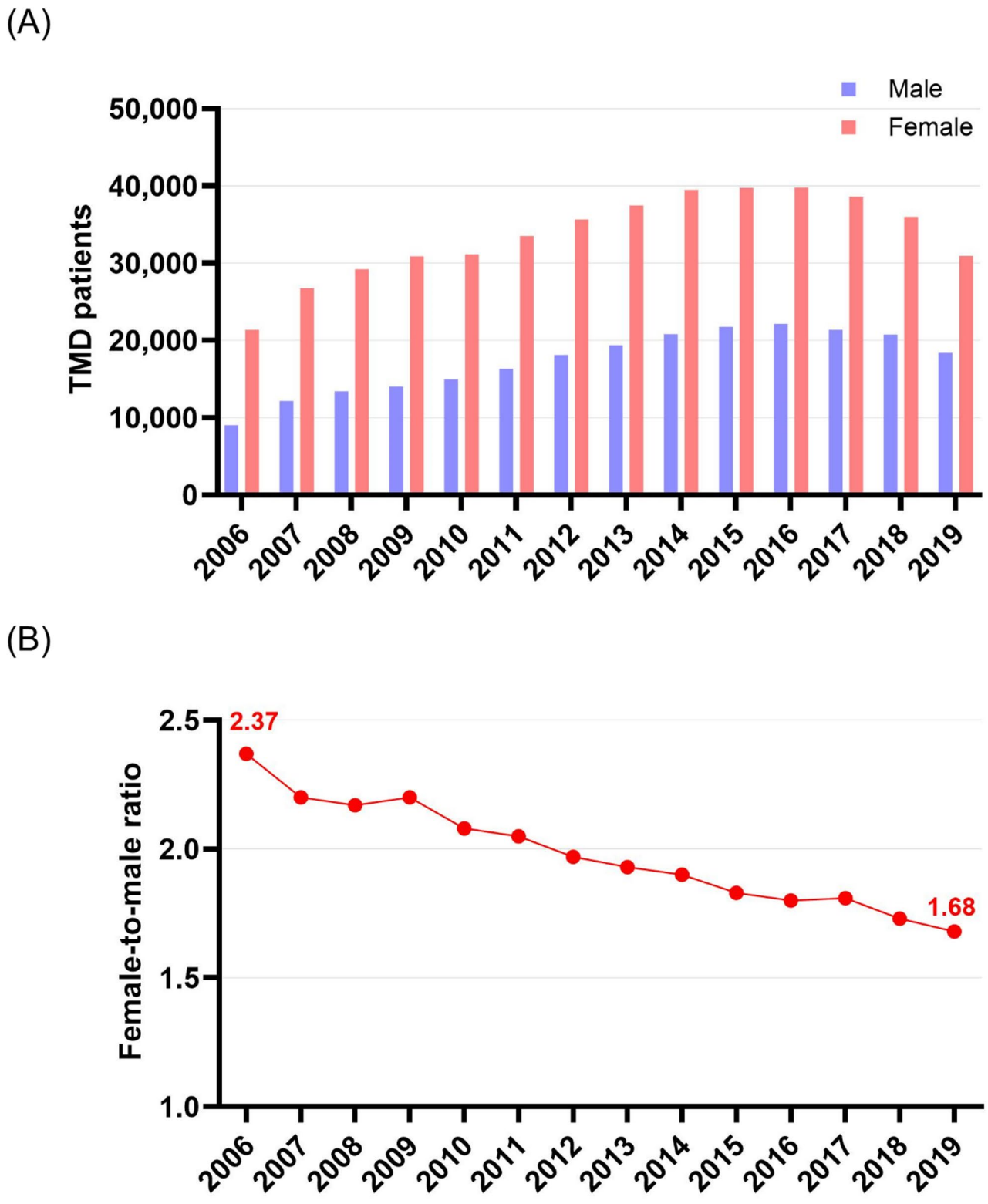

Fig. 2 Sex-specific prevalence of TMD from 2006 to 2019. **A** Annual distribution of male and female patients. **B** Female-to-male ratio, depicting gradual decline. Abbreviations: TMD = temporomandibular disorders

