

ARTICLE



Access to dental care in individuals with disability: a systematic review

Upendra Singh Bhadauria¹, Bharathi Purohit¹ and Harsh Priya¹✉

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KEY POINTS

- Readers will be able to address the factors inhibiting access to dental care.
- Readers may consider designing ergonomically designed dental clinics and specialized training for individuals with disability.
- Readers will be able to identify the barriers associated.

OBJECTIVE: This systematic review was conducted to explore the factors influencing access to oral health services and to identify and examine the strategies to improve the access.

MATERIALS AND METHODS: PubMed, Scopus and Embase databases were searched. Studies except editorials reported in English regardless of the study design were included. Risk of Bias assessment was carried out using Agency for Healthcare Research and Quality, Newcastle Ottawa Scale and The Joanna Briggs Institute tool for cross-sectional, case-control and cohort and qualitative studies, respectively.

RESULTS: In total, 11,372 records were initially identified, eventually leading to 12 relevant publications to be included in the review. Individuals valued oral health but found it difficult to access oral health services. Dental care was mainly accessed during emergencies and participants felt apprehensive in visiting dentists. Caregiver's and dentist's perspective was also reported.

CONCLUSION: There is a need for provision of education, training and increasing awareness on dental hygiene and annual dental checkups to improve access.

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INTRODUCTION

Individuals with disabilities face unique challenges when it comes to accessing oral health services. Studies have also reported a higher burden of dental diseases in disabled groups of individuals^{1,2}. Oral health plays a vital role in their overall well-being, but different barriers associated with disabled individuals often hinder their ability to receive proper dental care. This disparity often leads to these individuals developing oral health problems when compared with other individuals without disabilities.

Literature pertaining to individuals with disabilities has focused on assessing access to healthcare, utilization of health care services, and barriers faced by individuals with disabilities. Access to healthcare is defined as the timely use of personal health services to achieve the best possible health outcome³. Access requires gaining entry into the health-care system, getting access to sites of care where patients can receive needed services, and finding providers who meet the needs of patients and with whom patients can develop a relationship based on mutual communication and trust⁴. Health Care Utilization, on the other hand, is the quantification or description of the use of services by persons for the purpose of preventing and curing health problems, promoting the maintenance of health and well-being, or obtaining information about one's health status and prognosis⁵.

A comprehensive evaluation of the utilization of dental services and the barriers associated with dental care for individuals with disabilities has been carried out in the past^{6,7}. Despite the recognized importance of oral health for children with disabilities,

there remains a paucity of comprehensive evidence regarding access to oral health for individuals with disabilities. This systematic review was thus carried out to synthesize existing literature and gain a comprehensive understanding of the current state of access to oral health services for this vulnerable population.

The primary objective of this systematic review is to explore the factors influencing access to oral health services among individuals with disabilities. The secondary objectives were to identify and examine the strategies suggested to improve access to oral healthcare for these individuals.

MATERIAL AND METHOD

Protocol development

This review was carried out according to PRISMA (Preferred reporting items of systematic review) guidelines with PROSPERO registration number CRD42023422331.

Eligibility criteria

The research question for this systematic review according to Population, Exposure and Outcome (PEO) was: "Factors influencing access to oral healthcare services among individuals with disabilities." Descriptive, analytical and experimental studies explicitly specifying and assessing access to oral health services for individuals with disabilities were included in the study. Studies reported or translated in the English language were included.

¹Division of Public Health Dentistry, Centre for Dental Education and Research, AIIMS, New Delhi, India. ✉email: drharshpriya@gmail.com

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Editorials and studies not carried out or translated in English were excluded.

Search strategy and information

The PubMed, Scopus, and Embase databases were electronically searched from May 2023 to June 2023 to conduct this review. Restriction of time frame was considered in this study to make it relevant to the current practices of accessibility for individuals with disabilities as well as to address the current strategies to improve access to oral healthcare for these individuals. Studies carried out in the past 10 years, from 2013 to 2023, were thus included in the study. Google Scholar and gray literature were additionally searched to extract data. Medical Subject Heading (MeSH) keywords and terms related to PEO were additionally used along with Boolean operators to combine searches (Table 1).

Study selection

The screening was carried out by two independent reviewers (USB and HP), following the predetermined protocol and analyzing the title and abstract. The removal of the duplicates was carried out manually. USB and HP checked for the initial inclusion of studies by evaluating the titles and abstracts. The full text of the articles was subsequently selected for reading and analyzed for data extraction. The authors of the articles with limited full-text eligibility were also contacted. Discrepancies were discussed and resolved by the third author (BP). Cohen's Kappa was used to evaluate the inter-reliability across the title/abstract and full text review stages, which were found to be around 0.84 and 0.85 respectively.

