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Operational Capacity of Public Dental Health Services in Tunisia: A pilot study

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Abstract

Background:

Oral diseases are a significant public health problem globally, especially in developing countries where the availability of basic oral healthcare is limited. In Tunisia, the high prevalence of dental caries and periodontal diseases, with low public-sector dentist density and inequitable distribution of resources, raises concerns about the operational capacity of public dental services. Operational capacity, including equipment performance, material availability, and service readiness, is an important but understudied factor influencing access to care.

Objective:

The objective of this study was to evaluate the operational capacity of public dental health services in Tunisia and its influence on access to care in first- and second-line public healthcare facilities.

Materials and Methods:

A pilot cross-sectional study was carried out among dentists in public primary and secondary oral healthcare services. A structured online questionnaire was used to collect data on sociodemographic variables, the functionality of the dental chair, the availability of equipment and materials, the frequency of service refusal, and the perceived effect on access to care. A convenience sample was used from August to October 2023. Descriptive and analytic results were analyzed using SPSS version 20, and statistical significance was set at $p \leq 0.05$.

Results:

The study included 78 participants. The majority were general practitioners (97.4%), and the majority had professional experience of more than five years (88%). The majority of the dentists had access to the basic parts of the dental chair, although 89% of them reported service refusal due to equipment failure, which happened more than six times a year. The majority of the services were for emergency care only, and access to radiology, prosthetic care, and pediatric and surgical care was severely restricted, at 42%, 11%, and less than 2%, respectively. The shortage of materials was also reported by 87.2% of dentists

Conclusion:

Public dental services in Tunisia face substantial operational constraints that significantly limit access to essential oral healthcare. Strengthening equipment maintenance, supply chain management, and equitable resource allocation is essential to improve service delivery and support universal health coverage for oral health

Key words: pilot study, operational capacity, public dental services

Introduction

Oral diseases are a critical public health challenge worldwide, with 3.5 billion people affected. The diseases are a major cause of disability-adjusted life years (DALYs), with untreated caries and periodontal diseases being the main contributors. In low- and middle-income countries like Tunisia, the situation is worsened by the resources available, the distribution of the dental workforce, and the integration of the dental field into universal health coverage. In Tunisia, the prevalence of caries in 6-year-old children is above 50%, while the prevalence in 12-year-old children is 60%. In 15-year-old Tunisian children, the prevalence of periodontal diseases is above 55%. The dentist density in the public sector is low, at 0.61 for every 10,000 inhabitants, compared with 3.15 in the private sector (1,2).

Operational capacity, which includes the functionality of equipment, the availability of materials, and the readiness of services, is a key aspect of the operations of the frontlines of dental care. However, it is often neglected. In recent assessments in the WHO Eastern Mediterranean Region countries, such as Tunisia, large disparities in the density of dentists, ranging from 1 in every 120,000 in the southern regions to 2,215 in the capital, were reported, along with a lack of auxiliaries and clinic infrastructure, which results in the use of emergency extractions instead of preventive and curative procedures (3,4).

Regarding access to adequate dental care, the percentage of subjects with access to adequate oral health in 2003 was approximately 63% for schoolchildren, 43% for adults aged 35 to 44 years and 16% for adults aged ≥ 65 years in 2008 (5).

This pilot study addresses these gaps by surveying public dentists on dental chair functionality, material shortages, refusal frequencies, and perceived access impacts in first- (basic health centers) and second-line (district/regional hospitals) facilities.

The aim of this study is to describe operational barriers and their statistical associations with care access, informing policy for enhanced capacity under Tunisia's health reforms.

Materials and Methods

A pilot cross-sectional design was used for this research. The population of interest comprised dentists working in public primary and secondary oral health care services.

The inclusion criterion for the participants was dentists currently working in first- and second-level public oral health care services. These services included public dispensaries, district hospitals, basic health centers, and second-level facilities such as regional hospitals.

The dentists also needed to have a minimum of one year of work experience. This criterion was selected because it ensured that the dentists had enough exposure to the realities of working in first- and second-level public oral health care services.

Dentists working in university hospitals, medico-social centers, military hospitals, and health centers for security forces were excluded from the sample population. This was due to the differences in governance structures, funding models, populations receiving care, and organizational structures. These differences could have resulted in selection bias and reduced homogeneity of the sample.

A convenience sampling method was used in this pilot study. The participants were recruited over a period of two months from August 1st to October 29th, 2023.

Data collection involved the use of a structured online questionnaire created using Google Forms.

The data collection tool was developed based on the research objectives and literature relevant to the research. It had sections on the sociodemographic characteristics of the respondents, functionality of the dental chair, availability of equipment and materials, and the patients information on constraints to the service. The data collection tool collected data in real time, which was then stored in a database. The data collection period was between August 1, 2023, and October 19, 2023.

