Men Who Have Sex With Men—Identification Criteria and Characteristics From the National Health and Nutrition Examination Survey, 1999 to 2014

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Abstract

Objectives: This study aimed to provide identification criteria for men who have sex with men (MSM), estimate the prevalence of MSM behavior, and compare sociodemographics and sexually transmitted disease risk behaviors between non-MSM and MSM groups using data from a nationally representative, population-based survey.

Methods: Using data from men aged 18 to 59 years who took part in the National Health and Nutrition Examination Survey (NHANES), 1999 to 2014, detailed criteria were developed to estimate MSM behavior—at least one lifetime same-sex partner (MSM-ever), at least one same-sex partner in the past 12 months (MSM-current), and at least one lifetime and zero same-sex partners in the past 12 months (MSM-past).

Results: The estimated prevalence of MSM-ever was 5.5%—of these, 52.4% were MSM-current and 47.1% were MSM-past. Furthermore, MSM-ever are a nonhomogenous subpopulation, for example, 70.4% of MSM-current identified as homosexual and 71.2% of MSM-past identified as heterosexual ($P < 0.001$).

Conclusions: The prevalence of MSM behavior identified here is similar to other published estimates. This is also the first article, to our knowledge, to use National Health and Nutrition Examination Survey data to compare MSM by 2 recall periods (recent vs. lifetime) of last same-sex sexual behavior.

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Gay, bisexual, and other men who have sex with men (MSM) have been shown to have an increased risk of acquiring sexually transmitted diseases (STDs), including HIV, compared with women and MSM only.[1,2] In particular, 67% of new HIV diagnoses in 2015 were estimated to come from male-to-male contact—82% among all male participants 13 years and older—consistent with MSM being the population most heavily impacted by the epidemic in the United States,[2] despite representing a relatively small portion of men.[3] Moreover, an epidemiologic synergy exists between HIV and other STDs[4–6] further underscoring the need for STD surveillance and prevention efforts targeting MSM.

The term MSM is widely used in public health; however, it may not always correlate with self-identified sexual orientation; for example, not all men who identify as homosexual would be considered "MSM" if this classification was based on recent sexual behavior and they reported zero male sex partners within the past 6 or 12 months. In addition, not all men who identify as heterosexual have sex exclusively with women. One study using data from a population-based survey in New York City found a discordance between self-reported sexual identity and self-reported sexual behavior among men—nearly 10% of heterosexual-identified men had at least 1 sexual encounter with another man during the previous year.[7]

To calculate HIV and other STD prevalence measures among MSM, an estimate of the total number of this subpopulation is required.[3] Several studies estimate the size of the US MSM subpopulation using population-based surveys, including the American Community Survey,[8] the National Survey of Family Growth,[9] the General Social Surveys,[10] and the National Survey of Men.[11] Despite the individual strengths of these surveys, none collect biological specimens to detect the presence of STDs, precluding the ability to directly estimate STD prevalences from these data sources. For instance, using National Health and Nutrition Examination Survey (NHANES) data from 2001 to 2006, Xu et al.[12] found the prevalence of HIV among MSM to be 9.1%.

A population-based program of cross-sectional surveys, NHANES is designed to assess the health and nutritional status of the noninstitutionalized US population through a combination of interviews with physical and laboratory examinations administered continuously, and data are released in 2-year cycles. It is one of few population-based surveys that collect and test biological specimens for STDs.[13] These data can be used to help answer a variety of epidemiologic questions and explore characteristics within population subgroups, but relatively few studies have explored health outcomes of sexual minorities, such as MSM, using this source.[12,14–20]

The NHANES-collected STD risk behaviors include number of sexual partners (lifetime and in the past 12 months) and age at first sexual intercourse.[21] Interviews incorporate the use of audio computer-assisted self-interview for the Sexual Behavior Questionnaire and other questionnaires containing other sensitive questions, where participants are allowed to listen to questions through earphones and to read questions on a computer screen at their own pace without an interviewer present.[22] The program NHANES allows for weighted population-based estimates and for pooling data across survey cycles, which may be necessary when analyzing data from relatively small subpopulations such as MSM. However, periodic revisions to NHANES survey questionnaires have resulted in inconsistencies in question

wording and variable creation across data cycles that researchers must be aware of when analyzing responses collected from MSM, hindering straightforward data pooling across multiple survey cycles. For example, between 1999 and 2014, the indicator for ever having sex went through 2 revisions, resulting in 3 different variable names using 2 different collection methods during the 16-year period.