Table 2 Age-specific distribution of patients with TMD and total population (2006–2019)

Age group (10-year interval)	TMD patients	Total population	%
20–29 years	209,798	97,837,599	0.21
30–39 years	121,846	112,237,037	0.11
40–49 years	115,412	119,897,670	0.10
50–59 years	113,327	102,879,943	0.11
60–69 years	82,717	64,052,236	0.13
≥ 70 years	56,874	71,666,710	0.08
Total	713,473	703,295,169	0.10

Abbreviations: *TMD* Temporomandibular disorders

explored the impact of different case definitions on concordance with clinical conditions, validation studies for TMD are limited [15, 16]. In this study, repeated diagnostic entries were used as a pragmatic indicator of chronicity, as recurrence of TMD diagnostic codes suggests ongoing or recurrent symptoms requiring continued care rather than single, self-limiting episodes.

Previous studies have reported varying TMD prevalence based on a single diagnostic entry, including conditions such as jaw sprain or strain [10, 11]. Such provisional diagnoses can overestimate prevalence, as acute TMD are typically self-limiting and resolve with conservative care although some acute cases may progress to chronic forms requiring long-term management. The present study therefore focused on patients demonstrating sustained care patterns, estimating the burden of established chronic TMD rather than the incidence or progression of acute cases. To achieve this, the three-or-more-visit threshold was applied as a pragmatic operational definition, reflecting persistent or recurrent symptoms that require continued management. This approach improves diagnostic specificity while excluding most acute cases and aligns with the chronic pain framework of the IASP and the ICOP, which emphasize persistence or recurrence beyond short-term episodes, thereby providing a more accurate representation of chronic TMD within the constraints of administrative data [14].

The KCD code 'K07.6,' employed by the NHIS, broadly categorizes 'TMJ disorders.' Within the S00-T98 category for injuries and external causes, S03.0 (Dislocation of the jaw) and S03.4 (Sprain and strain of jaw) are primarily applied in emergency settings for trauma-related conditions like dislocation, TMJ pain, and restricted mouth opening. These correspond to the K07.6 subclassifications: K07.62 (recurrent dislocation and subluxation of the TMJ) and K07.63 (Pain in the TMJ not elsewhere classified). Clinically, K07.6 is often used as a general diagnostic term without specifying sub-diagnoses, while S codes are typically reserved for injury reports. Only cases coded under K07.6 were analyzed in this study, encompassing all patients in the NHIS dataset from 2006 to 2019 to assess long-term trends.

The annual prevalence of TMD per 10,000 individuals increased from 6.28 in 2010 to 12.09 in 2016, stabilizing at 9.53 in 2019, representing approximately 0.1% of the population over 14 years. These estimates are lower than those in other studies, likely due to the exclusion of adolescents, as this analysis focused on adults aged ≥ 20 [17]. By restricting the cohort to patients with ≥ 3-visits, this study provides a more accurate reflection of chronic TMD prevalence than approaches counting total claims or single-visit diagnoses.

Age is an important and independent risk factor for TMD, influencing its prevalence across populations [4]. Previous studies indicate that TMD prevalence is highest in younger age groups, with peaks reported in the mid-to-late teens, 20 s, and 35–44 years, reflecting variability across studies [4, 18–20]. Consistent with these patterns, our findings indicate higher prevalence rates in younger adults. Many studies over the past two decades have also shown that TMD prevalence increases from early adulthood, peaks around the fifth decade of life, and then gradually declines. The findings of this study contrast with that common pattern, showing the highest prevalence among younger adults followed by a gradual decrease with age [21, 22]. This pattern likely reflects differences in chronicity rather than true prevalence. The ≥ 3-visit definition captured patients requiring sustained care, often younger adults with higher functional demands and healthcare access. However, over the 14-year period, the proportion of patients in their 20 s and 30 s gradually declined despite stable population size, suggesting a shifting burden of chronic TMD. Demographic aging and reduced healthcare use among older adults may have further influenced this distribution. Overall, these results indicate that the observed age pattern reflects cohort and healthcare utilization effects rather than biological susceptibility.

