Sexual Minority Health Disparities in Adult Men and Women in the United States: National Health and Nutrition Examination Survey, 2001–2010

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A recently published and widely cited report by the Institute of Medicine called for the greater prioritization of research on the health of sexual minorities (i.e., individuals who identify as lesbian, gay, bisexual, or nonheterosexual) in the United States.[1] Although this seminal review demonstrated that much progress has been made in documenting sexual minority health disparities and elucidating their determinants, the Institute of Medicine committee noted a number of critical research challenges. For example, most empirical literature that examines sexual minority health has been conducted using convenience samples and local studies. To inform, implement, and achieve coordinated public health responses at the national level, the report recommended increased attention to and investigation of the health of sexual minority populations from nationally representative data.

Despite the paucity of population-based sexual minority research, accumulated data from nonprobability samples provide evidence of health disparities between sexual minority and heterosexual populations in the United States. For example, sentinel surveillance data reported by the Centers for Disease Control and Prevention illustrated that the rates of chlamydia, gonorrhea, herpes, and genital warts infections have increased in previous years, with gay, bisexual, and other men who have sex with men experiencing the largest spike in cases.[2] Recent data also indicated that human papillomavirus (HPV) infections account for most incident and prevalent sexually transmitted infections (STIs) for both men and women in the United States.[3] In addition to the established increased risk of STIs and HIV among sexual minority men,[1,4,5] observational studies have also demonstrated higher rates of STIs among women who have sex with women compared with women who have sex with men

only.[6–8] Notably, gender differences in STIs have also been observed among samples of heterosexual adults. Although most studies suggest that men have a higher incidence of most STIs than women,[9,10] 1 study found that women were more likely to have herpes simplex virus type 2 (HSV-2) compared with men.[11] As such, it stands to reason that there may be important differences in STI rates by both sexual orientation and biological gender.

An increased risk of mental health problems, hazardous alcohol use, and illicit drug use among sexual minority populations has also been found in previous research. Studies using probability sampling have documented disparities by sexual minority status in the prevalence of psychiatric disorders,[12–15] tobacco use,[16] drug use,[17] health care access,[17,18] violence and victimization,[17] and chronic disease risk, including cardiovascular risk, asthma, and

obesity.[19,20] With few exceptions, a limited number of population-based health studies have explicitly examined variability within sexual minority populations, as many single-state or single-wave population studies lack sufficient sample size to examine differences by key sociodemographics such as gender.[17]

To examine sexual minority health disparities at the national level, we analyzed data from the 2001 to 2010 waves of the National Health and Nutrition Examination Survey (NHANES), a nationally representative sample of civilian, noninstitutionalized populations in the United States.[21] Given the accumulating evidence for variability in health outcomes within sexual minority populations, we sought to describe trends separately for sexual minority men and sexual minority women compared with their heterosexual counterparts. Specifically, our aims were to utilize the

Objectives. We used nationally representative data to investigate health disparities associated with sexual minority status among adults in the United States.

Methods. We analyzed data from 11 114 adults who participated in the 2001 to 2010 waves of the National Health and Nutrition Examination Survey. Using multiple logistic regressions, we examined the prevalence of HIV, sexually transmitted infections, mental health problems, cigarette smoking, and alcohol and illicit drug use in sexual minorities and heterosexual adults.

Results. After adjusting for sociodemographic characteristics, sexual minority men had greater odds of mental health problems, testing positive for HIV and herpes simplex virus type 2 and self-reported gonorrhea and chlamydia. Sexual minority women had greater odds of mental health problems, testing positive for hepatitis C, smoking, heavy drinking, and illicit drug use.

Conclusions. Numerous health disparities continue to face sexual minority men and women in the United States. Notably, health disparities persisted beyond the role of sociodemographic factors, including access to insurance and primary care, suggesting that further research is warranted to identify the determinants of health inequity for sexual minorities. (*Am J Public Health.* 2015;105:e27–e34. doi:10.2105/AJPH.2015.302762)

NHANES to (1) investigate the prevalence of 5 of the most commonly reported STIs—gonorrhea, chlamydia, HSV-2, HIV, and HPV (as measured by reports of genital warts)—using a combination of biomarker and self-reported data; (2) assess prevalence of mental health and health behaviors, including number of poor mental health days, smoking, heavy drinking, and illicit drug use; and (3) examine disparities in health indicators between sexual minority men versus heterosexual men and sexual minority women versus heterosexual women.

