

Oral Health Status of a Utah Health Professional Shortage Areas (HPSAs) Population

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Abstract

Background: There is a paucity of literature on the state of oral health in the minority populations of Utah. The purpose of this study was to analyze the oral health needs of individuals in Health Professional Shortage Areas (HPSA) regions in Utah, many of whom belong to minority groups.

Methods: The study was conducted through the use of a retrospective analysis of survey data collected as part of the standard of care from outreach activities of the University of Utah School of Dentistry. Events targeted specific populations with traditionally poor access to oral health care, including low-income, Hispanic, refugee, elderly and rural populations. Dental students conducted clinical exams and oral interviews with each patient; participant responses were entered directly into an online database using REDCap. The data was analyzed using Pearson's chi-square test and Fisher's exact test. Approval for this retrospective data analysis was obtained from the University of Utah Institutional Review Board.

Results: This research identified pervasive treatment needs, with almost half of those studied needing moderate to urgent oral healthcare (49%). This HPSA population (60%) struggles to access appropriate care, with financial barriers being particularly problematic. Important gaps in oral health knowledge also suggest the potential for educational interventions to improve the oral health status of this population.

Conclusion: The information provided by this study will allow for the future development of focused strategies in meeting HPSA population's oral healthcare needs, including targeted seeking of funds for treatment from Federal and State authorities.

Background

It has been predicted that the White population will no longer comprise the majority in the United States in 2060 [1], indicating that it is imperative to understand the expanding healthcare needs of minority communities. Specifically, subpar levels of oral health alter an individual's quality of life in terms of speech, mastication, self-esteem, social interactions, educational attainment, career achievement, as well as their emotional state [2]. Additionally, poor oral health is associated with a higher rate of chronic diseases such as diabetes [3] and heart disease [4]. Nationwide, minority children such as Hispanic and non-Hispanic Black children are more likely to present with carious lesions and lesions of higher severity compared to non-minority children [5]. Nationally, 51 million school hours are missed by children yearly due to dental concerns [6]. A systematic review showed that poor oral health was significantly associated with the increase of poor academic performance and absenteeism [7]. Among the adult population, those living in poverty have higher rates of caries. African Americans and Mexican Americans have more untreated caries than their White counterparts and periodontal disease is more prevalent in African Americans and lower socioeconomic levels [8–9].

As of 2020, Utah's estimated population is 3.28 million, a significant increase of over 68% from the numbers declared back in 2000 [10]. The 2018 Census in Utah reported 85.7% White, 2.4% Asian, 1.3% Black or African American, 1.1% American Indian/Alaska Native, 0.9% Native Hawaiian/Other Pacific Islander, 5.4% another race, and 3.2% of two or more races, while 14.2% was of Hispanic, Latino, or Spanish origin. Critically, in 2018, over one-in-five individuals in Utah were a minority, with 26.5% of those under the age of one classified as a minority [11].

Currently, 66% of Utah counties are designated as dental Health Professional Shortage Areas (HPSAs) [12], with approximately 54% of Utah's population residing in one of these areas [13]. Of the dental HPSA counties, 84% of them are classified as both low-income and geographic HPSA sub-categories. For primary care HPSA counties in Utah, 50% of the population seeking for services were low-income HPSA, while 50% were geographic HPSA. These findings suggest that socioeconomic factors influence attainment of dental care to a greater extent when compared to primary care in the state of Utah.

Qualifying for Medicaid in Utah does not guarantee oral healthcare access. Dental care beyond emergency coverage is a service available only for Medicaid members who are pregnant, disabled, blind or children qualifying for Early Periodic Screening, Diagnostic and Treatment [14]. Medicaid members who are not eligible for dental coverage may receive Medicaid services by providing payment at the time of service at a rate equivalent to the rate Medicaid would pay for a qualifying member. Additionally, while the Patient Protection and Affordable Care Act provided a large expansion of health coverage in Utah, it failed to identify oral health as one of the 10 essential health benefits for all age groups, with the exception of dental pediatric services [15]. Utah's development of a health insurance exchange marketplace did not improve access to dental insurance. With limited Medicaid coverage for oral health services available for adults in place and no plan for Medicaid expansion, oral health access remains a serious concern in Utah.

