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Determinants of Dental Care Utilization, Unmet Dental Care Need, and Barriers among Women of Reproductive Age in the United States

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ABSTRACT

Introduction: *Dental care is integral to general health but is often isolated from the healthcare system nor discussed as part of overall health. The barriers to accessing needed dental care vary among socioeconomic and demographic groups. This study examined the disparities in dental care access and identified the socioeconomic and demographic factors associated with dental health needs among United States women.*

Methods: *Using data from the 2017-2020 National Health and Nutrition Examination Surveys (NHANES), we conducted a Chi-square to assess the differences in the proportions of women who reported not getting their needed dental care and computed a weighted multivariate logistic regression to examine the factors associated with access to dental care use, unmet dental-care need, and reported reasons for unmet need.*

Results: *Race, income, and education played a significant role in surveyed participants regarding dental care use and unmet dental care needs. Non-Hispanic Blacks and other minority racial-ethnic groups, including multi-racial groups, were likelier to have never used dental care than non-Hispanic Whites. Furthermore, non-Hispanic Whites with less than a high school education were likelier to have never used dental care than those with a high school education. Groups more likely to report an unmet need were women with PIR < 1.00. Moreover, between 1.00 and 1.99 compared to PIR ≥ 2.00 and women without health insurance compared to those with health insurance.*

Conclusion: *Expanding insurance coverage for dental care and improving access for women with poor health may improve racial-ethnic and education-level disparities, specifically in African American women's unmet dental care needs.*

Keywords
Barriers for Dental Care, Dental Care, Dental Care Utilization, Determinants, Unmet Dental Care Need.

Introduction
Dental care is integral to general health but is often isolated from the healthcare system and not discussed as part of overall health [1]. Access to dental care in the US is a major structural and societal determinant of oral health inequities rooted in structural racism. Historical racist policies have provided direct and indirect access to health and dental insurance, specifically for black Americans [2]. Unfortunately, health disparities exist and primarily affect African Americans, among other minority groups. Factors affecting dental care utilization include health equity, political culture, and social determinants of health. Addressing these factors can promote equitable dental healthcare access for all individuals [3]. If health equity existed in the US, all qualifying individuals would have equal access, opportunity, and resources for optimal dental care [4].

The environmental conditions in which people are born, live, learn, work, play, worship, and age affect various health, functioning, and quality-of-life outcomes and risks [5]. These social determinants of health are highlighted by disparities in dental care and are associated with dental health needs among underserved communities. On the other hand, the political determinants of health negatively affect poor and underrepresented minority groups as they involve a systematic process of equitable distribution of resources to provide opportunities that advance health equity. Unfortunately, race, age, sex, disability, socioeconomic status, geographic location, and other societal paradigms [4] largely predetermine individuals' social and political power and access to the resources needed for health and well-being [6]. Unfortunately, underserved minority groups carry a significant burden of oral and cardiovascular diseases in most measured outcomes [2,7,8].

Barriers to accessing dental care vary among socioeconomic and demographic groups. The results of this study showed that affordability and a lack of insurance were significant barriers to unfulfilled dental needs. In most cases, these dental issues result from inequities in the experience of dental diseases, including fear of dentists and the inability to take time off work [9]. This study adds to the existing knowledge on disparities in access to dental care among women by focusing on the entire reproductive lifespan of women in a nationally representative sample.

Methods
We analyzed data from the National Health and Nutrition Examination Survey (NHANES) 2017–2020. The NHANES is an ongoing, complex, multistage survey that involves a series of cross-sectional surveys conducted every 2 years [10]. The NHANES and Nutrition Examination Survey suspended field operations in March 2020 due to the coronavirus disease 2019. To create a nationally representative sample of pre-pandemic data for NHANES 2017–March 2020, the NCHS combined data collected from March 2019 to March 2020 with data from the NHANES 2017–2018 cycle. The resulting public-use files were derived from household interviews conducted with all participants, followed by physical examinations conducted in a mobile examination center (MEC) for most participants. The NCHS Research Ethics Review Board approved this study. Participants provided written informed consent. Detailed information on the sampling and procedures is available on the NHANES website [10].

