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Differences in Access to Care and Healthcare Utilization Among Sexual Minorities: A Master's Thesis

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DIFFERENCES IN ACCESS TO CARE AND HEALTHCARE UTILIZATION AMONG SEXUAL MINORITIES

A Masters Thesis Presented

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Abstract

BACKGROUND: The barriers in accessing healthcare for gay, lesbian and bisexuals individuals are not well explored. These challenges as well as a lack of knowledge concerning this understudied group has prompted the Institute of Medicine to create a research agenda to build a foundational understanding of gay, lesbian and bisexual health and the barriers they encounter.[1] the primary aim of this study will be to compare the differences in health care access and utilization between gay/lesbian, bisexual and heterosexual individuals using a large, nationally representative dataset of the U.S. population. METHODS: Data from 2001 to 2012 from the National Health and Nutrition Examination Survey was pooled. Using logistic regression, we calculated the unadjusted and adjusted odds ratios of having health insurance, having a routine place and seeing a provider at least one in the past year. RESULTS: We found that gay men were more likely to have health insurance coverage (OR_{adj}:2.13 95%CI: 1.15,3.92), while bisexual men were at a small disadvantage in having health insurance coverage (OR_{adj}:0.82 95%CI: 0.46,1.46). Bisexual men were more likely to have received health care in the past 12 months (OR_{adj}:3.11 95%CI: 1.74,5.55). Lesbian women were less likely to have health insurance coverage ($OR_{adj\text{-}lesbian}$:0.58 95%CI: 0.34,0.97). CONCLUSION: This study contributed to the limited knowledge on understanding the health care access and utilization among gay, lesbian and bisexual individuals, which was classified as a high priority by the Institute of Medicine. Expanding health insurance coverage through the Affordable Care Act and Universal Partnership Coverage may reduce the disparities among gay, lesbian and bisexual individuals.

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Chapter 1 Background

The barriers in accessing healthcare for gay, lesbian and bisexuals individuals are not well explored. Existing literature notes that members of these populations experience patient-provider distrust as well as discrimination in the health care setting. [2,3] In addition, same-sex couples living in a state that does not recognize same-sex marriage or domestic partnership, gay, lesbian, and bisexual employees may be required to pay taxes on the employer contributions to their spouse's health insurance, a tax burden not imposed on mixed-sex married partners[4]. These challenges as well as a lack of knowledge concerning this understudied group has prompted the Institute of Medicine to create a research agenda to build a foundational understanding of gay, lesbian and bisexual health and the barriers they encounter.[1]

The existing, yet scarce literature examining differences in health care access and utilization among the gay, lesbian, bisexual and heterosexual populations in the United States are riddled with inconsistencies, further complicating the research on this understudied population. For example some studies have reported no difference[5,6] in health insurance coverage between gay, bisexual and heterosexual men, while others have cited that gay and bisexual men were less likely to have health insurance coverage.[7,8] In addition, there was no difference in having a usual place for care when comparing men in same-sex relationships to men in opposite-sex relationships,[5,9] though it has also been reported that gay men were more likely to have a usual place for care than heterosexual men.[6] It is also unclear if there are differences in having a usual place for care when comparing bisexual and heterosexual men.[6,8] Contradictory findings also

persisted when examining differences in health care utilization between gay, bisexual and heterosexual men.[5-7,10] Lesbian and bisexual women were less likely to have health insurance coverage[5,7,8,11] and less likely to have a usual place for care when compared to their heterosexual counterparts.[5,8,9] Similar to the findings on men, it was unclear if there were any differences in health care utilization between lesbian, bisexual and heterosexual women.[5,7,10]

Due to the nature of these contradictory findings, the Institute of Medicine concluded that there is a need to implement a research agenda to further understand the health care inequities of gay/lesbian and bisexual populations.[1] In response to this report, the primary aim of this study will be to compare the differences in health care access and utilization between gay/lesbian, bisexual and heterosexual individuals using a large, nationally representative dataset of the U.S. population.

Chapter 2 Methods

2.1 Data Source

The National Health and Nutrition Examination Survey (NHANES) is a complex, multistage probability sample of civilians who are non-institutionalized in the United States. NHANES has been a continuous biennially survey since 1999. Detailed information regarding NAHNES design and sampling strategies are described elsewhere.[12] This investigation included respondents who were between the ages of 20 and 59 years of age at the time of the interview as NHANES restricted questions regarding sexual orientation to this age group. In addition, only individuals who specified their sexual orientation as homosexual, bisexual or heterosexual were included in this analysis. To increase sample size, five data releases from 2001 to 2012 were combined.

2.2 Measures

2.2.1 Sexual Orientation. Participants reported their sexual orientation using the Audio Computer Assisted Self Interview (ACASI) system to ensure privacy. Qualitative research has shown that using ACASI is an important strategy to ensure data quality when measuring sexual orientation.[13] NHANES asked subjects to identify their sexual orientation ("Do you think of yourself as…") as one of the following categories: "heterosexual/straight (attracted to the opposite sex)", "homosexual/gay/lesbian (attracted to the same-sex)", "bisexual (attracted to men and women)", "something else", "not sure", "refused", or "don't know." This study excluded respondents who specified their sexual orientation as: "something else," "not sure," "refused," or "don't know." Finally,

sexual orientation was recoded into the following categories: “heterosexual”, “gay/lesbian” and “bisexual.”

2.2.2 Access to Care. Access to care was conceptualized in two ways: having health insurance coverage and report of having a routine place for care that was not the emergency room. Access to care outcomes were self-reported using the Computer-Assisted Personal Interviewing (CAPI) system.

