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# THE EVOLUTION OF DENTAL SERVICES IN THE KINGDOM: CRITICAL CHALLENGES AND STRATEGIC OPPORTUNITIES

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**Abstract**
Saudi Arabia's dental care system has undergone significant transformation in recent decades, paralleling the broader development of the nation's healthcare infrastructure. This comprehensive review examines the evolution of dental services in the Kingdom of Saudi Arabia (KSA), highlighting critical challenges and strategic opportunities for advancement. Drawing on extensive literature, this article analyzes the current state of dental services, identifies existing barriers to care, and explores promising avenues for improvement. Key challenges include regional disparities in service accessibility, workforce limitations, and inadequate oral health literacy. Significant opportunities exist in digital health transformation, expanded preventive programs, specialized care enhancement, and integration with the Vision 2030 health sector reforms. This analysis offers insights for policymakers, practitioners, and researchers seeking to contribute to the continued advancement of dental services in Saudi Arabia, ultimately improving population oral health outcomes and aligning with national healthcare goals.

## INTRODUCTION

The Kingdom of Saudi Arabia has witnessed remarkable growth in its healthcare system over the past several decades, transforming from a basic infrastructure to an extensive network of healthcare facilities across the country. This evolution has occurred alongside rapid economic development and demographic changes, presenting both unique challenges and opportunities for healthcare delivery, including dental services (Almalki et al., 2011). As the nation continues to advance, dental care has emerged as a critical component of comprehensive healthcare, with increasing recognition of its importance for overall well-being.

Dental health services in Saudi Arabia are provided through multiple channels, including government facilities under the Ministry of Health (MOH), other governmental sectors, and the private sector. Despite considerable investments in healthcare infrastructure, the dental care system faces several challenges that impact service delivery and oral health outcomes (Almajed et al., 2024). These challenges span accessibility issues, workforce constraints, technological limitations, educational gaps, and specific barriers affecting vulnerable populations.

The purpose of this study is to analyze the evolution of dental services in Saudi Arabia, identify critical challenges in the current system, and explore strategic opportunities for advancement. By examining these aspects comprehensively, this review aims to contribute to the ongoing dialogue regarding healthcare improvement in the Kingdom and provide insights for policymakers, practitioners, and researchers working to enhance dental care

delivery. This analysis is particularly timely given the ambitious healthcare transformation goals outlined in Saudi Vision 2030, which aims to improve healthcare quality, efficiency, and accessibility across all domains (Health Sector Transformation Program, 2023).

## Historical Development of Dental Services in Saudi Arabia

### Early Development

The development of dental services in Saudi Arabia parallels the broader evolution of the nation's healthcare system. Before the establishment of the Ministry of Health in 1950, healthcare services, including dental care, were limited and primarily focused on pilgrim health during Hajj seasons (Al-Hashem, 2016). The formal development of dental services began in the mid-20th century, with the first dental clinics established in major cities to provide basic treatment.

During the 1970s and 1980s, increased oil revenues enabled significant expansion of the healthcare infrastructure, including dental facilities. This period saw the establishment of dental departments in major hospitals and the beginning of dental education in the Kingdom with the opening of the first dental school at King Saud University in 1975 (Al-Hashem, 2016). This marked a pivotal shift from reliance on expatriate dental professionals to the development of a domestic workforce.

### Current Structure and Organization

Today, dental services in Saudi Arabia are provided through a multi-tiered system spanning public and private sectors. The Ministry of Health serves as the principal healthcare provider and regulator, operating numerous dental clinics within primary healthcare centers and dental departments in secondary and tertiary hospitals across the country (Almalki et al., 2011). Additional governmental entities, including the Ministry of Defense, National Guard, Ministry of Interior, and university hospitals, also provide dental services to their target populations.

The private sector has grown considerably in recent decades, with numerous private dental clinics and specialized centers established throughout the Kingdom, particularly in urban areas. These facilities range from solo practices to large multi-specialty dental centers, offering various services from routine care to advanced treatments (Alshahrani & Raheel, 2016). The private sector has been particularly responsive to technological advancements and patient demands for cosmetic and specialized services.