Sample Selection
Out of the total sample size of 15,560 individuals surveyed between 2017 and 2020, 7,839 were women. To focus the analysis, we excluded 3,086 women under 20 years and 2,879 women above 44 years, resulting in a final participant count of 1,874 individuals. We defined the reproductive age group as 20–44 years based on the sampling of the NHANES, in which questions related to reproductive years were asked only to women in this age group. We further excluded three women with missing data (including "do not know" and "refused") for our primary outcome variable "time since last dental visit," six women for missing data on marital status, six women for missing data on education status, and six women for missing information about health insurance. Our final sample consisted of 1,795 women, representing 50,936,447 women at the US national level.

Primary Outcome Variable and Assessment
The study assessed access to dental care through three measured outcomes: [1] "Use of dental care," which categorized individuals based on self-reported "time since last dental visit" into three groups: "never," "1 year or less," and "more than 1 year." [2] "Unmet dental care needs" examined the self-reported inability to access dental care when needed within the last 12 months. A positive response indicated unmet dental care needs [3]. The study also identified the "reasons for unmet dental care needs," or the barriers individuals faced when accessing dental care. These reasons were self-reported and included: inability to afford the cost, the expectation of dental problems being resolved on their own, lack of insurance coverage for procedures, convenience barriers (such as a distant location or inconvenient office hours), and fear or dislike of dentists.

Predictor variables
We computed and examined the following variables: age groups (20–24 years, 25–34 years, and 35–44 years), race/ethnicity (Mexican American, non-Hispanic white, non-Hispanic black, and others), marital status (married/living with a partner, never married, and widowed/separated/divorced), and educational status (less than high school, high school graduate/equivalent, and more than high school graduate). Income status was classified using the poverty income ratio (PIR), calculated by "dividing family income by the federal poverty threshold specific to family size and calendar year, as defined by the US Census Bureau"[11]. The PIR was categorized into three groups, i.e., <1.00, ≥1.00 to <2.00, and PIR ≥2.00 [12]. Health insurance status was categorized as "yes" or "no," referring to having health insurance versus not having health insurance, respectively. Information on dental insurance was unavailable in the dataset.

Statistical analysis

Using methods recommended by the NCHS, the analysis was weighted to provide estimates of the US population. Combining NHANES 2017–2018 and 2019–March 2020, the PSUs for these cycles were selected from different 4-year sample designs. The combined 2017–March 2020 pre-pandemic data file comprised 48 PSUs: 30 PSUs from the 2017–2018 cycle and 18 PSUs from the 2019–March 2020 data collection, with unequal PSUs per primary stratum. Special weighting measures were required to calibrate the dataset back to an equal number of PSUs across the major strata, as specified in the 2015–2018 sample design. A PSU-level adjustment factor was created to equalize the contribution of each stratum to the total survey sample and was applied to the participant base weights. The PSU-level adjustment was derived to effectively increase the weights from underrepresented strata and reduce the weights from overrepresented strata while improving the efficiency of the combined sample.

Finally, we calculated the sample weights (interview and MEC weights). As per the NHANES analytical guidelines, using weights from the smallest sample when conducting analysis is recommended. In line with this, since the sample size for the MEC was smaller than the interview sample, we used the MEC or exam sample weights for our analysis. By applying these weights, we aim to ensure accurate and representative results that account for the complex survey design of NHANES. Weighted tabulations were used to report the sociodemographic attributes of the sample and reported barriers to dental care access. Chi-square tests were used to evaluate sample characteristics according to dental care use categories. We reported both absolute and weighted population-level proportions. Statistical significance was set at P <0.05.