Data extraction

The information from the included studies was collected by (USB), which was independently cross-checked by the second reviewer, (HP). The data extraction consisted of the following data from the included studies: Author, year, country, sample size, type of disability, study findings, and conclusion/recommendation. Any inconsistency was discussed and resolved between the authors.

Assessment of the risk of bias

The studies included were cross-sectional, case-control, cohort, and qualitative in nature. The assessment of the risk of bias for different study designs was carried out in accordance with the systematic review of the methodological quality assessment tools by Zeng et al.⁸. The assessment of the risk of bias for cross-sectional studies was carried out using the Agency for Healthcare Research and Quality (AHRQ) tool; the case control studies were assessed using the Newcastle Ottawa Scale (NOS); and the qualitative studies were assessed using the Joanna Briggs Institute tool for qualitative studies.

The AHRQ tool recommends 11 items and the rating is done depending on the overall score. Each item is provided with a score if the quality of the study meets the methodological standard. A score of 0 to 4 indicates a high ROB, 5 to 7 indicates a moderate ROB, and 8 to 11 indicates a low ROB⁹.

The NOS contains eight items, categorized into three dimensions, including selection, comparability, and—depending on the study type—outcome (cohort studies) or exposure (case-control studies). For each item a series of response options are provided. A star system is used to allow a semi-quantitative assessment of study quality, such that the highest-quality studies are awarded a maximum of one star for each item, with the exception of the item related to comparability that allows the assignment of two stars. The NOS ranges from zero to nine stars¹⁰. The Joanna Briggs Institute qualitative research tool is a 10-item critical appraisal checklist for qualitative research with an overall appraisal to include, exclude, or seek further information from the study evaluated¹¹.

RESULTS

Literature search

The databases PubMed (7649), Embase (3619), and Scopus (94) were searched initially, leading to the identification of 11,372 records. In total, 128 records were reported to be duplicates and were subsequently removed. The titles and abstracts of these articles were screened, resulting in the exclusion of 11,158 articles that did not meet the predetermined inclusion criteria. The full texts of the remaining 77 articles were assessed for eligibility. Following a thorough evaluation, 14 articles were included in the final analysis. Of the 14 articles, one study did not explicitly specify the study design, whereas the other specified a population-based record linkage study that could not be evaluated using an explicit risk of bias assessment tool (Fig. 1).

The remaining 12 articles were published between 2013 and 2023 and represented a diverse range of geographic locations, including Brazil, South Korea, the USA, Canada, the UK, Saudi Arabia, Kuwait, Dubai, and Ghana (Table 2). With regards to the study design, seven studies were cross-sectional in nature; one was case-control, two were cohort, and the remaining two were qualitative in nature. Sample sizes ranged from small-scale studies involving 13 samples to retrospective cohort studies carried out on 789, 6251 samples. Motor, hearing, visual, physical, intellectual, autism spectrum disorder, Down syndrome, cerebral palsy, fetal alcohol spectrum disorder, and bleeding disorders were a few of the disabilities reported in this study.

The overall assessment for qualitative studies revealed an overall appraisal to include all the studies evaluated. Both the cohort studies were reported to be of good quality, whereas one

Table 1. Search strategy.

Databases	Search strategy		Results
PubMed	("Disabled children"[All Fields] OR "Disability"[All Fields] OR "Dental care for Disabled"[All Fields] OR "Child"[All Fields] OR "Disabled"[All Fields] OR "Individuals with disability"[All Fields]) AND ("Oral Health services"[All Fields] OR "Dental Services"[All Fields] OR "Dental Health Surveys"[All Fields] OR "Health Services Accessibility"[All Fields] OR "Health Services Needs and Demand"[All Fields] OR "Healthcare Disparities"[All Fields]) AND ("Dental Care"[All Fields] OR "Oral Health"[All Fields] OR "Dental Insurance"[All Fields] OR "Cost of treatment"[All Fields] OR "Dental Public Health"[All Fields] OR "Barriers"[All Fields] OR "Facilitators"[All Fields])		
Embase	No.	Query	Results
	#4	#1 AND #2 AND #3	3615
	#3	'dental care' OR 'oral health' OR 'dental insurance' OR 'cost of treatment' OR 'dental public health' OR 'barriers' OR 'facilitators'	330,471
	#2	'oral health services' OR 'dental services' OR 'dental health surveys' OR 'health services accessibility' OR 'health services needs and demand' OR 'healthcare disparities'	10,926
	#1	'disabled children'/exp OR 'disabled children' OR 'disability'/exp OR 'disability' OR 'dental care for disabled'/exp OR 'dental care for disabled' OR 'child'/exp OR 'child' OR 'disabled'/exp OR 'disabled' OR 'individuals with disability'	4,439,475
Scopus	(TITLE ("Disabled children" OR "Disability" OR "Dental care for Disabled" OR "Child" OR "Disabled" OR "Individuals with disability")) AND (TITLE ("Oral Health services" OR "Dental Services" OR "Dental Health Surveys" OR "Health Services Accessibility" OR "Health Services Needs and Demand" OR "Healthcare Disparities")) AND (TITLE ("Dental Care" OR "Oral Health" OR "Dental Insurance" OR "Cost of treatment" OR "Dental Public Health" OR "Barriers" OR "Facilitators"))		