Health insurance coverage was first assessed for each participant. Each participant was asked questions about their coverage over the previous 12 months for each type of health insurance (private insurance, Medicare, Medicaid, other government insurance). Of note, some of the NHANES waves, varied in the presentation of the health insurance question. For example, NHANES waves 2006 and later, participants were asked multiple questions concerning different types of government insurance separately, (i.e.: military health plan, Indian Health Service, state-sponsored health plan and other government insurance) while earlier waves (prior to 2006) of the NHANES asked participants one question about government insurance, “Are you covered by other government insurance?” The analytic notes provided by NHANES were used to recode variables in order to combine data across the study time period. For this study, insurance status was dichotomized as either having health insurance or not (reference group) as an outcome variable. To prevent loss of variability in insurance when used as a covariate, insurance status was coded into the following categories: private-only insurance, public-only insurance, (Medicare, Medicaid, other government) dual insurance (private and public) and no insurance.

Having a routine place for care was assessed for each participant. Participants were asked, “If there is a place that you usually go when you are sick or you need advice about your health?” Participants who answered “There is no place”, “refused” or “Don’t know” were considered to not have a routine place for care. For participants who indicated that they do have a routine place for care (answered to the previous question: “yes” or “There is more than one place”), they were asked a follow-up question: “What kind of place do you go to most often: is it a clinic/health center, doctor's office/HMO, hospital emergency room, hospital outpatient department or some other place?” Participants who specified that their routine place for care was the “hospital emergency room” were considered not to have a routine place for care. Participants who indicated other sources were considered to have a routine place for care.

2.2.3 Health care Utilization. Healthcare utilization was assessed for each participant. Participants were asked, “How many times have you seen a doctor or health care professional at a doctor’s office, a clinic, hospital emergency room, at home or some other place.” This measure included hospital emergency room usage, which according to our definition is not considered a usual place to receive health care. Unfortunately, there was no way to differentiate each type of care the participant received over the previous year. To prevent recall bias on the number of participant healthcare visits over the past year, this study defined having proper healthcare utilization as receiving healthcare at least once per year.

2.2.4 Covariates. Several covariates were chosen to be included in this study. [14] All covariates were self-reported using the CAPI system. Demographic characteristics

were assessed and recoded for each participant to include: age at interview (continuous), marital status (“married”, “living with partner”, “widowed/divorced/separated” and “never married”), race/ethnicity (“non-Hispanic White”, “non-Hispanic Black”, “Mexican American”, “Other Hispanic” and “Other race/multiracial”), education (“<high school and no GED”, ‘high school graduate or GED”, “some college” and “college degree/graduate degree”), employment status (yes/no) and annual household income (“<$25,000”, $25,000-$34,999”, “$35,000-$44,999”, “$45,000-$54,000” and “$50,000 or more”).

Health status was assessed and recoded for each participant to include: perceived health status (“Excellent”, “Very Good”, “good”, “fair” and “poor”) and a comorbidity score (The Charlson Comorbidity Index). The Charlson Comorbidity Index is based on participants reporting if they had any of the following conditions: myocardial infarction, chronic heart failure, stroke, chronic obstructive pulmonary disease (chronic bronchitis and/or emphysema), connective tissue diagnosis, any tumor (cancer), diabetes without complications and diabetes with complications (diabetes affected eyes/retinopathy). The comorbidity score was calculated by summing the total number of conditions using pre-specified weights (range 0-10).[15]

Health behavior was assessed and recoded for each participant to include: smoking status (yes/no), alcohol abuse risk (National Institute on Alcohol Abuse and Alcoholism [NIAA]) and history of drug use ("Cocaine", "crack cocaine", "heroin" or "methamphetamine"). Questions developed by the NIAA on alcohol risk were used in the NHANES study.[14,16,17] NIAA defines single day alcohol consumption limits (men <4

drinks/day and women <3 drinks/day in past 12 months) and weekly alcohol consumption limits (men <14 drinks/week and women <7 drinks/week in past 12 months). Using NIAA's criteria, the level of alcohol usage was categorized into four alcohol abuse risk categories: "no risk", "low risk", "increased risk" and "high risk." No alcohol risk for alcohol abuse was defined as reported drinking less than 12 drinks in the past year. Low risk for alcohol abuse was defined as drinking at least 12 drinks a year, but not exceeding the single day or weekly alcohol consumption limits. Increased risk for alcohol abuse was defined as exceeding either the single day or weekly alcohol consumption limits. High risk for alcohol abuse was defined as exceeding both the single day and weekly alcohol consumption limits.

Lastly, to account for the societal's changes in equality and acceptability of gay, lesbian and bisexual individuals in the United States over time, the year (data wave) that the participant was interviewed was included as a covariate.

2.3 Statistical Analysis

All data analyses incorporated the complex survey design and weights as specified in the NHANES Analytic and Reporting Guidelines.[18] Due to the different health needs and health risks between genders, all analyses were stratified by gender.[5,7,9,10] Missing data was not imputed and only complete-case analyses were performed. Differences in demographic, health status, health behaviors and data wave by sexual orientations were examined using analysis of variance (ANOVA) for continuous variables and chi-square for categorical variables.

Multiple logistic regression models were used to examine the relationship between access to care and healthcare utilization outcome measures with sexual orientation. This study reported unadjusted odds ratios (ORs) and adjusted ORs with their respective 95% confidence intervals (CIs) for all outcome measures.

For the logistic regression model examining having health insurance as an outcome, the model will include the following covariates: age, race/ethnicity, education, annual household income, data wave and employment status. To our knowledge, there has been no theoretical framework published to assist in selecting explanatory measures as it relates to health insurance coverage.

For the logistic regression model examining health care utilization outcomes (having a routine place for care and receiving care in the past 12 months), the process for selecting covariates was guided by the theoretical framework developed by Gelberg and Andersen[19]. Gelberg's framework suggests that health care utilization is influenced by predisposing, enabling, need, and behavioral factors. The predisposing factors include: age, marital status, race/ethnicity, education and employment status. The enabling factors include: household income and health insurance coverage. Need-based factors include self-rated health status and a comorbidity score. Behavioral factors include: risk for alcohol abuse, smoking status and history of drug use. Lastly, the data wave was included in this model to account for the acceptability of gay, lesbian and bisexual individuals in the United States.