METHODS

We used publically available data from annual NHANES surveys pooled from 2001 to 2010. Five NHANES cycles were combined to increase sample size. A detailed description of the NHANES study design and procedures is provided elsewhere.[21] In 2001, sexual orientation questions were included in the sexual behavior interview and the public use data set for participants aged 20 to 59 years from 2001 to 2006 and for participants aged 20 to 69 from 2007 to 2010. We included in our analyses only participants who completed the clinical examination phase of the NHANES protocol, during which biospecimen data were collected, and who provided data on all covariates. HSV-2 was only assessed for individuals younger than 49 years. This yielded a final analytic sample of n = 11 114 adults aged 20 to 49 years, for whom key data were systematically collected. Of 11 114 adults, approximately 20% (n = 2218) reported "don't know" or "refuse to answer" on self-reported gonorrhea, chlamydia, and herpes (> 8% for both men and women) and self-reported heavy alcohol use (> 7% for men and > 15% for women).

Measures

Sociodemographic variables examined included race/ethnicity, age, education, annual family income, marital status, place of birth, sexual orientation, health insurance status, and access to a regular health care provider. Sexual orientation was assessed using the following question: "Do you think of yourself as . . . heterosexual or straight (attracted to the opposite sex); homosexual or gay (attracted to the same sex); bisexual (attracted to men and women); something else; or you're not sure?"

In total, 34 women (0.6%) and 15 men (0.3%) reported "something else." We categorized participants' sexual orientation as "heterosexual" or "sexual minority"; the latter category included those who identified as "homosexual or gay/lesbian," "bisexual," or "something else"; we coded "refused" and "don't know" as missing. Participants provided blood and urine specimens to test for the presence of the HIV antibody, chlamydia (assessed from 2001 to 2008 only), HSV-2, and the hepatitis C antibody. Participants reported on any lifetime gonorrhea, chlamydia, herpes, or genital warts diagnoses, as well as lifetime HIV testing. Participants reported the number of days of poor mental health during the past 30 days, whether they had consumed more than 5 alcoholic drinks in 1 day during the past year, whether they had smoked more than 100 cigarettes during their lifetime, and whether they had used any of the following illicit drugs during their lifetime: marijuana (or hashish), cocaine, heroin, methamphetamines, and any injection drug use (the latter variable measured from 2005 to 2010 only).

Analyses

We used the statistical software package Stata version 13.1 (StataCorp LP, College Station, TX) for all analyses. All analyses were conducted separately for men and women. We report weighted percentages and 95% confidence intervals (CIs) for sociodemographic characteristics, biologically assessed HIV and STIs, self-reported STIs, and other psychological and behavioral health variables of interest. Sample weights were assigned to each person based on the complex sampling strategy of the NHANES to achieve estimates that could approximate the entire sampling frame; weighting accounted for nonresponse, oversampling of specific subgroups, postsurvey stratification, and sampling error.[21] We compared sexual minority with heterosexual participants on the weighted prevalence of each variable using χ^2 or one-way ANOVA, depending on the variable type. We conducted multivariable logistic regression analyses (separately for men and women) to compare sexual minority with heterosexual participants for each health condition, adjusting for sociodemographic variables (age, race/ethnicity, education, employment, marital status, family income, health insurance status, and access to a regular health care

provider). We applied a 15-day cutoff for number of poor mental health days during the past month.[22] We used Poisson regressions for dependent variables with count data (number of drinking days and number of days of heavy drinking) because of skewed distributions. Adjusted odds ratios (AORs) and 95% CIs were reported for logistic regressions, and adjusted incidence rate ratios (AIRRs) were reported for Poisson regressions; heterosexuals served as the reference group for all regressions. All analyses were executed using the *svy* prefix command to incorporate the NHANES sampling weights and to account for the complex sampling design, including oversampling, survey nonresponse, and poststratification.