In this article, we provide guidance on best practices, tailored to NHANES, to identify respondents as MSM. We explore the prevalence of MSM behaviors at 2 recall periods (lifetime and past year) and examine the differences in populations of MSM defined by these varying periods. Based on the approach of Xu et al.,[12] we defined MSM using 3 sets of criteria: reporting at least 1 lifetime same-sex partner, reporting at least 1 same-sex partner in the past 12 months, and reporting at least 1 lifetime same-sex partner but zero same-sex partners in the past 12 months. We then applied our method to estimate the prevalence of MSM in the United States using the aforementioned definitions and compared basic sociodemographic characteristics and STD risk behaviors among MSM definition groups and non-MSM, pooling data from 8 NHANES cycles from 1999 to 2014. We also provide R (Appendix A, http://links.lww.com/OLQ/A220) and SAS (Appendix B, http://links.lww.com/OLQ/A221) programming syntax, so that researchers may use this as a guide to analyze data collected from MSM NHANES participants. Because there is currently no recommended procedure to define the MSM subpopulation using NHANES, our approach may be particularly useful when combining multiple years of data derived from inconsistent questions and variable construction due to periodic survey questionnaire updates.

METHODS

Study Population

We used data from the NHANES Sexual Behavior Questionnaire from 1999 to 2014 comprising eight 2-year cycles: 1999–2000, 2001–2002, 2003–2004, 2005–2006, 2007–2008, 2009–2010, 2011–2012, and 2013–2014. Across the cycles included in this analysis, at the beginning of the Sexual Behavior Questionnaire, sex was defined for participants as meaning vaginal, anal, or oral sex. During the cycles between 1999 and 2004, all participants were first asked, "Have you ever had sex?" (variable SXQ020); from 2005 to 2008, this question was replaced with "Have you ever had vaginal, anal, or oral sex?" (variable SXQ021). Beginning in 2009, this variable was replaced with SXD021, for which responses from male participants were derived from the following questions: "Have you ever had vaginal sex with a woman?" "Have you ever performed oral sex on a woman?" "Have you ever had anal sex with a woman?" and "Have you ever had any kind of sex with a man, including oral or anal?" Male participants were also asked to report the number of lifetime male partners and number of male partners in the past 12 months. Table 1 illustrates the changes in these aforementioned variables from 1999 to 2014. In our analysis, we limited the sample to male participants who reported ever having sex.

Within the Sexual Behavior Questionnaire, all participants who reported never having sex were only asked about their sexual orientation (this question was included in all survey cycles except 1999–2000). All sexually active participants (i.e., those who reported ever having had sex) were asked about their age at first sexual intercourse, number of lifetime

male sex partners, number of lifetime female sex partners, and sexual orientation. For male participants, only those who reported having had sex with more than 1 person in their lifetime were asked about their number of sex partners in the past 12 months by each sex (male or female) of sex partner (Supplemental Figs. 1–3, http://links.lww.com/OLQ/A223). Although NHANES participants aged 60 to 69 years were administered the Sexual Behavior Questionnaire beginning in the 2007–2008 survey cycle, these participants were asked about neither their number of sex partners in the past 12 months nor their sexual orientation during the 2007–2014 survey cycles (Supplemental Fig. 4, http://links.lww.com/OLQ/A223). During the cycles between 2009 and 2014, only male participants aged 18 to 59 years who answered "yes" to "Have you ever had any kind of sex with a man, including oral or anal?" were asked about the number of male sex partners they have had in both their lifetime and in the past 12 months (Supplemental Fig. 5, http://links.lww.com/OLQ/A223). Additional data included in this analysis were sociodemographic characteristics (age, race/ethnicity, educational attainment, marital status, poverty status, and sexual orientation) and STD risk behaviors (number of lifetime sex partners, number of sex partners in the past 12 months, and age at first sexual intercourse).

MSM Definition Criteria

The definition criteria for MSM required data on the sex of sex partners as well as the recall period during which sex with those partners occurred. We defined MSM using several terms based on the approach from Xu et al.[12] The first term, MSM-ever, was defined as male participants who reported at least 1 life-time male sexual partner (using data from cycles from 1999 to 2008) or reported ever having any kind of sex with a man (using data from cycles from 2009 to 2014). This 2009–2014 revision allowed us to capture men who have reported having sex with a man but who may have refused to respond to a question about their number of male sexual partners, which was also included in these cycles. The second term, MSM-current, was defined as male participants who reported at least 1 male sexual partner in the past 12 months. Therefore, MSM-current is a subset of MSM-ever. We further defined MSM-past, another subset of MSM-ever, as male participants who reported at least 1 lifetime male sexual partner and zero male sexual partners in the past 12 months.