Chapter 3 Results

3.1 Sample Size

Figure 1 presents the sample sizes at each inclusion criteria step applied. NHANES surveyed 61,951 participants between the years of 2010-2012. Of the 61,951 participants, 21,783 were between the ages of 20-59. 3,883 participants aged 20-59 were excluded because they indicated their sexual orientation as "Something Else", "Not Sure", "Refused", "Don't Know" or "Missing." The analyses of those who were excluded were conducted and presented as an appendix. Approximately 206 (2.2%) males and 323 (3.4%) females were considered non-responders (answered at least one question on the sexual behavior questionnaire, but excluded due to their response to the sexual orientation question).

This study sample consisted of 17,900 participants (49.1% male, 50.9% female). Among the males in the sample (Weighted n=71,317,335, Sample n=8,787), 96.7% identified as heterosexual, 1.5% as bisexual and 1.8 as gay/homosexual. Among the females in the sample (Weighted n=70,705,436, Sample n=9,113), 95.6% identified as heterosexual, 3.1% as bisexual and 1.3% as lesbian/homosexual.

3.2 Description of Sample

Table 1 presents the characteristics of the male participants by sexual orientation. There were no significant differences between gay, bisexual and heterosexual men when examining age, race/ethnicity, employment status, smoking status and year surveyed. Heterosexual men were more likely to be married when compared to gay and bisexual men. Gay men were more likely to have a college degree while bisexual and heterosexual

men were most likely to have some college education. In addition, gay men had the best perception of their health, while bisexual men had the worst perception of their health. Bisexual men were more likely to have at least one comorbidity when compared to gay and heterosexual men. Gay and bisexual men were more likely to be current smokers. Bisexual and heterosexual men were more likely to be at a higher risk for alcohol abuse. Finally, bisexual men were more likely to have a history of drug usage.

Table 2 presents the characteristics of the female participants by sexual orientation. There were no significant differences between lesbian, bisexual and heterosexual women when examining race/ethnicity, education, employment status and having at least one comorbidity. Lesbian and heterosexual women were older than bisexual women. Heterosexual women were most likely to be married and were more likely to have a higher income ($55,000 or more) than lesbian and bisexual women. Lesbian and bisexual women had a worst perception of their health. Bisexual women were more likely to be current smokers. In addition, lesbian and bisexual women were more likely to have a higher risk for alcohol abuse and were more likely to have a history of drug usage.

3.4 Access to Care

Table 3 provides the unadjusted and adjusted odd-ratios for differences in health care access and utilization by gender and sexual orientation.

3.4.1 Health Insurance Coverage. In an unadjusted analysis, gay men were 2.44 times more likely to have health insurance coverage when compared to heterosexual men (95% CI_{unadj}: 1.50,3.97). This finding remained significant after adjusting for covariates

(OR_{adj}: 2.13, 95% CI_{adj}:1.15,3.92). Bisexual men were less likely to have health insurance coverage when compared to heterosexual men, but the unadjusted and adjusted odd-ratios were non-significant. Lesbian and bisexual women were less likely to have health insurance coverage when compared to heterosexual women (Lesbian: OR_{unadj}: 0.54 95% CI_{unadj}:0.37,0.87) (Bisexual: OR_{unadj}:0.51 95% CI_{unadj}: 0.37,0.69). After adjusting for covariates, there was no difference in health insurance coverage between bisexual and heterosexual women (OR_{adj}: 0.71 95% CI_{adj}:0.48,1.05), but there was a difference in health insurance coverage when comparing lesbian women to heterosexual women (OR_{adj}: 0.58 95% CI_{adj}:0.34,0.97).

3.4.2 Routine Place for Care. There were no differences in having a routine place for care when comparing gay men to heterosexual men and bisexual men to heterosexual men in both the unadjusted and adjusted models. In the unadjusted model, lesbian and bisexual women were less likely to have a routine place for care (Lesbian: OR_{unadj}: 0.55 95% CI_{unadj}:0.35,0.88) (Bisexual: OR_{unadj}:0.59 95% CI_{unadj}: 0.41,0.83). When adjusting for covariates, there were no differences in having a routine place for care when comparing lesbian women to heterosexual women and bisexual women to heterosexual women.

3.5 Health Care Utilization

Gay and bisexual men were more likely to have seen a health care provider at least once over the past year when compared to heterosexual men (Gay: OR_{unadj}: 1.97 95% CI_{unadj}:1.23,3.13) (Bisexual: OR_{unadj}:2.77 95% CI_{unadj}: 1.58,4.86). When adjusting for covariates, there were no significant differences in seeing a health provider between

gay and heterosexual men (OR_{adj}: 1.31 95% CI_{adj}:0.75,2.28), but bisexual men were three times more likely to see a provider in the past year when compared to heterosexual men (OR_{adj}: 3.11 95% CI_{adj}:1.74,5.55). There were no differences in seeing a healthcare provider in the past year when comparing lesbian women to heterosexual women and bisexual women to heterosexual women.

Chapter 4 Discussion

The Institute of Medicine noted that there is needed for substantial research focusing on gay, lesbian, bisexual individuals to better understand the inequities in health care.[1] The findings from this study contribute to the limited knowledge on understanding the health care access and utilization among gay, lesbian and bisexual individuals.

