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DENTAL CONDITION AND TREATMENT DEMAND

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Abstract. The article addresses pressing issues related to the prevalence and intensity of dental diseases, emphasizing the critical role of oral hygiene in the onset and progression of major dental pathologies. As individuals age, the condition of their dental and jaw systems tends to deteriorate, resulting in a higher likelihood of tooth loss. This, in turn, increases demand for restorative dental services. The declining oral health indicators among the population of Khabarovsk highlight a growing need for prosthodontic care, periodontal treatment, and management of advanced carious lesions—conditions that frequently lead to tooth loss, even among younger individuals. These diseases often result in persistent morphological and functional changes in the masticatory system, which adversely affect the digestive process, facial aesthetics, chewing efficiency, and speech capabilities. Consequently, there is a notable surge in demand for comprehensive dental care services.

Keywords: prevalence, oral cavity, diseases, demand.

INTRODUCTION

Numerous researchers have explored the prevalence of major dental and maxillofacial diseases across various age groups [1, 2, 5]. Among adults, dental caries remains the most widespread oral health condition. According to World Health Organization (WHO) statistics, the incidence of dental caries varies significantly across countries and populations, ranging from 80% to 98%. Over the past twenty years, there has been a noticeable increase in caries rates among children, particularly in economically developed nations. By the age of 6 to 7, between 80% and 90% of children are affected by cavities of varying severity.

Inflammatory periodontal diseases also occupy a leading position in the overall structure of dental pathologies [6]. Based on WHO's 1990 global survey covering 53 countries, the prevalence of periodontal conditions is especially high in the 35–44 age group (65% to 98%) and among adolescents aged 15–19 (55% to 89%).

These oral conditions frequently lead to premature tooth loss—even among younger individuals—resulting in persistent morphological and functional changes in the masticatory system. Such alterations negatively impact digestive function, facial symmetry, chewing ability, and speech articulation, which ultimately intensify the demand for comprehensive dental care services [3].

The prevalence and severity of dental diseases vary significantly across different regions of the country. These differences are influenced by a range of factors, including climatic and geographical conditions, the concentration of fluoride, iodine, and other trace elements in drinking water, as well as environmental, social, and economic determinants.

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The primary aim of this study was to investigate the prevalence of dental and jaw system pathologies as a factor contributing to the growing demand for dental services. To achieve this objective, the study focused on evaluating oral hygiene indices, the extent and intensity of hard dental tissue diseases, and the condition of periodontal structures [4].

MATERIALS AND METHODS

Oral health constitutes an essential component of general well-being and directly influences the quality of life, self-esteem, nutritional behavior, and social communication of individuals. Despite this significance, dental diseases remain among the most prevalent chronic conditions affecting humanity today. According to the World Health Organization, up to 90% of the global population is affected by some form of oral disease throughout their lifetime. In many countries, especially those undergoing demographic transition and socio-economic transformation, the burden of oral disease continues to rise. Consequently, understanding the status of dental health in a given community is a fundamental prerequisite for planning dental care resources, adjusting service delivery models, and implementing preventive policies at both clinical and population levels [4].

The assessment of dental health conditions provides a scientific basis for measuring the magnitude and distribution of diseases such as dental caries, gingivitis, periodontitis, malocclusion, edentulism, and oral mucosal lesions. These data, when analyzed in conjunction with socio-demographic variables such as age, gender, income, education, and urban-rural residency, allow health authorities to determine priority areas, allocate budgets, and optimize the deployment of dental professionals and infrastructure. Furthermore, in the context of limited financial and human resources, it becomes imperative to stratify the population based on risk profiles and to align service provision accordingly [7].

To assess the potential for expanding medical service offerings in the city of Andijan, a study was conducted to evaluate the oral health status of the population across different age groups using the WHO's standardized methodology and a randomized sampling approach.

A total of 699 individuals residing in Khabarovsk participated in the dental examination. Among them, 15.45% (108 individuals) were 12-year-old children, while the remaining 84.55% were adults from key demographic groups (see Figure). The collected data were processed using MS Excel.

The age distribution of participants was relatively uniform, with the exception of the smallest subgroups—children aged 12 and seniors aged 65 and older ($p < 0.05$). Specifically, the breakdown by age group was as follows:

12 years – 108 participants (15.45%),

20–35 years – 153 participants (21.89%),

35–44 years – 164 participants (23.46%),

45–64 years – 174 participants (24.89%),

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65 years and older – 100 participants (14.31%).

