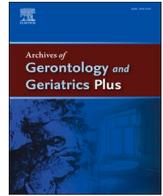




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Rehabilitation with removable dentures in adults and older people with partial or total edentulism: Chilean Public Health System Experience, 2017–2019

Karen Danke, DDS, MSc^a, Ingeborg Bevensee, DDS^b, Ana Beatriz Silva, DDS, MSc^{a,c,d}, Alicia Morales, DDS, MSc^{a,e,f}, Gisela Jara, DDS, MSc^{a,e,f,g}, Fabiola Werlinger, MSc, PhD^{a,h,i}, Mauricio Baeza, DDS, MSc, PhD^{e,j}, María Ignacia Muñoz, DDS^k, Viviana García Ubillo, MSc^{f,l}, Jorge Gamonal, DDS, MSc, PhD^{e,m,*}

^a Center for Epidemiology and Surveillance of Oral Diseases (CEVEO), Faculty of Dentistry, Universidad de Chile (UCh), Santiago, Chile

^b Faculty of Medicine, School of Dentistry, Oral Rehabilitation Department, Pontificia Universidad Católica de Chile (PUC), Santiago, Chile

^c Facultad Odontología y Ciencias de la Rehabilitación, Universidad San Sebastián (USS), Bellavista, Santiago, Chile

^d Faculty of Dentistry, Universidad de Chile (UCh), Santiago, Chile

^e Faculty of Dentistry, Department of Conservative Dentistry, Universidad de Chile (UCh), Santiago, Chile

^f Interuniversity Center for Healthy Aging (CIES), Consortium of State Universities (CUECH), Santiago, Chile

^g Institute for Research in Dental Sciences, Public Health Area, Faculty of Dentistry, Universidad de Chile (UCh), Santiago, Chile

^h Institute for Research in Dental Sciences (ICOD), Faculty of Dentistry, Universidad de Chile (UCh), Santiago, Chile

ⁱ Department of Medical Technology, Faculty of Medicine, University of Chile (UCh), Santiago, Chile

^j Center for Epidemiology and Surveillance of Oral Diseases (CEVEO), Universidad de Chile (UCh), Santiago, Chile

^k Department of Prosthodontics, Faculty of Dentistry, Universidad de Chile (UCh), Santiago, Chile

^l Gerópolis Center, Faculty of Medicine, Universidad de Valparaíso (UV), Valparaíso, Chile

^m Center for Epidemiology and Surveillance of Oral Diseases (CEVEO); Interuniversity Center for Healthy Aging (CIES), Consortium of State Universities (CUECH), Santiago, Chile

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ABSTRACT

Statement of problem: Tooth loss is frequent among the Chilean population, particularly the poor and elderly. The Public's response is mostly via removable dentures (RDs), however there is limited evidence regarding its results. **Purpose:** The objective of this descriptive ecological study is to monitor and characterize the production of RDs within Chile's Public Health System.

Material and methods: Public records were obtained from the Department of Statistics and Health Information of Chile (DEIS) website. All records regarding RDs activities within the Public Health System for years 2017 to 2019 were retrieved and included in the analysis.

Results: Between 2017 and 2019, the Public Health sector delivered an average of 342,261 RDs annually, which corresponds to 2.4 RD per 100 individuals. Overall, 70.3 % of beneficiaries were female, 63.2 % were for people between the ages of 20 to 64, and 35.3 % were for people aged 65 or older. Among RDs provided, 57 % were made at the primary level and 43 % at the secondary level of care. The program "More Smiles", accounted for 52.3 % of primary healthcare RD delivery. At the secondary level, 14.9 % of RDs had metallic framework, while 85.1 % were acrylic. Older persons and males were more likely to receive acrylic RDs than their counterparts.

Conclusions: RDs are regularly supplied in Chile's Public Healthcare System, mainly through primary care. The characterization regarding programs, type of RDs, gender and age of the recipients, may guide future hypothesis regarding the adequateness of the response to address tooth loss at a population level. Further investigation into the impact on patient satisfaction and RD quality is recommended to enhance understanding in this domain.

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* Corresponding author at: Department of Conservative Dentistry, Facultad of Dentistry, University of Chile, 943 Avenida Sergio Livingstone, Independencia, Santiago, Chile.

E-mail address: jgamonal@odontologia.uchile.cl (J. Gamonal).

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Clinical implications: The study explores the scale and characteristics of removable prosthetic provision within Chile's Public Health System. This comprehensive overview enables the identification of areas requiring further attention to ensure the delivery of high-quality treatments and the efficient allocation of public resources.