RESULTS

Of the 11 114 participants eligible for inclusion in this analysis, 5287 were men (among whom 234 [4.0% weighted estimate] identified as a sexual minority) and 5827 were women (among whom 337 [6.3% weighted estimate] identified as a sexual minority). Table 1 presents weighted descriptive statistics and comparisons between sexual minority and heterosexual participants on sociodemographic characteristics for men and women. Compared with heterosexual men, sexual minority men were more likely to have completed college, less likely to be currently employed, and less likely to be married. Compared with heterosexual women, sexual minority women were younger, less likely to have completed college, less likely to be currently employed, less likely to be married, more likely to report an annual family income less than $20 000, and less likely to have health care insurance.

HIV and Sexually Transmitted Infections

Weighted prevalence estimates and group comparisons for HIV and STIs are presented in Table 2, and weighted prevalence estimates and group comparisons for poor mental health days, smoking, alcohol, and illicit drug use are presented in Table 3. Compared with heterosexual men, sexual minority men had a higher prevalence of biologically confirmed HIV and HSV-2, self-reported lifetime diagnoses of gonorrhea and chlamydia, and self-reported lifetime HIV testing. Compared with heterosexual women, sexual minority women had

TABLE 1—Comparison of Heterosexual and Sexual Minority Men and Women on Socioeconomic Variables: National Health and Nutrition Examination Survey, United States, 2001–2010

Variables	Heterosexual Men (n = 5053), Mean ±SE (95% CI)	Sexual Minority Men (n = 234), Mean ±SE (95% CI)	P	Heterosexual Women (n = 5450), Mean ±SE (95% CI)	Sexual Minority Women (n = 377), Mean ±SE (95% CI)	P
Age, y	35.0 ±0.16	35.7 ±0.59	.23	35.2 ±0.15	32.7 ±0.49	< .001
Race/ethnicity			.18			.09
Non-Hispanic African American	10.4 (9.1, 11.9)	11.4 (8.4, 15.3)		12.0 (10.4, 13.9)	16.6 (13.2, 20.6)	
Non-Hispanic White	67.9 (65.0, 70.8)	60.4 (52.8, 67.6)		67.8 (64.6, 70.8)	63.3 (56.8, 69.3)	
Hispanic	16.3 (14.0, 18.7)	20.6 (14.8, 28.0)		14.4 (12.4, 16.7)	13.5 (9.6, 18.6)	
Mixed or other	5.4 (4.6, 6.4)	7.6 (4.1, 13.6)		5.8 (4.9, 6.9)	6.7 (4.2, 10.5)	
Highest education level			< .001			< .001
< high school	16.9 (15.5, 18.5)	17.1 (12.9, 22.4)		14.5 (13.2, 16.0)	23.5 (18.7, 29.0)	
High school or GED	27.0 (25.2, 28.8)	15.0 (10.4, 21.0)		21.1 (19.9, 22.3)	20.8 (16.3, 26.1)	
Some college	30.9 (29.4, 32.5)	27.9 (21.9, 34.9)		35.3 (33.5, 37.1)	37.3 (30.9, 44.1)	
≥ college	25.2 (23.1, 27.3)	40.0 (31.1, 49.6)		29.1 (27.0, 31.3)	18.5 (13.6, 24.6)	
Employment			< .01			< .01
Employed	86.5 (85.3, 87.7)	77.0 (68.3, 83.9)		71.6 (69.7, 73.5)	63.1 (56.6, 69.2)	
Unemployed	13.5 (12.3, 14.7)	23.0 (16.1, 31.7)		28.4 (26.5, 30.3)	36.9 (30.8, 43.4)	
Marital status			< .001			< .001
Married	54.6 (52.9, 56.4)	17.7 (12.3, 24.9)		56.4 (54.6, 58.1)	24.9 (20.0, 30.7)	
Widowed, divorced, or separated	9.5 (8.5, 10.5)	8.8 (5.6, 13.4)		13.2 (12.1, 14.5)	14.0 (10.8, 17.8)	
Never married	25.2 (23.6, 27.0)	56.2 (47.5, 64.5)		21.0 (19.3, 22.8)	41.8 (36.3, 47.6)	
Living with partner	10.7 (9.6, 11.8)	17.3 (10.2, 27.9)		9.4 (8.5, 10.4)	19.3 (14.4, 25.3)	
Place of birth			.52			.41
Born in the US	81.5 (79.2, 83.6)	79.3 (71.5, 85.4)		84.7 (82.6, 86.6)	86.6 (81.3, 90.6)	
Born outside the US	18.5 (16.4, 20.8)	20.7 (14.7, 28.5)		15.3 (13.4, 17.4)	13.4 (9.4, 18.7)	
Family income, $			.11			< .001
< 20 000	16.2 (14.8, 17.7)	20.5 (15.7, 26.5)		19.0 (17.5, 20.6)	34.6 (28.9, 40.7)	
≥ 20 000	83.8 (82.3, 85.2)	79.5 (73.6, 84.3)		81.0 (79.4, 82.5)	65.5 (59.3, 71.1)	
Health care insurance			.3			< .001
Yes	71.3 (69.7, 72.9)	75.6 (67.2, 82.4)		80.2 (78.5, 81.8)	64.5 (58.9, 69.8)	
No	28.7 (27.1, 30.3)	24.4 (17.6, 32.8)		19.8 (18.2, 21.5)	35.5 (30.2, 41.1)	
Regular provider			.35			.02
Yes	73.4 (71.9, 74.9)	76.8 (69.3, 83.0)		88.4 (87.2, 89.5)	83.5 (78.4, 87.7)	
No	26.6 (25.1, 28.1)	23.2 (17.1, 30.7)		11.6 (10.5, 12.8)	16.5 (12.3, 21.6)	