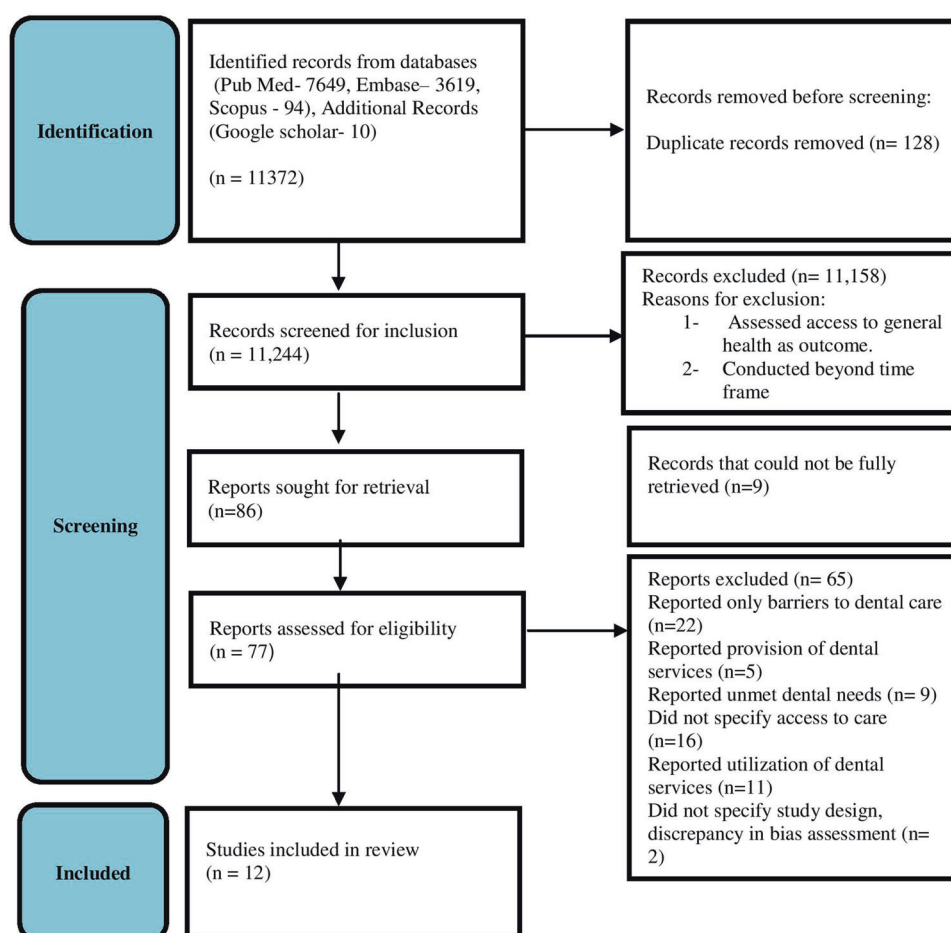


Fig. 1 Flowchart of records screening through review process.

case control study was reported to have poor quality. Amongst the cross-sectional studies assessed for risk of bias evaluation, two studies were reported to have low risk, three were reported to have moderate risk, and two studies were reported to have high risk. (Tables 3–6).