Introduction

Partial and total tooth loss are a major public health concern over the world, since it is highly prevalent among adults and older persons (Kassebaum et al., 2014). Tooth loss can profoundly disrupt an individual's daily life, hampering their ability to chew effectively, impacting their nutritional intake, and causing aesthetic concerns that may adversely affect their mental health, social functioning and overall well-being and oral health-related quality of life (OHRQoL) (Sáenz-Ravello et al., 2024; Azami-Aghdash et al., 2021; S. Techapiroontong et al., 2022; Sekundo et al., 2021). People from lower socioeconomic backgrounds disproportionately experience oral health problems and tooth loss, while limited access to dental care hinders early intervention, perpetuating these disparities (Vujicic et al., 2016; Borgeat Meza et al., 2022; Manski et al., 2016). Removable dental prosthesis (RDP), whether partial or complete, are frequently employed as an effective treatment to restore the chewing ability (Huraib et al., 2022), enhance aesthetics and improve quality of life following tooth loss (MP Moya et al., 2019; Ha et al., 2012; S. Techapiroontong et al., 2022). Publicly delivered dental care, often includes rehabilitation through RDP due to their cost-effectiveness and minimally invasive nature compared to fixed prosthesis and implants (S. Techapiroontong et al., 2022). As the population continues to live longer and retain more of their natural teeth, rehabilitation through partial RDP will continue to be a relevant option for restoring oral function and aesthetics in the future (S. Techapiroontong et al., 2022; Campbell et al., 2017; Douglass & Watson, 2002; Calabrese & Rawal, 2023).

Chile's healthcare system is characterized by a combination of private insurance companies (ISAPRE), which covers people from higher socioeconomic groups, and public insurance known as National Health Fund (FONASA), accounting for 78 % of the population's coverage protection, approximately 16,229,898 persons (Ministry of Social Development, 2024). In comparison to ISAPRE beneficiaries, FONASA-insured population is typically older, poorer, and has greater health needs (Castillo-Laborde et al., 2017). The country has high prevalence of tooth loss, which disproportionately affects those from lower socioeconomic backgrounds (Ministry of Health, 2024). According to the most recent National Health Survey from 2016 to 2017, 13.5 % of the national population has complete edentulism, whereas 25 % have less than 20 teeth. When studied by age, these markers decline significantly as age progresses, reaching 41 % of complete edentulism and 88 % of non-functional dentition for those over 75 years (Ministry of Health, 2024). The State addresses the dental needs of FONASA beneficiaries by providing removable prosthetic treatments through several oral health programs (Ministry of Health-Government of Chile, 2021). The history of dental programs within the public health system began in 1990, as part of the primary health care strengthening initiatives known as PRAPS (Primary Health Care Reinforcing Programs) (Ministry of Health-Government of Chile, 2005). There are four dental programs that provide RDP at the primary care level (P. Ministry of Health-Government of Chile, 2024). The 'Specialty Resolution' program was initially implemented within the PRAPS to reduce waiting lists for secondary care by enhancing access to endodontic therapy and RDP for individuals aged 20 and above (Ministry of Social Development & Family, 2022). Subsequently, in 1995, the 'Women Heads of Household' program, now known as 'More Smiles', was launched to address disparities in dental care access for vulnerable women aged 20 and older. The program includes comprehensive dental treatment, including complete or partial denture rehabilitation (Ministry of Health-Government of Chile, 2017). The implementation of the men's

version of 'More Smiles' took place in 2000 under the name 'Low-income Men' (LIM) program, recently renamed as 'Comprehensive dental care for men' (CDCM). Finally, the Explicit Health Guarantee 'GES 60' program was introduced in 2007 as part of a National Health Reform, ensuring comprehensive dental care for individuals aged 60 years old (P. Ministry of Health-Government of Chile, 2024). All these programs operate at the primary care level, complementing the prosthetic rehabilitation capacity of secondary care, where long waiting lists for such services persist (P. Ministry of Health-Government of Chile, 2024; P. Ministry of Health-Government of Chile, 2024).

The Chilean Public Health System faces a pressing challenge in addressing the widespread issue of tooth loss among adults and older people, with a substantial need and demand for removable dental prosthesis (RDP). However, the lack of comprehensive data regarding the accessibility of such treatments across the various programs within the system limits a throughout understanding of its adequateness to respond to the needs of the population. The aim of this study is to monitor and characterize the production of RDP within Chile's Public Health System between 2017 and 2019, according to the level of care and different programs offered. The findings will provide valuable insights about the current state of RDP provision availability and distribution, offering crucial insights to inform future policy and resource allocation decisions.

Material and methods

This study employed a descriptive ecological design using data from publicly available sources. FONASA beneficiaries population data was taken from the related website's open data source (www.fonasa.cl) (<https://www.fonasa.cl/sites/fonasa/datos-abiertos/estadisticas-anuales>), while production data was obtained from the Department of Statistics and Health Information (DEIS) of the Ministry of Health of Chile website (www.deis.cl), which is a state entity that provides reliable data regarding the healthcare sector (Department of Health Statistics and Information (DEIS) 2024). The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guideline was used (von Elm et al., 2014).