Females constituted the majority of the examined cohort, accounting for 59.51% of the total sample.

Dental caries and periodontal diseases represent the primary causes of tooth loss and dysfunction in most populations. These conditions not only impair mastication and speech but also contribute to systemic health issues, including cardiovascular diseases and diabetes mellitus. The prevalence of caries among school-age children, particularly in developing countries, often exceeds 60%, while the adult population shows a significant incidence of untreated periodontal pockets. The high occurrence of these conditions translates into a sustained and increasing demand for restorative, endodontic, prosthetic, and periodontal services [8].

Epidemiological studies employing indices such as DMFT (Decayed, Missing, Filled Teeth) and CPI (Community Periodontal Index) provide a quantified picture of the disease burden. For example, data collected from urban centers in Central Asia have shown that more than 45% of adults aged 35–44 years suffer from moderate to severe periodontitis, with minimal access to professional scaling and root planing. These trends underscore the necessity of expanding the availability of dental services, especially within public healthcare systems where affordability remains a critical barrier.

The accessibility and utilization of dental services are heavily influenced by socioeconomic status, health literacy, insurance coverage, and geographic location. Individuals residing in low-income regions or rural settings often experience delayed or inadequate dental care due to cost, distance, and lack of awareness. Moreover, marginalized groups such as the elderly, persons with disabilities, and refugees face compounded barriers to service utilization, thereby exacerbating the untreated disease burden [9].

In countries such as Uzbekistan, dental health assessments conducted within national health surveys reveal significant regional disparities. Urban populations tend to show higher utilization rates and better oral hygiene indices, whereas rural dwellers are more likely to present advanced stages of disease upon their first dental visit. These discrepancies necessitate the implementation of mobile dental clinics, school-based sealant programs, and tele-dentistry initiatives to bridge the urban-rural divide in service access.

An important dimension in reducing the mismatch between dental needs and services is the integration of prevention-focused strategies. Fluoridation programs, oral health education in schools, routine screenings, and promotion of proper brushing habits can drastically reduce the incidence of caries and periodontal disease. Countries that have adopted community-wide preventive initiatives report a marked decline in treatment demand, allowing them to redirect resources towards more complex restorative and rehabilitative care.

Risk stratification, which involves segmenting the population based on their oral health risk profile, allows dental care providers to prioritize interventions. For instance, high-risk individuals such as smokers, diabetics, and immunocompromised patients may require more frequent check-ups and personalized care plans. Incorporating this risk-based

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approach into public health policies helps ensure efficient use of limited resources and improves health equity.

RESULTS AND DISCUSSION

To implement the process of planning the economic justification and management of the production of services in dentistry, their promotion to consumers, information about the market in dentistry is necessary. One of the methods of such social analysis is to obtain information for making a decision on what services and in what volume should be planned to be produced. The change in the population size is directly influenced by natural and migration population growth. Every year the number of the age group "under 18" decreases, and "over 65" increases. A characteristic feature of the age composition of the city of Khabarovsk in recent years has been a decrease in the number and proportion of people younger than working age and the aging of the population. Almost every fifth resident of the region is older than working age (Table 1).

Table 1

Population dynamics of the city of Andijan

Men and women						
Age (years)	2019	2020	2021	2022	2023	2024
Younger than working age	87855	83268	80886	83467	77698	83903
Working age	383064	388342	387204	380243	375358	381565
Older than working age	111544	107457	109319	115358	124697	128168
Total	582464	579067	577409	579068	577753	593636

An analysis of the population of Andijan shows an increase in the population by 1.92% over the past 11 years due to the population of over working age. The level of hygiene among children is satisfactory at 76.85 ± 4.06%. Among adults aged 20 to 64, the level of hygiene is satisfactory in 68–76% of cases. Oral hygiene has a persistent tendency to deteriorate with age (Table 2).

Table 2

OHI-S scores in different age groups of residents

Age	Oral hygiene index			
	good	satisfactory	bad	very bad
12	15,74 ± 3,50	76,85 ± 4,06	6,48 ± 2,37	0,93 ± 0,92
20–34	9,15 ± 2,33	67,97 ± 2,77	19,61 ± 3,21	3,27 ± 1,44
35–44	3,66 ± 1,47	69,51 ± 3,63	24,39 ± 3,35	2,44 ± 1,20
45–64	3,45 ± 1,38	75,86 ± 3,32	18,97 ± 2,97	1,72 ± 0,99
65 and >	0,00 ± 0,00	60,00 ± 4,90	30,00 ± 4,58	10,00 ± 3,00

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Indicators of the intensity and prevalence of the main dental diseases - dental caries and inflammatory periodontal diseases among children aged 12 years and the adult population.