Study findings

The findings from the study reveal that people with disabilities highly value oral health and oral health care¹²; however, the majority of the studies reported that the patients with disabilities do not seek¹³ or have difficulty accessing dental services¹². Implementation of the targeted public health programs was, however, associated with an increased number of annual visits¹⁴. A higher rate of child refusal for dental treatment, especially in individuals with autism was also reported by Sherriff et al.¹⁵. Children with autism also reported visiting a general dentist rather than a specialty one. More than one-third of the patients reported never visiting a dentist before¹⁶. Studies on individuals with bleeding disorders reported that more than half of the patients had visited a dentist at least once in the past year¹⁷. Contrasting findings were reported in two studies, which revealed that the number of annual visits was higher among people with disabilities¹⁴, and no significant difference was seen between the autistic children and their healthy counterparts regarding visiting a dentist¹⁶.

Caregiver's perspective

With regards to the caregiver's perspective, half of children with special health care needs (CSHCN) caregivers found difficulties in obtaining dental treatment. Moreover, families of CSHCN with cerebral palsy and developmental delays reported significantly more difficulties in obtaining dental treatment when compared to families of CSHCN with autism spectrum disorder and Down syndrome¹⁸.

Dentist's perspective

A study conducted by D'Addazio et al.¹⁹, reported that only 69.2% of dentists treat people with disabilities. Of these, 73.5% treat less than 10 patients with physical disabilities per year. In total, 54% of dentists do not treat people with cognitive impairment and a poor ability to collaborate during treatment. In total, 50% of dentists who treat people with cognitive impairment do not include them in follow-up, while only 20% of these patients reported being regularly recalled. In total, 49.1% of people with disabilities report that they rarely or never go to the dental office, and when they do, it is mainly for emergencies¹⁹. Study also reported that 56.2% of dentists reported difficulty communicating with deaf patients, and 97.8% desired interpreters to improve access¹³.

Access to dental care

Studies reported that dental care was accessed only during emergencies^{13,19}. Studies also reported delayed first dental visits in this group of population. Findings from the study conducted by Shyama et al. showed that nearly half (47%) of the Down syndrome children and over one-third (37%) of those with physical disabilities had their first dental visit when they were 6 years of age or older. Children with Down syndrome (28%) and those who were physically disabled (41%) had received preventive care compared to normal children (53%)²⁰. In total, 53.2% of individuals with bleeding disorders did not feel confident that their local dentist was able to provide dental care considering their bleeding tendency¹⁷. Most participants (64.6%) felt apprehensive about visiting a local dentist because of their health condition, and 38.4% already required dental treatment, but they could not afford it or could not schedule an appointment at the public service²⁰.

Sociodemographic factors

With regards to access to dental care, older individuals and women were reported to have fewer annual dental visits¹⁴. Older

Table 2. Study characteristics of eligible studies.

Author	Year	Country	Study design	Sample size	Type of disability	Study findings	Recommendation
Lyana Leal Rocha et al.	2015	Brazil	Cross sectional study	People with disability (N = 204) 89 dentists	51%—Motor disability 36.8%—Hearing disability 12.5%—Visual disability	52.5% do not usually seek dental care, 76.3% of those who seek care find it difficult to receive care and 84.5% only seek care on an emergency basis. Of the dentists, 56.2% reported difficulty in communicating with deaf patients, and 97.8% desired interpreters, 37.3% of the patients and 43.8% of dentists reported inadequate physical access infrastructure (including doors, hallways, waiting rooms, and offices).	<ol style="list-style-type: none"> Urgent need to restructure service sand processes including the scheduling of dental visits, patient reception, waiting time for consultations, and training of professionals. Communication barriers must be acknowledged and overcome to promote access for people with disabilities.
Farnaz Rashid-Kandvani et al.	2015	Canada	Qualitative descriptive design	13	Physical disability (People using wheel chair)	Participants highly valued oral health and oral health care, yet participants reported tremendous difficulties accessing dental services. The challenges reported were: finding a dentist and being accepted, organizing transportation, entering the building, and circulating inside, interacting with the dental staff, transferring into the dental chair, overcoming discomfort on the dental chair, and paying for treatment.	<ol style="list-style-type: none"> Degree of accessibility of dental clinics should be systematically evaluated. Professional bodies, dental schools, and governmental institutions should carefully examine the results of this evaluation and, in partnership with people with disabilities, identify actions to be undertaken.
M. Shyama et al.	2015	Kuwait	Cross sectional study	308	Physical disability (n = 211) Down syndrome (n = 97)	21% of the disabled children had never visited a dentist. Nearly half (47%) of the Down syndrome children and over one-third (37%) of the physically disabled had their first dental visit, when they were 6 years of age or above. Normal children (29%) had more often dental check-ups than the Down syndrome children (21%) and physically disabled children (16%). Fewer Down syndrome children (28%) and physically disabled (41%) had received preventive care compared to the normal children (53%).	<ol style="list-style-type: none"> Need to improve access to dental services and to educate parents and the disabled children about preventive oral health procedures.
Rebecca Schaffer et al.	2016	U.S.	Cross sectional study	102	People with bleeding disorders	Survey results revealed inconsistent levels of oral health services available to patients. Major factors limiting access to care include finances, patient anxiety with respect to dental treatment and a lack of providers with the skills to treat this population.	<ol style="list-style-type: none"> Improvement in oral health for persons with bleeding disorders requires appropriate education for providers, patients and families. Both public and private health funding must be re-evaluated as it relates to people with bleeding disorders.
D. Mansoor et al.	2018	Dubai	Case control comparative study	84 ASD and 53 healthy	Autism spectrum disorder	65% of autistic children have visited a dentist compared to 79.2% of healthy children. The autistic children have mostly visited the general dental practitioner rather than a pediatric dentist. Over one third (35%) of autistic children had not been to a dentist before; the most common reason reported by 5.3% of parents was due to their child being uncooperative. Other parents all equally reported that their child did not go to the dentist due to being afraid, having no complaint or they did not find a dentist who can handle the child. No significant difference was found between autistic children and their healthy counterparts regarding visiting a dentist, adjusted over nationality.	<ol style="list-style-type: none"> Establishing a data registry for autistic children in the UAE that is run by the government. Raising the awareness of the workers and medical practitioners at the special needs centers to the importance of maintaining the autistic child's dental health and should give the dental hygiene and annual dental check-ups as much importance as the autistic child's behavioral and medical condition. Dentists should spend more time educating parents and involving them in the task of maintaining their child's oral hygiene at home and to put realistic achievable goals with the parents concerning their child's oral health.