The Monthly Statistical Summaries, commonly known as 'REM records,' systematically document activities and services within the public healthcare system, enabling the monitoring of progress and the achievement of health program objectives. These administrative records are generated at the point of service delivery and are routinely submitted to the central health authority, providing a continuous flow of data for oversight and evaluation (Ministry of Health-Government of Chile, 2019). The REM records are publicly accessible through the DEIS website, organized into distinct series based on the type of care and strategies employed (Department of Health Statistics and Information (DEIS) 2024). The REM-A-09 series provides a comprehensive record of dental services and activities within the Public Health network, and is organized into various sections [(Department of Health Statistics and Information (DEIS) 2024; Ministry of Health-Government of Chile, 2019)]. All sections from REM-A09 were examined, and then retrieved data from sections D, F, and G, which contained pertinent data for this study. Section D documents referrals between primary and secondary care, while Section F details activities conducted at the secondary care level, including specialized dental care. Total RDP count categorized by type (metal or acrylic based) and age groups (15–19, 20–64, and 65+). Only the overall count is disaggregated by gender. Additionally, service purchases from external providers are recorded without specifying gender or age. Section G documents the activities under the dental

Primary Health Care Reinforcing Programs (PRAPS) and Explicit Health Guarantee (GES) dental programs, such as 'More Smiles', 'Comprehensive Dental Care for Men' (CDCM), 'Specialty Resolution in PHC', and 'GES 60'. These programs provide acrylic and metallic RDPs to adults and seniors, with data on RDP production also categorized by age groups (15–19, 20–64, and 65+). To gain a more comprehensive understanding, the data was further disaggregated in accordance with the country's political and geographic delimitation, which encompasses a total of 16 distinct regions. The dental programs specific eligibility criteria are outlined in [Table 1](#).

The data is available in dashboard format from 2017 to 2020. Thus, only 2017, 2018, and 2019 were included, excluding 2020, which fails to reflect usual production due to the disruption and postponement of dental services caused by the COVID-19 pandemic. The data was retrieved from the source and organized in Microsoft Excel. Following descriptive analyses, absolute and relative frequencies were calculated. We did not require inferential tests to compare groups since we used the universe of data and the differences observed correspond to the real ones. Given the population-based approach and use of public secondary data without participant identifiers, an ethics committee review was unnecessary.

Results

Removable dental prosthodontics represented the third most common referral to dental specialists (secondary care), comprising 18.6 % of all referrals from primary care. This reflects the high demand for removable prosthetic rehabilitation in the Public Health System in Chile. The referral patterns across various specialties remained constant over the three-year period, as shown in [Fig. 1](#).

Between 2017 and 2019, the Public Health sector delivered 1022,870 RDPs, an average of 340,956 per year, this figure includes both partial and complete RDPs. The data in [Table 2](#) shows the annual distribution of RDPs provided by each program and level of care. Dentures were predominantly delivered in primary care, accounting for 47 % of RDPs, with this proportion increasing over time. Most dentures provided at this level were delivered through the "More Smiles" program (52.7 %). Meanwhile, 40.3 % were delivered at the secondary level, maintaining a stable proportion, from which 86.2 % were acrylic RDP and 13.8 % were metallic RDPs. Overall, 12.7 % of RDP were supplied through external providers, a figure that declined during the observed period.

[Table 3](#) shows the distribution of RDPs provided in the period according to sex and age of the recipients in each program and level of care for the triennium. The data reveals that females constituted the majority of the beneficiary population, representing 70.4 %. This proportion was even higher at the primary care level, where they accounted for 74.9 %, compared to 65.0 % at the secondary level. Programs without gender-

Table 1
Dental programs that include removable dental prosthesis (RDP) in the public health sector.

Level of Care	Program	Eligibility Criteria	Public Record
Primary Care	More Smiles	Vulnerable Woman >20 years	REM A09 Section G
	GES 60	60 years of age	REM A09 Section G
	Comprehensive dental care for men (CDCM)	Vulnerable Men >20 years	REM A09 Section G
	Specialty Resolution	Waiting list patients for RDP according to availability	REM A09 Section G
Secondary Care	Removable Dental Prosthesis (RDP)	Referrals from primary care attending according to availability (chronological queuing)	REM A09 Section F

based eligibility criteria showed diverse utilization patterns, with 'GES 60' and secondary level recording higher female participation. Conversely, the 'Specialty Resolution' program predominantly benefited men (64.8 %). At the secondary level, woman received a slightly higher proportion of metallic over acrylic RDPs compared to men. Regarding age, most RDP recipients were individuals aged 20 to 64, comprising 63.2 % of the total. Notably, the secondary level of care served a higher proportion of those aged 65 and older, while primary care predominantly served the 20–64 age group. However, the 'CDCM' and 'Specialty Resolution' programs exhibited a higher proportion of RDPs being offered to people 65 and older. The proportion of acrylic RDPs was considerably higher among individuals aged 65 and older (93 %) compared to younger individuals, who received a greater proportion of metallic RDPs. Notably, primary care sourced 17.2 % of all RDPs from external providers, whereas this figure was only 6.7 % in secondary care.