Nationwide, emergency department (ED) visits for dental conditions are increasing at more than triple the rate of all other medical conditions combined [16]. In Utah, between 2007 and 2017, there were approximately 56,000 admissions to the ED for dental emergencies, costing the state over 50 million dollars [17]. Among the ethnic groups analyzed, Black/African American individuals had the highest rate of visits to the ED, followed by American Indian and Hispanic individuals. Nationwide, approximately 320.8 million work hours are missed annually by employed individuals due to dental visits or problems [18].

In Utah, there are many specific populations that have ill-defined access to oral healthcare. To our knowledge, there were no reports on the oral health status or needs of the following populations: refugees, individuals with mental and physical disabilities, older adults, Latinos/Hispanics, Native Americans, ex-Fundamentalist LDS, homeless individuals, LGBTQ individuals, patients with cancer, and patients with a substance use disorder.

This study analyzed the oral health needs of individuals in HPSA regions in Utah through the use of a retrospective analysis of survey data collected as part of the standard of care from outreach activities of the University of Utah School of Dentistry. Ultimately, the aims were to better understand and report on the oral health status of Utah's population, particularly those from underserved minority communities, which will allow for the future development of focused strategies in meeting their oral healthcare needs, including targeted seeking of funds for treatment from Federal and State authorities.

Materials & Methods

This study is a retrospective analysis of the data obtained at outreach service events organized by the University of Utah School Dentistry (UUSoD). Events were held in various locations, primarily in the Salt Lake and Midvale service areas and Tooele county, between September 2017 and May 2018. Events targeted specific populations with traditionally poor access to oral health care, including low-income, Hispanic, refugee, elderly and rural populations. Data collected at each event included demographic information, dental and medical history, oral health behaviors and beliefs, as well as clinical exam findings (oral health screening and Odontogram). Collecting these information was part of the outreach events required to obtain diagnoses, treatment plan, and prognosis. Dental students from UUSoD conducted oral interviews with each participant and obtained the questionnaire answers individually at the different outreach UUSoD events. Translators were available for those patients that were not fluent in English. All the dental students were previously calibrated during the course work to be able to treat their patients in a comprehensive way. Data were originally collected using the REDCap database (by Vanderbilt, Nashville, TN, USA). All records were included in this retrospective analysis, as no exclusion criteria were applied.

The data were analyzed using Pearson's chi-square test and Fisher's exact test. Data analysis was conducted using STATA version 14.2 (Stata Corporation, College Station, Texas). Formal review and approval for this retrospective data analysis were obtained from the University of Utah Institutional Review Board (IRB#109970).

Results

Data from 285 individuals (55% female) were analyzed in this study. The study had a large range of age groups (0–99 years old). Sixty percent of the sample population was between 18–54 years old with the smallest age group between 0–17 years old. The mean age was 39 years old (SD = 22).

The study population was primarily Hispanic (59%) and White (27%), with the remaining participants African American, Asian, Native American, Pacific Islander or declined to answer. Sixty percent of the sample had a high school-level education or less. Of those who reported their annual income (65%), 33% reported an annual household income of less than \$15,000. Sixty-two percent of the participants did not have health insurance, 8% of participants had Medicaid/CHIP (Table 1).