Consistent with previous studies, TMD prevalence was higher among females, with a female-to-male ratio historically approximating 2:1 [17]. However, the proportion of male patients increased over the study period, reducing this ratio. This trend may reflect demographic changes, particularly an aging population and an increasing number of post-menopausal women. Hormonal factors contributing to the higher prevalence of TMD in younger women decrease with age, potentially narrowing the sex gap. Additionally, increased awareness and diagnosis of TMD in men, who were historically underdiagnosed or less likely to seek treatment, may contribute to this convergence.

Analysis of income revealed a consistently higher TMD prevalence among individuals in the higher-income brackets over the 14-year period. This likely reflects

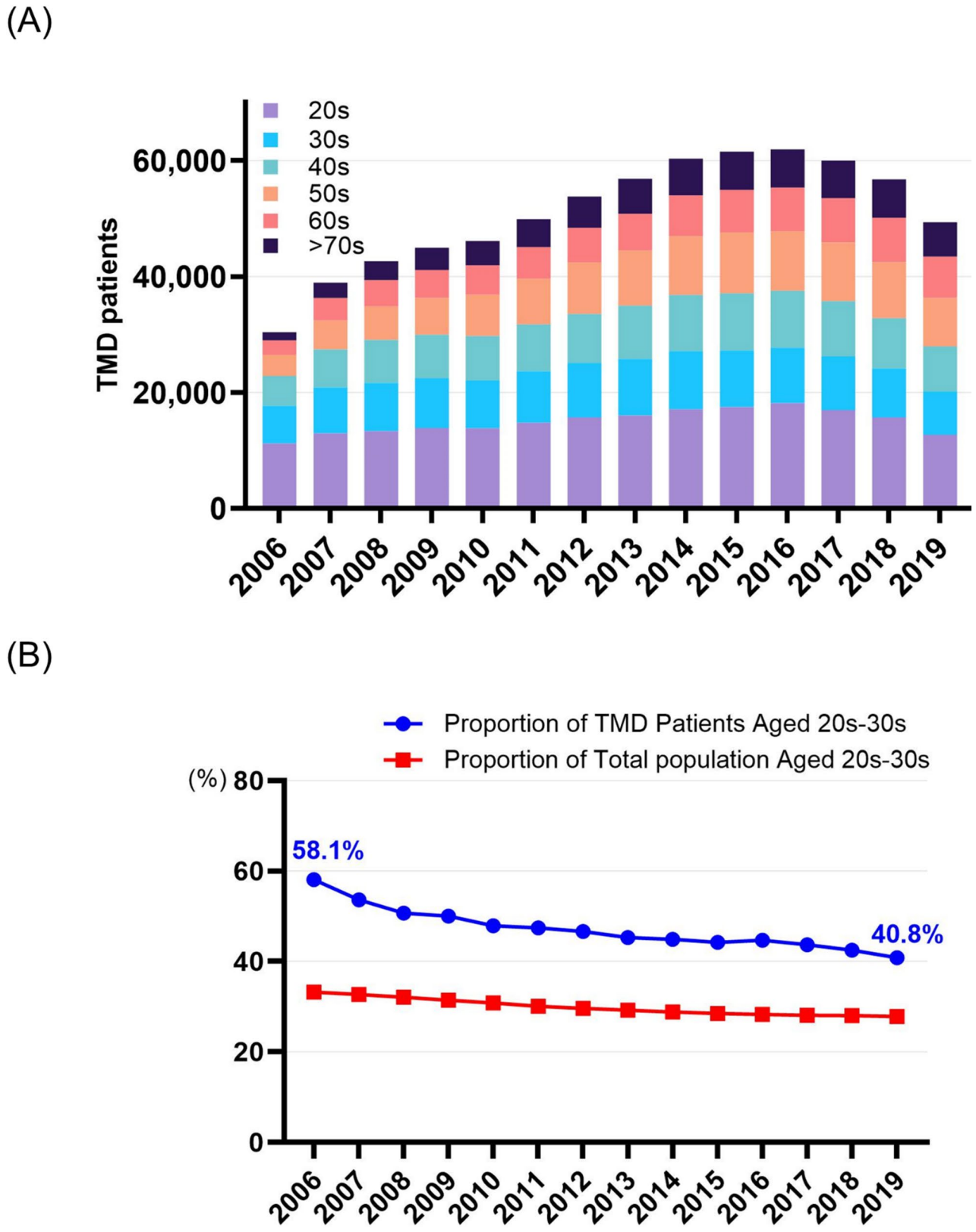

Fig. 3 Age-specific prevalence of TMD from 2006 to 2019. **A** Distribution of patients with TMD by age. **B** Proportion of patients with TMD in their 20–30s and proportion of total population in the same range. Abbreviations: TMD = temporomandibular disorders

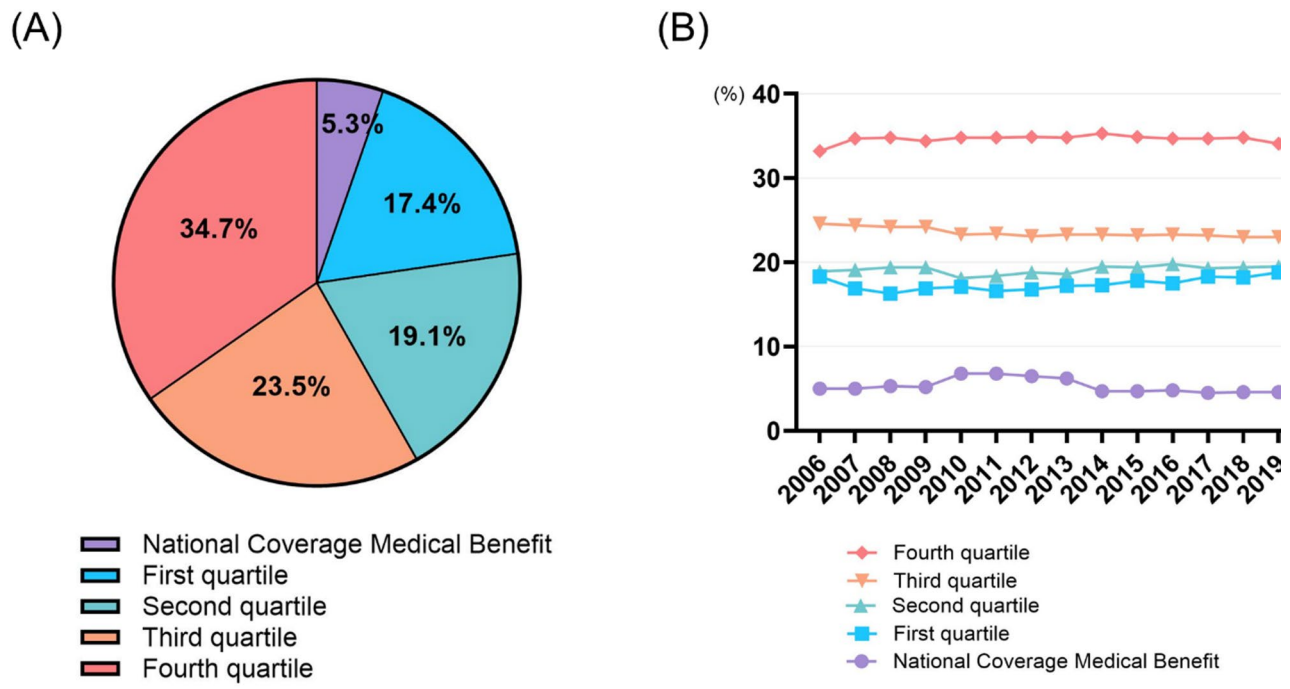

Fig. 4 Prevalence of TMD by income level from 2006 to 2019. **A** Cumulative distribution of TMD across income groups over 14 years. **B** Annual percentage trends of TMD by income level from 2006 to 2019. Abbreviations: TMD = temporomandibular disorders