### Integration with National Healthcare Reforms

The dental care system is increasingly being integrated into broader healthcare reforms, particularly under the Saudi Vision 2030 framework. The Health Sector Transformation Program aims to enhance healthcare quality, improve access, and achieve greater efficiency through structural reforms (Health Sector Transformation Program, 2023). These initiatives include digitalization of health services, private sector engagement, workforce development, and preventive care emphasis—all of which have implications for dental service delivery.

## Critical Challenges in Saudi Dental Care

### Access Disparities

One of the most significant challenges facing dental care in Saudi Arabia is the uneven distribution of services across regions, creating notable disparities in accessibility. Urban areas, particularly major cities like Riyadh, Jeddah, and Dammam, are generally well-served with both public and private dental facilities. However, rural and remote areas often have limited access to comprehensive dental services (Al-Jaber & Da'ar, 2016). This geographical maldistribution results in residents of underserved areas experiencing difficulties accessing timely dental care, particularly for specialized services.

Economic factors also contribute to access disparities. While government facilities provide free or highly subsidized services, capacity constraints often lead to long waiting times. Private sector services, though more readily available, may be financially inaccessible to segments of the population without adequate insurance coverage (Alshahrani & Raheel, 2016). This economic barrier particularly affects middle and lower-income groups who may delay seeking necessary dental care due to cost concerns.

### Workforce Challenges

The dental workforce in Saudi Arabia has expanded significantly in recent decades, but challenges remain regarding distribution, specialization, and nationality mix. Despite an increasing number of dental graduates, there continues to be a reliance on expatriate professionals, particularly in specialized fields (Almajed et al., 2024). The concentration of dental professionals in urban areas exacerbates access issues in rural regions where recruitment and retention remain challenging.

Gender imbalance represents another workforce consideration. While female dental school enrollment has increased substantially, workplace integration faces cultural and practical challenges in some contexts. This is particularly relevant given patient preferences in a gender-segregated society, where many female patients prefer treatment by female dentists (Almajed et al., 2024).

Additionally, there are gaps in certain dental specialties, with particular shortages in pediatric dentistry, orthodontics, and special needs dentistry. These shortages affect service availability and may result in inadequate specialized care for specific population groups, especially children and individuals with special healthcare needs (Alfaraj et al., 2021).

### Oral Health Literacy and Preventive Care

Limited oral health literacy represents a fundamental challenge to improving dental outcomes in Saudi Arabia. Studies indicate varying levels of oral hygiene practices and dental knowledge across different population segments, with concerning gaps particularly evident in some communities (El Bcheraoui et al., 2016). This knowledge deficit contributes to preventable oral diseases and delayed care-seeking behavior.

The prevalence of dental caries, particularly among children, remains high despite improvements in dental care infrastructure. A systematic review and meta-analysis of school children's caries studies in Gulf Cooperation Council states, including Saudi Arabia, found high caries prevalence, indicating the need for more effective preventive programs (Alayyan et al., 2017). The cultural dietary patterns, including high sugar consumption, combined with inadequate oral hygiene practices, contribute to this ongoing public health challenge.

Preventive dentistry remains underdeveloped compared to restorative services, with insufficient emphasis on community-based prevention programs, school-based interventions, and public education campaigns. This imbalance leads to a predominantly treatment-oriented approach rather than disease prevention and oral health promotion (Cross, 2020).

**Special Needs and Vulnerable Populations**

Individuals with special healthcare needs face significant barriers to accessing appropriate dental services in Saudi Arabia. Research indicates that children with disabilities encounter substantial challenges in receiving regular dental care, with barriers including limited specialized facilities, inadequate professional training, and physical accessibility issues (Zahran et al., 2023). Families of children with autism spectrum disorders, for instance, report difficulties finding dentists with appropriate expertise and accommodations for their children's specific needs (AlHammad et al., 2020).