We also present the RDP delivery patterns across regions of the country, as illustrated in [Fig. 2](#). In terms of gender distribution, the proportion of women ranges from a minimum of 61.0 % in the Tarapacá region to a maximum of 75.5 % in the Los Ríos region ([Fig. 2a](#)). Regarding age, the northern regions tend to exhibit a higher proportion of individuals aged 65 and older compared to other regions of the country ([Fig. 2b](#)). As shown in [Fig. 2c](#), the reliance on primary and secondary care levels, as well as external providers, varies across different regions. Notably, the regions at the extreme north (Arica) and south (Aysén) primarily rely on secondary care for delivering this treatment, while regions like Atacama and La Araucanía and Ñuble show a high dependence on external providers. This reliance on external providers may indicate challenges in providing these treatments within the public healthcare network. Furthermore, as shown in [Fig. 2d](#), the distribution of programs within primary care varies across regions but follows a similar pattern overall. The 'More Smiles' program delivers the majority of RDPs within the primary care level across the regions, with the exception of Aysén, where the 'GES 60' program is responsible for most RDPs delivered within this level (49.3 %).

The 2018 FONASA beneficiary count was utilized to calculate the RDP production-to-population ratio, reflecting the midpoint of the study period. On average, 2.4 dentures were provided annually for every 100 individuals covered by the Public Healthcare System, as shown in [Table 4](#). This rate varied by age group, with 0.1 RDPs per 100 beneficiaries under 20 years, 2.3 for those aged 20–64, and 5.5 for those over 65. [Table 4](#) also highlights significant regional variations. This metric provides context for understanding the scale of the RDP program and offers key insights into its reach and service delivery across the country.

Discussion

The Chilean Public Health System delivered 1022,870 complete and partial RDPs between 2017 and 2019. This equates to 2.4 RDPs for every 100 individuals enrolled in the public system. In the context of denture public programs in Chile, the average individual is estimated to receive 1.2 dentures. Consequently, approximately 852,392 individuals underwent rehabilitation for partial or complete tooth loss during the study period, an average of 284,131 individuals annually.

Publicly funded RDP treatments are the primary means of accessing tooth loss rehabilitation for individuals who cannot afford private care and those living in underserved or rural areas. By providing dental care that would otherwise be out of reach, public dental care plays a crucial role in addressing the significant disparities in oral health across the country ([Aida et al., 2022](#); [Ghanbarzadegan et al., 2021](#)). Referrals for specialized RDP care is the third most common type of referral from primary to secondary care, highlighting the country's substantial need for dentures ([Ministry of Social Development & Family, 2022](#)). Currently, this treatment has the largest waiting list for secondary dental care, with a median wait time of 202 days ([P. Ministry of Health-Government of Chile, 2024](#)). Given the high demand, it's important to implement transparent prioritization mechanisms that

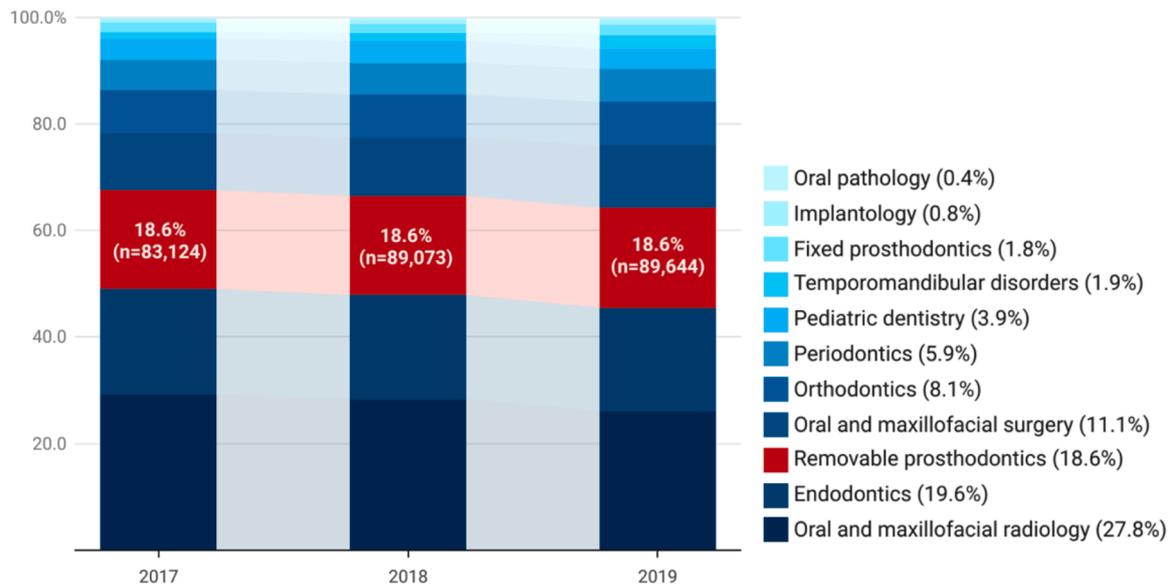


Fig. 1. Referrals to Secondary Care Dental Specialties from Primary Care.

Table 2 Annual distribution of removable dental prostheses (RDP) provided by program and care level.