Table 1
Descriptive Analysis of Oral Health Behaviors, Self-Evaluation, Access to Care N = 285

Insurance Status	N (%)
Private	36 (13)
Medicaid/CHIP	22 (8)
Uninsured	176 (62)
Don't Know	32 (11)
Missing	19 (7)
Report weekly use of:	
Toothbrush/toothpaste	276 (97)
Mouthwash	147 (52)
Floss	161 (56)
Fluoride	107 (38)
Your oral health status is:	
Very good	54 (19)
Good	101 (35)
Fair	85 (30)
Poor	29 (10)
Very poor	7 (2)
Missing	9 (3)
What is the urgency of treatment needs? (As reported by evaluator)	
Low	126 (44)
Moderate	110 (39)
High	30 (10)
Missing	19 (7)
How long since you last had a dental visit?	
Less than 6 months	59 (21)
6–11 months	54 (19)
1–3 years	94 (33)
Over 3 years	50 (18)
I have never been to a dentist	20 (7)
Missing	8 (3)
What was the reason for your last visit to the dentist?	
Check-up, exam, or cleaning	143 (50)
Something was wrong, bothering, or hurting me	78 (27)
Follow-up treatment from a previous visit	22 (8)
Don't know/don't remember	25 (9)
Missing	17 (6)
During the past 12 months, was there a time when you needed dental care but could not get it?	
Yes	87 (30)
No	175 (61)

Insurance Status	N (%)
Don't know	9 (3)
Missing	14 (5)
What is the main reason you did not receive dental care in the last 12 months? (n = 110)	
I could not afford it	66 (60)
Transportation problems	7 (6)
Dentist did not take Medicaid	3 (3)
Language barrier made the process too difficult	1 (0)
Scheduling	12 (11)
Could not find a dentist	14 (13)
Missing	7 (6)
Are you satisfied with the appearance of your teeth?	
Yes	159 (56)
No	115 (40)
Missing	11.0 (3.9)
Do you think that your teeth are affecting your general health in any way?	
Yes	88 (31)
No	186 (65)
Missing	11 (4)

Nearly all subjects reported the use of a toothbrush and toothpaste as a part of their oral hygiene regimen, with just over half reporting the use of floss (Table 1). Only 38% reported using any fluoride products, likely an underestimate of the true value given that 97% reported using toothpaste weekly. Regarding perceptions of their own oral health status, most subjects reported "Good" oral health, followed by "Fair" and "Very Good".

Participants' oral health was then evaluated by dental students to determine the urgency of their dental needs. Low urgency was defined as needing preventative treatment, a prophylaxis, or minimal restorative treatment on initial lesions. Moderate urgency included moderate caries extent and periodontitis, while high urgency included advanced caries, pain, and acute/chronic infections. Of all participants evaluated, nearly half had moderate to high urgency needs (Table 1).

Less than a quarter of participants visited the dentist within the past six months. 50% of the dental visits were due to check-up, exam, or cleaning. More than a quarter of participants (27%) had the last dental visits due to emergency. Of the individuals who had not seen a dentist in the last year (30%), an inability to afford care was the primary barrier (60%). 56% were satisfied with the general appearance of their teeth.

Participants were also asked whether or not oral health impacts general health as part of the questionnaire. Only 31% of participants believed that the status of their teeth had an impact on their general health (Table 1).

Interestingly, of those who believed oral health affects general health, the majority had moderate-high urgency dental needs (Table 2). Analysis also found an association between having a systemic condition and believing oral health affects general health ($p < .001$). Of those individuals who said oral health affects general health, a greater proportion of them (33%) was likely to have an underlying systemic condition compared to the individuals who did not think oral health affects general health (15%, data not shown).

Table 2
Associations with Urgency of Dental Intervention*

Variable		Low Urgency n (%)	Moderate/High Urgency n (%)	Total	p
Self-reported oral health status (n = 264)	Good	98 (67)	49 (33)	147	< 0.001
	Fair	21 (26)	61 (74)	82	
	Poor	5 (14)	30 (86)	35	
Education (n = 238)	Less than high school	27 (32)	58 (68)	85	< 0.001
	High school diploma	24 (29)	60 (71)	84	
	At least some college	53 (77)	16 (23)	69	
Believe oral health affects general health (n = 262)	Yes	12 (14)	73 (86)	85	< 0.001
	No	112(63)	65 (37)	177	
Insurance Status (n = 226)	Insured	47 (86)	8 (14)	55	< 0.001
	Uninsured	55 (32)	116 (68)	171	

*Urgency was evaluated by dental students examining the participant.