Table 2. continued

Author	Year	Country	Study design	Sample size	Type of disability	Study findings	Recommendation
Gianmaria D'Addazio et al.	2021	Italy	Cross sectional study	Dental professionals: 91 People with disability who answered themselves: 35 Caregivers answering on behalf of people with disabilities: 26	Dental professionals: 91 People with disability who answered themselves: 35 Caregivers answering on behalf of people with disabilities: 26	Only 69.2% of dentists treat persons with disabilities. Of these, 73.5% treat less than 10 patients with physical disabilities per year. 54% of dentists do not treat people with cognitive impairment and a poor ability to collaborate during treatment. More than 80% of respondent dentists report that people with disabilities do not have good oral hygiene. 49.1% of people with disabilities (or their caregivers in cases where the patient was unable to answer) report that they rarely or never go to the dental office. Moreover, when they do go, it is mainly for emergencies. Respondents have difficulties in communicating their dental problems to their dentist. The 50% of dentists who treat people with cognitive impairment do not include them in follow-up, while only 20% of these patients reported being regularly recalled.	<ol style="list-style-type: none"> Greater attention to the requests of people with disabilities (barrier-free dental offices, specialized dentists and dental offices equipped with the necessary tools) and effective communication between themselves and dentists may improve their oral health condition. Inclusion in follow-up programs could facilitate the management of dental problems, which would then avoid having to manage almost solely emergency therapies and reduce the gap between these people and the rest of the population. Specialized dental training courses should also be increased to offer a wide range of options to these people. Understanding the needs of people with disabilities, which could be the best way to increase their oral health conditions.
Ebenezar et al.	2022	Northern Ghana	Qualitative study	33	18 with physical disability 15 healthcare providers	According to participants health care could be more accessible by the help of following four themes: (1) Making it more affordable; (2) Increasing the availability of providers and services; (3) Providing more education about system navigation; and (4) Improving access to disability friendly health facilities and equipment.	<ol style="list-style-type: none"> Policy makers need to consider supporting persons with physical disabilities who cannot afford nonmedical services (i.e., cost of transportation). The provision of education and training related to physical disability issues should be extended to both clinical and nonclinical health workers for better client centered care. Urgent need for policy makers and relevant key stakeholders to include persons with physical disabilities in designing and implementing policies and programs.
Katie Hu and Keith Da Silva	2022	Canada	A cross sectional study	189	Parents and caregiver for children with fetal alcohol spectrum disorder	85% had visited the dentist within the last 24 months. Annual family income, caregiver education level, primary residence location, and insurance status had a significant association with difficulty accessing oral health care. Individuals with a higher education (post-graduate/doctoral) were less likely to report difficulty accessing care. Individuals who reported a high school education or depended on public insurance or out-of-pocket payments or lived in rural or remote locations were more likely to report having difficulty in accessing oral health care.	Recognizing the challenges related to access to oral health care will help clinicians, public health professionals, and policymakers adjust current care practices as well as develop appropriate programs and resources to break down barriers and improve the oral health status of children with fetal alcohol spectrum disorder.
Carolina Mendes Frusca do Monte et al.	2022	Brazil	Cross sectional study	131	Inherited bleeding and hemoglobin disorders	58% had visited a dentist at least once in the past year, in which preventive appointment (prophylaxis/monitoring/diagnosis) was reported by 53.2% as their last visit to the dentist. Among the participants with inherited bleeding disorders (IBD), 53.2% did not feel confident that their local dentist was able to provide dental care considering their bleeding tendency. Most participants (64.6%) felt apprehensive about visiting a local dentist and 38.4% had already needed dental treatment, but they could not afford it or could not schedule an appointment at the public service. The older the individuals the higher the prevalence of dental care refusal. Individuals with low bleeding risk were less likely to be denied dental care by a	<ol style="list-style-type: none"> Improvement in oral health literacy, especially at hemotherapy centers, can help people realize its importance. Including dental surgeons in hematology centers, providing continuing education for primary healthcare professionals and improving undergraduate dentistry curriculum could be strategies to gradually overcome some of these barriers.