Year	2017		2018		2019		Period 2017–2019	
	n	column %	n	column %	n	column %	n	column %
Primary Level	142,206	44.9	167,984	47.5	170,783	48.4	480,973	47.0
GES 60	42,131	29.6	43,375	25.8	43,834	25.7	129,340	26.9
CDCM	3717	2.6	11,839	7.0	11,477	6.7	27,033	5.6
More Smiles	72,699	51.1	88,825	52.9	92,135	53.9	253,659	52.7
Specialty Resolution	23,659	16.6	23,945	14.3	23,337	13.7	70,941	14.7
Secondary Level	128,461	40.6	140,635	39.8	143,290	40.6	412,386	40.3
Acrylic RDP	109,728	85.4	121,844	86.6	123,715	86.3	355,287	86.2
Metal RDP	18,733	14.6	18,791	13.4	19,575	13.7	57,099	13.8
External Provider	45,713	14.4	44,949	12.7	38,849	11.0	129,511	12.7
All RDP delivered	316,380	100.0	353,568	100.0	352,922	100.0	1022,870	100.0

Table 3 Sex and age distribution of removable dental prosthesis (RDP) recipients by program and care level, 2017–2019.

Level of care / Program	Sex				Age						Subtotal	External provider*	Total	
	Female		Male		< 20		20–64		>65					
	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)				
Primary Level	360,288	74.9	120,777	25.1	10,920	2.3	359,632	74.5	112,000	23.2	481,065	100,047	17.2	581,112
GES 60	81,608	63.1	47,732	36.9	4910	3.8	122,747	94.4	2371	1.8	129,340	26,766	17.1	156,106
CDCM	38	0.1	27,087	99.9	447	1.6	16,254	59.8	10,477	38.5	27,033	5710	17.4	32,743
More Smiles	253,642	100.0	17	0.0	3654	1.4	177,223	69.7	73,399	28.9	253,659	50,338	16.6	303,997
Specialty Resolution	25,000	35.2	45,941	64.8	1909	2.7	43,408	61.1	25,753	36.2	70,941	17,233	19.5	88,174
Secondary level	266,385	65.0	143,178	35.0	2317	0.6	205,785	49.9	204,283	49.5	409,563	29,464	6.7	439,027
Acrylic RD	227,678	64.5	125,350	35.5	1901	0.5	162,501	45.7	190,885	53.7	355,287	20,698	5.5	375,985
Metalic RD	38,707	68.5	17,828	31.5	416	0.7	43,284	75.8	13,398	23.5	57,099	8766	13.3	65,865
Total	626,673	70.4	263,955	29.6	13,237	1.5	565,417	63.2	316,283	35.3	893,359	129,511	12.7	1022,870

* External providers data lacks beneficiary sex and age information. That information can not be accessed.

enable to focus the strategy on those who most need care, and promote an equitable distribution of services (Jones, 2014; Allen et al., 2024). While the “More Smiles” and CDCM programs incorporate vulnerability as a criterion for accessing RDP treatments, other programs lack explicit prioritization criteria. Instead, eligibility is based solely on age or follows a first-come, first-served basis. This approach risks allowing individuals with greater resources to access benefits more readily than those with lower incomes, potentially exacerbating existing inequalities

(P. Ministry of Health-Government of Chile, 2024; Jones, 2014).

Despite clinical guidelines from the Chilean Ministry of Health recommending the use of metal RDPs over acrylic for partial tooth loss, 86.2 % of the RDPs provided in secondary care were acrylic-based. Primary care records do not differentiate between RDP types, but a 2017 evaluation of the “More Smiles” program revealed that 27.7 % of patients were completely edentulous, and consistent with our findings, 84.5 % of the dentures provided were acrylic, with a higher prevalence