Table 3 Co-claim data for TMD diagnoses including associated examination, physical therapy, medication, arthrocentesis, and TMJ surgery codes (2006–2019)

	Total population	%
only code K07.6	23	0.003
K07.6 + TMD examination code	9	0.001
K07.6 + physical therapy code	41	0.006
K07.6 + medication code	684,338	95.916
K07.6 + arthrocentesis code	7643	1.071
K07.6 + TMJ surgery code	4509	0.632
Total	713,473	100.000

The categories include: "Only code K07.6" indicates claims with only the K07.6 diagnosis code; " K07.6 + TMD examination code" for claims with the K07.6 diagnosis and TMD examination codes; " K07.6 + physical therapy code" for claims with the K07.6 diagnosis and physical therapy codes; " K07.6 + medication code" for claims with the K07.6 diagnosis and medication codes, including those combined with physical therapy; " K07.6 + arthrocentesis code" for claims with the K07.6 diagnosis and arthrocentesis codes, including those combined with physical therapy or medication; and " K07.6 + TMJ surgery code" for claims with the K07.6 diagnosis and TMJ surgery codes, including those combined with physical therapy, medication, or arthrocentesis

Abbreviations: *TMD* Temporomandibular disorders

differences in healthcare-seeking behaviors, as wealthier individuals are more likely to access healthcare services, even for self-limiting conditions like TMD, rather than indicating greater inherent susceptibility [23]. In South Korea, the NHIS provides universal coverage with low out-of-pocket costs, and most dental services, including TMD management, are offered in private clinics under this system, while tertiary hospitals mainly handle referred or complex cases. Under this structure, socioeconomic status influences the timing and frequency of care rather than access itself. Lower-income groups may rely on self-care or postpone treatment because of financial or informational barriers, whereas higher-income groups, with greater health literacy and awareness, are more likely to obtain early diagnosis and treatment [6]. Regionally, the higher TMD prevalence in metropolitan areas corresponds with prior findings attributing this to better healthcare availability, higher population density, and urban lifestyle factors [24, 25].

Nearly half of all TMD cases (49.3%) from 2006 to 2019 were concentrated in Seoul and other major metropolitan areas. This likely reflects factors such as better healthcare access, higher population density, and urban lifestyle contributing to the increased prevalence and diagnosis of TMD in these regions. The fewer cases in rural areas may indicate disparities in healthcare access, underdiagnosis, or delayed treatment. Prior research has suggested that elevated stress levels in urban areas may contribute to this geographical difference [7].

Treatment analysis revealed that medication was the primary management strategy for TMD, accounting for about 96% of cases, emphasizing its dominant role in managing the disorder. This aligns with standard clinical practice, where analgesics and muscle relaxants are commonly used for symptomatic relief. In South Korea, TMD treatment mainly follows a conservative approach centered on medication, physical therapy, and self-care, with invasive procedures such as arthrocentesis or surgery

reserved for severe or nonresponsive cases. The number of patients receiving physical therapy may be underrepresented, as combined physical therapy and medication cases were classified under the medication treatment category. The relatively low frequency of non-pharmacological interventions and the rare occurrence of TMD examination codes without subsequent treatment suggest a preference for immediate and accessible options. Invasive procedures, such as arthrocentesis and TMJ surgery, were infrequent, consistent with clinical guidelines that recommend conservative management as first-line therapy. The inclusion of physical therapy or medication in arthrocentesis claims suggests these treatments are reserved for severe or refractory cases. Further research is needed to explore factors influencing treatment decisions and optimize TMD management strategies.