Based on the participants' self-evaluations, the individuals' perceptions of oral health status were significantly associated with the urgency of dental treatments ($p < 0.001$). Participants with a lower perception of their oral health status were more likely to present with higher urgency dental needs (Table 2).

Individuals without insurance and lower educational backgrounds had higher needs for dental care. There was a significant association among education, insurance status, and the urgency of dental needs ($p < 0.001$). Uninsured individuals (38.5%) were more likely to report being unable to access needed care, having a tooth ache in the last six months and experiencing gingival bleeding (Table 3).

Table 3
Association between Insurance Status and Oral Health Status

Variable		Insured n (%)	Uninsured n (%)	Total	p
Toothache in last 6 months (n = 228)	Yes	13 (13)	82 (86)	95	0.002
	No	42 (32)	91 (68)	133	
Gingival bleeding (n = 287)	Yes	90 (49)	94 (51)	184	< 0.001
	No	22 (21)	81 (79)	103	
Unable to get needed care (n = 226)	Yes	9 (12)	67 (88)	76	0.002
	No	46 (31)	104 (69)	150	

Chi-square analysis revealed significant associations when ethnicity was crossed with education, insurance status, dental urgency, and time since last dental visit ($p < .001$). Likewise, Fisher's exact tests revealed significant associations when ethnicity was crossed with self-reported oral health status, reasons for lack of dental care, and reasons for their previous dental visit. Overall, participants who self-identified as Hispanic were more likely to report lower education levels, uninsured status, poorer oral health status, and were diagnosed with higher urgency needs. Hispanic respondents also reported a longer time since their last dental care visit and were more likely to have last sought care for an acute problem as opposed to routine check-ups or follow-up visits (Table 4).

Table 4
Association between Ethnicity and Oral Health Behaviors, Self-Evaluation, and Access to Care

Variable		White n (%)	Hispanic n (%)	Other n (%)	Total	p
Education (n = 245)	High school or less	6 (3.6)	141 (83)	22 (13)	169	< 0.001
	Beyond high school	52 (68)	19 (25)	5 (7)	76	
Insurance status (n = 230)	Insured	31 (55)	15 (27)	10 (18)	56	< 0.001
	Uninsured	20 (11)	134 (77)	20 (12)	174	
Self-Reported Oral Health Status (n = 271)	Good	60 (40)	72 (48)	19 (13)	151	< 0.001*
	Fair	9 (11)	72 (85)	4 (5)	85	
	Poor	3 (9)	24 (69)	8 (23)	35	
Urgency (n = 262)	Low	57 (46)	51 (41)	16 (13)	124	< 0.001
	Moderate/High	11 (8)	113 (82)	14 (10)	138	
Time since last dental visit (n = 272)	Less than 1 year	47 (43)	56 (51)	7 (6)	110	< 0.001
	1–3 years	18 (20)	60 (62)	14 (14.2)	92	
	Over 3 years	8 (11)	51 (73)	11 (15.7)	10	
Reason for lack of care (n = 103)	I could not afford it	3 (4)	54 (82)	9 (14)	66	< 0.001*
	Other (scheduling, transportation)	9 (24)	15 (40)	13 (35)	37	
Reason for last dental visit (n=238)	Check-up/cleaning or follow-up treatment	53 (33)	94 (58)	15 (9)	162	0.0232*
	Something was wrong, bothering or hurting me	12 (16)	56 (74)	8 (10)	76	
*Fisher's exact test						

Discussion

Despite 78% of Utah's population being White, the majority of the individuals surveyed were minorities with Hispanics being the predominant group [19]. The majority of the participants were adults, many falling below the poverty threshold, leading them to depend on free dental screening events for potential treatment. To better understand the HPSA population in Utah, barriers involving dental care were analyzed by having participants complete a questionnaire about their experience (or lack thereof) with dental treatment.