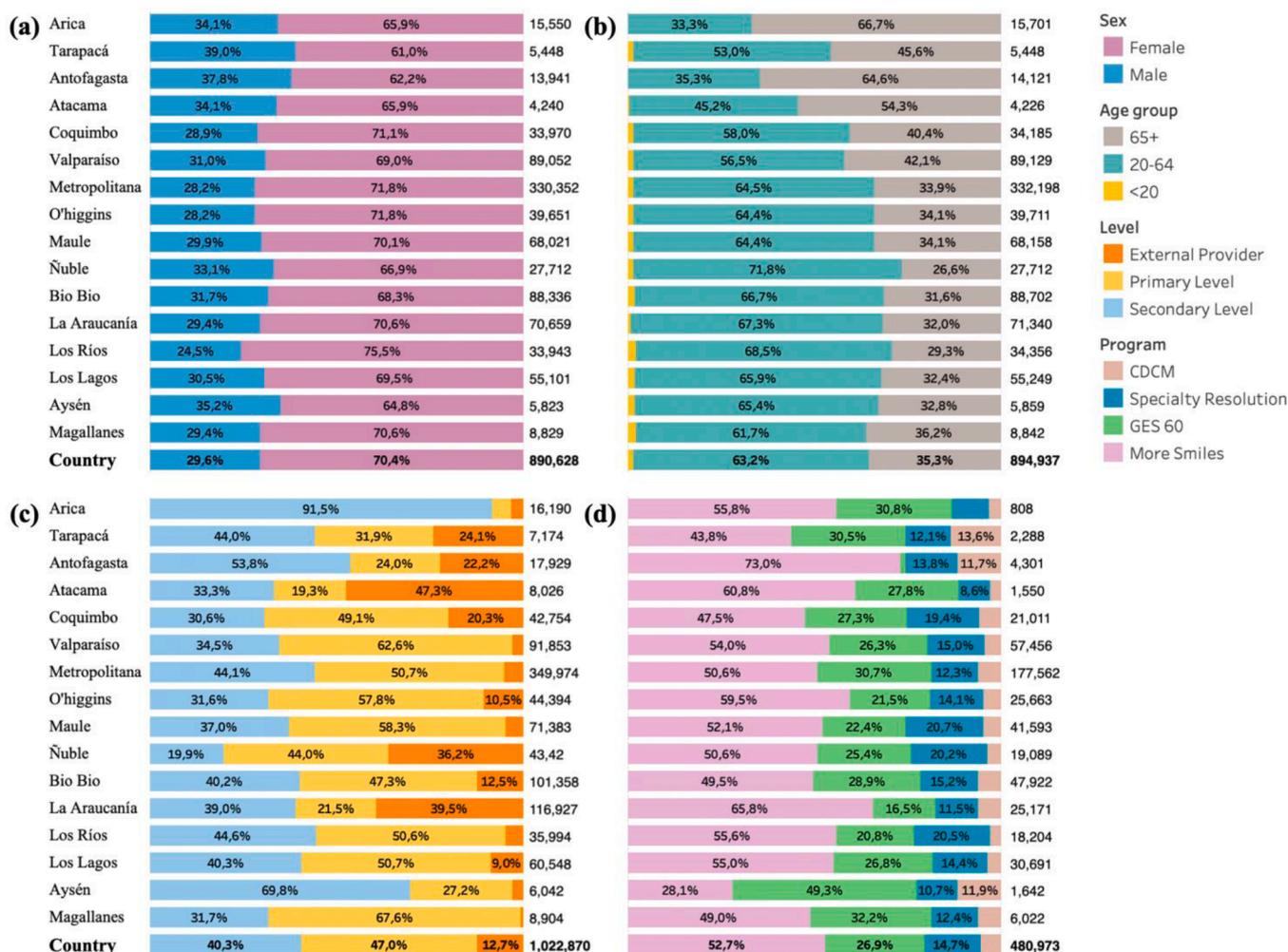


Fig. 2. RDP provided in the Chilean Public Health System years 2017–2019 by region (2a) Regional distribution of RDP by sex. (2b) Regional distribution of RDP by age category. (2c) Regional distribution of RDP delivered by level of care and type of provider. (2d) Regional distribution of RDP by primary care programs.

in rural areas (Ministry of Health-Government of Chile, 2017). The high proportion of acrylic RDPs raises concerns about whether this prevalence in the public system is driven by clinical needs or by provider convenience, given their faster and easier production compared to metal-based alternatives (Friel & Waia, 2020). Acrylic partial RDPs are often considered a temporary solution (Friel & Waia, 2020), making it essential to determine whether their higher use is based on clinical indications or provider limitations, which could potentially compromise treatment effectiveness and impact (MP Moya et al., 2019; Almufleh et al., 2020). Evaluating these factors is particularly important at a population level, as the lifespan of RDPs can vary significantly depending on the material used (Taylor et al., 2023; Taylor et al., 2021; Khangura et al., 2023). Recent systematic reviews suggest that complete dentures typically last around 10 years, with maxillary dentures outlasting mandibular ones (Taylor et al., 2021; Khangura et al., 2023). However, an Australian study reported a shorter average lifespan of 6 years for publicly provided complete RDPs (Taylor et al., 2022). Acrylic partial RDPs last between 1 and 5 years, while metallic ones average 8 years (Khangura et al., 2023; Walmsley, 2003). Although metallic RDPs offer better support, stability, and retention, (Campbell et al., 2017) it remains unclear if they surpass acrylics in patient satisfaction and quality of life (Almufleh et al., 2020). Based on 2019 FONASA fees, the estimated cost of each RDP provided in the Public Care System is approximately US\$97.7, resulting in an annual expense of US\$33.3 million (Arancel FONASA, 2019). Given the significant cost burden, it is essential to evaluate the performance and cost-effectiveness of RDPs in a

local context to optimize program design, replacement intervals, and outcomes (Almufleh et al., 2020).

Dentures pose significant functional and psychosocial challenges for older adults (de Moraes Flores et al., 2023), and many recipients, whether of complete or partial dentures, do not use them regularly or at all (S. Techapirontong et al., 2022; Mehtab et al., 2023). A 2005 evaluation of Chile’s “More Smiles” program found that 23 % of upper and 27 % of lower denture recipients seldom used their dentures, citing pain, mouth damage, or defective prostheses as the main reasons for non-utilization (Ministry of Health-Government of Chile, 2017). Similarly, the 2010 National Health Survey in Chile reported 21 % dissatisfaction among denture wearers (Ministry of Health, 2010). Dissatisfaction with RDPs can result in frustration and poor social and functional recovery (Ha et al., 2012; Cortez et al., 2023), resulting in therapeutic failure and the misuse of scarce resources (Sangappa, 2012; Yen et al., 2015). A recent study found that individuals with functional dentition and at least four posterior occlusal pairs were more likely to abandon partial RDP use, supporting the shortened dental arch theory, which suggests that function and satisfaction can be achieved without full tooth replacement (S. Techapirontong et al., 2022). This emphasizes the importance of incorporating patients’ perceived need for dentures before recommending them, engaging in a shared decision-making to set realistic goals and improve adherence to RDP use (S. Techapirontong et al., 2022; Vieira & Leles, 2014). Attention also must be given to satisfactory prosthetic preparation by public sector dentists, as inadequate design and biomechanical planning can lead to

Table 4
Rate of RDPs delivered every 100 persons in the Public Healthcare System.