Note. CI = confidence interval; GED = general equivalency diploma.

a higher prevalence of biologically confirmed HIV and hepatitis C, as well as self-reported lifetime gonorrhea.

In multivariable analyses (Table 4), after adjusting for sociodemographic factors, sexual minority men had increased odds of testing positive for HIV (AOR = 59.91; 95% CI = 28.08, 128.07) and HSV-2 (AOR = 1.83; 95% CI = 1.24, 2.71) and of reporting lifetime diagnoses for gonorrhea (AOR = 7.73; 95% CI = 2.31, 25.82), chlamydia (AOR = 5.13; 95% CI = 1.48, 17.71), and lifetime HIV testing

(AOR = 3.47; 95% CI = 2.27, 5.30) compared with heterosexual men. Sexual minority women had increased odds of testing positive for the hepatitis C antibody (AOR = 2.99; 95% CI 1.33, 6.73) and reporting lifetime HIV testing (AOR = 1.33; CI = 1.03, 1.71) compared with heterosexual women.

Mental Health, Smoking, and Alcohol and Drug Use Behaviors

Compared with heterosexual men, sexual minority men had a higher prevalence of having 15

or more poor mental health days during the past 30 days (Table 3). Sexual minority and heterosexual men did not differ with respect to smoking status, heavy alcohol use, or illicit drug use. Compared with heterosexual women, sexual minority women had a higher prevalence of reporting 15 or more days poor mental health during the past 30 days, lifetime heavy alcohol use, and more drinks per day during the past year; they also reported having a history of smoking more than 100 cigarettes and using marijuana, cocaine, heroin, methamphetamine, or injection drugs.