Table 2. continued

Author	Year	Country	Study design	Sample size	Type of disability	Study findings	Recommendation
Bo-Young Park et al.	2023	South Korea	Retrospective Cohort	7,896,251	-	<p>professional compared to those with high bleeding risk.</p> <p>The number of annual dental visits was higher among people with than among those without disabilities.</p> <p>Annual dental visits and dental expenses per visit were low among older individuals and women.</p> <p>Regular Source of Dental Care (RSDC) had differential effects on the severity of disabilities. Compared to people without disabilities, RSDC increased the number of annual dental visits and the dental expenses per visit among those with severe disabilities.</p>	<p>1. Policies that can help to provide an RSDC for people with disabilities and to resolve inequality in dental services for women and older individuals with disabilities would result in significant improvement in the use of dental care.</p>
Andrea Sherriff et al.	2023	UK	Record linkage cohort study	166,781 children	<p>Intellectual disability, Autism spectrum disorder, Additional Social Needs (ASN) (Social ASN) (Interrupted learning, English as an additional language, Looked after, More able pupil, Communication support needs, Young carer, Bereavement, Substance misuse, Family issues, Risk of exclusion, Not disclosed/declared, Other) and (iv) Other ASN (Dyslexia, Other specific learning difficulty, Other moderate learning difficulty, Visual impairment, Hearing impairment, Deafblind, Physical or motor impairment, Language or speech disorder, Social, emotional & behavioral difficulty, Physical health problem, Mental health problem).</p>	<p>Children with any additional social needs had higher rates of caries experience than those with no ASN. School-based dental inspection access improved for children with intellectual disability and/or autism. Although higher rates of child refusal on the day were observed in these groups (no ASN refusal: 5.4%; intellectual disability: 35.8%; autism: 40.3%). Children with any ASN were less likely to attend primary dental-carer regularly, and in those who attended, children with intellectual disability or autism were less likely than their peers to receive prevention (fluoride varnish, oral-hygiene instruction, or dietary advice).</p>	<p>1. The inequalities are compounded by reduced and variable access to preventive dental services, which could mitigate the challenges.</p>
Shatha S. Zahran	2023	Jeddah, Saudi Arabia	Cross sectional study	602	<p>Autisticspectrum disorder (ASD), Down syndrome, cerebral palsy, and Developmental delay</p>	<p>Only 24.9% of the participated caregivers routinely visited the dentist for their children with special health care needs (CSHCN). Half of CSHCN caregivers found difficulties obtaining dental treatment. Moreover, families of CSHCN with cerebral palsy and developmental delays reported significantly more difficulties in obtaining dental treatment. Family size and education level impacted the struggles in finding a treating dentist.</p>	<p>1. Reemphasizing the present accessibility regulations in private and public dental clinics. Moreover, special educational programs should be offered to families of CSHCN.</p> <p>2. Dentists require more education and training in management of CSHCN cases to allow better access to dental care, particularly in underserved areas.</p> <p>3. Future studies should focus on a national survey to address different areas of the country, as well as dental health plans designed to overcome these barriers.</p>

Table 3. Risk of bias for cross sectional studies.

