

Original Article

Dental service utilization trends in rural and semiurban health centers of Isfahan, Iran (2016–2021): A retrospective descriptive study

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ABSTRACT

Background: Iran's oral health reform plan aimed to shift primary dental care toward prevention through the family dentist program, yet longitudinal evidence on real-world service mix is limited. We assessed 6-year trends in dental service utilization in rural and semiurban primary healthcare facilities in Isfahan, Iran.

Materials and Methods: This retrospective, longitudinal, observational, descriptive study analyzed aggregated service counts extracted from Iran's integrated health system (SIB) for two healthcare networks in Isfahan from 2016 to 2021. We included Level 2 clinical procedures recorded under the family dentist program and categorized them as preventive (fluoride varnish, fissure sealants, and scaling) or curative/treatment (restorations, extractions, and pulpotomy). Trends were summarized using annual volumes, year-to-year percentage change, and the proportional share of preventive versus curative services. Data were analyzed using descriptive statistics; no inferential statistical tests were applied, and a significance threshold was not defined, given the descriptive nature of the study.

Results: A total of 133,075 Level 2 dental services were delivered over the study period. Utilization peaked in 2017 (28,290 services) and remained high in 2019 (28,027), suggesting a period of increased throughput during the implementation and maturation of the oral health reform package in primary health care, followed by a sharp decline in 2020 (11,215; –60.0% vs. 2019) and partial recovery in 2021 (20,691; +84.5% vs. 2020). Preventive share dropped to 7.2% in 2017, increased to 21.0% by 2019, and remained near 19% in 2020–2021. Health Center No. 2 delivered a higher cumulative volume than No. 1 (76,697 vs. 56,378 services). Permanent tooth extractions were the most frequent procedure (66,152), exceeding the total number of restorations (28,160).

Conclusion: Despite a stable preventive component in later years and postpandemic recovery, service delivery remained strongly treatment- and extraction-oriented, indicating a limited shift toward prevention within the primary care dental package.

Key Words: Dental care, health services accessibility, primary health care, rural health services

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INTRODUCTION

Oral diseases remain a major global public health challenge, affecting an estimated 3.5 billion people

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and limiting daily functions such as eating, speaking, and social participation. Beyond the clinical burden, they impose substantial economic losses through direct treatment expenditures and productivity impacts, with the heaviest consequences often borne by disadvantaged populations.^[1] Despite growing global consensus that essential oral health services should be integrated into primary health care (PHC) as part of universal health coverage, translation from policy aspiration to routine frontline delivery remains uncertain in many settings, particularly in low- and middle-income countries (LMICs).^[2] A practical way to assess whether integration is happening is to examine the service mix delivered at PHC level – specifically, whether preventive interventions expand over time or whether care continues to be dominated by curative, late-stage procedures. However, the evidence base remains limited in one critical respect: longitudinal, facility-level descriptions of preventive-versus-curative service patterns under PHC-oriented reforms are scarce, and much of what is known comes from cross-sectional snapshots.^[3,4] Routine electronic health records (EHRs) and routine health information systems offer a feasible methodological solution because they capture service activity continuously and can track trends at scale.^[5] Within this framing, Iran can be treated not as the topic of primary interest, but as an illustrative case through which transferable lessons can be generated about monitoring PHC-based oral health delivery under reform conditions.^[2,6]

Iran provides a relevant case because it combines a high burden of oral disease with well-documented structural barriers to equitable access. Longitudinal estimates indicate that the mean decayed, missing, and filled teeth (DMFT) index increased significantly between 1990 and 2017 specifically in young adults.^[7] Historically, dental care in Iran has been shaped by high out-of-pocket spending, limited financial protection, and the uneven geographic distribution of dentists – conditions that tend to concentrate services in urban areas and disadvantage rural and semiurban communities.^[8] In such contexts, oral health inequities are not only a matter of individual risk; they reflect health system design, financing arrangements, and the availability of prevention-oriented care within PHC.^[8,9] This is precisely the type of systems problem that global policy documents increasingly emphasize: reducing avoidable disease by shifting emphasis from downstream treatment toward upstream prevention,

early detection, and continuity of care delivered close to where people live.^[10]