In 2003, the Institute of Medicine published another reported noting that lesbians who seek health care may face access barriers.[20] We found that both lesbian and bisexual women were less likely to have health insurance coverage. Marital status is an important predictor of having health insurance for all women aged 25 to 64 years.[21] There were a higher proportion of lesbian and bisexual women who were unmarried when compared to heterosexual women. In many states, marriage equality or domestic partnership benefits do not exist. Unmarried same-sex couples are at disadvantage in obtaining health insurance coverage. [22] Lesbian and bisexual women may face barriers in adding their same-sex partner to their employer-sponsored health plans, such as companies not offering insurance coverage for same sex partners, individuals not wishing to disclose their sexual orientation at work, or paying differences in taxation for non-married partners.[23,24] It has demonstrated that universal partner coverage would increase insurance coverage for same sex couples and would not significantly impact the cost of coverage for the employer or the health premium for its workers.[22] In addition to universal partnership coverage, the full implementation of the Affordable Care Act (ACA) may increase access to health insurance for all adults, including lesbian and

bisexual women, regardless of marital status. The ACA will potentially lower the cost of insurance premiums and allow low-income individuals to receive federal subsidies for insurance coverage. These policies may be the solution in eliminating the disparity in health coverage among lesbian and bisexual women.

We also found that lesbian and bisexual women were less likely to have a routine place for health care when compared to their heterosexual counterparts. These findings have been consistent with other studies examining access to care among lesbian and bisexual women.[5,7,11] The Institute of Medicine have suggested that some lesbian and bisexual women have experienced discrimination from their providers[20,23] and dissatisfaction with health care services or health system,[11,20] which may explain why some lesbian and bisexual women may not have found a routine place that they are comfortable with in this study. Thus there may be a need to train our medical providers on how to become more welcoming to lesbian and bisexual patients and train them to understand their health needs.

Previous studies have reported contradictory findings when examining the differences in health care utilization by sexual orientation. Heck and colleagues reported that women in same-sex relationship were less likely to have seen a provider in the past year;[5] while Buchmueller and colleagues reported the opposite.[7] A study comparing lesbian, bisexual and heterosexual individuals found no differences in healthcare utilization between the three groups.[10] It was unclear if there were any differences in health care utilization between lesbian, bisexual and heterosexual women. While lesbian and bisexual women in this study faced barriers in accessing care, we found no

significant difference in health care utilization between lesbian, bisexual and heterosexual women in this study. Some lesbian and bisexual women may have overcome economic barriers (lack of health insurance) and comfort in order to have their medical needs met. Our sample size may not be robust enough to detect small differences as previous studies have found when examining the differences in health care utilization between lesbian, bisexual and heterosexual women.

We found that gay men were more likely to have health insurance coverage and bisexual men may have a small disadvantage in having health insurance coverage when compared to heterosexual men. There have been some evidence reported that bisexual men were more likely to report no insurance coverage.[8] There is a need to further explore the circumstances in health insurance coverage between men who identifies as bisexual and men who identifies as gay. The reason in reduction in health insurance coverage among bisexual men in this study is unclear and was not explained by sociodemographics characteristics included in this study.

We found that there were no differences in having a routine place for care between gay, bisexual and heterosexual men, but gay and bisexual men were more likely to have utilized care. Our findings suggest that gay and bisexual men may have faced barriers to care, but may have overcame it. When comparing men in same-sex relationship with men in an opposite-sex relationship, Heck and Colleagues reported that men in same-sex relationships were more likely to have seen their provider in the past year.[5] Similarly, it has been reported that gay and bisexual men were more likely to see their physician in the past year.[10] This increase in health care usage may suggest that gay

and bisexual men may have different health needs than heterosexual men. It has been reported that gay and bisexual men are at higher risk for cardiovascular disease[24,25] and mental health issues[26,27] than heterosexual men, which my explain the increase in health care utilization.

The small number of gay, lesbian and bisexual individuals in the National Health and Nutrition Examination Survey may limit the confidence in some of the null findings reported in this study. The analyses may have been underpowered to identify the small but significant differences that may exist. An oversampling of sexual minorities would allow more robust comparisons across groups.

This study used a direct measure to define sexual orientation. Previous studies examining the relationships between access to care and sexual orientation using nationally representative data sources used indirect ways to measure sexual orientation, such as examining the gender composition within each household.[5,7,9]

There may be a potential for item nonresponse bias when measuring sexual orientation in population-based surveys. The likelihood of this misclassification is low because participants reported their sexual orientation using ACASI, which has shown to decrease the risk of response bias.[13] A report by The Williams Institute estimated that roughly 3.5% of Americans identified as gay, lesbian or bisexual.[28] In our study, approximately 3.7% of participants identified as gay, lesbian or bisexual. Lastly, we assessed and controlled for confounding factors using a theoretical framework for health utilization, but there is a potential for uncontrolled and residual confounding.

This study contributed to the limited knowledge on understanding the health care access and utilization among gay, lesbian and bisexual individuals, which was classified as a high priority by the Institute of Medicine. We found that gay men were more likely to have health insurance coverage, while bisexual men were at a small disadvantage in having health insurance coverage. Gay and bisexual men were more likely to have received health care in the past 12 months. There is a disparity in accessing care for lesbian and bisexual women, in terms of health insurance coverage and having a routine place for care. By expanding health insurance coverage through the Affordable Care Act and Universal Partnership Coverage may reduce the disparities among gay, lesbian and bisexual individuals.

Chapter 5 Additional Analyses (Appendix)

5.1 Sample Size

There was a concern that the sample sizes of gay/lesbian and bisexual individuals were not robust enough to detect small meaningful differences, especially with multiple covariates in the logistic regression model. The minimum number of events per covariate for logistic regression models had been discussed.[29] Therefore, additional analyses were performed comparing sexual minorities with non-sexual minorities. Table Appendix 1Table Appendix shows the distribution of each outcome by sexual minority status (gay/bisexual men [sexual minority men] with heterosexual men [non-sexual minority men], lesbian/bisexual [sexual minority women] with heterosexual [non-sexual minority women]).