S. No	Question No.	Score							
		Lyana Leal Rocha et al.	Shatha S. Zahran	Katie Hu and Keith Da Silva	Rebecca Schaffer et al.	Carolina Mendes Frusca do Monte et al.	Gianmaria D'Addazio et al.	M. Shyama et al.	
1	Define the source of information (Survey, record review)	1	1	1	1	1	1	1	
2	List inclusion and exclusion criteria for subjects or refer to previous publication	-	1	1	-	1	1	-	
3	Indicate whether subjects were consecutive, if not population based. Whether subjects are representative of the average in the community?	1	1	1	1	1	1	1	
4	Indicate time period used for identifying subjects	-	1	1	-	1	1	-	
5	Indicate if evaluators of subjective components of study were masked to other aspects of the status of the participants. Are the evaluators professional (trained/calibrated)?	-	-	1	-	1	-	-	
6	Is the examination method standard?	1	1	1	1	1	1	1	
7	Describe any assessments undertaken for quality assurance purposes (e.g., test/retest of primary outcome measurements)	1	1	1	-	1	1	-	
8	Are the assessments and classification of caries index and BMI clearly stated and standard?	-	-	-	-	-	-	-	
9	If any, explain any subject exclusions from analysis	-	-	-	-	-	-	-	
10	Describe how confounding was assessed and/ or controlled	-	-	-	-	-	-	-	
11	Summarize patient response rates and completeness of data collection	1	1	1	1	1	1	1	
Total		5	7	8	4	8	7	4	

Table 4. Risk of bias for case control studies.

Study name	Selection		Comparability			Exposure		Non-response rate
	Is the case definition adequate	Representativeness of the cases	Selection of controls	Definition of controls	Comparability of cases and controls on the basis of the design or analysis controlled for confounders	Ascertainment of exposure	Same method of ascertainment for cases and controls	
D. Mansoor et al.	*	*	*	*	*		*	

Table 5. Risk of bias for cohort studies.

Study name	Selection			Comparability		Outcome		
	Representativeness of the exposed cohort	Selection of non-exposed cohort	Ascertainment of exposure	Demonstration that outcome of interest was not present at the start of the study	Comparability of cohorts on the basis of the design or analysis controlled for confounders	Assessment of outcome	Was follow-up enough for outcomes to occur	Adequacy of follow-up of cohorts
Bo-Young Park et al.	*	*	*	*	*	*	*	*
Andrea Sherriff et al.	*	*	*	*	*	*	*	*

Table 6. Risk of bias for qualitative study.

Checklist	Farnaz Rashid Kandvani et al.	Ebenezer Dassah et al.
Is there congruity between the stated philosophical perspective and the research methodology?	*	*
Is there congruity between the research methodology and the research question or objectives?	*	*
Is there congruity between the research methodology and the methods used to collect data?	*	*
Is there congruity between the research methodology and the representation and analysis of data?	*	*
Is there congruity between the research methodology and the interpretation of results?	*	*
Is there a statement locating the researcher culturally or theoretically?	*	*
Is the influence of the researcher on the research, and vice-versa, addressed?	-	-
Are participants, and their voices, adequately represented?	*	*
Is the research ethical according to current criteria or, for recent studies, and is there evidence of ethical approval by an appropriate body?	-	*
Do the conclusions drawn in the research report flow from the analysis, or interpretation, of the data?	*	*

individuals with bleeding disorders were reported to have a higher prevalence of dental care refusal¹⁷. Family size and education level impacted the struggles of finding a treating dentist¹⁸. Other factors reported to have a significant impact on access to healthcare comprised of annual family income, caregiver education level, primary residence location, and insurance status²¹.

Challenges

The challenges reported primarily consisted of finding a dentist and being accepted, organizing transportation, entering the building and circulating inside, interacting with the dental staff, transferring into the dental chair, overcoming discomfort on the dental chair, and paying for treatment¹². The other major factors limiting access to healthcare are finances, patient anxiety with respect to dental treatment, and a lack of providers with the skills to treat this population²².

Recommendations

The studies suggested the need for the provision of education and training for both clinical and non-clinical health workers²³. Enhancing education and awareness on dental hygiene and the annual dental checkups of caregivers can also help in improving access. Restructuring services such as specialized dentists, waiting time for consultations, scheduling dental visits, barrier-free dental offices, and dental offices equipped with the necessary tools can significantly aid in enhancing access¹³. Effective communication between disabled individuals and dental professionals¹⁹, public health programs and policies targeted specifically for disabled individuals to resolve inequalities, evaluating public and private health funding²², systematically evaluating the degree of accessibility, establishing a data registry¹⁶ to aid in epidemiological studies, and including follow-ups could facilitate the management of dental problems, which would then avoid having to manage almost solely emergency therapies and reduce the gap between these people and the rest of the population¹⁹. Ebenezer et al. additionally recommended that healthcare could be more accessible by: (1) Making it more affordable; (2) Increasing the availability of providers and services; (3) Providing more education about system navigation; and (4) Improving access to disability-friendly health facilities and equipment²³.