In response to broader health system challenges, Iran implemented a nationwide reform agenda in the mid-2010s aimed at improving access and quality within the public sector. Within this broader reform environment, oral health initiatives were developed to strengthen the delivery of essential dental services through the PHC network.^[2,3] The family dentist program represents one operational model aligned with this direction. It is designed to reach rural and semiurban populations and to prioritize groups with elevated need, including children and maternal populations. The program package emphasizes preventive interventions (such as fluoride varnish and fissure sealants) alongside basic curative services (for example, restorations and extractions) delivered within PHC-affiliated settings.^[6]

However, policy design and service delivery frequently diverge. Even when reforms lower financial barriers or expand entitlements, utilization may remain shaped by perceived need – often meaning pain-driven visits and delayed care – rather than routine prevention.^[9] Moreover, implementation constraints common to PHC delivery platforms can undermine intended shifts in practice: workforce instability, infrastructure limitations, and operational disruptions can all affect the quality of the services.^[2] In this respect, the key question for an international readership is not the fine detail of Iran's institutional arrangements, but the broader, generalizable problem of oral health integration into PHC settings.^[4,10]

Answering that question requires longitudinal evidence. A single-year or cross-sectional evaluation can describe coverage at one point in time, but it cannot show whether service patterns are evolving toward prevention, whether changes are sustained, or whether a temporary increase reflects short-lived implementation pressure rather than durable system change.^[11] In PHC-based oral health programs, the preventive-versus-curative balance is a particularly informative operational signal because it captures the everyday clinical output of the system: preventive services imply proactive outreach, planned encounters, and early-stage management, whereas a predominantly curative profile – especially extraction-heavy patterns – often signals late presentation and limited prevention. Tracking this balance over multiple years, therefore, provides a pragmatic lens on the

policy-to-practice gap and on the extent to which prevention-oriented intent is realized in routine delivery.^[12]

Iran's capacity for longitudinal monitoring is strengthened by the integrated health system (SIB), a national EHR platform used in public-sector primary care to record clinical encounters with standardized service codes.^[13] In routine practice, these records are not collected for research purposes; they are collected for service delivery and reporting. That feature is methodologically valuable: it reduces reliance on retrospective recall, enables multiyear trend analysis, and supports facility-level comparisons. In the context of PHC dental services, SIB records can therefore be used to describe how an oral health reform package is reflected in actual service activity over time.^[8]

Against this background, the present study aimed to describe 6-year trends in dental service utilization delivered through rural and semiurban PHC dental settings in Isfahan Province, from 2016 to 2021, using routinely collected SIB records. Dental services in this study refer to the nationally coded package of essential clinical dental services recorded within the PHC platform, encompassing both preventive interventions (including fluoride varnish and fissure sealants) and common curative procedures (including restorations and extractions). The descriptive analysis focuses on two complementary outcomes: (i) annual service volumes and (ii) the composition of care, with emphasis on the preventive-versus-curative balance. By examining these trends over time, the study provides an empirical assessment of whether real-world service delivery moved in the prevention-oriented direction that PHC-based oral health reforms typically intend. Importantly, the contribution is positioned as transferable learning: Iran is treated as an illustrative LMIC case in which routinely collected electronic records can be leveraged to monitor whether oral health integration into PHC changes what facilities deliver.

MATERIALS AND METHODS

Study design and ethics

This study was a retrospective, longitudinal, observational, and descriptive analysis of dental service utilization within the PHC framework. The research was conducted in Isfahan, Iran, spanning a 6-year period from March 2016 to March 2022. The study protocol was reviewed and approved

by the Ethics Committee of Isfahan University of Medical Sciences (Approval Code: IR.MUI.RESEARCH.REC.1402.00.38). Since the study utilized de-identified, aggregated administrative data, the requirement for informed consent was waived by the ethics committee.

Setting and population

The study focused on the family dentist program, an integral component of Iran's health transformation plan. The setting included rural districts and semiurban towns (populations under 20,000) overseen by Isfahan Health Centers No. 1 and No. 2. These two networks represent a significant portion of the provincial health infrastructure. The study population encompassed all residents eligible for the rural health insurance scheme who were entitled to receive free or subsidized essential dental care at PHC facilities. No sampling was performed; instead, a total census approach was adopted, covering all dental service encounters recorded in the catchment areas during the study period.