Table Appendix 2 presents the unadjusted and adjusted odds ratios for each outcome when comparing sexual minority with non-sexual minority by gender. In both the unadjusted and adjusted analyses, there were no differences between sexual minority men and non-sexual minority men when it comes to having health insurance coverage or having a routine place for care. But sexual minority men were about 2 times more likely to have seen a healthcare provider in the past year when compared to non-sexual minority men. Sexual minority women were less likely to have health insurance coverage in both the unadjusted and adjusted models. Sexual minority women were significantly less likely to have a routine place for care in the unadjusted model, but when adjusting for covariates, the odd-ratio was not significant. There were no difference between sexual

minority women and non-sexual minority women when it comes to seeing a healthcare provider at least once in the past year.

When comparing the odds ratio from Table 3 (sexual orientation) with Table Appendix 2 (sexual minority), the variability to detect a meaningful difference was lost when examining the differences in health insurance coverage. For women, the trends were the same. It is still unclear if the sample size of gay/lesbian and bisexual individuals were robust enough to detect meaningful differences. But this analyses was an attempt to explore

The sexual orientation measure had enough variability to detect meaningful differences. Therefore the sexual orientation measure was used for this study.

5.2 Non-Responders vs. Responders

The purpose of this analysis is to explore the differences among participants that were excluded because they indicated their sexual orientation as: "Missing", "Something Else", "Not Sure", "Refused" and "Don't Know." Table Appendix 3 shows the distribution of the sexual orientation question by gender. The table first shows the raw frequencies of the sexual orientation question.

The sexual orientation question was part of the sexual behavior questionnaire. Among those who had a missing value for the sexual orientation question, the majority of the participants did not answer any question on this questionnaire. One possible explanation to this is that they may have skipped or never received the questionnaire. The sexual orientation variable was represented excluding those who did not answer any

questions on the sexual behavior questionnaire and the responsiveness to the sexual orientation question was calculated based on this distribution.

Participants were considered as a non-responder, if they answered at least one question on the sexual behavior questionnaire and their sexual orientation value is either: "Missing", "Something Else", "Not Sure", "Refused" and "Don't Know." Responders included those who specified their sexual orientation as heterosexual, homosexual or bisexual. Table Appendix 4 presents the logistic regression model examining the differences in health care access and utilization by responder status and gender. The trends of all odd ratios were similar to those in Table 3. Male non-responders had better health care access and utilization than male responders and female non-responders had worst health care access and utilization than female responders. These individual may be sexual minorities, but did not identify with the predetermined categories set by NHANES (heterosexual, homosexual, bisexual). Sexuality is a fluid concept and committing to a sexual identity can be a struggle, often dependent on age.[30] There is a need to standardize sexual orientation measures and be inclusive of all sexual minorities.

