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Tracking Workforce Diversity in Dentistry: Importance, Methods, and Challenges

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Abstract

Objective—The objective of this paper is to describe sources of data on underrepresented minority (URM) dental providers and to perform a structured critique of primary survey research on African American (AA), Hispanic/Latino (HL) and American-Indian/Alaska-Native (AI/AN) dentists.

Methods—A national sample survey was conducted between October 2012 to March 2013, and secondary datasets were assessed for comparability. The survey used 21 sampling frames, with censuses of AI/AN and non-urban dentists, and assessed demographics, education, practice history, patient population, volunteerism, experiences with discrimination, and opinions on issues in dentistry. The survey was developed with constituent input, pilot-tested, and distributed online and through US Mail with three reminder postcards, phone, and email follow-up. Continuing education credit and entry to a prize drawing were provided for participation.

Results—Existing data sources cannot answer critical research questions about URM dentists. Using best practices, the survey received a 34% adjusted response rate. Selection likelihood and measurable response bias were adjusted for using base and post-stratification weights.

Conclusions—The survey design was consistent with best practices, and our response analytics provide high confidence that the survey produced data representative of the URM dentist population. Enhanced study design, content, and response rates of existing survey efforts would be

needed to provide a more robust body of knowledge on URM providers, perspectives, and practices.

Keywords

Dentists; Minority Groups; Data Collection; Questionnaires; Survey Research

Introduction

In many health care professions, including the field of dentistry, African Americans (AA), Hispanic/Latinos (H/L), and American Indian/Alaska Natives (AI/AN) have long been underrepresented (1). In dentistry, not all minority populations' representation is disproportionately smaller than their distribution in the general US population. Asians, as a broad group, are overrepresented in the dental field, although sub-populations such as Hmong may be under-represented. In this paper, the term underrepresented minority (URM) is used to describe AA, H/L and AI/AN providers. The goal of improving workforce diversity in the health professions has been embraced not only from a social justice and affirmative action perspective, but as a way to improve health care access, equity and quality (2). Research that builds from the theory of racial concordance, which posits that minority patients are more likely to seek care from a provider with a race or ethnicity similar to their own, points to increasing the number of URM providers as an important element of reducing health disparities (3) (4, 5). The lack of workforce diversity in dentistry and significant oral health disparities have been highlighted as critical problems for the field, as has been the lack of adequate data to report on the providers and delivery system (6-9).

High-level and well-funded initiatives aimed at diversifying the profession have been launched over the last two decades such as the American Dental Education Association's (ADEA) establishment in 1998 of the Center for Equity and Diversity and the Pipeline, Profession, and Practice Community-based Dental Program in 2000. Much effort has been made to more effectively recruit URM into dental school, and understand their educational experience as well as their practice intentions, but little effort has been made to track URM providers once in practice and to understand these providers' ongoing needs and contributions. While regional studies have provided key insights, the only known national study of the practice patterns of AA dentists was conducted in 1992, but never published (10, 11). Overall, data on the outcomes of these efforts in terms of URM practice remains scarce, and the number of URM providers remains significantly below parity (12, 13).

Our primary research goal is to assess the outcomes of the efforts to improve the diversity of the dental workforce and the relationship of these efforts to improvements in access to care and reductions in oral health disparities. The data necessary to achieve this goal were collected in a comprehensive nationally representative sample survey of licensed African American (AA), Hispanic/Latino (HL) and American Indian/Alaskan Native (AI/AN) dentists in the United States. The study and all survey instruments were approved by the Institutional Review Board at the University of California, San Francisco (UCSF). The purpose of this paper is to describe the availability and limitations of sources of data on the racial composition of dentists, report the methodology used to conduct the national sample

survey of URM dentists, and to evaluate the survey quality through a critical assessment of the design, outreach and engagement strategy, response rate, and representativeness. Finally, we recommend future actions to improve the quality and availability of dental workforce data needed to conduct research on pressing policy issues.