Multivariate logistic regression models were developed to examine the predictors of never using dental care and unmet dental care needs. These models were adjusted for the factors that showed significant associations in the bivariate analysis. P-values were adjusted using the Bonferroni adjustment to account for the two outcomes under consideration and ensure statistical rigor. Statistically significant results were determined at a threshold of P <0.025 to account for the multiple comparisons conducted. This approach helps maintain the validity of the findings and ensures robust statistical inference. Multivariate logistic regression models were also constructed to study the predictors of the reported reasons for unmet needs. A Bonferroni adjustment was used to compare the 12 predictor categories across the reported reasons for unmet needs. A Bonferroni adjustment was also used to account for multiple comparisons of the 12 predictor categories across the five categories of reported reasons. Hence, a P-value of <0.0008 was considered statistically significant. All statistical tests were two-sided. The analyses were performed using STATA SE version 18 (STATA Corp 2023. Stata Statistical Software: Release 18 college Station, TX: Stata Corp LLC). This study was exempt from Institutional Review Board approval.

Results

Sample characteristics

The final sample included 1,795 women, representing an estimated population of 50,936,447 women at the national level in the US. The average age of the participants was 31.3 years. Among the sample, the majority were non-Hispanic whites (54.1%), had completed education beyond high school (68.3%), had a PIR of 2.00 or higher (58.8%), had health insurance coverage (84.0%), and were either married or living with a partner (58.5%) (Table 1).

Use of Dental Care

Of the surveyed women, 53.5% reported that it had been 1 year or less since they last visited a dentist, and 45% indicated that they had visited a dentist more than 1 year ago. Furthermore, 1.5% of the participants reported visiting a dentist. Race/ethnicity, education, PIR, and health insurance were significantly associated with "time since last dental visit" (P < 0.05) (Table 1). For example, 56.4% of non-Hispanic whites reported visiting a dentist in 1 year or less, and only 4.0% of non-Hispanic whites reported never having visited a dentist. Mexican Americans and non-Hispanic blacks reported the lowest percentage (10.4 and 12.3%, respectively) of dentist visits within 1 year or less. Approximately 74.1% of participants with more than a high school education had visited a dentist in 1 year or less, and 7.8% of high school-educated participants reported never having visited a dentist. In addition, 89.6% of women with health insurance visited a dentist within 1 year or less, and only 10.4% of participants with no health insurance visited the dentist within 1 year or less. Finally, 65.4% of women (PIR > 2.00) visited a dentist within 1 year or less, and 15.4% of participants (PIR < 1) visited the dentist within 1 year or less.

In the unadjusted models, the groups that were more likely to have never used dental care were: non-Hispanic blacks as compared to non-Hispanic-white, less than high school graduates, and high school graduates as compared to more than high school graduates; those with PIR <1.00 and with PIR between 1.00 and 1.99 as compared to PIR ≥2.00; and those without health insurance as compared to those with health insurance.

As shown in Table 2, in the multivariate model with age, race/ethnicity, education, PIR, and health insurance as the examined predictors, the groups that were more likely to have never used dental care were as follows: less than high school graduates as compared to more than high school graduates; those with PIR <1.00, compared to PIR ≥2.00; and those without health insurance as compared to those with health insurance. A total of 24.8% (N = 471, representing 12,525,081 at the national level) mentioned that they needed dental care in the last 12 months but could not get it, indicating an unmet dental care need (Table 3). In a comparison of different educational levels, individuals with less than a high school education and only a high school education were not adjusted in the analysis, while those with more than a high school education were used as the reference group. Similarly, participants with a PIR below 1.00 and between 1.00 and 1.99 were compared to those with a PIR of 2.00 or higher. Furthermore, women without health

Table 1: Characteristics of patients evaluated by "Time Since Last Dental Visit" (N = 1,795 Representing 50,936,447 individuals at the US National Level).