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Figure 1: Sample Size

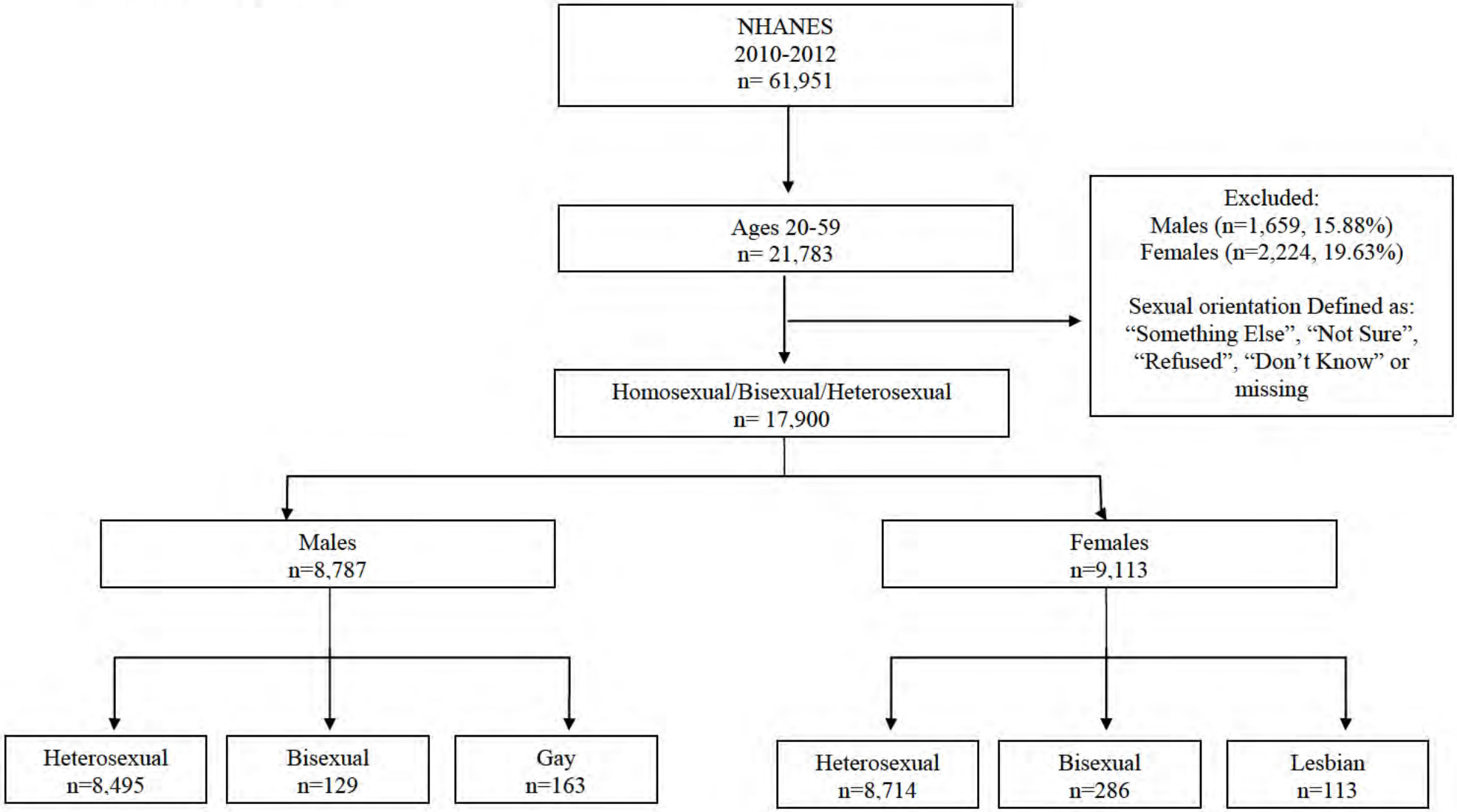

Table 1: Demographic Characteristics of Male Participants, by Sexual Orientation (Weighted N=71,317,335, Sample N=8,787)

	Gay N=163 n (%)	Bisexual N=129 n (%)	Heterosexual N=8495 n (%)	p-value
Age [Mean[SE]]	40.4 (1.1)	39.1 (1.3)	39.2 (0.20)	0.53
Marital Status				
Married	3 (2.1%)	39 (28.6%)	4527 (57.0%)	
Living with Partner	46 (35.0%)	5 (3.9%)	893 (9.2%)	
Widowed/Divorced/ Separated	8 (4.7%)	24 (20.2%)	994 (11.2%)	**<.0001**
Never married	105 (58.2%)	61 (47.2%)	2076 (22.6%)	
Race/Ethnicity				
Non-Hispanic White	86 (76.4%)	61 (69.4%)	3875 (68.8%)	
Non-Hispanic Black	26 (6.6%)	29 (12.5%)	1826 (10.8%)	
Mexican American	23 (5.8%)	23 (8.8%)	1641 (9.7%)	0.07
Other Hispanic	14 (4.0%)	11 (7.3%)	600 (5.1%)	
Other Race/Multiracial	14 (7.1%)	5 (2.0%)	553 (5.5%)	
Education				
<HS/GED	9 (2.8%)	27 (19.3%)	2062 (16.4%)	
HS Graduate/GED	16 (10.2%)	36 (23.9%)	2181 (25.7%)	**<.0001**
Some College	53 (29.8%)	41 (33.2%)	2461 (31.4%)	
College Degree	85 (57.3%)	25 (23.6%)	1786 (26.5%)	
Unemployed	38 (20.0%)	37 (26.2%)	1782 (16.8%)	0.10
Household Income				
<25,000	34 (13.3%)	50 (32.8%)	1999 (17.6%)	
25,000-34,999	14 (7.1%)	12 (6.9%)	990 (9.8%)	
35,000-44,999	6 (4.4%)	15 (10.5%)	827 (9.6%)	**0.005**
45,000-54,999	21 (14.2%)	7 (8.5%)	753 (10.2%)	
55,000+	78 (60.9%)	36 (41.4%)	3316 (52.7%)	
Perceived Health status				
Excellent	27 (18.3%)	15 (16.8%)	1571 (20.1%)	
Very Good	72 (47.1%)	29 (22.8%)	2450 (33.0%)	
Good	47 (27.1%)	49 (38.2%)	2955 (33.0%)	**0.002**
Fair	13 (6.2%)	30 (19.8%)	1280 (11.9%)	
Poor	4 (1.2%)	6 (2.5%)	237 (2.1%)	
Comorbidity Score				
No Conditions	143 (85.0%)	91 (70.5%)	7181 (85.1%)	**0.007**
1+ Conditions	20 (15.0%)	38 (29.5%)	1314 (14.9%)	
Smoking Status				
Never Smoke	83 (47.5%)	55 (44.9%)	4107 (49.1%)	
Former Smoke	28 (19.2%)	21 (18.3%)	1733 (22.0%)	0.62
Current Smoker	52 (33.3%)	52 (36.8%)	2650 (29.0%)	
Current Alcohol Abuse Risk				
No Risk	8 (2.9%)	8 (4.5%)	532 (5.7%)	
Low Risk	77 (47.7%)	46 (38.0%)	2836 (33.0%)	**0.024**
Increased Risk	63 (40.2%)	59 (43.8%)	4091 (48.6%)	
Highest Risk	15 (9.1%)	16 (13.7%)	1029 (12.7%)	
History of Drug Use (excluding Marijuana)	50 (31.9%)	56 (42.9%)	2121 (25.9%)	**0.007**
Year Surveyed				
2001-2002	16 (9.7%)	22 (19.7%)	1394 (16.8%)	
2003-2004	25 (18.0%)	13 (12.2%)	1199 (16.2%)	
2005-2006	34 (22.6%)	21 (18.0%)	1283 (16.7%)	0.64
2007-2008	33 (14.5%)	22 (14.1%)	1523 (16.9%)	
2009-2010	21 (10.8%)	31 (17.5%)	1627 (16.7%)	
2011-2012	34 (24.4%)	20 (18.4%)	1469 (16.7%)	

Table 2: Demographic Characteristics of Female Participants, by Sexual Orientation (Weighted N=70,705,436, Sample N= 9,113)