Methods

Sources of Data on The Racial Composition of Dental Providers

In order to understand dentist practice patterns by race, and the relationship of these patterns to access and health outcomes, detailed data on dental providers, their practices, and their patients is required. No single source of data on dentists contains such information. Available sources are detailed in Table 1. The American Dental Association (ADA) maintains the dentist masterfile, the most comprehensive data on active and retired dentists in the US that includes all known dentists in the US, regardless of ADA membership. It is continuously maintained and updated by the ADA's Membership Information department with self-reported information from dentists who contact the ADA or one of its constituent or component societies directly. It also relies on data received from the USPS' National Change of Address registry and data obtained from state dental boards and other dental organizations. In addition, the ADA dentist masterfile is updated with information collected through the Distribution of Dentists survey and the Survey of Dental Graduates, which are conducted on an annual basis by the ADA's Health Policy Institute (14). The ADA publishes a number of reports based on its data throughout each year -- their most recent report on the distribution of dentists includes age, location, and gender, but does not include race/ethnicity (15).

The American Dental Education Association's (ADEA) membership includes all U.S. and Canadian dental schools, advanced dental education programs, hospital dental education programs, and allied dental education programs, corporations, faculty, and students. ADEA collects applicant, entrant and graduation data through school reports and student surveys which include demographics such as race and gender. ADEA's data does not include any information on foreign-trained dentists (outside of the US and Canada), many of whom are minorities. Although ADEA's data is linkable to the ADA masterfile data at the individual level, the linked data is neither published nor available for research.

State dental boards maintain address data on individuals who hold dental licenses in their state, but these data vary in details such as demographic characteristics and in what variables are released to the public. The Census Bureau conducts several Surveys of Business Owners, including surveys specifically targeted to Black-owned, Hispanic-owned, and American Indian- and Alaska Native-owned firms. These are sample surveys conducted every five years, but they only provide data on business owners and would not speak to dentists who are employees, students, or in the military or IHS. Neither the Census Bureau's Economic Census nor the Bureau of Economic Analysis' Survey of Current Business collect demographic data on business owners or employees, and the Census Bureau's American Community Survey (ACS), is primarily provides information on household characteristics rather than data relevant to the practice of dentistry by the URM dentist population. The Health Resources and Services Administration's (HRSA) Area Health Resource Files

(AHRF) provides detailed aggregated demographic and employment statistics at the county-level for over 50 health care professionals, including dentists; however, race/ethnicity of dental providers was not available at the time we were conducting our research and is only available through data pulled from the ACS (16).

Finally, data is available through minority dental professional associations such as the National Dental Association (NDA) (representing AA dentists), the Hispanic Dental Association (HDA) and the Society of American Indian Dentists (SAID). Membership-based data is limited to the individuals who belong to their respective organizations and varies in accuracy and completeness as membership fluctuates over time. In addition, membership in these organizations tends to vary regionally, resulting in patchwork data, and some organizations are more willing than others to share their data with researchers.

Researchers have used existing data sources to study the overall trends in the size of the URM dental workforce. These studies have documented declines in the number of URM students enrolling in dental school (12, 17), estimated the Latino dentists population in California (18), and examined the distribution of providers according to the population (19). However, detailed, comparative analysis of URM dentist practice patterns is not possible with current data sources.

Survey Development

A 12 member Advisory Committee (AC) was engaged to provide guidance, insight, and support of the research efforts. The AC included representatives from each of the target URM dental provider communities as well as researchers with workforce diversity and disparities expertise. Structured interviews were conducted and reviewed by the UCSF research team with each advisory committee member to identify gaps in existing data relevant to the study population, real world experiences common to these practitioners, and pressing issues in dental practice among URM dentists.

A question bank was populated from an inventory of dentist workforce surveys identified in preliminary research, in addition to Drs. Gates and Price's 1992 survey and health professions workforce surveys conducted at University of California, San Francisco (UCSF) (hygienists, nurses, physicians) and University of California, Los Angeles (UCLA) (20-23). The question bank was then divided into the key research domains of demographics, education, patient population, and practice patterns. A draft survey instrument was created by mapping existing questions across domains and adding original questions when needed. The inclusion of questions from existing surveys allowed generation of generally comparable data.