This study had several limitations. First, reliance on insurance claim data for TMD, rather than the Research Diagnostic Criteria for TMD (RDC/TMD) or the Diagnostic Criteria for TMD (DC/TMD), may reduce diagnostic reproducibility [26, 27]. Variability in clinician expertise and equipment further contributes to this issue. To address this, the umbrella code K07.6 was used instead of its subcategories (K07.60–K07.69) to enhance consistency in case identification. However, this approach may oversimplify TMD classification and overlook nuances in diagnosis, symptom severity, and treatment details. Second, reliance on claims data may introduce arbitrary post-treatment coding and exclude non-insurance treatments, potentially distorting care volumes and true prevalence. Third, although three or more TMD-coded visits serve as a proxy for chronic TMD, no minimum time interval between visits was specified in this study. While visit interval data are available in the claims database, these were not analyzed in the current study design. The absence of temporal criteria means that some cases may have had visits clustered within a short period rather than spanning the three-month threshold typically used to define chronic pain. Future studies should incorporate specific time intervals between visits (e.g., spanning at least three months) to provide a more refined operational definition of chronic TMD and improve alignment with the IASP and ICOP chronic pain framework. Finally, focusing on the Korean general population controlled for cultural and genetic variability, but limits generalizability to other ethnic or cultural groups.

Despite these limitations, the study has notable strengths. Using comprehensive national healthcare data spanning 14 years enabled robust statistical analyses of TMD prevalence, providing insights into long-term trends. By focusing on patients with three or more treatment visits, the study effectively approximated chronic TMD, capturing ongoing or recurrent cases rather than transient or acute episodes, thereby offering a clearer perspective of the burden of persistent TMD. Furthermore, leveraging a claims-based national database ensured high population coverage and representativeness, making it a valuable tool for chronic disease surveillance despite its inherent limitations. The wide age range of the study population provided valuable insights into age-related and sex-specific patterns, including the evolving sex ratio in TMD diagnoses.

Conclusions

This study leverages extensive national data to analyze TMD prevalence and demographic trends over a 14-year period. By applying stringent criteria to define chronic TMD, it provides a more accurate representation of recurrent cases than studies that relied on single-visit diagnostic codes. These findings highlight the need for further research to refine diagnostic criteria, explore the full spectrum of TMD management, including non-insurance-based treatments, and enhance the understanding of demographic shifts in TMD prevalence. Collectively, these insights contribute to a clearer understanding of the burden of TMD and support the development of more effective strategies for its management.

Abbreviations

TMD	Temporomandibular disorders
TMJ	Temporomandibular joint
NHIS	National Health Insurance Service
KCD	Korean Standard Classification of Diseases
WHO	World Health Organization
IASP	International Association for the Study of Pain
ICOP	International Classification of Orofacial Pain
NCMB	National Coverage Medical Benefits
RDC/TMD	Research Diagnostic Criteria for TMD
DC/TMD	Diagnostic Criteria for TMD

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12903-025-07478-x.

Supplementary Material 1: Table A.1. Treatment codes for temporomandibular disorders. Table A.2. Type, name, and main ingredient codes of medicines used in this study.

Acknowledgements

This study used the National Health Insurance Service-National Health Information Database (REQ000044592-003, made by National Health Insurance Service (NHIS). The authors alone are responsible for the content and writing of the paper. This work was supported by the National Health Insurance Service Ilsan Hospital grant NHIMC2020CR079.

Authors' contributions

YP contributed to investigation and writing of the original draft. SY performed formal analysis and data curation. JHY contributed to writing, review, and editing. JJY was responsible for conceptualization, methodology, visualization, supervision, project administration, and funding acquisition.

Funding

This study was supported by the National Health Insurance Service Ilsan Hospital grant (NHIMC2020CR079).