Data analysis were performed using the Statistical Package for the Social Sciences (SPSS) version 20 software. Results were expressed as frequencies and percentages, while the level of statistical significance used was $p \leq 0.05$.

Ethical issues were addressed by ensuring the anonymity of the respondents through the online data collection tool. An introductory statement explained the purpose and objectives of the research, while the participation of the respondents in the online data collection tool was used as informed consent.

Results

A total of 82 dentists participated in the study. Four respondents from university hospitals were excluded, resulting in 78 included subjects. The response rate was 11.4% of the total public dental workforce.

Sociodemographic and Professional Characteristics

The majority of respondents were general dental practitioners, accounting for 97.4%, while only 2.6% were specialists.

The respondents were mainly working in district hospitals (37.8%) and basic health centers (29.3%), followed by regional hospitals (13.4%) and other first-line health facilities.

The participants had acquired substantial professional experience, with 88.5% having more than five years of practice, while 44.9% had acquired more than ten years of experience. The dentists were distributed throughout the 24 governorates of Tunisia.

Operational Capacity and Service Delivery

Although basic components of dental chairs, including lighting, spittoon, chair movement, and turbine, were generally available, 89% of the respondents indicated that they had been compelled to deny patient services because of dental chair breakdowns (Figure 1). Denial of patient services because of equipment failure occurred more than six times per year in 29% of the instances.

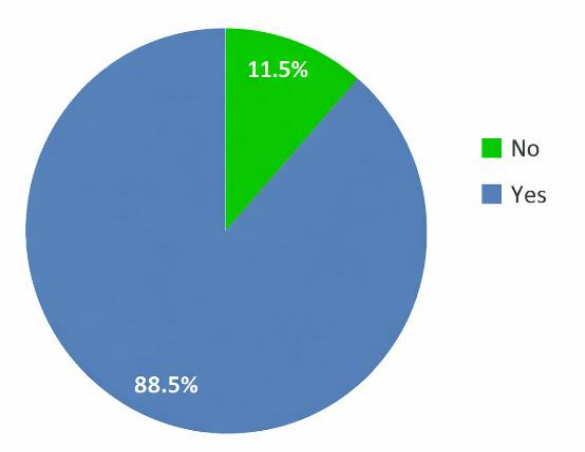

Figure1: Responses to the question "Have you ever been forced not to treat patients due to a malfunction of your dental chair?"

The dental services offered were mainly emergency-based. Extraction and conservative care were available in 92.3% of the dental facilities, while endodontic care was available in 87.2%. However, availability of other basic services was low: intraoral radiography in 42%, prosthetic care in 11%, and pediatric dentistry and oral surgery in less than 2%.

Impact of Material and Equipment Shortages

Material and equipment shortages were found to have a considerable impact on the delivery of services. Over half of the facilities were unable to provide intraoral radiographs, 39.7% were unable to provide endodontic care, and 80.8% were unable to provide prosthetic care. Overall, 87.2% of dentists were unable to provide care because of material shortages, and 53.6% of this refusal of care occurred more than six times a year (Figure 2).

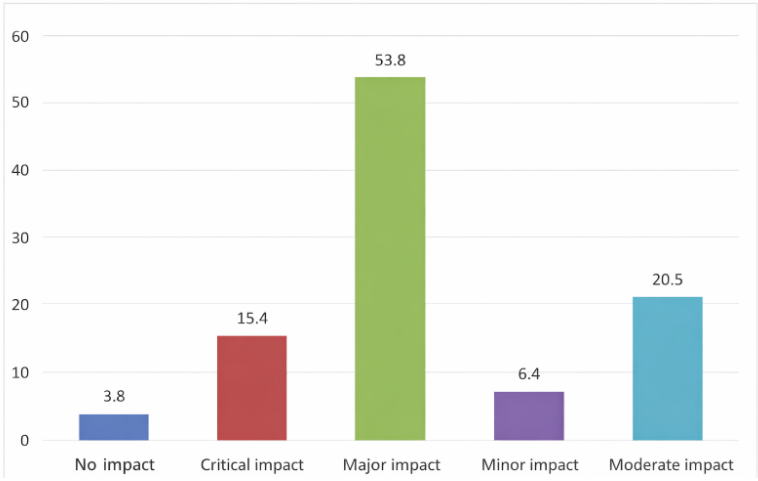

Figure 2: Impact of inadequate dental equipment and materials in public dental care structures on patients

The most common reasons given for refusal of care were dental chair inoperability, lack of materials, sterilization, lack of consumables, and lack of radiographic equipment. None of the participants worked in a facility where non-sterile equipment was used.