The draft survey was circulated to the AC, reviewed at a virtual meeting, and then revised into a final draft for pilot testing. The AC assisted in recruiting URM dentists via their personal networks to pilot test the survey. Six pilot participants were recruited -- two representatives from each of the study groups (AA, H/L, and AI/AN). These individuals offered geographic and career stage diversity to ensure that an array of perspectives were included. One representative from each URM group took the survey in hard copy while the other took the survey online. This was followed by a one hour interview to elicit feedback

on the survey content, length, phrasing, and clarity as well as on survey flow, formatting, and, for the online version, any technological issues encountered. The pilot participants received a \$50 gift certificate.

Upon completion of the pilot testing, the survey tool questions, phrasing, and flow were finalized. The electronic version was created and managed using REDCap (Research Electronic Data Capture) electronic data capture tools hosted at UCSF. REDCap is a secure, web-based application designed to support data capture for research studies, providing: 1) an intuitive interface for validated data entry; 2) audit trails for tracking data manipulation and export procedures; 3) automated export procedures for seamless data downloads to common statistical packages; and 4) procedures for importing data from external sources. (24) The online survey tool and the hard copy versions were synchronized, and a coding methodology was developed to allow data entry specialists to input the hard copy responses to a database that would seamlessly append with REDcap output. The final hard copy survey tool was formatted as a 12 page booklet, with approximately 150 questions organized into 8 sections: personal information, dental education (i.e. year, location, debt), practice history (at graduation), current practice status (clinical or other), clinical dental practice (ownership, size, location), patient population (demographics, payers), volunteer dental services, experiences with mentoring and discrimination, and opinions on current hot topics in the field, such as mid-level providers.

For example, under personal information we asked the common questions of age, gender and race. However, we went further by allowing individuals to self-identify in as many ethnic/racial categories as they desired (from a list of 21 options), tribal affiliation for AI/AN, language spoken, education of parents, marital status, caretaking responsibilities for dependents, status as lesbian, gay, bisexual or transgender (LGBT), and identify if they have a disability. This rich demographic profile, combined with an understanding of the trajectory of their dental career (education, debt, initial practice and current status), will allow for a intersectional analyses of diversity within URM provider experiences of the utmost importance to understanding the public health and disparities implications of this research (25).

Survey Sample Methodology

Health professionals' response rates to postal questionnaires have historically been problematic, although best practices have been identified (26). Online surveys are becoming more common among health professionals, although response rates vary quite widely to this format (27). Dentists are particularly notable for low survey response rates (20, 28, 29). In 54 studies of survey research on the practicing dentist population in the US published in PubMed over the last decade the average response rate was 46% (range 19%-87%) with a slightly higher rate for clinical practice surveys (48.6%, n=35) than non-clinical topics (41%, n=19). The closest comparable survey to this effort in scope and size received a 26% response (30). No surveys specific to any minority provider groups were found for comparison.

Cognizant of the challenges of surveying health professionals, the methodology chosen for this research incorporated the most effective strategies for achieving as high a response rate

as possible and decreasing the likelihood of survey abandonment with expectation of yielding a final response rate of between 20-40% (31). The sample was derived from ADA's masterfile and included name, address, and race/ethnicity for all dentists holding active licenses in the US as of September 2012. This yielded a total of 14,111 URM dentists in the US. Dentists from Puerto Rico, the Virgin Islands, and U.S. military bases were removed leaving 12,983 URM dentists: 471 AI/AN; 6,586 AA; and 5,926 H/L. The ADA URM dentist numbers were cross-referenced with an estimate of AA dentists the Gates and Price study (1992), with an assessment of the Hispanic dentist workforce (18), and with historical ADA reports(32), and were found to be generally consistent with previous estimates of the population. After examining the geographic distribution of the providers in the ADA file and identifying very low numbers of URM dentists in many states, we decided to use a regional sampling frame based on the US Census regions. Priority was placed on developing a data set inclusive of the diversity within URM providers rather than comparing URM to non-URM dentists; therefore, none of the limited budgetary resources were put to surveying a control group of non-URM dentists.