Data availability
The dataset supporting this article is not publicly available due to the restrictive policy of the National Health Insurance Sharing Service (https://nhiss.nhis.or.kr/bd/ay/bdaya001iv.do) as an affiliate of the NHIS, but are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate
This study was conducted in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. The use of anonymised data from the National Health Insurance Service (NHIS) database was approved by the Institutional Review Board (IRB) of NHIS-Ilsan Hospital (IRB Number: NHIMC 2025-04-002).

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

Received: 2 September 2025 / Accepted: 1 December 2025
Published online: 09 December 2025

References

1. National Institute of Dental and Craniofacial Research. Prevalence of TMJD and its signs and symptoms. 2018.
2. Poveda Roda R, Bagan JV, Díaz Fernández JM, Hernández Bazán S, Jiménez Soriano Y. Review of temporomandibular joint pathology. Part I: classification, epidemiology and risk factors. Med Oral Patol Oral Cir Bucal. 2007;12:E292–8.
3. Valesan LF, Da-Cas CD, Réus JC, Denardin ACS, Garanhani RR, Bonotto D, et al. Prevalence of temporomandibular joint disorders: a systematic review and meta-analysis. Clin Oral Investig. 2021;25:441–53. https://doi.org/10.1007/s00784-020-03710-w.
4. Slade GD, Fillingim RB, Sanders AE, Bair E, Greenspan JD, Ohrbach R, et al. Summary of findings from the OPPERA prospective cohort study of incidence of first-onset temporomandibular disorder: implications and future directions. J Pain. 2013;14:T116–24. https://doi.org/10.1016/j.jpain.2013.09.010.
5. Bueno CH, Pereira DD, Pattussi MP, Grossi PK, Grossi ML. Gender differences in temporomandibular disorders in adult populational studies: A systematic review and meta-analysis. J Oral Rehabil. 2018;45:720–9. https://doi.org/10.1111/joor.12661.
6. Carapinha IHA, De la Torre Canales G, Poluha RL, Câmara-Souza MB, Christidis N, Ernberg M, et al. Sociodemographic profile: A forgotten factor in temporomandibular disorders? A scoping review. J Pain Res. 2024;17:393–414. https://doi.org/10.2147/JPR.S434146.
7. Goddard G, Karibe H. TMD prevalence in rural and urban native American populations. Cranio. 2002;20:125–8. https://doi.org/10.1080/08869634.2002.11746201.
8. Restrepo C, Ortiz AM, Henao AC, Manrique R. Association between psychological factors and temporomandibular disorders in adolescents of rural and urban zones. BMC Oral Health. 2021;21:140. https://doi.org/10.1186/s12903-021-01485-4.
9. Kim HK, Song SO, Noh J, Jeong IK, Lee BW. Data Configuration and Publication Trends for the Korean National Health Insurance and Health Insurance Review & Assessment Database. Diabetes Metab J. 2020;44:671–8. https://doi.org/10.4093/dmj.2020.0207.
10. Jung SY, Kim ES, Kim KW, Cho JH, Lee YJ, Ha IH. Treatment for temporomandibular disorders in South korea: A 9-year trend using cluster analysis. J Oral Rehabil. 2022;49:691–700. https://doi.org/10.1111/joor.13333.
11. Seo H, Jung B, Yeo J, Kim KW, Cho JH, Lee YJ, et al. Healthcare utilisation and costs for temporomandibular disorders: a descriptive, cross-sectional study. BMJ Open. 2020;10:e036768. https://doi.org/10.1136/bmjopen-2020-036768.
12. Treede RD, Rief W, Barke A, Aziz Q, Bennett MI, Benoliel R, et al. Chronic pain as a symptom or a disease: the IASP classification of chronic pain for the international classification of diseases (ICD-11). Pain. 2019;160:19–27. https://doi.org/10.1097/j.pain.0000000000001384.