Perceived Impact on Access to Care

Over two-thirds of the participants perceived the impact of equipment and material shortages on access to dental care as major (53.8%) or critical (15.4%). There was a statistically significant relationship between the dental chair not working and the impact on access to care ($p = 0.001$) (Table 1).

Table 1: Impact of Dental Chair Functionality on Access to Care

		Minor impact	Major impact	Total
Have you ever been forced to refuse patients due to dysfunction of your dental chair?	**No** – Number	3	2	5
	No – Percentage	8.5%	2.4%	11.0%
	Yes – Number	18	55	73
	Yes – Percentage	22.0%	67.1%	89.0%
Total	**Number**	21	57	78
	Percentage	30.5%	69.5%	100%

Access to care was also significantly affected by the place of practice, with dentists practicing in district hospitals perceiving a greater negative impact than those practicing in regional hospitals ($p = 0.029$). There was no significant association between geographic location and the perceived impact on access to care ($p = 0.6$), indicating a nationwide problem.

Discussion

This article presents the first national assessment of the operational capacity of public dental services and the important limitations to access basic oral health care. The equipment's functionality and the availability of materials were identified as important determinants of the delivery of public dental services, thus reinforcing the idea that operational capacity is a mainstay of effective primary oral health care, as already emphasized by the World Health Organization (WHO)(6).

One of the most interesting results was the large number of dentists who reported being refused care because of the malfunctioning dental chair and lack of materials. Close to nine out of ten dentists had not been able to offer care because of equipment failure. Such findings have also been observed in low- and middle-income countries, where the lack of maintenance systems and technical support has been found to have a major impact on the continuity of care and unmet treatment needs. (7). Considering the medico-surgical nature of dental practice, functional equipment is a minimum requirement rather than an improvement in quality.

Material shortages were also an important factor in restricting access to care. More than 85% of the respondents indicated that they could not provide care because of material shortages, especially in endodontic, radiographic, and prosthetic procedures. These results are consistent with previous studies that have shown that supply chain problems and poor procurement practices are important factors in restricting the delivery of oral healthcare in public systems (7,8). The lack of capacity to deliver radiographic services in a large proportion of facilities raises important issues related to the accuracy and safety of diagnoses and the quality of care delivered.

Moreover, the study results also show that public dental services are mainly delivered for emergency and pain-relieving interventions such as extractions and basic conservative care. Preventive, rehabilitative, and special care services, particularly those related to prosthetic care, appear to be inaccessible. This kind of service delivery profile follows a care approach that is more related to urgency rather than the management of health conditions (9). These limitations could lead to the deterioration of oral health and the disease burden, impacting quality-adjusted life years and disability-adjusted life years (10).

A relationship was found between the location of practice and perceived influence on access to care, where first-line facilities were more constrained than second-line structures. This could reflect the structural inequity in the distribution of resources between different levels of care, as highlighted in the Tunisian public healthcare system

The lack of a strong relationship for the geographic location indicates that the issue is widespread and systemic in nature (11).

From a health system perspective, these issues in operations could worsen the existing disparity between public and private dental care services. The uneven distribution of dentists in Tunisia, which is biased in favor of private sector services, could result in delayed treatment, increased patient spending, and poor health outcomes in socio-economically disadvantaged groups. (5,12).

Overall, the findings highlight the critical importance of urgently improving the operational capacity of public dental services, both through equipment maintenance and supply chain management, as well as strategic investment in key diagnostic and rehabilitative services. Evaluation of service capacity, in line with the WHO Global Oral Health Strategy, is critical to ensuring equitable access to safe and effective oral health care and to inform evidence-based health policy reform in Tunisia (13).

Conclusion

The research in this study has pointed to several significant constraints in the operations of public dental services in Tunisia, with equipment functionality and availability of materials being cited as significant barriers to access to basic but essential oral healthcare services. While basic dental chair parts were cited as being readily available in most dental clinics, dysfunctional equipment, lack of maintenance, as well as recurring shortages, led to a pattern of refusal to provide care, with services offered on an emergency basis only.

The research in this study has shown that lack of access to diagnostic, preventive, and rehabilitative services, such as radiography, endodontics, and prosthetics, compromises the quality of oral healthcare services, which can result in the progression of oral diseases. The strong association between equipment functionality, place of practice, and access to care highlights the structural nature of these barriers in public healthcare.

Improving the functional capacity of the public dental services through better maintenance of equipment, supply chain management, and resource distribution is necessary to ensure safe and comprehensive oral health care. Periodic assessment of the service capacity and alignment with the World Health Organization's Global Oral Health Strategy are essential steps in improving access to care, addressing inequalities, and achieving universal health coverage for oral health in Tunisia.

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