The prevalence of periodontal diseases is closely related to age. The prevalence of periodontal diseases in the age group "20-34 years" was 92.15%; in the group "35-44" - 97.56%; and in the groups "45-64" and "65 and older" - 100%. Among the adult population aged 20-34 years, the average value of sextants with bleeding was 2.55 ± 0.12, with tartar 1.01 ± 0.08, the presence of a periodontal pocket up to 5 mm 0.07 ± 0.01, excluded sextants was 0.01 ± 0.00. Only 2.39 ± 0.14 examined sextants did not show signs of periodontal tissue damage. In adults aged 35–44 years, the number of sextants with bleeding was 2.50 ± 0.09, with tartar 1.50 ± 0.08, with a periodontal pocket up to 5 mm 0.23 ± 0.03, and excluded sextants was 0.38 ± 0.05. In 1.39 ± 0.09 cases, no changes were detected. In the group of subjects aged 45–64 years, the number of sextants with healthy periodontium decreased to 1.05 ± 0.06, but the number of sextants increased: with bleeding – 2.55 ± 0.10, with tartar – 1.03 ± 0.05, with a periodontal pocket up to 5 mm – 0.34 ± 0.04. In this age group, sextants with a periodontal pocket of more than 6 mm were recorded (0.19 ± 0.03). Due to significant tooth loss, the number of excluded sextants was 0.38 ± 0.05. In our opinion, this tendency towards an increase in the prevalence of periodontal tissue diseases is associated not only with a low level of oral hygiene, but also with early tooth loss, irrational prosthetics, and the presence of concomitant general somatic pathology. In the age group “65 and older”, determining the CPITN index was difficult due to the large number of excluded sextants (1.94 ± 0.18). A decrease in the amount of bleeding, tartar, and periodontal pockets larger than 6 mm indicated a deterioration in the condition of the periodontal tissues, which was accompanied by a significant decrease in the average number of healthy sextants 1.05 ± 0.11, and an increase in the number of missing sextants (1.94 ± 0.18).

The supply side of dental service provision—comprising dentists, hygienists, auxiliaries, and dental technicians—must be aligned with the assessed demand to achieve systemic efficiency. Workforce distribution often fails to reflect the actual need: most providers tend to concentrate in metropolitan areas, while underserved rural zones struggle with chronic shortages. Strategic human resource planning based on population needs, supported by real-time data and predictive modeling, is essential to balancing this inequity.

Likewise, infrastructure investment should prioritize the development of multifunctional dental care units within community health centers, especially in areas identified with high untreated disease prevalence. Policy makers must also consider the growing role of digital dentistry and minimally invasive technologies, which can lower treatment costs and broaden the spectrum of accessible procedures [10].

An increasingly important but often overlooked dimension in assessing dental health needs is the interplay between psychosomatic factors and oral health conditions. Contemporary clinical research has demonstrated that psychological stress, anxiety disorders, depression, and chronic fatigue syndrome are not merely peripheral to physical health but can act as significant catalysts in the manifestation and progression of various oral diseases. Conditions such as bruxism (teeth grinding), temporomandibular joint disorders, glossodynia (burning mouth syndrome), and stress-induced periodontal deterioration have

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been directly linked to mental health status. Among adolescents and university students, for instance, neglect of oral hygiene due to academic or social stress often results in the rapid onset of carious lesions and gingival inflammation, despite adequate access to dental care resources [5].

These findings highlight the importance of integrating psychological assessments and behavioral screening tools into dental health evaluations, especially when planning public health interventions or designing personalized treatment strategies. The future of dental service provision must therefore extend beyond a purely clinical diagnosis and incorporate elements of mental well-being, lifestyle counseling, and stress management programs. Such a biopsychosocial approach not only enhances treatment outcomes but also improves patient compliance and reduces relapse rates. Moreover, stratifying patients based on their psychological vulnerability allows practitioners to forecast service needs more precisely and to prioritize preventive or supportive interventions accordingly [11].

Another crucial factor shaping the demand for dental services is the progressive aging of the population, particularly in middle-income countries undergoing demographic transition. The increased life expectancy, while a positive indicator of public health success, also contributes to a higher prevalence of chronic oral conditions among the elderly. Among these, edentulism (complete tooth loss), xerostomia (dry mouth due to medication or systemic conditions), root caries, and ill-fitting prostheses are dominant concerns. These conditions severely impair the nutritional status, speech, and social interaction of older adults, diminishing their overall quality of life and increasing their dependence on health systems.