The oral health status of persons with disabilities in Saudi Arabia shows concerning disparities, with higher prevalence of untreated dental disease compared to the general population (Asiri et al., 2022). This disparity reflects not only access barriers but also issues with healthcare provider attitudes, communication challenges, and institutional limitations in accommodating diverse patient needs.

Socioeconomic factors significantly influence dental care utilization and outcomes, with studies demonstrating correlations between parental education, socioeconomic status, and dental caries prevalence among children (Ellakany et al., 2021). These social determinants create vulnerabilities that the current system has not adequately addressed, perpetuating oral health inequalities.

**Technological and Information System Limitations**

Despite increasing digitalization, many dental facilities in Saudi Arabia still face challenges in implementing comprehensive electronic dental record (EDR) systems. An exploratory study on EDR use in Saudi Arabia found varying levels of implementation and integration, with obstacles including technical limitations, cost barriers, and resistance to change (Almaiman et al., 2014). This technological gap limits the potential for data-driven improvements, efficient patient management, and seamless coordination between providers.

Integration of dental records with broader healthcare information systems remains incomplete, hampering continuity of care and comprehensive patient management. The limited interoperability between dental and medical records systems creates fragmentation that affects quality of care, particularly for patients with complex medical conditions requiring coordinated treatment approaches (Barakah, 2016).

The adoption of advanced dental technologies shows geographical and sectoral variation, with leading facilities embracing innovations while others lag behind due to financial constraints, technical expertise limitations, or administrative barriers. This uneven technological landscape contributes to quality disparities across the dental care system (Alfallaj et al., 2022).

**Strategic Opportunities for Advancement**

**Digital Transformation and Technological Innovation**

Saudi Arabia is well-positioned to leverage digital health technologies to transform dental services. The implementation of comprehensive electronic dental records integrated with the national health information system would enhance coordination, enable data-driven decision-making, and improve continuity of care (Almaiman et al., 2014). Such integration aligns with broader e-health initiatives under the Saudi Vision 2030 framework.

Emerging technologies offer promising opportunities for dental care advancement. Telehealth applications demonstrated value during the COVID-19 pandemic, with studies showing patient willingness to utilize teledental services (Bugis, 2022). Expanding these platforms could particularly benefit underserved regions by providing remote consultations, follow-up care, and educational interventions.

Innovative dental technologies, including digital imaging, CAD/CAM systems, 3D printing, and artificial intelligence applications, can enhance diagnostic accuracy, treatment efficiency, and patient outcomes when strategically implemented (Alfallaj et al., 2022). Saudi researchers are contributing to this innovation ecosystem, with initiatives such as the development of flexible biocompatible micro-batteries for implantable orthodontic systems demonstrating the potential for locally driven technological advancement (Kutbee et al., 2017).

**Workforce Development and Education Enhancement**

Strategic workforce planning represents a critical opportunity to address distribution challenges and specialty gaps in dental services. Initiatives could include incentive programs for practice in underserved areas, targeted scholarship programs for priority specialties, and policies to optimize the mix of Saudi and expatriate professionals while building domestic capacity.

Dental education curriculum modernization provides another avenue for advancement. Incorporating digital dentistry, evidence-based practice, preventive orientation, and patient-centered care models would better prepare graduates for contemporary practice demands (Alfallaj et al., 2022). Integration of interprofessional education would foster collaboration between dental professionals and other healthcare providers, improving comprehensive patient care.

Continuing professional development programs could be expanded and standardized to ensure consistent quality improvement and knowledge updates across the dental workforce. These programs should encompass not only clinical skills but also management capabilities, communication competencies, and cultural sensitivity, particularly for treating diverse patient populations including those with special needs.

**Preventive Programs and Community Engagement**

The expansion of preventive dentistry initiatives presents perhaps the most cost-effective opportunity for improving population oral health outcomes. School-based prevention programs have demonstrated effectiveness in Saudi contexts, as evidenced by research on oral health education interventions among female primary school children in Riyadh (Halawany et al., 2018). Scaling such initiatives nationwide could substantially reduce caries prevalence and establish lifelong healthy oral habits.