	1 year or less %* (N)†	More than 1 year %* (N)†	Never %*(N) †	
	53.5% (960)	45.0% (808)	1.5% (27)	P-value
Age				
20–24 years	21.2% (168)	21.5% (173)	15.3% (5)	0.269
25–34 years	42.5% (415)	43.3% (331)	68.9% (17)	
35–44 years	36.4% (377)	35.3% (304)	15.9% (5)	
Ethnicity/race				
Mexican American	10.4% (122)	12.6% (119)	13.9% (4)	<0.003
Non-Hispanic White	56.4% (275)	52.1% (236)	4.0% (1)	
Non-Hispanic Black	12.3% (252)	15.7% (241)	36.6% (12)	
Others	20.9% (311)	19.6% (212)	45.5% (10)	
Education				
Less than High School	6.7% (97)	12.5% (144)	43.8% (11)	<0.001
High School	19.2% (184)	26.9% (190)	7.8% (2)	
More than High School	74.1% (679)	60.7% (473)	48.4% (14)	
PIR				
<1.00	15.4% (165)	24.1% (233)	56.3% (12)	<0.002
1.00 to 1.99	19.2% (194)	25.3% (195)	17.7% (5)	
2.00 or above	65.4% (459)	50.6% (268)	26.0% (5)	
Health insurance				
Yes	89.6% (831)	76.9% (582)	58.8% (15)	<0.001
No	10.4% (126)	23.1% (222)	41.2% (12)	
Marital status				
Married/living with a partner	58% (547)	59.0% (430)	70.0% (17)	0.6501
Not Married	30.1% (10)	42.0% (413)	41.0% (378)	

* % denotes the proportion of each characteristic in the national-level sample computed using sample weights.

These percentages will not correspond to the given unweighted numbers. Proportions are column percentages.

† N denotes the unweighted actual number of observations in the population sampled.

**Table 2:** Unadjusted and Adjusted Risk-Ratios (RR) for "Never Having Had a Dental Visit"*.

	Unadjusted		Adjusted†	
	RR (95% CI)	P-value	RR (95% CI)	P-value
Age				
20–24 years	1.05 (0.74 to 1.50)	0.770	1.04 (0.70 to 1.54)	0.84
25–34 years	1.08 (0.80 to 1.45)	0.606	1.12 (0.81 to 1.55)	0.49
35–44 years	Ref		Ref	
Ethnicity/race				
Mexican American	1.34 (0.94 to 1.92)	0.105	0.88 (0.58 to 1.33)	0.54
Non-Hispanic White	Ref		Ref	
Non-Hispanic Black	1.45 (1.07 to 1.95)	0.015	1.10 (0.80 to 1.52)	0.57
Others	1.07 (0.79 to 1.45)	0.657	0.96 (0.68 to 1.34)	0.790
Education				
Less than High School	2.42 (1.69 to 3.46)	0.000	1.57 (1.02 to 2.42)	0.04
High School	1.69 (1.23 to 2.32)	0.001	1.46 (1.00 to 2.12)	0.051
More than High School	Ref		Ref	
PIR				
<1.00	2.10 (1.50 to 2.93)	0.000	1.47 (1.02 to 2.12)	0.040
1.00 to 1.99	1.71 (1.23 to 2.38)	0.002	1.30 (0.92 to 1.85)	0.14
2.00 or above	Ref		Ref	
Health insurance				
Yes	Ref		Ref	
No	2.64 (1.91 to 3.64)	0.000	2.51 (1.77 to 3.56)	0.000

PIR, poverty income ratio.

Risk ratios are exponentiated coefficients from multivariate logistic regression models: education, health insurance, and general health status.

* In reference to having had the last dental visit within the last year.

† Adjusted for age, race, income, education, and health insurance.

Table 3: Risk-Ratios (RR) for Not Getting Dental Care When It Was Needed in the Last 12 months.