TABLE 2—Comparison of Heterosexual and Sexual Minority Men and Women on HIV and STIs: National Health and Nutrition Examination Survey, United States, 2001–2010

HIV and STI variables	Heterosexual Men (n = 5053), Mean ±SE (95% CI)	Sexual Minority Men (n = 234), Mean ±SE (95% CI)	P	Heterosexual Women (n = 5450), Mean ±SE (95% CI)	Sexual Minority Women (n = 377), Mean ±SE (95% CI)	P
	HIV and STIs (biomarker)					
HIV antibody			< .001			.01
Yes	0.2 (< 0.01, 0.3)	10.8 (7.1, 16.3)		0.2 (< 0.01, 0.3)	0.7 (0.2, 2.3)	
No	99.8 (99.7, 99.9)	89.2 (83.7, 93.0)		99.8 (99.7, 99.9)	99.3 (97.8, 99.8)	
Urine chlamydia			.53			.53
(years 2001–2008 only)						
Yes	1.4 (1.1, 1.9)	0.8 (0.1, 5.4)		1.4 (0.9, 2.0)	2.1 (0.6, 7.2)	
No	98.6 (98.1, 98.9)	99.2 (94.6, 99.9)		98.6 (98.0, 99.1)	97.9 (92.8, 99.4)	
HSV-2			< .01			.63
Yes	12.6 (11.4, 13.9)	20.3 (15.5, 26.2)		24.5 (23.1, 26.0)	25.6 (21.5, 30.2)	
No	87.4 (86.1, 88.6)	79.7 (73.8, 84.5)		75.5 (74.0, 76.9)	74.4 (69.8, 78.5)	
Hepatitis C antibody			.77			< .001
Yes	2.1 (1.7, 2.7)	2.5 (1.0, 6.0)		1.2 (0.9, 1.5)	4.6 (2.7, 7.8)	
No	97.9 (97.3, 98.3)	97.5 (94.0, 99.0)		98.8 (98.5, 99.1)	95.4 (92.2, 97.3)	
	STIs (self-reported)					
Ever had STI			< .01			.96
Yes	6.0 (5.2, 6.8)	11.3 (7.4, 16.8)		12.5 (11.3, 13.8)	12.3 (8.5, 17.5)	
No	94.0 (93.2, 94.8)	88.7 (83.2, 92.6)		87.5 (86.2, 88.7)	87.7 (82.5, 91.5)	
Ever had gonorrhea			< .001			.01
Yes	0.2 (0.2, 0.4)	2.0 (0.8, 5.0)		0.3 (0.2, 0.5)	1.2 (0.5, 2.8)	
No	99.8 (99.6, 99.8)	98.0 (95.0, 99.3)		99.7 (99.5, 99.8)	98.9 (97.2, 99.5)	
Ever had chlamydia			< .01			.06
Yes	0.5 (0.4, 0.8)	2.4 (0.9, 6.1)		1.0 (0.7, 1.3)	2.2 (1.0, 4.8)	
No	99.5 (99.2, 99.6)	97.7 (93.9, 99.1)		99.0 (98.7, 99.3)	97.8 (95.2, 99.0)	
Ever had herpes			.15			.38
Yes	2.2 (1.8, 2.8)	3.9 (1.9, 7.8)		5.8 (5.1, 6.7)	4.5 (2.6, 7.8)	
No	97.8 (97.2, 98.2)	96.1 (92.2, 98.1)		94.2 (93.3, 95.0)	95.5 (92.2, 97.5)	
Ever had warts			.03			.91
Yes	3.6 (3.0, 4.4)	6.6 (3.9, 11.0)		7.1 (6.2, 8.1)	6.9 (4.2, 11.2)	
No	96.4 (95.6, 97.0)	93.4 (89.0, 96.1)		92.9 (91.9, 93.8)	93.1 (88.8, 95.8)	
Ever tested for HIV			< .001			.05
Yes	40.5 (39.0, 41.9)	71.1 (61.9, 78.8)		52.3 (50.6, 54.0)	58.4 (52.3, 64.4)	
No	59.6 (58.1, 61.0)	29.0 (21.2, 38.1)		47.7 (46.0, 49.4)	41.6 (35.6, 47.8)	

Note. CI = confidence interval; HSV-2 = herpes simplex virus type 2; STI = sexually transmitted infection.