Financial Barriers

The highest reported reason participants had not received dental care in the last 12 months was the unaffordability of treatment (Table 1). 34% of the participants reported that they were not able to obtain needed dental care (Table 3). Of the population that reported income, 51% were at or below poverty [20], 62% were uninsured, and 11% marked "do not know." In Utah, meeting income requirements does not guarantee qualification for Medicaid comprehensive dental coverage. Applicants must meet the Federal Poverty Level requirements and be either pregnant, disabled, blind, or a child [14]. This leaves much of the impoverished working adult population (18–64 years) with little to no resources for dental services. As a result, 58% of the sample population had not been to the dentist in over a year (Table 4) or had never been.

By looking at the annual income and insurance coverage alone, it is assumed that the majority of the sample population is at high risk for untreated dental diseases such as caries and periodontal disease. 49% of the population had moderate to high urgency of dental needs, 42% reported having a toothache in the last 6 months and 64.1% had gingival bleeding (Table 4). Multiple studies have reported that the prevalence of untreated caries in people of all ages was strongly influenced by social determinants [21–24]. In 2000, the U.S. Surgeon General reported that poor children have twice as many dental caries as compared to their affluent counterparts and, moreover, that these diseases are left untreated; these results are still relevant in 2017 [8–9]. The CDC reported a greater prevalence of periodontitis in persons in lower Federal Poverty Level percentage categories, with an estimate of 65.4% of persons in the poorest families [25].

Consequences of Untreated Dental Disease

Between 2007 and 2017, there are approximately 56,000 admissions to the ED in Utah for preventable dental emergencies [17]. Patients of the working age group (20–64 years) had the highest rates of ED visits, both in rural and urban areas, with the average cost of each visit being \$1,033 with the cost increasing each year. In rural areas, there were even higher rates of ED visits than in the urban areas. Most patients were uninsured, not charged, or self-pay. The primary diagnoses at the dental emergency ED visits were periapical abscess without sinus (50%), dental cavities (27%), periapical/periodontal pathology (18%), cellulitis (3.5%), and periapical abscess with sinus (0.1%). All of these were preventable if the patients had access to comprehensive dental services. The American Dental Association suggests that individuals visit the dentist regularly to help spot dental health problems early, thus preventing many problems from developing initially [26].

Benefits of Expanding Dental Coverage in Utah

Singhal et al. study [27] compared the dental coverage of adults with or without expansive Medicaid dental coverage. Those residing in states whose Medicaid programs covered non-emergency dental services had a greater probability of having visited a dentist, compared to those living in states without such dental benefits [27]. The result of expanding comprehensive Medicaid dental coverage has decreased the use of dental emergency visits in the ED but has also shown greater significance in lowered ED visit rates when there were greater number of Medicaid-accepting providers.

Providing more affordable dental coverage only solves a piece of the problem. Even with the expansion of Medicaid dental benefits, there was a decline in accessing dental services due a lack of dental providers accepting Medicaid coverage in the community [28]. The reimbursement of Medicaid coverage averages 41% of commercial dental insurance charges for adult dental care services. Low Medicaid FFS reimbursement is one of many important factors hindering the success of Medicaid programs. There is a significant positive effect on provider participation as Medicaid FFS reimbursement rates increase, in conjunction with other reforms [29]. Until urban and rural areas develop health centers that specifically target Medicaid patients, no matter how much dental coverage is expanded, there will not be enough providers to serve these patients.

Utah has two dental schools that openly accept Medicaid patients. Dental schools such as the University of Utah rely on high patient volume, as the cost of dental services is about 50% less than private practice. The potential symbiotic relationship between dental students and Medicaid patients would potentially solve the dilemma that many other states experienced in the *Health Affairs* systematic review [28]. The incentive for dental schools to accept more Medicaid patients greatly impacts the patient volume and learning experience for dental students in a positive way. Medicaid patients who seek treatment at dental schools have more access to providers that are willing and able to treat their dental needs.