	Lesbian N=113 (1.3%) n (%)	Bisexual N=286 (3.0%) n (%)	Heterosexual N= 8714 (95.6%) n (%)	p-value
Age [Mean[SE]]	38.6 (1.4)	33.0 (0.7)	39.6 (0.2)	**<.0001**
Marital Status				
Married	5 (4.6%)	73 (26.5%)	4625 (57.2%)	**<.0001**
Living with Partner	26 (24.9%)	53 (17.9%)	788 (8.3%)	
Widowed/Divorced/ Separated	17 (16.4%)	42 (16.6%)	1490 (16.2%)	
Never married	65 (54.1%)	118 (39.0%)	1807 (18.4%)	
Race/Ethnicity				
Non-Hispanic White	58 (71.6%)	151 (71.6%)	4002 (68.7%)	0.20
Non-Hispanic Black	30 (14.9%)	74 (15.2%)	1873 (12.3%)	
Mexican American	11 (3.9%)	27 (5.2%)	1616 (7.9%)	
Other Hispanic	7 (4.7%)	17 (3.9%)	682 (5.2%)	
Other Race/Multiracial	7 (4.8%)	17 (4.1%)	541 (5.9%)	
Education				
<HS/GED	20 (12.3%)	68 (19.4%)	1828 (13.9%)	0.12
HS Graduate/GED	23 (18.3%)	69 (23.4%)	1842 (21.3%)	
Some College	39 (36.2%)	104 (37.4%)	2909 (34.7%)	
College Degree	31 (33.2%)	45 (19.8%)	2132 (30.1%)	
Unemployed	36 (27.5%)	118 (37.1%)	3004 (29.4%)	0.0823
Household Income				
<25,000	34 (23.0%)	107 (34.2%)	2289 (20.5%)	**0.0003**
25,000-34,999	18 (18.1%)	36 (10.9%)	988 (9.9%)	
35,000-44,999	8 (9.4%)	27 (10.9%)	785 (9.3%)	
45,000-54,999	11 (10.0%)	28 (10.5%)	710 (9.3%)	
55,000+	34 (39.4%)	74 (33.6%)	3361 (51.0%)	
Perceived Health status				
Excellent	10 (12.8%)	29 (9.5%)	1540 (19.6%)	**<.0001**
Very Good	38 (30.9%)	66 (27.7%)	2515 (33.2%)	
Good	42 (38.3%)	114 (38.3%)	2988 (32.7%)	
Fair	15 (10.7%)	59 (18.0%)	1372 (11.9%)	
Poor	8 (7.2%)	18 (6.5%)	295 (2.6%)	
Comorbidity Score				
No Conditions	88 (76.2%)	224 (80.1%)	6953 (79.2%)	0.7736
1+ Conditions	25 (23.8%)	62 (19.9%)	1761 (20.8%)	
Smoking Status				
Never Smoke	46 (40.6%)	107 (39.3%)	5427 (58.9%)	**<.0001**
Former Smoke	21 (22.8%)	44 (16.6%)	1412 (18.5%)	
Current Smoker	46 (36.6%)	135 (44.2%)	1873 (22.6%)	
Current Alcohol Abuse Risk				
No Risk	9 (6.1%)	16 (3.8%)	1437 (12.9%)	**<.0001**
Low Risk	40 (35.7%)	86 (30.5%)	4424 (51.7%)	
Increased Risk	48 (45.4%)	141 (51.6%)	2346 (28.6%)	
Highest Risk	16 (12.8%)	43 (14.1%)	496 (6.8%)	
History of Drug Use (excluding Marijuana)	36 (35.5%)	120 (44.0%)	1190 (15.6%)	**<.0001**
Year Surveyed				
2001-2002	16 (16.0%)	31 (9.7%)	1494 (16.9%)	**0.040**
2003-2004	19 (21.8%)	25 (9.0%)	1287 (16.5%)	
2005-2006	13 (15.2%)	42 (19.2%)	1471 (17.2%)	
2007-2008	22 (14.1%)	55 (20.6%)	1522 (17.0%)	
2009-2010	23 (16.1%)	75 (21.2%)	1586 (16.0%)	
2011-2012	20 (16.9%)	58 (20.4%)	1354 (16.4%)	

Table 3: Association between Sexual Orientation and Health Care Access and Utilization by Gender and Sexual Orientation

Males							
Outcome	Gay n (%)	Bisexual n (%)	Heterosexual n (%)	Gay vs. Heterosexual		Bisexual vs. Heterosexual	
				Unadjusted OR	Adjusted OR	Unadjusted OR	Adjusted OR
Had Health Insurance Coverage [A]	130 (87.3%)	82 (65.5%)	5539 (73.7%)	**2.44 (1.50,3.97)**	**2.13 (1.15,3.92)**	0.68 (0.45,1.02)	0.82 (0.46,1.46)
Had a Routine Place for Health Care [B]	126 (80.8%)	96 (75.7%)	5832 (73.0%)	1.55 (1.00,2.40)	1.45 (0.87,2.43)	1.15 (0.70,1.89)	1.45 (0.79,2.66)
Received Health care in Past 12 Months [B]	137 (84.2%)	109 (88.2%)	5938 (73.0%)	**1.97 (1.23,3.13)**	1.31 (0.75,2.28)	**2.77 (1.58,4.86)**	**3.11 (1.74,5.55)**
Females							
	Lesbian n (%)	Bisexual n (%)	Heterosexual n (%)	Lesbian vs. Heterosexual		Bisexual vs. Heterosexual	
				Unadjusted OR	Adjusted OR	Unadjusted OR	Adjusted OR
Had Health Insurance Coverage [A]	69 (70.2%)	190 (68.8%)	6591 (81.3%)	**0.54 (0.34,0.87)**	**0.58 (0.34,0.97)**	**0.51 (0.37,0.69)**	0.71 (0.48,1.05)
Had a Routine Place for Health Care [B]	87 (79.4%)	220 (80.4%)	7410 (87.5%)	**0.55 (0.35,0.88)**	0.71 (0.38,1.31)	**0.59 (0.41,0.83)**	0.93 (0.63,1.38)
Received Health care in Past 12 Months [B]	93 (83.9%)	256 (90.2%)	7675 (88.8%)	0.66 (0.37,1.16)	0.72 (0.40,1.30)	1.16 (0.68,1.96)	1.43 (0.80,2.53)

[A] Adjusted model adjusted for: age, race/ethnicity, education, annual household income, data wave and employment status

[B] Adjusted models adjusted for: age, marital status, race/ethnicity, education, employment status, household income, having health insurance coverage, self-rated health status, comorbidity score, risk for alcohol abuse, smoking status, history of drug use and data wave.