In multivariable analyses (Table 4), sexual minority men had increased odds of reporting 15 or more poor mental health days during the past 30 days (AOR = 2.24; 95% CI = 1.48, 3.39) compared with heterosexual men. Sexual minority women had increased odds of reporting 15 or more poor mental health days during the past 30 days (AOR = 1.52; 95% CI = 1.10, 2.10); more drinks per day during the past year (AIRR = 1.18; 95% CI = 1.07, 1.31); lifetime use of heavy alcohol (AOR = 2.37; 95% CI = 1.66, 3.37); 100 or more cigarettes (AOR = 1.51; 95% CI = 1.11, 2.03); marijuana use (AOR = 2.11; 95% CI = 1.48, 3.02); lifetime use of cocaine, heroin, or methamphetamine (AOR = 2.73; 95% CI = 1.80, 4.15); and injection drug use (AOR = 5.85; 95% CI = 2.86, 11.96) compared with heterosexual women.

DISCUSSION

In this nationally representative study, we found a greater burden of multiple health problems among sexual minority men and women. To our knowledge, this is among the most robust reports that used nationally representative data spanning 10 years of survey recruitment to investigate sexual minority health disparities in the United States. Our

TABLE 3—Comparison of Heterosexual and Sexual Minority Men and Women on Mental Health, Alcohol, Smoking, and Drug Use: National Health and Nutrition Examination Survey, United States, 2001–2010

Alcohol, Smoking, and Drug Use Variables	Heterosexual Men (n = 5053), Mean ±SE (95% CI)	Sexual Minority Men (n = 234), Mean ±SE (95% CI)	P	Heterosexual Women (n = 5450), Mean ±SE (95% CI)	Sexual Minority Women (n = 377), Mean ±SE (95% CI)	P
> 15 d of poor mental health in past 30 d			< .001			< .001
Yes	8.2 (7.3, 9.2)	15.9 (11.5, 21.4)		12.6 (11.7, 13.7)	20.6 (16.0, 26.1)	
No	91.8 (90.8, 92.7)	84.1 (78.6, 88.5)		87.4 (86.4, 88.3)	79.4 (73.9, 84.0)	
Average no. of drinks per day in past year (mean)	4.0 ±0.08	3.6 ±0.32	.30	2.4 ±0.04	3.3 ±0.17	< .001
Ever heavy alcohol user (> 5 per day)			0.80			< .001
Yes	22.7 (21.1, 24.4)	21.9 (16.3, 28.6)		8.3 (7.4, 9.2)	21.3 (16.8, 26.6)	
No	77.3 (75.6, 78.9)	78.1 (71.4, 83.7)		91.7 (90.8, 92.6)	78.7 (73.4, 83.2)	
Smoked > 100 cigarettes in life			.61			< .001
Yes	49.5 (47.2, 51.8)	46.8 (37.5, 56.4)		40.5 (38.3, 42.9)	54.3 (47.7, 60.8)	
No	50.5 (48.2, 52.8)	53.2 (43.6, 62.5)		59.5 (57.1, 61.8)	45.7 (39.2, 52.3)	
Ever used marijuana or hashish (years 2005–2010 only)			.56			< .001
Yes	66.5 (63.8, 69.1)	63.6 (53.1, 72.9)		56.1 (53.2, 59.0)	73.9 (67.6, 79.3)	
No	33.5 (30.9, 36.2)	36.4 (27.1, 46.9)		43.9 (41.0, 46.8)	26.1 (20.7, 32.4)	
Ever used cocaine, heroin, or methamphetamine (years 2005–2010 only)			.4			< .001
Yes	26.5 (24.2, 29.0)	30.9 (21.6, 42.2)		15.9 (14.1, 17.8)	34.7 (27.4, 42.7)	
No	73.5 (71.1, 75.8)	69.1 (57.8, 78.4)		84.1 (82.2, 85.9)	65.3 (57.3, 72.6)	
Ever injected drugs (years 2005–2010 only)			.76			< .001
Yes	3.3 (2.5, 4.2)	2.8 (1.1, 7.3)		1.3 (0.9, 1.8)	9.0 (5.4, 14.6)	
No	96.7 (95.8, 97.5)	97.2 (92.7, 99.0)		98.7 (98.2, 99.1)	91.0 (85.4, 94.6)	