Data source

Data were extracted from the Integrated Health System the national EHR platform for primary care in Iran. Launched in late 2015, the SIB system (Iranian data source of HER) serves as a centralized repository where all PHC providers, including dentists, are mandated to log clinical procedures in real-time. For this study, official performance reports were obtained from the provincial health authorities. These reports provide validated, aggregated counts of delivered services based on standardized national coding.

Service categorization and inclusion criteria

We included clinical dental procedures recorded under the family dentist program in accordance with the executive instruction of the family physician and rural insurance program. In this instruction, dental activities are classified into two main levels. Level 1 activities primarily cover routine PHC and outreach tasks such as oral health education, screening, and recording DMFT indices in health records. Level 2 activities refer to chairside clinical procedures delivered using a dental unit and recorded with standardized national service codes.

For this study, we extracted aggregated counts of Level 2 procedures from official SIB performance reports. To support a descriptive analysis of the service mix, Level 2 procedures were grouped into two categories based on clinical objective:

1. Preventive services: Dentist-delivered chairside fluoride varnish, fissure sealants, and professional scaling
2. Curative/treatment services: Tooth extractions (primary and permanent), restorative treatments (amalgam and composite fillings, categorized by number of surfaces), and vital pulp therapy (pulpotomy).

A key distinction of this study is its focus on Level 2 services. Within the family dentist program's performance-based payment system, compensation for dental staff (dentists and oral health technicians) includes a fixed base salary and a performance-based incentive. This incentive is calculated based on the volume and complexity of Level 2 services by applying predefined time weights to each recorded procedure. As a result, Level 2 procedures are generally recorded more consistently in the SIB system than Level 1 activities.

In contrast, Level 1 activities are considered part of routine duties and do not typically generate additional performance-based payments. Therefore, they may be recorded less consistently. To improve comparability and focus on services with clearer clinical outcomes, Level 1 activities were not included in the quantitative volume analysis.

Advanced or specialized dental treatments (e.g., endodontic therapy for permanent teeth or fixed prosthodontics) were excluded because they fall under Level 3 (specialized care) and are outside the scope of the family dentist program's primary care package.

Data validation and quality assurance

To ensure the integrity of the findings, the dataset underwent a two-stage validation process. First, the SIB system itself utilizes built-in logic checks to minimize miscoding at the point of entry. Second, the family dentist program employs a performance-based payment model, where a portion of the provider's remuneration is contingent upon quarterly audits by oral health supervisors. These audits verify the alignment between digital records, physical clinical logs, and actual service delivery. For this research, the final aggregated data were cross-checked for outliers and transcription errors by two independent researchers.

Statistical analysis

Descriptive statistics were employed to characterize service utilization patterns. Annual service counts were calculated for each category and stratified by the

health center network (Center 1 vs. Center 2). Trends over the 6-year horizon were assessed by calculating absolute volumes, yearly percentage changes, and the relative share of each service category (preventive vs. curative). Data cleaning and primary calculations were performed using Microsoft Excel 2019. Findings are reported as frequencies and proportions in accordance with the STROBE guideline.

Use of artificial intelligence tools

An artificial intelligence (AI) assistant (ChatGPT, OpenAI) was used to support manuscript language editing and to help generate code for data visualization based on the authors' extracted, aggregated dataset. The AI tool was not used to generate, alter, or impute any data, and did not perform independent statistical inference beyond the descriptive calculations specified by the authors. All figures were produced from the original dataset, and all analyses, interpretations, and final wording were verified and approved by the authors, who take full responsibility for the work.

RESULTS

Overall service workload

Over the 6-year study period (2016–2021), a total of 133,075 Level 2 dental procedures were delivered across the two health center networks in Isfahan. Health Center No. 2 contributed 76,697 procedures (57.6% of the total), while Center No. 1 delivered 56,378 (42.4%). The annual service workload ranged from a low of 11,215 procedures in 2020 to a high of 28,290 in 2017. As shown in Table 1 and Figure 1, after reaching a peak in 2017, the total workload remained above 26,000 procedures per year through 2019 before declining sharply in 2020. Center No. 2 maintained a higher absolute workload than Center No. 1 in every year of the study, with the gap being most pronounced during the 2017–2019 period,

Table 1: Annual distribution of level 2 dental procedures across health centers in Isfahan (2016–2021)

Year	Center number 1 (n)	Center number 2 (n)	Total (n)
2016	7483	11,233	18,716
2017	12,673	15,617	28,290
2018	9621	16,515	26,136
2019	10,835	17,192	28,027
2020	6437	4778	11,215
2021	9329	11,362	20,691
Total	56,378	76,697	133,075

when Center No. 2 delivered approximately 1.5 times the volume of Center No. 1.