Community-based approaches that engage local stakeholders in oral health promotion show promise, particularly when culturally adapted. Research on oral health promotion among teachers and parents of special care school children in Al-Kharj demonstrated positive outcomes through targeted educational interventions (Gulzar et al., 2021). Similar community-centered models could be replicated across diverse settings.

Public awareness campaigns utilizing mass media and social platforms could address knowledge gaps regarding oral health practices and the importance of preventive care. These campaigns should be evidence-informed and culturally appropriate, targeting specific behavioral change while countering misconceptions about dental health and treatment.

**Enhancing Services for Special Needs and Vulnerable Populations**

Specialized care pathways for individuals with special healthcare needs represent an important advancement opportunity. Dedicated facilities with appropriate modifications, specialized training for dental providers, and coordinated care protocols would improve access and outcomes for this underserved population (Zahran et al., 2023). Models could include sensory-friendly environments for patients with autism spectrum disorders, physical accommodations for mobility impairments, and communication supports for various cognitive and sensory needs.

Training programs specifically focused on special care dentistry would address the current expertise shortage in this field. Incorporating modules on disability awareness, communication techniques, behavior management, and adaptive treatment approaches into dental education and continuing professional development would build capacity across the dental workforce (Alfaraj et al., 2021).

Targeted interventions addressing socioeconomic barriers could reduce oral health disparities related to social determinants. Initiatives might include subsidized services for low-income populations, mobile dental clinics serving remote communities, and school-based programs prioritizing disadvantaged areas. Research on the relationship between socioeconomic factors and dental caries highlights the importance of such targeted approaches (Ellakany et al., 2021).

**Quality Assessment and Patient Experience Enhancement**

Implementing standardized quality metrics for dental care would enable systematic performance monitoring and continuous improvement. Validated measures assessing clinical outcomes, process adherence, and patient-reported outcomes would provide data for evidence-based service enhancement and accountability (Althumairy, 2022).

Patient experience measurement using culturally validated tools such as the Arabic version of the Oral Health Impact Profile could inform service improvements (Al-Jundi et al., 2007). Understanding patients' perspectives regarding treatment effectiveness, comfort, accessibility, and communication would support patient-centered care development.

Accreditation programs specific to dental facilities could establish baseline quality standards and drive continuous improvement. These programs would complement existing healthcare accreditation frameworks while addressing dental-specific considerations, promoting excellence across both public and private sectors.

**Integration with Vision 2030 Healthcare Transformation**

The Saudi Vision 2030 Health Sector Transformation Program provides a framework for comprehensive dental care enhancement through systematic reforms (Health Sector Transformation Program, 2023). Dental services can be strategically positioned within this broader transformation, ensuring alignment with national health priorities and resource allocation.

Public-private partnerships offer promising mechanisms for expanding dental service capacity and introducing innovative delivery models. These collaborations could leverage private sector efficiency and public sector reach to improve accessibility, particularly for specialized services and underserved populations.

Value-based healthcare models, emphasizing outcomes relative to costs, could be adapted for dental services to improve efficiency and effectiveness. Such approaches would shift focus from volume of procedures to quality of results, potentially addressing overtreatment concerns while improving overall oral health status through appropriate incentive structures.

**Lessons from the COVID-19 Pandemic**

The COVID-19 pandemic presented unprecedented challenges for dental services in Saudi Arabia while catalyzing innovations that may have lasting benefits. Dental practices implemented enhanced infection control protocols, physical modifications, and procedural adaptations to minimize transmission risks while maintaining essential services (Meisha et al., 2021). These adaptations demonstrated the sector's resilience and ability to rapidly implement evidence-based safety measures.

Teledentistry emerged as a viable alternative for certain aspects of dental care during lockdown periods, with research indicating patient receptivity to these services (Bugis, 2022). This accelerated digital adoption could be leveraged for ongoing service enhancement, particularly for initial consultations, follow-up care, and preventive education.