Age group		<20			20-64			65+			All ages		
Zone	Region	FONASA Beneficiaries 2018	Annual average RDPs	RDP to Population Ratio (per 100)	FONASA Beneficiaries	Annual average RDPs	RDP to Population Ratio (per 100)	FONASA Beneficiaries	Annual average RDPs	RDP to Population Ratio (per 100)	FONASA Beneficiaries	Annual average RDPs	RDP to Population Ratio (per 100)
Big North	Arica	56,640	2	0.00	108,196	1,742	1.61	24,412	3,489	14.29	189,270	5,397	2.85
	Tarapacá	81,640	24	0.03	155,377	963	0.62	25,640	829	3.23	262,674	2,391	0.91
	Antofagasta	117,424	7	0.01	252,397	1,661	0.66	43,853	3,039	6.93	413,731	5,976	1.44
Small North	Atacama	70,265	8	0.01	141,531	637	0.45	29,122	764	2.62	240,935	2,675	1.11
	Coquimbo	183,174	183	0.10	376,844	6,609	1.75	88,063	4,603	5.23	648,137	14,251	2.20
Central	Valparaíso	375,511	397	0.11	864,320	16,796	1.94	226,802	12,516	5.52	1,466,805	30,618	2.09
	Metropolitana	1,334,791	1,800	0.13	3,062,291	71,446	2.33	721,777	37,487	5.19	5,120,290	116,658	2.28
	O'Higgins	206,910	200	0.10	466,286	8,521	1.83	100,226	4,516	4.51	773,524	14,798	1.91
	Maule	251,457	326	0.13	559,852	14,642	2.62	128,542	7,752	6.03	939,927	23,794	2.53
	Ñuble	101,090	141	0.14	232,416	6,637	2.86	57,806	2,459	4.25	391,334	14,473	3.70
South	Bio Bío	352,685	500	0.14	795,639	19,726	2.48	183,124	9,342	5.10	1,331,561	33,786	2.54
	La Araucanía	233,752	162	0.07	491,506	16,012	3.26	119,425	7,606	6.37	844,771	38,976	4.61
	Los Ríos	91,763	253	0.28	201,145	7,843	3.90	47,869	3,356	7.01	340,809	11,998	3.52
	Los Lagos	200,912	312	0.16	441,253	12,144	2.75	95,094	5,961	6.27	737,343	20,183	2.74
Austral	Aysén	21,874	35	0.16	44,844	1,277	2.85	8,892	641	7.21	75,617	2,014	2.66
	Magallanes	29,752	63	0.21	74,930	1,818	2.43	18,197	1,067	5.86	122,885	2,968	2.42
Country		3,709,640	4,412	0.12	8,268,827	188,472	2.28	1,918,844	105,428	5.49	14,102,709	340,957	2.42

malfunctioning dentures and damage to adjacent structures (Fernandez et al., 2021). Evidence shows that dentists often fail to follow RDP fabrication principles (Kilfeather et al., 2010; Radhi et al., 2007), a recent Chilean study found that 59 % of 1512 metal prosthetic frameworks lacked proper rest-seat preparation (Fernandez et al., 2021). Effective communication with dental technicians is also crucial for ensuring high-quality RDPs, but is often lacking (Cebeci, 2018). These issues underscore the need of strengthening training in removable prosthetic rehabilitation to ensure competency and adherence to ethical and legal responsibilities (León et al., 2024; Farias-Neto et al., 2012). Moreover, there is a critical need to routinely evaluate the quality of treatments and patient satisfaction within the public sector. Although some evidence indicates that the "More Smiles" (Ortuño Borroto et al., 2021) and "GES 60" (P. Moya et al., 2019) programs enhance oral health-related quality of life (OHQoL), this aspect is not routinely assessed. Instead, monitoring often relies on activity-based indicators (e.g., the number of dentures provided and discharges), perpetuating a focus on quantitative outputs rather than the quality of treatments and their impact on patients' well-being and functionality (Ha et al., 2012; Almufleh et al., 2020; Sangappa, 2012).