Temporal trends

Annual dental procedure totals increased sharply in 2017, remained relatively stable in 2018–2019, declined markedly in 2020, and partially recovered in 2021 [Table 2]. Between the years 2016 and 2017, the total workload increased by 51.2%, rising from 18,716 to 28,290 procedures, the largest change observed during the study period. In 2018, workload declined by 7.6% to 26,136 procedures, followed by a 7.2% increase in 2019, bringing the annual total to 28,027 procedures, closely approaching the 2017 peak.

The most pronounced disruption occurred in 2020, when the number of procedures delivered fell by 60.0% relative to 2019, reaching only 11,215 procedures. Both centers were affected, although to different degrees: Center No. 2 declined from 17,192 procedures in 2019 to 4778 in 2020 (–72.2%), whereas Center No. 1 decreased from 10,835 to 6437 (–40.6%). In 2021, the total workload rebounded by 84.5% to 20,691 procedures. Despite this recovery, the 2021 total remained 26.2% below the prepandemic peak in 2019. Both centers contributed to the rebound, with Center No. 2 reaching 11,362 procedures and Center No. 1 9329 procedures [Figure 1]. Table 2 summarizes the year-to-year absolute and percentage changes in total workload.

Patterns in dental procedures

Curative procedures (extractions, restorations, and pulpotomies) accounted for most of the clinical workload throughout 2016–2021. As shown in Figure 2, the preventive share (fluoride varnish, fissure sealants, and professional scaling) varied across years, whereas curative procedures consistently represented the larger proportion of the annual workload. Preventive procedures comprised 21.8% of the total workload in 2016 (approximately 4083/18,716), declined to 7.2% in 2017 (approximately 28,290 total procedures), and then increased to 12.8% in 2018 and 21.0% in 2019 (approximately 5894/28,027). In 2020

and 2021, preventive shares were 19.4% and 19.1%, respectively. Overall, 21,476 preventive and 111,599 curative procedures were delivered over the study period, corresponding to an overall preventive share of 16.1%.

A sustained difference in service composition was observed between the two networks [Table 3 and Figure 3]. Center No. 1 recorded a higher preventive share than Center No. 2 in every year. In Center No. 1, preventive share ranged from 5.8% (2017) to 39.0% (2019) and exceeded 28% in 4 years (2016, 2019, 2020, and 2021). In contrast, Center No. 2 never exceeded 11.5% and declined from 11.5% in 2016 to 4.3% in 2021. The preventive-share gap increased from 25.8 percentage points in 2016 (37.3% vs. 11.5%) to 32.8 percentage points in 2021 (37.1% vs. 4.3%), despite similar time trends in total workload in both centers, including

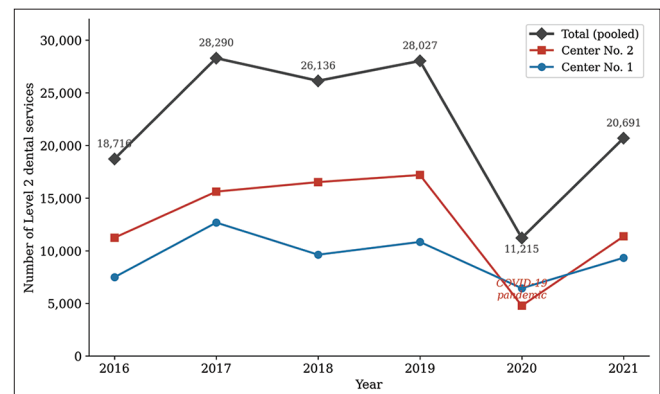


Figure 1: Annual workload across health centers (2016–2021). Each data point represents the total number of level 2 dental procedures recorded across each health center. The combined line represents the total across both health centers.