13. Orofacial T, Classification P. International classification of orofacial Pain, 1st edition (ICOP). Cephalalgia. 2020;40:129–221. https://doi.org/10.1177/0333102419893823.
14. Yap AU, Jo JH, Kim S, Lee BM, Park JW. Comparative analysis of acute and chronic painful temporomandibular disorders: insights into pain, behavioral, and psychosocial features. PLoS ONE. 2025;20:e0318946. https://doi.org/10.1371/journal.pone.0318946.
15. Tsai TY, Lin JF, Tu YK, Lee JH, Hsiao YT, Sung SF, et al. Validation of ICD-10-CM diagnostic codes for identifying patients with ST-Elevation and Non-ST-Elevation myocardial infarction in a National health insurance claims database. Clin Epidemiol. 2023;15:1027–39. https://doi.org/10.2147/CLEP.S431231.
16. Hsieh CY, Cheng CL, Lai EC, Wang MC, Chen CH, Li CY, et al. Identifying renal dysfunction in stroke patients using diagnostic codes in the Taiwan National health insurance research database. Int J Stroke. 2015;10:E5. https://doi.org/10.1111/ijs.12380.
17. Slade GD, Ohrbach R, Greenspan JD, Fillingim RB, Bair E, Sanders AE, et al. Painful temporomandibular disorder: decade of discovery from OPPERA studies. J Dent Res. 2016;95:1084–92. https://doi.org/10.1177/0022034516653743.
18. Gauer RL, Semidey MJ. Diagnosis and treatment of temporomandibular disorders. Am Fam Physician. 2015;91:378–86.
19. Omezli MM, Torul D, Varer Akpinar C. Temporomandibular disorder severity and its association with psychosocial and sociodemographic factors in Turkish adults. BMC Oral Health. 2023;23:34. https://doi.org/10.1186/s12903-023-02737-1.
20. Lee YH, Chung JW. Climate temperature and seasonal influences on the prevalence of temporomandibular disorders in South Korea. Sci Rep. 2024;14:10974. https://doi.org/10.1038/s41598-024-61829-2.
21. Yadav S, Yang Y, Dutra EH, Robinson JL, Wadhwa S. Temporomandibular joint disorders in older adults. J Am Geriatr Soc. 2018;66:1213–17. https://doi.org/10.1111/jgs.15354.
22. Yekkalam N, Wänman A. Prevalence of signs and symptoms indicative of temporomandibular disorders and headaches in 35-, 50-, 65- and 75-year-olds living in Västerbotten, Sweden. Acta Odontol Scand. 2014;72:458–65. https://doi.org/10.3109/00016357.2013.860620.
23. Yang J, Zhong Q, Liao Z, Pan C, Fan Q. Socioeconomic deprivation, medical services accessibility, and income-related health inequality among older Chinese adults: evidence from a National longitudinal survey from 2011 to 2018. Fam Pract. 2023;40:671–81. https://doi.org/10.1093/fampra/cmad018.
24. Lee KS, Jha N, Kim YJ. Risk factor assessments of temporomandibular disorders via machine learning. Sci Rep. 2021;11:19802. https://doi.org/10.1038/s41598-021-98837-5.
25. Minervini G, Franco R, Marrapodi MM, Fiorillo L, Cervino G, Cicciù M. Economic inequalities and temporomandibular disorders: A systematic review with meta-analysis. J Oral Rehabil. 2023;50:715–23. https://doi.org/10.1111/joor.13491.
26. Schiffman E, Ohrbach R, Truelove E, Look J, Anderson G, Goulet JP, et al. Diagnostic criteria for temporomandibular disorders (DC/TMD) for clinical and research applications: recommendations of the international RDC/TMD consortium Network* and orofacial pain special interest Group†. J Oral Facial Pain Headache. 2014;28:6–27. https://doi.org/10.11607/jop.1151.
27. Dworkin SF, LeResche L. Research diagnostic criteria for temporomandibular disorders: review, criteria, examinations and specifications, critique. J Craniomandib Disord. 1992;6:301–55.

Publisher's Note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.