Note. CI = confidence interval.

findings were broadly consistent with previous research on sexual minority health disparities[17,23] and extend previous NHANES analyses that examined HIV and HSV-2 in men who have sex with men and HSV-2 in women who have sex with women.[24,25] However, many past studies that compared sexual minorities with heterosexuals have obscured differences by biological gender in their analyses.[17] Our results demonstrated the importance of parsing out differences by gender to permit the improved identification of subgroups that are at particular risk for specific types of poor health outcomes. For example, sexual minority men showed greater odds of STI infection, including biologically confirmed HIV and HSV-2, and self-reported lifetime diagnoses of gonorrhea and chlamydia. By contrast, there were no differences in STI prevalence between sexual minority and heterosexual women. Consistent with prior research, approximately 12% of sexual

minority women in this sample were diagnosed with an STI in their lifetime.[26–30] Contrary to much previous research, sexual minority men did not differ from heterosexual men with respect to heavy alcohol use, smoking, and illicit drug use.[16,18,31] By contrast, sexual minority women showed significantly higher levels of substance use compared with their heterosexual counterparts. These results suggest that culturally competent, gender-specific screening and treatment services are warranted for both sexual minority men and women.

Addressing health disparities in sexual minority populations is an emerging national public health priority. The Institute of Medicine has proposed that federally funded surveys administered by the Department of Health and Human Services collect information about sexual orientation and gender identity to identify health inequities, demographic trends, and areas for intervention in sexual minority

populations.[1] Federally funded health surveys have recently begun to systematically collect information about sexual orientation.[4] This analysis of NHANES data provides additional population-level evidence that sexual minority men and women in the United States experience disparities in sexual health, mental health, and other behavioral health factors that can contribute to morbidity and preventable mortality.

Previous research has underscored the role of socioeconomic inequality as a determinant of population health.[32] Notably, the health disparities among sexual minority men and women shown in this study were observed over and above adjustment for indicators of socioeconomic status such as education, income, race, and access to health insurance and a health care provider. One explanation for the striking disparities observed in our analyses is that social factors related to societal discrimination and stigma toward specific marginalized

TABLE 4—Adjusted Multiple Logistic Regressions to Examine Health Disparities Among Sexual Minority Men and Women: National Health and Nutrition Examination Survey, United States, 2001–2010

Health Outcome Variables	Sexual Minority Men vs Heterosexual Men (Ref)		Sexual Minority Women vs Heterosexual Women (Ref)	
	AOR (95% CI)	P	AOR (95% CI)	P
Sexual health (biomarker)				
HIV antibody	59.91 (28.03, 128.07)	< .001	2.46 (0.59, 10.26)	.21
Urine chlamydia (years 2001–2008 only)	0.64 (0.08, 5.07)	.67	1.32 (0.31, 5.62)	.71
HSV-2	1.83 (1.24, 2.71)	< .01	0.91 (0.70, 1.18)	.47
Hepatitis C antibody	0.87 (0.29, 2.62)	.8	2.99 (1.33, 6.73)	< .01
Sexual health (self-reported)				
Ever had STI	1.48 (0.89, 2.47)	.13	0.97 (0.64, 1.48)	.9
Ever had gonorrhea	7.73 (2.31, 25.82)	< .01	2.84 (0.85, 9.52)†	.09
Ever had chlamydia	5.13 (1.48, 17.71)	.01	1.59 (0.65, 3.89)	.3
Ever had herpes	1.20 (0.49, 2.92)	.69	0.74 (0.40, 1.39)	.35
Ever had warts	1.47 (0.81, 2.68)	.21	1.05 (0.60, 1.84)	.85
Ever tested for HIV	3.47 (2.27, 5.30)	< .001	1.33 (1.03, 1.71)	.03
Mental health				
≥ 15 d of poor mental health in past 30 d	2.24 (1.48, 3.39)	< .001	1.52 (1.10, 2.10)	.01
Alcohol and drug use				
Mean number of drinks per day past year[a] (AIRR)	0.94 (0.81, 1.10)	.45	1.18 (1.07, 1.31)	< .01
Ever heavy alcohol user (> 5 per day)	1.03 (0.68, 1.57)	.89	2.37 (1.66, 3.37)	< .001
Smoked > 100 cigarettes in life	0.98 (0.63, 1.53)	.94	1.50 (1.11, 2.03)	< .01
Ever used marijuana or hashish (years 2005–2010 only)	0.87 (0.53, 1.42)	.57	2.11 (1.48, 3.02)	< .001
Ever used cocaine, heroin, or methamphetamine (years 2005–2010 only)	1.23 (0.70, 2.15)	.46	2.73 (1.80, 4.15)	< .001
Ever injected drugs (years 2005–2010 only)	1.02 (0.32, 3.26)	.97	5.85 (2.86, 11.96)	< .001