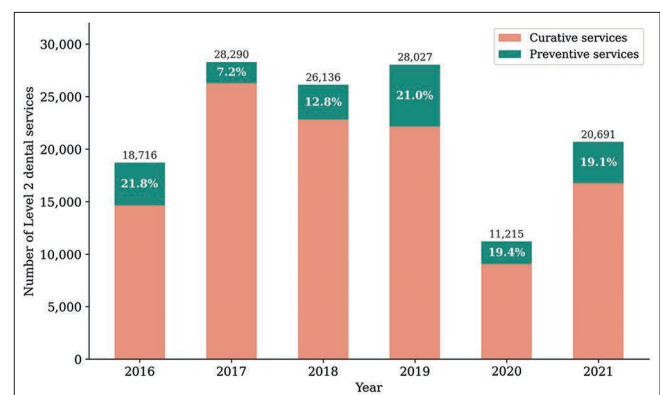


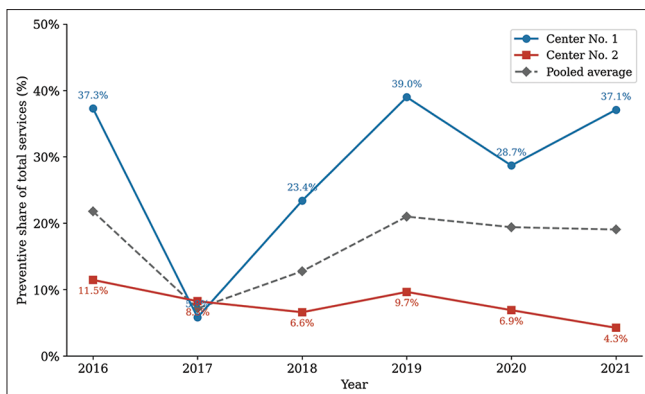
Figure 2: Distribution of preventive and curative dental procedures (2016–2021). Stacked bar chart showing the absolute number of preventive and curative level 2 dental procedures per year. Percentages indicate the preventive share of total annual services.

Table 2: Year-over-year change in total workload (2016–2021)

Transition period	Absolute change (n)	Percentage change (%)
2016 → 2017	+9574	+51.2
2017 → 2018	–2154	–7.6
2018 → 2019	+1891	+7.2
2019 → 2020	–16,812	–60.0
2020 → 2021	+9476	+84.5

Table 3: Comparative annual workload and preventive share across health centers (2016–2021)

Year	Center number 1: Total (n)	Center number 1: Preventive share (%)	Center number 2: Total (n)	Center number 2: Preventive share (%)	Overall preventive share (%)
2016	7,483	37.3	11,233	11.5	21.8
2017	12,673	5.8	15,617	8.3	7.2
2018	9,621	23.4	16,515	6.6	12.8
2019	10,835	39.0	17,192	9.7	21.0
2020	6,437	28.7	4,778	6.9	19.4
2021	9,329	37.1	11,362	4.3	19.1

**Figure 3:** Annual preventive procedure share across health centers (2016–2021). Lines represent the proportion of level 2 procedures classified as preventive for Center No. 1 and Center No. 2. The overall line represents the combined preventive share across both centers.

concurrent declines in 2020 and rebounds in 2021. Over 2016–2021, Center No. 1 delivered a higher cumulative number of preventive procedures despite a lower total workload, whereas Center No. 2's higher workload was largely driven by curative procedures, particularly extractions. The mean dental workforce was higher in Center No. 1 (11.5 dentists/year) than in Center No. 2 (6.2 dentists/year).

Permanent tooth extraction was the most frequent procedure, totaling 66,152 over 6 years [Table 4]. Annual counts ranged from 6048 (2020) to 14,280, (2017) and permanent extractions comprised 53.9% of the total workload in 2020. In 2021, permanent extractions increased to 12,471, while restorations increased to 2998 (vs. 5965 in 2019). Primary tooth extractions totaled 12,854, bringing total extractions (permanent + primary) to 79,006; primary extractions declined from 2776 in 2019 to 996 in 2020 and 657 in 2021.