Table Appendix 1 Distribution of Outcome Variables by Gender, Sexual Orientation and Sexual Minority Status

Male				
	Sexual Orientation		**Sexual Minority (Gay+Bisexual)**	**Non-Sexual Minority (Heterosexual)**
	Gay	**Bisexual**		
Had Health Insurance Coverage				
Yes	130	82	212	5539
No	31	47	78	2906
Had a Routine Place for Care				
Yes	126	96	222	5832
No	37	33	70	2663
Received Health Care in past 12 months				
Yes	137	109	246	5938
No	**26**	**20**	46	2551
Female				
	Sexual Orientation		**Sexual Minority (Lesbian+Bisexual)**	**Non-Sexual Minority (Heterosexual)**
	Lesbian	**Bisexual**		
Had Health Insurance Coverage				
Yes	69	190	259	6591
No	44	94	138	2078
Had a Routine Place for Care				
Yes	87	220	307	7410
No	**26**	66	92	1304
Received Health Care in past 12 months				
Yes	93	256	349	7675
No	**20**	**30**	50	1039

Table Appendix 2 Association between Sexual Minority Status and Health Care Access and Utilization by Gender

Outcomes	Sexual Minority Men vs. Non-Sexual Minority Men		Sexual Minority Women vs. Non-Sexual Minority Women	
	Unadjusted OR	Adjusted OR	Unadjusted OR	Adjusted OR
Had Health Insurance Coverage [A]	1.36 (0.95,1.92)	1.34 (0.85,2.09)	**0.52 (0.39,0.69)**	**0.67 (0.46,0.96)**
Had a Routine Place for Care [B]	1.38 (0.97, 1.96)	1.45 (0.96, 2.19)	**0.58 (0.44,0.76)**	0.86 (0.62,1.19)
Received Health Care in past 12 months [B]	**2.21 (1.55, 3.15)**	**1.79 (1.18, 2.72)**	0.95 (0.65, 1.39)	1.13 (0.75,1.69)

[A] Adjusted model adjusted for: age, race/ethnicity, education, annual household income, data wave and employment status

[B] Adjusted models adjusted for: age, marital status, race/ethnicity, education, employment status, household income, having health insurance coverage, self-rated health status, comorbidity score, risk for alcohol abuse, smoking status, history of drug use and data wave

Table Appendix 3 Distribution of Responses from NHANES Sexual Orientation Questions, ages 20-59 by Gender

	Male	**Female**
Do You think of yourself as… (NHANES)		
Missing	1469 (14.1%)	1912 (16.9%)
Heterosexual/Straight	8495 (81.3%)	8714 (76.9%)
Homosexual/Gay	163 (1.6%)	113 (1.0%)
Bisexual	129 (1.2%)	286 (2.5%)
Something Else	33 (0.3%)	55 (0.5%)
Not Sure	91 (0.9%)	160 (1.4%)
Refused	18 (0.2%)	37 (0.3%)
Don't Know	48 (0.5%)	60 (0.5%)
Among those who indicated missing for NHANES' sexual orientation	N=1469	N=1912
Number of Participants who did NOT respond to ANY questions on the NHANES' sexual behavior questionnaire	1453 (98.9%)	1901 (99.4%)
Number of Participants who answered at least 1 question on the NHANES' sexual behavior questionnaire	16 (1.1%)	11 (0.6%)
Distribution of Sexual Orientation excluding participants who did not respond to any question on the sexual behavior questionnaire	N=8993	N=9436
Missing	16 (0.2%)	11 (0.1%)
Heterosexual/Straight	8495 (94.5%)	8714 (97.0%)
Homosexual/Gay	163 (1.8%)	113 (1.3%)
Bisexual	129 (1.4%)	286 (3.2%)
Something Else	33 (0.4%)	55 (0.6%)
Not Sure	91 (1.0%)	160 (1.8%)
Refused	18 (0.2%)	37 (0.4%)
Don't Know	48 (0.5%)	60 (0.7%)
Distribution of Sexual Orientation Responsiveness		
Non-Responder	206 (2.2%)	323 (3.4%)
Responder	8787 (93.12%)	9113 (96.58%)

Table Appendix 4: Post Hoc Analysis Differences between responders and non-responders to sexual orientation across primary outcomes

Outcomes	Men: Non-Responders vs Responders		Women: Non-Responders vs Responders	
	Unadjusted OR	Adjusted OR	Unadjusted OR	Adjusted OR
Had Health Insurance Coverage [A]	1.27 (1.19,1.35)	1.48 (1.37,1.59)	0.64 (0.60,0.69)	0.66 (0.61,0.71)
Had a Routine Place for Care [B]	2.03 (1.89,2.18)	2.26 (2.06,2.49)	0.42 (0.39,0.46)	0.44 (0.40,0.48)
Received Health Care in past 12 months [B]	2.29 (2.11,2.49)	2.55 (2.27,2.86)	0.37 (0.34,0.41)	0.39 (0.34,0.43)

Non-Responders included those who indicated their sexual orientation as: “Something Else”, “Not Sure”, “Refused”, “Don’t Know” or “Missing”, but answered at least one question on the sexual behavior questionnaire

Responders included those who indicated their sexual orientation as: “Heterosexual”, “gay/lesbian/homosexual” or “bisexual” (Reference Group).

[A] Adjusted model adjusted for: age, race/ethnicity, education, annual household income, data wave and employment status

[B] Adjusted models adjusted for: age, marital status, race/ethnicity, education, employment status, household income, having health insurance coverage, self-rated health status, comorbidity score, risk for alcohol abuse, smoking status, history of drug use and data wave