Ethnicity and Education Levels Affect Oral Health Status

Ethnicity and education similarly correlate to a patient's access to dental services. Minorities when compared to Utah's White majority tended to have significantly lower education levels, lower income, higher un-insurance rates, lower frequency of dental visits, lower perceived oral health status, and higher urgency needs for dental treatment (Table 4). Of the White participants, 90% attained education beyond high school while 87% of the Hispanic population only obtained a high school education or less (Table 4). The great disparity of education levels between ethnic groups is strongly associated with oral health status. As shown in Table 2, the better educated experienced lower treatment urgency.

Similar findings reported by the U.S. Surgeon General in 2000 determined that minority populations bear a disproportionate burden of oral disease in the United States [8]. That same year, the U.S. Census Bureau reported that Hispanics had become the nation's largest minority group [30]. Hispanic adults were more likely to be poor, unemployed and uninsured. The percentage of untreated oral disease for Hispanics (40%) and non-Hispanic blacks (48%) was nearly double that for non-Hispanic Whites (24%) during the same period [30]. One of the major reasons for the identified ethnic health disparities may be due in part to a lack of oral health education and lack of awareness of health services available. Therefore, focusing on educating the Hispanic community (and others) specifically on resources and preventative practices should be central to any effort to close the disparity in oral health between these groups [31].

Oral Health Literacy

97% of the participants answered that they use toothbrush and toothpaste, but only 38% of the participants stated they used fluoride toothpaste (Table 1) even though fluoride toothpastes make up the majority of all toothpaste sales. Additionally, 65% of the participants stated that they did not believe that oral health affects general health (Table 2). It was hypothesized that those with better oral health status had greater motivation in maintaining their dentition because of their better understanding of the relationship between the oral cavity and the body. Participants that believed that oral health affects general health were actually individuals who had systemic diseases and had the highest urgency dental needs. This suggests that many of these participants were not aware of the systemic consequences of poor oral health until they experience it for themselves, which also suggests that their understanding of dental prevention is low and their dental visits are symptom driven instead of preventative.

Limitations

The limitations of this study include the use of a convenience sample, for the HPSAs studied were not chosen at random, but out of proximity to the university and its outreach events. Participants included only those individuals that were screened voluntarily at the University of Utah School of Dentistry outreach activities from each HPSA. Because students were responsible for conducting the screenings, it is possible that there may

have been variations in how the screenings were conducted, particularly in relation to the assessment of treatment urgency. Additionally, participants may not have had enough knowledge to provide accurate responses. It is possible that the participants' responses could be influenced by the academic environment and the perception of their response awarding dental treatment, although screening responses were in no way associated with provision of care. Furthermore, some sensitive questions (e.g., income) showed a large number of denied/missing responses.

Conclusion

There is a paucity of literature on the state of oral health in the minority populations of Utah. This research identified pervasive treatment needs, with almost half of the studied population needing moderate to urgent oral healthcare. This HPSA population struggles to access appropriate care, with financial barriers being particularly problematic. Important gaps in oral health knowledge also suggest the potential for educational interventions to improve the oral health status of this population.

Abbreviations

- HPSA: Health Professional Shortage Areas
- ED: Emergency department
- LDS: Later-Day Saints
- LGBTQ: Lesbian, Gay, Bisexual, Transgender, Queer
- UUSoD: University of Utah School of Dentistry
- IRB: Institutional Review Board

Declarations

Ethical approval and consent to participate: The study was conducted according to the guidelines of the Declaration of Helsinki, and approved by the Institutional Review Board of University of Utah (IRB#109970 and date of approval: 03/12/2019). Informed consent and assent (for children aged 7-18) were obtained from all participants involved in the outreach activities conducted by the University of Utah School of Dentistry. Informed consent is not applicable for this retrospective analysis of survey data.

Consent for publication: Not applicable

Availability of data and materials: The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests: The Authors declare that there is no conflict of interest. All manuscript's copyright ownership is transferred from the author(s) of the article [Oral health status of a Utah Health Professional Shortage Areas (HPSAs) population] to the *Archives of Public Health* in the event the work is published. The manuscript has not been published in any form or any language and is only submitted to the *Archives of Public Health*.

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