Across 2016–2021, amalgam restorations totaled 19,629 and composite restorations 8,531 (28,160 restorations overall), with amalgam accounting for 69.7%. The amalgam-to-composite ratio ranged from 1.7:1 to 2.5:1, indicating the number

of amalgam restorations performed per composite restoration. The extraction-to-restoration ratio (total extractions divided by total restorations) ranged from 2.4:1 to 2.6:1 during 2016–2019, increased to 4.4:1 in 2020 and 2021, and was 2.8:1 overall [Table 4]. Pulpotomy accounted for 4457 procedures (3.3% of total workload), peaking at 1305 in 2017 and reaching 401 in 2020 and 622 in 2021.

DISCUSSION

This 6-year longitudinal analysis of level 2 dental procedures delivered through Isfahan's PHC network highlights four key findings: an extraction-dominated treatment profile, a preventive component that remained relatively low, a sharp pandemic-related disruption followed by partial recovery, and growing differences in the treatment profile between the two health center networks. Together, these findings show how policy priorities, provider incentives, and local context can shape routine dental care delivery.

A key finding was the notable gap between extractions and restorative care. Across 133,075 procedures, the extraction-to-restoration ratio was 2.8:1, indicating that extractions were far more common than restorations. This pattern contrasts with the program's stated emphasis on preserving natural dentition.^[6] Similar extraction-dominant profiles have nevertheless been reported in other public systems. For example, Bhayat *et al.*, in a review of PHC dental facilities in South Africa, reported extraction-to-restoration ratios substantially higher than those observed in Isfahan. Such differences may reflect variation in access to restorative materials and equipment, and broader socioeconomic conditions across settings.^[14,15] In a scoping review of universal oral health coverage in 27 low-income countries, Luan *et al.* reported that extractions are commonly included in health benefit packages, whereas preventive interventions are less frequently available.^[15] International experience also indicates that improving the preservation of

Table 4: Annual number of curative dental procedures and extraction-to-restoration ratio (2016–2021)

Year	Amalgam restorations (n)	Composite restorations (n)	Permanent extractions (n)	Primary extractions (n)	Pulpotomy (n)	Extraction-to-restoration ratio (extractions: Restorations)
2016	2708	1580	7927	2142	281	2.4:1
2017	5099	2026	14,280	3551	1305	2.5:1
2018	4414	1777	12,921	2732	952	2.5:1
2019	4353	1612	12,505	2776	896	2.6:1
2020	1049	544	6048	996	401	4.4:1
2021	2006	992	12,471	657	622	4.4:1
Total	19,629	8531	66,152	12,854	4457	2.8:1

natural permanent teeth often requires coordinated, multisectoral efforts and integration of oral health into existing health programs.^[2,16] For example, Nzobo *et al.* evaluated a government-led reform of Tanzania's national oral health system and reported a substantial improvement in the balance between tooth preservation and extraction over a 2-year period. The authors suggested that embedding oral health within primary care and maternal health services can achieve rapid improvements in preventive coverage and other short-term oral health outcomes.^[16]

The preventive share of dental procedures showed a distinct temporal pattern. Preventive procedures accounted for 21.8% of total workload in 2016, fell to 7.2% in 2017 (when overall workload peaked), then rebounded to 21.0% by 2019 and remained near 19%–21% in 2020–2021. The combination of a high workload and a low preventive share in 2017 may indicate that clinics prioritized unmet curative needs in the populations during a period of rapid service expansion in early years of implementing family dentist program. This pattern is consistent with findings reported by Watt *et al.* and the review by Gafari *et al.*, which noted that in the early phases of oral health programs, high levels of unmet needs often shift dental procedures toward curative care rather than prevention. In such settings, procedures that address immediate pain and urgent complaints tend to take priority over preventive interventions.^[17,18]

There was a significant reduction in procedures delivered in 2020. This is consistent with international evidence. For example, the scoping review by Farrokhi *et al.* documented substantial reductions in dental service delivery during the COVID-19 pandemic across multiple settings, attributing these declines to both supply-side restrictions (e.g., service closures and capacity limits) and demand-side avoidance related to perceived aerosol-transmission risk.^[17] Notably, the preventive share in Isfahan remained

relatively stable in 2020 (19.4%), which may indicate that low-aerosol preventive procedures (such as chair-side fluoride varnish) were more feasible to maintain under infection-control constraints. This pattern differs from findings in US federally qualified health centers, where Choi *et al.* reported a relative shift toward oral surgery and away from preventive care.^[19] Differences in program context may partly explain this contrast. The family dentist program was primarily implemented in rural and smaller-population settings, where pandemic-related disruptions may have been less severe than in large urban areas, potentially supporting a faster recovery.^[20] Consistent with this interpretation, the 84.5% increase in total workload in 2021 indicates a substantial recovery, although total workload remained 26.2% below the 2019 peak.