Our results are consistent with evidence that show higher dental consultation rates among women (Redondo-Sendino et al., 2006; Spinler et al., 2019), which may be partly attributed to the gender focalization criteria of "More Smiles", the largest program in primary healthcare. Among strategies without gender-specific targeting, the Specialty Resolution was the only one with higher male participation. Regarding age, while most RDPs were provided to individuals aged 20–64, those aged 65 and older had a higher denture rate of 5.5 per 100 FONASA

beneficiaries. Individuals aged 65 and older were more likely to receive RDPs in secondary care, predominantly acrylic rather than metallic. Despite the higher rate of provision in this age group, the rate remains relatively low given the disproportionate burden of tooth loss among older adults (Sáenz-Ravello et al., 2024; Hempel et al., 2020; Gamonal et al., 2010), particularly those with lower education and limited access to dental services (S. Techapiroontong et al., 2022; Ha et al., 2012; Calabrese & Rawal, 2023). Notwithstanding the GES 60 program's focus on improving access to dental care for the elderly at no cost, participation is restricted to individuals aged 60, and only one-third of eligible individuals enroll in the program (Danke et al., 2021; Aravena-Rivas et al., 2024). As younger cohorts of older adults are retaining more of their natural teeth and have higher expectations for oral health, future dental care patterns and treatment needs are expected to shift, with more educated and younger individuals likely preferring fixed rehabilitation options over removable prostheses (Kassebaum et al., 2014; Fejerskov & Baelum, 2014; Cronin et al., 2009). Therefore, it is essential that public programs continuously adapt to the evolving needs of the population to ensure that the available treatment options remain relevant and effectively serve those who stand to benefit (Hiltunen et al., 2021).

The reliance on external services for RDPs was substantially greater in primary care (17.1 %) than in secondary care (6.7 %), suggesting greater struggles to deliver this treatment at the primary level. The regional analysis reveals varying patterns of public care provision, with some regions relying more on secondary care and others on primary care for delivering RDP treatments. Additionally, certain regions depend more heavily on external providers to offer these services. Given the

challenges in providing RDPs through public healthcare, exploring public-private models of collaboration using the existing network of private dental clinics for the delivery of subsidized dental care, could increase geographic reach and improve overall access to dental care. Considering the difficulties in expanding the public healthcare system's infrastructure, this approach could offer a more efficient and cost-effective way to meet the dental care needs of the population (Taylor et al., 2023; Dudko et al., 2017). Such an option could be viable in Chile to enhance treatment availability and access, in a context where there are enough qualified dentists and private infrastructure to provide dental treatment for all (Arellano-Villalón & Fuentes, 2020).

This study has several limitations. Firstly, the ecological design limits its ability to draw individual-level conclusions or investigate associations with factors like denture quality and user satisfaction, confining the analysis to a descriptive nature. The use of secondary data restricts research questions to the available data, while transcription inaccuracies in administrative records initially created for non-research purposes may introduce bias. Despite these limitations, the study holds significant value, as it is the first to examine Chile's public healthcare provision of removable partial dentures (RPDs), offering crucial insights in a context where Latin America is underrepresented in scientific literature and population-wide research on public RPDs treatments is scarce (Cunha et al., 2018). Furthermore, the use of administrative data provides a cost-effective approach (Koo, 2016), enabling generalization to the entire population covered by the Public Health Fund (FONASA) and offering crucial data to inform public policy decisions on oral health and denture use.

There is a national need for a more comprehensive understanding of the impact of complete and partial edentulism, as well as patient satisfaction with public denture treatments. Carefully considering patients' requirements before treatment and focusing on outcomes that are meaningful to patients can improve the likelihood of successful treatment and avoid resource wastage in a denture that will not be used. Additionally, continually capacitation of dentists, along with the incorporation of emerging technologies and materials in RDP provision could lead to more efficient and cost-effective denture manufacturing, improving access to high-quality dental care (Campbell et al., 2017; Deng et al., 2023). While removable dental prosthesis provides vital support for tooth loss, more comprehensive public health efforts are needed in Chile, with a long-term focus on preventing tooth loss and preserving natural dentition throughout life (Sáenz-Ravello et al., 2024). Initiatives such as Japan's "8020 campaign" offer a valuable model to look up to for promoting lifelong oral health (Ni et al., 2022).

Conclusion

Our research has outlined several findings about the delivery of RDs in Chile's public healthcare system. RDPs are regularly supplied in Chile's public healthcare system, mainly in primary care. The characterization regarding programs, type of RDs, gender and age of the recipients, may guide future hypothesis regarding the adequateness of the response to address tooth loss at a population level. These insights are crucial for informing future healthcare policies and optimize the allocation of resources to better address the country's dental prosthetic rehabilitation needs, especially in light of an aging population.

CRedit authorship contribution statement

Karen Danke: Methodology, Investigation, Formal analysis. **Ingeborg Bevensee:** Methodology, Investigation, Formal analysis. **Ana Beatriz Silva:** Writing – original draft, Formal analysis. **Alicia Morales:** Supervision. **Gisela Jara:** Supervision, Formal analysis. **Fabiola Werlinger:** Writing – original draft, Methodology. **Mauricio Baeza:** Supervision, Conceptualization. **María Ignacia Muñoz:** Methodology, Formal analysis. **Viviana García Ubillo:** Writing – original draft, Methodology, Investigation. **Jorge Gamonal:** Writing – review &

editing.

Declaration of competing interest

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

Data availability

Data will be made available on request.

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