To ensure adequate sampling of rural practitioners, the file was geocoded based on Rural Urban Commuting Area Codes (RUCA) obtained from the University of Washington's (UW) Rural Health Research Center. RUCA codes use Census data to classify U.S. Census tracts based on measures of population density, urbanization, and daily commuting patterns and are particularly useful in health services research (33). UW provides ZIP-code approximations for RUCA codes, which allowed linkage of the RUCA to the zip code for each dentist in our potential sample. Based on this geocoding analysis, 11,638 (89.6%) URM dentists were categorized urban, 1,063 (8.2%) suburban, and 282 (2.2%) rural,

The final sample was derived using 21 primary sampling units (PSU), or sampling frames, shown in Table 2. The total budget of over \$300,000 allowed for a sample target of 35% of all URM dentists (i.e. 12,983 URM dentists * 0.35 = 4544). To ensure adequate data would be yielded by the survey, some groups were oversampled, including the first PSU which was a census of all AI/AN dentists (n=471). The second PSU was also a census to capture all rural dentists (n=239), but excluded rural AI/AN as they were already represented in the first PSU. PSU three was a census of all non-AI/AN suburban dentists (n=975).

To complete the sampling frames, the percent of the universe of URM dentists represented by each of the urban AA and the urban H/L dentists was calculated and applied to the remaining 2,859 sample slots resulting in 52.3% (n=1,495) AA and 47.7% (n=1,363) H/L. To create a sample that was proportionally representative of the geographic distribution of urban AA and H/L dentists, respectively, the percent of dentists within each group by US Census region was calculated and applied. For example, of all urban H/L dentists, 7.35% reside in the East North Central (NC). Therefore, 7.35% of the total urban H/L sample (n=1,363) was allocated to the East NC region (.0735*1,363=100). An oversample was taken in eight of the 18 regions to attain a minimum of 125 individuals in each PSU, allowing for adequate power even at a relatively low response rate. Two PSUs did not have enough dentists to reach the goal of 125 AA and H/L dentists, so all AA and H/L dentists were surveyed in those regions.

Twelve bad addresses were found when processing the sample through the National Change of Address (NCOA) system prior to mailing. Of these, seven were not replaceable in our sample because they part of census PSUs (one AI/AN; one rural; and five suburban). The five replaceable addresses were replaced using dentists of the same region and race/ethnic group. The final sample size was 5076.

To raise awareness about the survey and to link the survey to key stakeholder issues, the research team partnered with the National Dental Association (NDA), Hispanic Dental Association (HDA), and the Society of American Indian Dentists (SAID) and promoted the survey at the Multicultural Oral Health Summit held in Washington DC in July 2012. Each organization included notices about the survey and its importance in their respective newsletters and communications to their membership prior to and during the survey's open period. Partners at ADEA and the ADA also generously included notices encouraging survey participation in their electronic membership bulletins.

To make the survey as accessible as possible, a hard copy of the survey was mailed with a pre-paid return envelope included. The URL with an individual access code for online survey response was provided on the cover letter to the mailed survey. The cover letter also informed recipients that the online survey did not need to be completed in one session and that all survey respondents would be entered into a drawing for an Apple iPad™. The cover letter noted the constituent association support of the survey and emphasized the importance of each response in better understanding the URM dentist population, improving support for practicing URM dentists, and improving the pipeline current and future URM students entering the dental field. These concepts were raised as important issues to the URM dentist population by our Advisory Committee and by our pilot participants. Finally the survey mailing included a form that could be completed and returned with the survey for one credit of Continuing Dental Education (CDE). The online survey allowed participants to provide their relevant professional details if they wanted to receive CDE.

The survey was launched in October 2012. A follow up postcard was sent two weeks after the initial mailing to the whole sample. Six weeks after the first mailing, a second survey package was mailed to all non-respondents to date, excluding those who had opted out and those whose initial mailing had been returned as undeliverable. A second reminder postcard followed two weeks after the second survey mailing. A final reminder postcard was sent to non-respondents in the first week of January 2013. This postcard emphasized that it was the recipient's final opportunity to participate in the survey. The survey was closed in March 2013.