Analysis

Our analysis was limited to men participating during the 1999–2008 cycles who responded "yes" to ever having sex and men participating during the 2009–2014 cycles who responded "yes" to having any kind of sex. Although data were publicly available for participants aged 20 to 59 years between 1999 and 2006, participants aged 20 to 69 years during the 2007–2008 cycle, and participants aged 18 to 69 years between 2009 and 2014, we excluded records for those aged 60 to 69 years from our analyses be- cause these participants were not asked about their number of sexual partners in the past 12 months. Some variables of interest required NHANES participants to be within a certain age range, and consequently, some data were not available for all included participants.

We estimated the prevalence of MSM-ever, MSM-current, and MSM-past for male participants aged 18 to 59 years in the 1999–2014 NHANES cycles. We also compared several sociodemographic characteristics and STD risk behaviors between MSM-ever and

non-MSM, and between MSM-current and MSM-past. Data were analyzed using RStudio version 1.0.44 (Boston, MA) and R survey package version 3.31–2, which accounted for the complex survey design.[23–25] The Taylor series linearization approach was used to estimate SEs. Estimates with a SE greater than 30% of the estimate may potentially be unreliable and were noted as such.[26] We additionally noted estimates with an SE between 20% and 30% of the estimate. Confidence intervals (CIs) were calculated using logit transformation. *P* values testing independence between groups were derived from the Rao-Scott adjusted χ^2 test and P values comparing medians were derived from the Wilcoxon signed-rank test; values less than 0.05 were deemed statistically significant. Sample weights for pooled analyses, which accounted for oversampling and nonresponse, were constructed from NHANES-provided weights based on National Center for Health Statistics (NCHS) guidelines and are intended to be representative of the US civilian noninstitutionalized population at the midpoint of the combined 1999 to 2014 survey period.[26,27]

RESULTS

There were 13,618 male participants aged 18 to 59 years who provided responses to questions in the NHANES Sexual Behavior Questionnaire between 1999 and 2014, and whose data were publicly available. We excluded 947 (7.0%) male participants who reported never having sex, 1384 (10.2%) who did not provide information on whether or not they have ever had sex, and 39 (0.3%) who reported having sex but did not provide information on the number of male partners in their lifetime or ever having sex with a man (Table 2). The remaining 11,248 (82.6%) participants, who had nonmissing responses to both ever having sex and number of lifetime male partners (zero or greater), were included in the analysis. Supplemental Table 1 (http://links.lww.com/OLQ/A222) provides a more detailed summary of these inclusions and exclusions, including cycle-specific information on frequencies of male respondents reporting ever having sex, having sex with a man (2009–2014), having at least 1 lifetime male sex partner, and having at least 1 male sex partner in the past 12 months.

The weighted prevalence of reported MSM-ever behavior was 5.5% (95% CI, 4.8–6.1). Of MSM-ever, we identified 52.4% (95% CI, 46.3–58.4) as MSM-current and 47.1% (95% CI, 41.1–53.1) as MSM-past. Table 3 presents estimates of sociodemographic characteristics and STD risk behaviors by MSM behavior.

MSM-ever vs non-MSM

Although non-MSM and MSM-ever respondents did not have significantly different median ages, they did have significantly different age distributions (*P* = 0.005); 35.8% of MSM-ever were aged between 30 and 39 years, whereas 24.4% of non-MSM were aged between 30 and 39 years (Table 3). Marital status differed significantly (*P* < 0.001) between non-MSM and MSM-ever; most non-MSM were married (58.6%), whereas a plurality of MSM-ever were never married (41.5%). In addition, 18.7% of MSM-ever reported their marital status as living with a partner compared with 8.9% of non-MSM (*P* < 0.001). Educational attainment differed significantly (*P* < 0.001), because MSM-ever were significantly more likely than non-MSM to have greater than 12 years of education. Neither race nor poverty status were

significantly different. Sexual orientation differed significantly between non-MSM and MSM-ever ($P < 0.001$); MSM-ever were more likely to identify as homosexual (44.8%) and nearly all non-MSM (99.6%) identified as heterosexual. A significantly larger proportion of MSM-ever reported at least 10 lifetime sex partners—the combined total of male and female sex partners reported—($P < 0.001$) and at least 2 past 12-month sex-partners ($P < 0.001$) compared with non-MSM. MSM-ever were significantly more likely ($P < 0.001$) to have their first sexual encounter at age younger than 15 years compared with non-MSM.