Note. AIRR = adjusted incidence rate ratio; AOR = adjusted odds ratio; CI = confidence interval; HSV-2 = herpes simplex virus type 2; STI = sexually transmitted infection. Adjusted for age, race/ethnicity, education, employment, marital status, family income, health insurance, and regular health care provider. Education omitted as a covariate in the regression because of collinearity in the model.
[a]AIRR based on Poisson regression.

subgroups, such as homophobia and heteronormativity experienced by sexual minorities, have a downstream effect on the health of individuals.[33] For example, minority stress theory describes how exposure to stigma, discrimination, and interpersonal rejection can deplete psychological coping resources and lead to mental health problems, as well as increased alcohol use, drug use, and HIV risk behaviors in sexual minorities.[34–36] Other social epidemiological frameworks have described factors across multiple levels that contribute to HIV and other STIs.[37] Further population-level research that incorporates validated measures and uses appropriate study designs to allow for inferences about causal mechanisms is needed to investigate the theoretical pathways that contribute to health in sexual minorities.

There were several limitations to this study. Analyses were primarily descriptive and did not permit inferences about theoretical mechanisms that contribute to health outcomes, trends over time, or linkages between health outcomes. The analytic sample included only adults aged between 20 and 49 years for whom data on key variables were systematically collected. Behavioral health measures were self-reported, frequently limited to single-item measures, and might have been affected by response or recall bias. In regression analyses, wide confidence intervals might suggest instability in effect sizes for findings related to HIV and STIs. Given the small cell sizes within the sexual minority groups, we were unable to compare bisexual men and women with other groups. Furthermore, we categorized individuals who reported their

sexual orientation as "something else" as sexual minorities. Although there were few individuals who responded in this manner, this categorization may not reflect their subjective identity. Our study did not examine whether and how health outcomes vary by other dimensions of sexuality such as history of same-sex behavior or sexual attraction. Future population-level research is needed to explore these issues. Finally, given limitations in the NHANES measure of gender identity, we were unable to report findings for transgender men and women.

In conclusion, our study identified a range of health disparities that face sexual minorities in the United States. Identifying multiple domains of health vulnerability for sexual minority men and women suggest that more comprehensive, rather than domain-specific, health interventions for this population are warranted.

Notably, health disparities seemed to occur differentially for men and women. A key issue for future research is understanding the nature of gender differences in macrolevel factors (e.g., stigma, discrimination, isolation) and health behaviors among sexual minorities in nationally representative samples. Moreover, we found that disparities persisted above and beyond the role of socioeconomic factors. Future research is warranted to examine the potential moderating role of socioeconomic status in explaining health disparities among sexual minorities to better understand the specific determinants of health inequalities among sexual minority men and women.[38] Evolving policy shifts that allow for greater inclusion of sexual minorities in social institutions, such as marriage equality and nondiscrimination laws, may ultimately affect health indices in these groups and should be examined in future research.[39] Individual- and community-level factors that promote resilience and coping are also important areas for investigation.[35] The continued inclusion of measures on sexual orientation in federal health surveys is critical for further identifying health disparities and prioritizing resources to address the health of sexual minority populations in the United States. ∎

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Human Participant Protection

Institutional review board approval was not needed because no human participants were involved directly in this study.

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