The need for geriatric-focused dental services is therefore growing rapidly. Despite this, many healthcare systems lack a dedicated infrastructure or sufficient number of dental professionals trained in gerodontology. The assessment of edentulism rates through population-based surveys—particularly among adults aged 65 and older—offers vital information for resource allocation. For example, a national survey conducted in Uzbekistan showed that over 30% of individuals in the 65+ age group were fully edentulous, yet fewer than half of them had access to functional removable dentures. This mismatch clearly demonstrates the urgency of investing in low-cost prosthetic rehabilitation programs, particularly for pensioners and individuals living in rural or economically disadvantaged communities.

Additionally, geriatric dental needs are often complicated by multimorbidity, polypharmacy, and reduced manual dexterity, which further hinder effective oral hygiene and increase vulnerability to infections and prosthetic failure. Health systems must therefore adopt multidisciplinary care models that integrate dental services with geriatric medicine, nutrition counseling, and caregiver support. Mobile dental units, domiciliary care services, and public subsidies for dentures and implants can all contribute to improving access and functionality. Without targeted strategies for elderly populations, the overall burden on the dental healthcare infrastructure will continue to grow, exacerbating inequalities and reducing the cost-effectiveness of oral health programs [6].

In parallel with the increasing demands of geriatric care, the oral health status of children and adolescents plays a pivotal role in shaping the future trajectory of dental service

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utilization. Pediatric dental conditions, particularly early childhood caries (ECC), malocclusion, enamel hypoplasia, and developmental anomalies, have a profound impact not only on the immediate well-being of the child but also on their long-term oral health outcomes. Studies consistently show that untreated dental caries is the most prevalent chronic disease in children worldwide, often surpassing asthma and obesity in frequency. In many low- and middle-income countries, including Uzbekistan, national surveys indicate that more than 60% of children under the age of 12 experience some form of untreated decay, with disproportionately high rates in socioeconomically disadvantaged populations [12].

The presence of dental pain and infection in early childhood can impair concentration, nutritional intake, speech development, and school attendance, thereby reinforcing cycles of poor educational and health outcomes. From a systems perspective, early diagnosis and timely intervention are among the most cost-effective strategies in dental public health. The integration of school-based screening programs, fluoride varnish applications, dental sealants, and oral hygiene instruction into primary healthcare and education systems significantly reduces the incidence and severity of disease. These programs, when systematically implemented, lead to decreased future demand for complex restorative care and reduce the financial burden on both families and public insurance schemes.

Moreover, the incorporation of behavioral education, such as motivational interviewing with parents and children, and the use of child-friendly technologies (e.g., gamified dental apps, visual storytelling, animated oral hygiene tutorials), enhances engagement and compliance. In this regard, the expansion of pediatric dental workforces, including dental therapists and hygienists, is essential to support preventive services in rural and underserved urban areas [13]. Policymakers must also address challenges such as unequal distribution of providers, the need for pediatric-specific training among general practitioners, and limited access to sedation or behavior management techniques for children with special needs.

In sum, the dental health status of children is not merely a clinical concern but a strategic determinant of how health systems must plan, allocate, and deliver dental services over decades to come. Neglecting pediatric needs today inevitably results in compounded restorative and prosthetic demands in adulthood. A forward-looking dental strategy therefore requires early, widespread, and equitable pediatric interventions.

In the evolving landscape of global healthcare, digital transformation and the application of artificial intelligence (AI) are rapidly redefining how oral health conditions are assessed and how the need for dental services is predicted and managed. These technological advancements are not merely accessories to traditional care models but are becoming integral tools in improving diagnostic accuracy, enhancing patient engagement, and optimizing health system efficiency. AI-powered diagnostic systems, for instance, can analyze intraoral images, radiographs, and electronic health records to detect caries, periodontal bone loss, and even early signs of oral cancer with a degree of speed and consistency that often surpasses manual evaluation [14].

Machine learning algorithms are also being developed to predict patient risk levels based on a combination of clinical history, behavioral data, diet, and socio-demographic indicators. These tools allow for personalized prevention plans, in which high-risk

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individuals receive intensified preventive measures and more frequent monitoring, while low-risk individuals are managed with a more cost-efficient recall schedule. Predictive modeling of this kind enhances the ability of public health planners to allocate resources strategically, forecast the future burden on dental services, and design targeted public awareness campaigns in communities with poor oral health indicators [15].