Outreach via phone and email was conducted to increase the response rate. The team recorded updated phone numbers, email addresses, and mailing addresses in a tracking database, where survey response date, undeliverable surveys, and refusals were also recorded. Working from an IRB approved phone and email script, each non-respondent received up to three phones and up to three emails. Where possible, the team confirmed the survey recipient's mailing/practice address, other contact information, encouraged response to the survey, and, when requested, resent the survey via US mail or via email. Survey

recipients who were deemed ineligible (non-URM status, retirement, deceased, or practicing outside of the U.S.) and those who outright declined were removed from further follow-up.

The initial follow-up strategy entailed randomly selecting an even number of non-respondents by sampling frame. As the response rates began to vary across the sampling frames, the strategy shifted to pulling a proportional random sample of eligible non-respondents by sampling frame in the number required to reach the minimum goal of 25% response rate, excluding those previously contacted. Calls prior to noon were focused on the East Coast and Central time zone while calls from noon onward were focused in the Mountain time zone and the West Coast. Outreach by phone continued through January 31, 2013, and a final email reminder was sent to all non-respondents for whom we had email addresses in February 2013.

Results

Response rate and weighting

The survey received 1,584 unique responses, 308 (19%) online and 1276 (81%) in hard copy. Through a combination of survey responses, outreach efforts, and undeliverable mail, 692 individuals in the sample were deemed ineligible: 321 could not be located, 299 were identified as non-URM, 39 were retired, 19 were deceased, and 14 were practicing outside the US. Removal of ineligible individuals yielded an adjusted universe of 11,382, an adjusted sample of 4389 and 1489 unique responses -- 289 (19%) online and 1200 (81%) hard copy -- for a final 34% response rate. (Table 2)

Responses were weighted by PSU. The base weight was calculated by multiplying the design weight (inverse likelihood of being selected into the sample) by the non-response rate (inverse of the response weight) in each PSU. Post-stratification weights were calculated for ADA membership and gender by age and were determined by calculating the respondents' distribution against the data available on URM dentists in the masterfile. The final weight was calculated as the base weight multiplied by the post-stratification weights in the PSU where respondent was sampled.

Additional analyses examined biases possible to document but not correct. Active non-response, those who refused to participate when contacted, was 3.4%, indicating minimal aversion to the general topics in the survey. Item non-response varied with very minor drop off toward the end of the survey, indicating that those who responded were committed to complete the survey, despite its length. All respondents received the same ordering of questions on the survey, with the opinion questions on professional issues at the end. A higher item non-response was found on traditionally sensitive questions about personal income and debt. There were four waves of data collection in hard copy and an online response group, which were comparatively analyzed by key variables to provide insight into who may be more likely to be a non-respondent. Identification of response waves for the online surveys was not possible as many individuals began the survey multiple times and level of survey completion per each log-in varied greatly. There is small variance in these waves by gender, race, geographic region, and ADA membership status. If we assume those who responded in the last data wave are similar to non-respondents, we see that a few

characteristics that stand out – the later respondents tended to be age 45-54, sole or associate practice, or have more than one practice. This may indicate bias against busier providers in the height of their career.

The final survey question requested an email address if the respondent was amenable to a follow-up survey, which we can use to control for as an “interest level” variable in the analyses. Of the AI/AN respondents, 36% (47/132) provide an email, among AA respondents this was 34% (227/665) and among H/L respondents this was 31% (214/692). We will benchmark against other studies where possible to further validate the data as analyses are conducted, but we are unlikely to replicate the research as a means to validate the response quality. Rather, we would hope that existing research and data collection efforts could evolve to build a sustainable research infrastructure more inclusive and representative of URM dental practices.