The pandemic highlighted existing disparities in dental care access, with studies showing differential impacts on care-seeking behavior based on socioeconomic factors (Meisha et al., 2021). Research on the pandemic's effect on children's oral health in the Eastern Province revealed behavioral changes and care disruptions that could have long-term consequences (Ezzeldin et al., 2022). These findings emphasize the importance of building system resilience and addressing underlying disparities to better withstand future disruptions.

**Recommendations for Stakeholders**

**For Policymakers and Health Authorities**

1. Develop a comprehensive national oral health strategy with specific goals, measurable targets, and dedicated resources aligned with Vision 2030 objectives.
2. Implement incentive programs to address geographical maldistribution of dental professionals, particularly encouraging practice in underserved regions.
3. Expand public dental insurance coverage to reduce financial barriers to care, particularly for preventive services and vulnerable populations.
4. Establish standardized quality metrics for dental services and implement systematic monitoring across public and private sectors.
5. Integrate dental health information systems with the national health information infrastructure to improve coordination and enable data-driven policy development.

**For Educational Institutions**

1. Modernize dental curriculum to incorporate digital dentistry, preventive orientation, and special needs care competencies.
2. Develop specialized postgraduate programs in undersupplied specialties, particularly pediatric dentistry, geriatric dentistry, and special care dentistry.
3. Establish interprofessional education initiatives connecting dental students with other healthcare disciplines to foster collaborative practice models.
4. Enhance research capacity focused on population oral health needs, intervention effectiveness, and technological innovations relevant to Saudi context.
5. Develop continuing education programs focused on emerging technologies, evidence-based practices, and specialized care approaches.

**For Dental Practitioners and Professional Organizations**

1. Embrace digital transformation through adoption of electronic records, telehealth capabilities, and advanced diagnostic technologies.
2. Prioritize preventive approaches and patient education in clinical practice, shifting from predominantly treatment-oriented models.
3. Develop specialized expertise in caring for patients with complex needs, including those with disabilities, chronic medical conditions, and age-related challenges.
4. Engage in quality improvement initiatives and outcome measurement to demonstrate value and drive practice enhancement.
5. Participate in community outreach and public education efforts to improve oral health literacy and preventive behaviors

**For Researchers**

1. Conduct comprehensive epidemiological studies to establish current oral health status across diverse populations and regions.
2. Evaluate effectiveness of preventive interventions in Saudi contexts to identify culturally appropriate, high-impact approaches.
3. Investigate barriers to care for vulnerable populations and test targeted interventions to improve access and outcomes.
4. Assess implementation of technological innovations and their impact on clinical outcomes, efficiency, and patient experience.
5. Develop and validate Arabic-language assessment tools for measuring oral health status, quality of care, and patient-reported outcomes.

## CONCLUSION

The evolution of dental services in Saudi Arabia reflects remarkable progress while highlighting persistent challenges that require strategic attention. This comprehensive review has identified critical issues including access disparities, workforce limitations, preventive care gaps, special needs accommodation deficiencies, and technological implementation barriers. Simultaneously, it has outlined promising opportunities for advancement through digital transformation, workforce development, preventive program expansion, specialized care enhancement, quality improvement initiatives, and alignment with broader healthcare reforms.

The dynamic nature of Saudi society, with its rapid economic development, technological adoption, and evolving healthcare expectations, creates a favorable environment for dental service innovation and improvement. The Vision 2030 framework provides both impetus and direction for these advancements, positioning oral health as an integral component of comprehensive healthcare transformation.

Realizing the full potential of dental services in the Kingdom will require coordinated efforts across multiple stakeholders, including government authorities, educational institutions, healthcare facilities, professionals, and researchers. By addressing current challenges through evidence-based approaches while strategically leveraging emerging opportunities, Saudi Arabia can build a dental care system that provides equitable, high-quality, patient-centered services aligned with population needs and national development goals.