A policy-relevant finding is the sustained and widening difference between Center No. 1 and Center No. 2. Center No. 1 consistently delivered a higher preventive share, whereas Center No. 2's preventive share declined to 4.3% by 2021 despite having the higher total workload. Several mechanisms may contribute. First, workforce capacity differed and per-provider workload was markedly higher in Center No. 2. Over 2016–2021, Center No. 2 delivered 76,697 procedures versus 56,378 in Center No. 1. On average, each provider delivered approximately 2,015 procedures per provider-year in Center No. 2 compared with 819 in Center No. 1. This imbalance was especially visible in high-volume curative work such as permanent tooth extraction (44,168 in Center No. 2 vs. 21,984 in Center No. 1). Sustained clinical pressure at the provider level can limit the delivery of preventive services and favor curative procedures.^[9] In addition, differences in accessibility and provider characteristics may influence the types of procedures delivered. Center No. 1 covers more geographically dispersed and less accessible facilities, which may be more likely to rely on recently graduated dentists completing mandatory service. In contrast,

Center No. 2 serves more accessible areas that may be more attractive to experienced dentists. In a performance-based payment setting, more experienced and skilled clinicians may respond by prioritizing higher throughput curative procedures, which could result in favoring curative dental procedures. These behavioral responses are consistent with evidence from other health systems. For example, Jia *et al.* reported that provider behavior is sensitive to remuneration design, including time-weighting frameworks that assign higher value to procedures requiring more clinical time. This may encourage providers to prioritize more complex curative procedures over preventive services, which are often assigned to lower time weights and therefore generate lower returns.^[21,22] This observed workload imbalance has implications for service quality and workforce sustainability. Persistently high procedures-per-provider ratios may increase time pressure, reduce preventive delivery, and negatively affect provider satisfaction. Furthermore, unmeasured differences in social determinants of health may influence need and care-seeking. Although patient-level socioeconomic data were unavailable, Iranian studies such as Vali *et al.* and Javadzadeh *et al.* highlighted socioeconomic gradients in utilization and higher caries burden in rural children, consistent with wider evidence on oral health inequalities. These contextual factors could contribute to between-network differences in both absolute workload and the type of services delivered.^[23,24]

Strengths and limitations

This study used a 6-year census of SIB-recorded level 2 dental procedures across all health centers in both networks, minimizing selection bias. Routine electronic records reduce recall bias compared with surveys. Key limitations include aggregated data, lack of patient-level covariates, and a small number of annual time points, which preclude causal inference. In addition, Level 1 preventive activities were excluded due to inconsistent recording, likely underestimating the program's full preventive scope.

CONCLUSION

Despite the expansion of PHC-based dental delivery under the oral health reform in Isfahan, service delivery during 2016–2021 remained largely extraction-dominant, with restorative care occurring far less frequently. Preventive procedures formed a minority share overall and varied over time. The

COVID-19 shock produced a sharp decline in 2020, followed by substantial recovery in 2021, indicating both vulnerability to external disruptions and the capacity for recovery within a state-supported PHC network. These findings provide a population-level longitudinal baseline for monitoring program performance and refining policy. Future work should move beyond description to test plausible mechanisms by linking changes in remuneration rules, time-weighting frameworks, staffing patterns, and characteristics to shifts in the treatments delivered. Such evidence would support targeted reforms – particularly recalibrating incentives and aligning workforce capacity with demand – to better balance throughput with the program's longer-term goals of tooth retention and preventive care.

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Conflicts of interest

The authors of this manuscript declare that they have no conflicts of interest, real or perceived, financial or non-financial in this article.

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