Discussion

A rich literature exists on best practices in survey research, and to the extent possible we aligned with these practices. According to Halbesleben & Whitman (2013) methods to increase survey response rates include the following: offering multiple survey modes; participation incentives: cognitive interviewing; and highlighting the match between the survey and potential participants' interests (31). Cook, et al. emphasize the importance of sending survey reminders to increase the response rate, a practice only about half of studies employ (34). This study's survey methodology included all of these components. In addition, using the decision chart for non-response bias designed by Halbesleben and Whitman we were able to correct for measureable non-response bias and report on possible biases that are not correctable, but are important to understand as our future analytic work utilizing these data is published (31). In sum, we have a high degree of confidence that within our response rate of 34% we have produced reasonably representative data on the URM dentist population in the US. Even with significantly more resources it would be difficult to attain a more ideal response rate to a survey of this depth without employing some sort of mandate or significant incentive to respond. State licensing boards can be empowered through legislation or other means to collect workforce data. For example, the threat of withholding licenses for those unwilling to provide required data usually results in very high adherence; however, not all states are willing or able to take on this data collection role.

Methodological guidance concerning research on historically disadvantaged groups urges a focus not on the “otherness,” or differences between the minority group and the control, but on the ability of the research to elucidate and transform these seeming differences into knowledge and potential action, which is best accomplished by giving the study population a voice in the research design (35). This perspective was the foundation of our project and infused every step of the research design. In contrast to the vast majority of research currently conducted on the dental workforce, our survey allowed respondents to self-identify as multiple races and ethnicity and disaggregated each racial group allowing for rich internal analyses of workforce diversity. The input of our AC and pilot respondents provided perspective, direction, and insight to the experiences, concerns, challenges, and successes of URM dentists that we could not have generated on our own. The final result is a data set

providing tremendous depth of detail about the relationship between provider identity and access to care and that can inform the steps necessary to enhance and advance this workforce in its own right.

Our study provides data that will fill a gap in the health research knowledge base, but that gap could easily re-emerge if this research is not continually carried forward. Existing sources of dental workforce data are clearly inadequate to answer critical questions about the diversity of the dental workforce. Almost 6% of the dentists in the original sample were not URM, indicating that the primary data source, the ADA masterfile, used to enumerate the racial and ethnic composition of the dental workforce, is problematic. This is consistent with research in medicine and nursing that shows universal databases such as the AMA masterfile and state licensure surveys tend to misestimate certain populations (36, 37).

Existing, ongoing survey efforts about the workforce often suffer from very low response rates, brining into question the value of the data produced on minorities in particular. This could be improved with changes to study and sample design informed by the involvement of minority dental provider communities to better track the whole dental workforce over time. If successful, efforts to create a universal dental provider database at the national level would at minimum serve as an accurate means to construct sample frames for future research, as has been done by the National Sample Survey of Registered Nurses. State licensing boards also play a critical role and can collect practice location and race information as part of their accountability to the public.

Assessing the diversity of the dental workforce and the relationships between provider diversity, practice patterns, and access to care for underserved populations is critical to inform policy-makers, educators, and professional associations about this vital component of the dental workforce. Detail lacking in the current sources of data on race/ethnicity of dental providers is now available through the first ever comprehensive dataset on the URM dental workforce. This paper provides a structured critique our study methodology, and concludes that systematic bias in the data is unlikely. By following best practices in survey design and data collection, our research has generated a novel data set providing valuable answers to questions about the URM dentist provider population. However, it is undeniably expensive and difficult to attain a high response in a dentist survey, and even more difficult for a URM dentist survey. Therefore, for future workforce tracking, enhancement of existing survey mechanisms may be the most efficient and productive strategy to continue this line of research.