	Unadjusted		Adjusted†	
	RR (95% CI)	P-value	RR (95% CI)	P-value
Age				
20–24 years	1.20 (0.81 to 1.79)	0.367	1.01 (0.63 to 1.62)	0.958
25–34 years	1.29 (0.91 to 1.81)	0.151	1.33 (0.90 to 1.97)	0.157
35–44 years	Ref		Ref	
Ethnicity/race				
Mexican American	1.30 (0.87 to 1.94)	0.201	0.745 (0.46 to 1.21)	0.230
Non-Hispanic White	Ref		Ref	
Non-Hispanic Black	1.26 (0.90 to 1.77)	0.171	0.90 (0.61 to 1.31)	0.569
Others	0.90 (0.63 to 1.29)	0.566	0.79(0.52 to 1.20)	0.266
Education				
Less than High School	2.48 (1.69 to 3.64)	0.000	1.42 (0.88 to 2.31)	0.154
High School	1.77 (1.24 to 2.54)	0.002	1.03 (0.68 to 1.56)	0.880
More than High School	Ref		Ref	
PIR				
<1.00	2.99 (2.02 to 4.41)	0.000	2.33 (1.48 to 3.67)	0.000
1.00 to 1.99	3.48 (2.35 to 5.14)	0.000	2.96 (1.95 to 4.49)	0.000
2.00 or above	Ref		Ref	
Health insurance				
Yes	Ref		Ref	
No	4.40 (3.16 to 6.14)	0.000	3.47 (2.38 to 5.05)	0.000
PIR, poverty income ratio.				
Risk ratios are exponentiated coefficients from multivariate logistic regression models: education, health insurance, and general health status.				
* In reference to having had the last dental visit within the last year.				
† Adjusted for age, race, PIR, education, and health insurance				
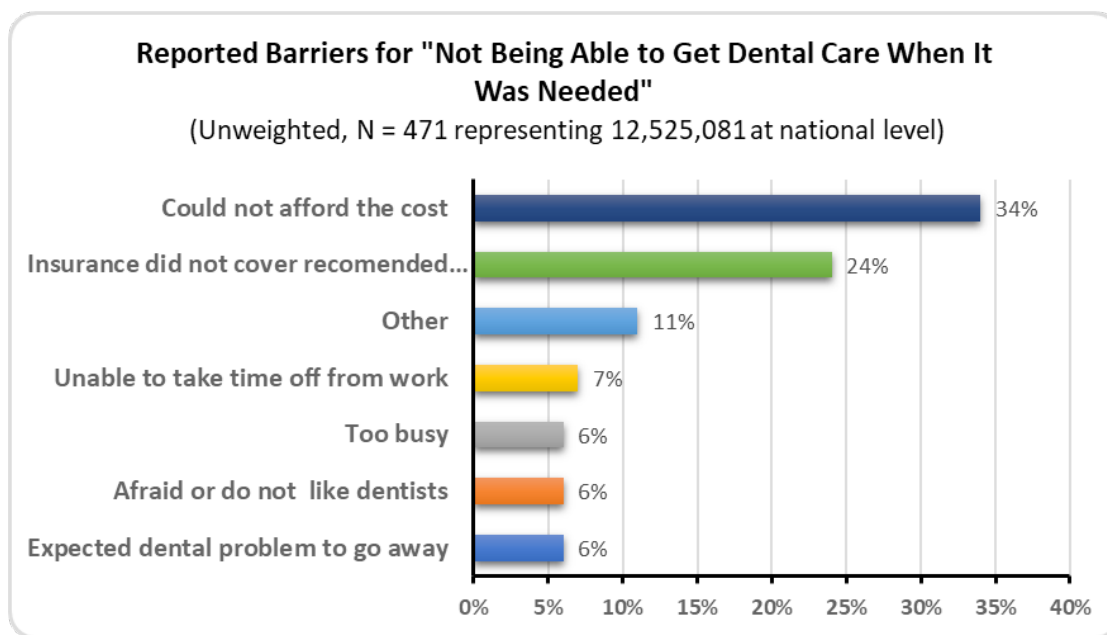
Figure 1: Reasons for unmet dental care needs.

insurance were compared to those with health insurance. However, in the multivariate model with age, race, income, education, health insurance, and general health status as the examined predictors, groups that were more likely to report an unmet need were women with PIR <1.00 and between 1.00 and 1.99 as compared to PIR ≥2.00; women without health insurance as compared to those with health insurance; and uninsured as compared to insured.

In the multivariate model with age, race, income, education, and health insurance as the examined predictors, groups that were more likely to report an unmet need were women with PIR <1.00 and between 1.00 and 1.99 as compared to PIR ≥ 2.00 and women without health insurance as compared to women with health insurance.

Reasons for Unmet Dental Care Need

Figure 1 illustrates the findings regarding the reasons for unmet dental care needs. Among women who reported having unmet dental care needs, the most prevalent reason (34.2%) cited was the inability to afford the associated costs. Additionally, 24.0% of the women stated that their insurance did not cover the cost of dental care, leading to their inability to receive the necessary treatment. In total, 5.5% of the women reported not getting the needed dental care because they thought the problem would "go away."