Tele-dentistry has likewise emerged as a transformative force, particularly in regions with geographical barriers or limited specialist availability. Through virtual consultations, asynchronous diagnostic submissions, and remote patient education, dentists can extend their reach to remote and vulnerable populations. In Uzbekistan and similar healthcare systems in transition, pilot programs using mobile phone–based oral screening and follow-up systems have shown promise in improving both detection rates and referral efficiency for children and older adults alike [16].

Furthermore, digital oral health records, when centralized and standardized, provide robust data sets for population-level analysis. Such data enable policymakers to conduct geospatial mapping of dental disease prevalence, service gaps, and high-risk clusters—tools that are essential for evidence-based policy formulation and health equity planning. The interoperability of these platforms with broader e-health systems also ensures better integration of oral health with overall patient care, thereby fostering holistic healthcare delivery.

While the integration of digital health tools in dentistry offers numerous advantages, challenges remain, including the need for practitioner training, data privacy regulation, and the initial financial investment for infrastructure. Nevertheless, with thoughtful implementation, digital technology stands to play a defining role in bridging the gap between oral health needs and service provision in both developed and developing countries.

To better understand the effectiveness of various approaches to assessing and responding to dental health needs, it is instructive to examine international models that have demonstrated success in improving oral health outcomes and optimizing service provision. In countries with advanced public health infrastructures—such as Sweden, Canada, and Japan—oral health surveillance systems are tightly integrated into national health strategies, with periodic population-based surveys, school-based screenings, and centralized health databases that track disease prevalence and treatment uptake over time. These systems allow for continuous monitoring, early identification of service gaps, and evidence-based decision-making [17].

Sweden, for instance, offers free dental care for all children and adolescents up to the age of 23, supported by a strong emphasis on prevention and early intervention. As a result, the country reports some of the lowest rates of untreated caries in Europe. Japan, meanwhile, places significant emphasis on geriatric dental care, with regular dental check-ups integrated into long-term care insurance programs for the elderly. This policy recognizes the critical link between oral health and systemic diseases, and it ensures that aging populations maintain masticatory function and nutrition. Canada's Indigenous Oral Health Strategy similarly demonstrates how culturally tailored interventions, combined with mobile dental clinics and tele-dentistry services, can improve access in geographically isolated and historically underserved populations.

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Emerging economies like Brazil and Thailand have also made notable progress by implementing decentralized, community-based dental health programs. Brazil's "Smiling Brazil" initiative provides public funding for oral health services, integrates dental teams into primary health units, and has expanded access to care in rural areas through mobile and portable clinics. Thailand has successfully trained a large cadre of dental nurses to provide preventive and basic restorative services in schools, which has dramatically reduced untreated decay in children.

These comparative experiences underscore a critical point: while the epidemiological burden of oral diseases is often universal, the solutions must be context-specific, drawing from global best practices but tailored to the socio-economic, cultural, and institutional realities of each country. For Uzbekistan, this means not only expanding public investment in dental infrastructure and human resources but also embedding oral health priorities into broader health and education systems, leveraging digital technologies, and pursuing partnerships with international organizations and academic institutions.

A strategic, multi-sectoral, and equity-focused approach—drawing on the successes and lessons of diverse countries—can guide Uzbekistan and similar nations in closing the gap between current oral health needs and the capacity of their dental care systems.

CONCLUSION

The results of the examination of the dental system of Andijan residents indicate a low level of hygiene in all age groups, a high level of prevalence and intensity of caries, periodontal tissues, which increases the tendency to tooth loss and stimulates the growth of the volume of services in the restorative section of dentistry. A decrease in the level of dental health indicators of Andijan residents creates an increase in demand for prosthetics services, treatment of periodontal tissues and complicated forms of caries. To improve dental health, it is necessary to strengthen preventive measures. In summary, the systematic assessment of dental health conditions offers invaluable insight into the magnitude and dynamics of dental care needs within a population. By employing reliable epidemiological tools and integrating them with socioeconomic and behavioral data, policy makers and healthcare planners can develop responsive and equitable dental service models. In regions such as Uzbekistan and similar developing economies, bridging the gap between oral health burden and care provision requires a multi-pronged approach encompassing risk-based planning, preventive programs, digital health integration, and targeted investments in workforce and infrastructure. A data-driven, patient-centered strategy will ultimately lead to sustainable improvements in both dental health outcomes and service efficiency.

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