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Table 1
Dental Workforce Data Sources

Source	Details	Benefit	Drawback
American Dental Association (ADA)	The ADA maintains a masterfile on every dentist in the US through a rolling 3 year census. This data includes license status, membership status and address and select demographics. Additional data is available from an annual practice survey.	Most comprehensive list of US dentists available. Includes race/ethnicity.	List and variables are available for purchase at the discretion of ADA. Special permissions needed for research use.
American Dental Education Association (ADEA)	ADEA collects information applicant, entrants and matriculants from dental school annually. Each student, when they enter dental school is assigned a unique ID that is then transferred upon graduation to the ADA's masterfile.	Student data contains race/ethnicity and can be linked to ADA masterfile data.	Linkages of the ADA and ADEA files is technically possible, but currently restricted by data use and organizational policy. Only includes US trained dentists.
State dental boards	State boards of dentistry in all 50 states keep lists of licensed dentists for regulatory purposes.	Licensing lists are considered public data, and relatively easy and inexpensive to obtain	License files often do not collect race/ethnicity. Not every state will share detailed data. Regularity of updating and file content vary by state.
U.S. Census Bureau	US Census conducts several Surveys of Business Owners (all; Black; Hip; and AI/AN-owned firms). These are sample surveys conducted every five years.	Extremely high quality data as the survey is compulsory and has a high response rate	Data only exists at the practice level so individual data would not be available. Survey is of business owners only, not employees.
U.S. Census Bureau	American Community Survey	Contains dentist race/ethnicity for a rolling sample of survey respondents	Provides individual information, but no data at the practice level and is a small sample annually.
Area Health Resource File (AHRF)--Health Resources and Service Administration (HRSA)	The AHRF contains a range of variables related to health care workforce and access at the county level.	Quality of the data is high and data are relatively easy and inexpensive to obtain	Demographic data was unavailable for dentists at the time of our research. It is now available, but pulled from the ACS.
National Dental Association (NDA), Hispanic Dental Association (HAD), Society of American Indian Dentists (SAID)	Minority dental association's maintain their own membership lists for regular business purposes	The membership lists are maintained regularly and are likely to consist of primarily minority dentists.	List is limited to members, and would not necessarily be representative of all minority dentists. May not be available for research.

URM Survey Sample and Response Rates

Table 2

No.	Category (PSU)	URM Universe	Original Sample	Over-sample	Total sample	NCOA+ process	Adjusted* URM Universe	Adjusted* survey distribution	Adjusted* Survey Resp. by original PSU	Adjusted* Response Rate
1	All AI/NA	471	471	0	471	470	376	376	128	34%
2	All Non AI/NA Rural	239	239	0	239	238	209	209	83	40%
3	All Non AI/NA Suburban	975	975	0	975	970	815	815	290	36%
4	Urban Hispanic East NC	396	100	25	125	125	361	114	40	35%
5	Urban Hispanic East SC	61	15	46	61	61	53	53	19	36%
6	Urban Hispanic Middle Atlantic	611	155	0	155	155	556	141	49	35%
7	Urban Hispanic Mountain	337	85	40	125	125	305	113	53	47%
8	Urban Hispanic New England	164	42	83	125	125	139	106	37	35%
9	Urban Hispanic Pacific	1,399	354	0	354	354	1,225	310	112	36%
10	Urban Hispanic South Atlantic	1,498	379	0	379	379	1,364	345	101	29%
11	Urban Hispanic West North Central	105	27	78	105	105	97	97	36	37%
12	Urban Hispanic West South Central	814	206	0	206	206	759	193	52	27%
13	Urban African-American East NC	768	194	0	194	194	709	179	65	36%
14	Urban African-American East SC	497	126	0	126	126	458	116	29	25%
15	Urban African-American Middle Atlantic	760	192	0	192	192	665	168	59	35%
16	Urban African-American Mountain	170	43	82	125	125	125	92	34	37%
17	Urban African-American New England	147	37	88	125	125	116	99	30	30%
18	Urban African-American Pacific	507	128	0	128	128	400	101	43	43%
19	Urban African-American South Atlantic	2,339	592	0	592	592	1,995	505	149	30%
20	Urban African-American West North Central	131	33	98~	131	131	118	118	38	32%
21	Urban African-American West South Central	593	150	0	150	150	538	136	42	31%
	Total	12,982	4,543	442	5,083	5,076	11,382	4,386	1,489	34%

+ National Change of Address Processing

* Ineligibles removed

The 6 additional dentists allowed a census survey in this sampling frame.

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