Discussion

This study examined the factors associated with dental care use, unmet dental care needs, and self-reported barriers when there was a perceived need for dental care among reproductive-aged women in the United States from 2017 to 2020. We adopted the methodological approach of Gupta et al. [13] to include all women of reproductive age, regardless of their pregnancy status.

The American College of Obstetricians and Gynecologists provides guidelines on oral health care during pregnancy because women have special dental care needs and considerations compared to men [14]. Hormonal fluctuations, oral contraceptive use, and menopause affect women's oral health and require unique dental care needs [15-17]. Adequate oral health is crucial for women of reproductive age. Poor oral health has been linked to adverse pregnancy outcomes such as preterm birth, low birth weight, poor glucose control, and preeclampsia [18,19].

Adults' need for dental care is often neglected in their overall health [8]. Oral health problems in older adults include untreated tooth decay, gum disease, tooth loss, oral cancer, and other chronic diseases [20,21]. In addition, the lack of dental care when not pregnant is associated with care during pregnancy and can jeopardize children's overall health [22].

Dental care utilization, unmet dental care needs, and barriers to accessing dental services are influenced by many factors. Notable examples encompass the high costs associated with dental care, challenges in obtaining dental insurance coverage, and the scarcity and unequal distribution of dentists, particularly in rural regions. These factors collectively contribute to disparities in oral health access and highlight the need for comprehensive strategies to address these challenges and ensure equitable dental care for all individuals [23,24]. McKernan et al. [25] investigated transportation barriers and the use of dental services among Medicaid-insured adults and found that individuals residing in remote areas faced more significant barriers to accessing dental services. In addition, dental care needs vary between socioeconomic and demographic groups. Previous studies on women have reported sociodemographic and economic disparities in the prevalence of dental diseases and the level of dental access [13,26].

Our study found significant differences in the use of dental care between different races. Specifically, the percentages of Hispanic and non-Hispanic black individuals who visited a dentist within 1 year were notably lower. Women of reproductive age without health insurance were more likely to have unmet dental care needs than those with health insurance. These findings were consistent with those reported by Gupta et al. [13]. Furthermore, regarding income levels, women of reproductive age with an income below the poverty level were more likely to experience unmet dental care needs. These results were consistent with those of Gupta et al. [13], Hwang et al. [27], Singhal et al. [28], and Azofeifa et al. [12]. Expanding insurance coverage for dental care and standardizing dental services within the healthcare insurance system could reduce racial and ethnic disparities in access to dental care.

Our study has a limitation in that it utilized a cross-sectional design, which restricts our ability to establish causality. Nevertheless, cross-sectional studies provide valuable insights and effectively explore the factors associated with dental care utilization, unmet dental care needs, and barriers to accessing dental care among reproductive-aged women in the US. While causal relationships cannot be determined from this study alone, our findings offer valuable exploratory analysis for understanding the complex dynamics surrounding oral healthcare in this population. Another limitation of our study is the potential presence of reporting bias in the self-reported data. This bias may arise because participants provide inaccurate or incomplete information about their dental care experiences. Additionally, we could not accurately ascertain participants' dental insurance status as the survey tool did not include specific questions related to dental insurance. However, it is worth noting that using "health" insurance as a proxy for "dental" insurance is likely to underestimate the impact of insurance on dental care access, as individuals without health insurance are also highly likely to lack dental insurance coverage.

While the 2010 Affordable Care Act improved the oral health status of Americans, the persistence of oral health disparities among black Americans persists because of limited dental coverage. Moreover, dental coverage in many states is restricted, especially for patients aged 21 and over, including women of reproductive age.

Conclusions

Oral and general health are linked. Regular dental checkups, good oral hygiene, and a healthy lifestyle are essential for optimal oral health. Health professionals must be aware of the social, cultural, and political determinants of health and racial health disparities that negatively affect communities and their ability to lead healthy lives. The Affordable Care Act should be expanded to improve the oral health status of Americans, particularly women of reproductive age. Health policies should encourage oral health prevention and promotion, increase access to dental care, and improve dental service quality.

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