As the Kingdom continues its journey of healthcare transformation, dental services stand at a pivotal juncture with the potential to dramatically improve population oral health outcomes. This evolution represents not merely technical advancement but a fundamental shift toward preventive, accessible, integrated, and technologically enhanced care that embodies the aspirations of a modern healthcare system serving the diverse needs of all residents.

## REFERENCES

1. Alayyan, W., Al Halabi, M., Hussein, I., Khamis, A., & Kowash, M. (2017). A systematic review and meta-analysis of school children's caries studies in Gulf Cooperation Council states. Journal of International Society of Preventive and Community Dentistry, 7(4), 234-241. https://doi.org/10.4103/jispcd.JISPCD_237_17
2. Alfaraj, A., Halawany, H.S., Al-Hinai, M.T., Al-Badr, A.H., Alalshaikh, M., & Al-Khalifa, K.S. (2021). Barriers to dental care in individuals with special healthcare needs in Qatif, Saudi Arabia: A caregiver's perspective. Patient Preference and Adherence, 15, 69-76. https://doi.org/10.2147/PPA.S291255
3. Alfallaj, H.A., Afrashtehfar, K.I., Asiri, A.K., Almasoud, F.S., Alnaqa, G.H., & Al-Angari, N.S. (2022). The status of digital dental technology implementation in the Saudi dental schools' curriculum: A national cross-sectional survey for healthcare digitization. International Journal of Environmental Research and Public Health, 20(1). https://doi.org/10.3390/ijerph20010321
4. AlHammad, K.A., Aldhalaan, M.H., Zakria, M., Alrowite, R., Aldossary, M.S., & AlHammad, M.J. (2020). Challenges of autism spectrum disorders families towards oral health care in Kingdom of Saudi Arabia. Pesquisa Brasileira em Odontopediatria e Clínica Integrada, 20. https://doi.org/10.1590/pboci.2020.046
5. Al-Hashem, A. (2016). Health education in Saudi Arabia: Historical overview. Sultan Qaboos University Medical Journal, 16(3), e286-e292. https://doi.org/10.18295/squmj.2016.16.03.004
6. Al-Jaber, A., & Da'ar, O.B. (2016). Primary health care centers, extent of challenges and demand for oral health care in Riyadh, Saudi Arabia. BMC Health Services Research, 16, 628. https://doi.org/10.1186/s12913-016-1876-6
7. Al-Jundi, M.A., Szentpétery, A., & John, M.T. (2007). An Arabic version of the oral health impact profile: Translation and psychometric properties. International Dental Journal, 57(2), 84-92. https://doi.org/10.1111/j.1875-595x.2007.tb00443.x
8. Almaiman, A., Bahkali, S., Bahkali, A., Almaiman, S., Elmetwally, A., & Househ, M. (2014). Electronic Dental Record (EDR) use in Saudi Arabia: An exploratory study. Studies in Health Technology and Informatics, 202, 169-172. https://doi.org/10.3233/978-1-61499-423-7-169
9. Almajed, O.S., Aljouie, A., Alghamdi, R., & Alabdulwahab, F.N., Laheq, M.T. (2024). Transforming dental care in Saudi Arabia: Challenges and opportunities. Cureus, 16(2), e54282. https://doi.org/10.7759/cureus.54282
10. Almalki, M., Fitzgerald, G., & Clark, M. (2011). Health care system in Saudi Arabia: An overview. Eastern Mediterranean Health Journal, 17(10), 784-793. https://doi.org/10.26719/2011.17.10.784
11. Alshahrani, A., & Raheel, S.A. (2016). Health-care system and accessibility of dental services in Kingdom of Saudi Arabia. Journal of International Oral Health, 8(8), 883-887. https://doi.org/10.2047/JIOH-08-08-10
12. Althumairy, R.I. (2022). Exploring the quality of life for Saudi patients utilizing dental healthcare services: A systematic review. Journal of Multidisciplinary Healthcare, 15, 309-315.
13. Asiri, F.Y., Tennant, M., & Kruger, E. (2022). Oral health status, oral health behaviors, and oral health care utilization among persons with disabilities in Saudi Arabia. International Journal of Environmental Research and Public Health, 19(24), 16633. https://doi.org/10.3390/ijerph192416633