DISCUSSION

Access to oral health services for individuals with disabilities is a critical concern due to the unique challenges faced by this population. Our systematic review aimed to explore the factors influencing access and evaluate possible recommendations to improve access to oral health services for these individuals. The

findings of this review shed light on key issues and provide valuable insights for improving oral health care delivery to this vulnerable population.

An integral component of understanding access to care is the associated barriers to it. Since the barriers have already been addressed in previous systematic reviews, they were not specifically considered in this study; however, this study still reports the challenges faced by these individuals as seen in the study findings. Previous systematic reviews and meta-analyses have identified lack of preparation of dental professionals, lack of awareness, and difficulty in communication as barriers addressed by the parents/guardians or by the person with disabilities⁶. In line with the barriers previously studied, the challenges reported in our study also include finding skilled dental care providers, transportation, finance and dental operatory challenges.

Addressing the barriers is crucial to ensuring that individuals with disabilities can navigate dental settings and receive the care they need. Efforts should be made to improve dental professionals' training on disability-specific care, communication techniques, and strategies for accommodating sensory impairments. It is crucial to develop and implement policies that address the financial burden of oral health care for individuals with disabilities and enhance transportation options to facilitate their access to dental services.

On the other hand, several facilitators of access were identified in the review. The involvement of specialized dental professionals who have received additional training in providing care for individuals with disabilities emerged as a significant facilitator. These professionals possess the knowledge and skills necessary to meet the specific needs of this population, thereby improving access and the quality of care provided. Additionally, collaborative partnerships between dental clinics, hospitals, and special education schools can also aid in enhancing access. These partnerships enable coordinated care, knowledge sharing, and the identification of individuals who may require additional support in accessing dental services. Sensory adaptations, extended appointment times, and modified dental techniques can also serve as effective strategies to make dental visits more comfortable and manageable for individuals with disabilities. Implementing these accommodations in dental practices can create a more inclusive environment and reduce barriers to care.

Furthermore, oral health education programs targeting parents and caregivers can empower them with the knowledge and skills to maintain good oral health practices at home. Training programs for dental professionals on disability-specific care can enhance their competence and confidence in providing appropriate care. The establishment of mobile dental clinics can bring oral health services directly to underserved populations, reducing the transportation burden and increasing access. Policy initiatives

that ensure adequate insurance coverage for dental care, funding for community-based oral health programs, and the integration of oral health into broader disability services are crucial for creating systemic changes and promoting equitable access to oral health care.

An important thing to consider while looking at the facilitators and the factors defining access to dental care is the fact that this study did not consider any age range, and participants from across all age groups were included. The dental services and access to dental care might differ for both children and adults, and hence the results must be interpreted in accordance with the age groups discussed.

It is also important to acknowledge the limitations of this review. The inclusion of a wide variety of disabilities in some of the individual studies might have caused a limited representation of specific disabilities. The review focused on studies published in English, potentially leading to language bias. The inclusion of a few studies with a high risk of bias can also be considered a limitation of the study. Future research should aim to include studies from diverse populations and settings to gain a more comprehensive understanding of the barriers and facilitators to access to oral health services for individuals with disabilities.

CONCLUSION

In conclusion, this systematic review provides valuable insights into the factors influencing access to oral health services for individuals with disabilities. Individuals with disabilities value and seek oral care but find it difficult to access it. This review recommends the provision of education, training, and increasing awareness of dental hygiene and annual dental checkups to improve access. It leverages facilitators such as specialized dental professionals, collaborative partnerships, and reasonable accommodations. Implementing interventions and policies targeted at those with disabilities can further aid in enhancing access to oral health services.

DATA AVAILABILITY

The data are available from the corresponding author on reasonable request.

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AUTHOR CONTRIBUTIONS

USB: conception, data acquisition, visualization, interpretation, and drafted the manuscript. BP: data acquisition, synthesis, interpretation, and drafted the manuscript. HP: provision and management of study literature resources, critically revised the manuscript. All authors gave their final approval and agreed to be accountable for all aspects of the work. The authors read and approved the final manuscript.

COMPETING INTERESTS

The authors declare no competing interests.

ADDITIONAL INFORMATION

Correspondence and requests for materials should be addressed to Harsh Priya.

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