14. Barakah, D. (2016). Integrating dental working experience in development of a dental clinic database system for a general tertiary hospital. International Conference on Computational Science and Computational Intelligence (CSCI), 63-67. https://doi.org/10.1109/CSCI.2016.0019
15. Bugis, B.A. (2022). Patients self-reporting of utilizing teledental services during the COVID-19 pandemic in Saudi Arabia. Journal of Patient Experience. https://doi.org/10.1177/2374373522111220
16. Cross, R. (2020). Editorial. International Journal of Health Promotion and Education, 58(1), 1-2. https://doi.org/10.1080/14635240.2020.1687169
17. El Bcheraoui, C., Tuffaha, M., Daoud, F., Kravitz, H., AlMazroa, M.A., Al Saeedi, M., Memish, Z.A., Basulaiman, M., Al Rabeeah, A.A., & Mokdad, A.H. (2016). Use of dental clinics and oral hygiene practices in the Kingdom of Saudi Arabia, 2013. International Dental Journal, 66(2), 99-104. https://doi.org/10.1111/idj.12210
18. Ellakany, P., Madi, M., Fouda, S.M., Ibrahim, M., & AlHumaid, J. (2021). The effect of parental education and socioeconomic status on dental caries among Saudi children. International Journal of Environmental Research and Public Health, 18(22). https://doi.org/10.3390/ijerph182211862
19. Ezzeldin, T., Alzayer, Y., Aljandan, J.K., Alsahwan, B., & Siddiqui, I. (2022). Impact of the COVID-19 pandemic lockdown on oral health and behaviour change among children in the eastern province of Saudi Arabia. Journal of Clinical and Diagnostic Research, 16, ZC36-ZC40. https://doi.org/10.7860/jcdr/2022/57487.16964
20. Gulzar, S., Wyne, A., AlJameel, A., Hammadi, H.A., Farooq, I., & Khan, S.Q. (2021). Effectiveness of oral health promotion among teachers and parents of special care school children in Al-Kharj, Kingdom of Saudi Arabia. World Journal, 11, 482-487. https://doi.org/10.5005/JP-JOURNALS-10015-1779
21. Halawany, H.S., Al Badr, A., Al Sadhan, S., Al Balkhi, M., Al-Maflehi, N., Abraham, N.B., Jacob, V., & Al Sherif, G. (2018). Effectiveness of oral health education intervention among female primary school children in Riyadh, Saudi Arabia. Saudi Dental Journal, 30(3), 190-196. https://doi.org/10.1016/j.sdentj.2018.04.001
22. Health sector transformation program. (2023). Accessed: February 16, 2024: http://www.vision2030.gov.sa/en/vision-2030/vrp/health-sector-transformation-program/
23. Kutbee, A., Bahabry, R., Alamoudi, K., Ghoneim, M.T., Cordero, M.D., Almuslem, A.S., Gumus, A., Diallo, E.M., Nassar, J.M., Hussain, A.M., Shaikh, S.F., & Hussain, M.M. (2017). Flexible and biocompatible high-performance solid-state micro-battery for implantable orthodontic system. npj Flexible Electronics, 1, 1-8. https://doi.org/10.1038/s41528-017-0008-7
24. Meisha, D.E., Alsolami, A.M., & Alharbi, G.M. (2021). Social determinants of seeking emergency and routine dental care in Saudi Arabia during the COVID-19 pandemic. BMC Oral Health, 21, 212. https://doi.org/10.1186/s12903-021-01577-1
25. Zahran, S.S., Bhadila, G.Y., Alasiri, S.A., Alkhashrami, A.A., & Alaki, S.M. (2023). Access to dental care for children with special health care needs: A cross-sectional community survey within Jeddah, Saudi Arabia. Journal of Clinical Pediatric Dentistry, 47(1), 50-57. https://doi.org/10.22514/jocpd.2022.032