MSM-current vs MSM-past

MSM-past respondents differed significantly in median age and age distribution compared with MSM-current respondents ($P < 0.001$ for both; Table 3). MSM-past respondents were older, with a median age of 44.0 years, whereas the median age of MSM-current was 37.9 years. Of MSM-past, 26.5% were aged between 30 and 39 years, and of MSM-current, 35.8% were aged between 30 and 39 years ($P < 0.001$). Marital status differed significantly ($P < 0.001$); MSM-current were more likely to report their marital status as never married (56.7%) and MSM-past were more likely to report being married (43.9%). Sexual orientation also differed significantly ($P < 0.001$); MSM-current were more likely to identify as homosexual (70.4%) and MSM-past were more likely to identify as heterosexual (71.2%). A significantly larger proportion of MSM-current reported at least 10 lifetime sex partners ($P = 0.02$) and at least 2 sex partners in the past 12 months ($P < 0.001$) compared with MSM-past, although most men in both groups reported at least 10 lifetime partners. Race/ethnicity, educational attainment, poverty status, and age at first sexual intercourse were not significantly different.

DISCUSSION

A population-based health survey, NHANES can be used to estimate the prevalence of diseases and STD risk behaviors. Survey cycles can be combined, especially when subpopulations of interest are small. We were able to use NHANES data from 1999 to 2014 to identify MSM respondents using 3 different definition criteria, estimate the prevalence of these MSM behaviors in the US population, and make comparisons between non-MSM and MSM-ever respondents, as well as between MSM-current and MSM-past respondents. We found that approximately 5.5% of sexually active men aged 18 to 59 years have had at least 1 male partner in their lifetime and approximately 2.9% have had at least 1 male partner in the past 12 months, comparable to prevalence estimates from other US studies.[3,8,28,29] We additionally found that 2.6% of sexually active men aged 18 to 59 years have had at least 1 male partner in their lifetime and zero male partners in the past 12 months. Trends between MSM-ever and non-MSM were consistent with results found elsewhere, namely, that MSM-ever generally had more sexual partners and were younger at first sexual intercourse compared with non-MSM.[30]

We also explored characteristics of 2 subsets of MSM-ever—MSM-current and MSM-past—and this is the first article, to our knowledge, using NHANES data to compare MSM by recall period (recent vs. lifetime behavior) of last same-sex sexual behavior. MSM-ever are a nonhomogenous subpopulation. We found that MSM-past respondents were, on average,

older than those classified as MSM-current; were more likely to be married; and were more likely to identify as heterosexual. MSM-current were more likely to have never been married and to identify as homosexual. MSM-current reported significantly more sex partners (the combined total of male and female partners reported), both lifetime and past 12 months, compared with MSM-past, although most members of both subgroups reported at least 10 lifetime sexual partners. It follows that MSM-current may face an increased risk of contracting STDs.[31] MSM-current may be favorable as the MSM categorization in NHANES if researchers were interested in exploring outcomes associated with more recent MSM sexual behavior (past 12 months)—for example, bacterial STDs such as gonorrhea, chlamydia, and syphilis—and if pooling many survey cycles (e.g., 8 cycles) was feasible. However, if researchers were interested in exploring outcomes associated with lifetime MSM sexual behavior—for example, viral STDs such as herpes simplex virus type 2 (HSV-2) and HIV—and if pooling fewer survey cycles was preferred, MSM-ever may be preferable as the MSM categorization, but acknowledging heterogeneity within MSM is advised.

It should also be noted that "MSM" has been used in epidemiologic literature since the 1990s as an identity-free term, avoiding the complexities of social and cultural contexts.[32] Young and Meyer noted that although the scientific use of MSM has shifted STD risk from identity-based to behaviorally based, public health practitioners should not ignore identity and should adopt a more nuanced approach in exploring sexual minorities. However, the term "sexual minorities" may similarly mask the heterogeneity within sexual minorities as a subpopulation.[32,33] Because sexual orientation is also available in NHANES, further analyses should include sexual identity, in conjunction with MSM sexual behavior, for a deeper understanding of how behavior and sexuality relate to STD risk, and to more appropriately tailor prevention efforts.

With the exception of HIV and syphilis, most nationally notifiable surveillance data do not include information on sexual behavior; as such, information on trends in STD prevalence among MSM is derived from surveys and sentinel surveillance systems.[1] The Centers for Disease Control and Prevention uses NHANES in tracking national estimates of HSV-2 seroprevalence (although HSV-2 is not nationally notifiable).[1] Among MSM, NHANES may also be used to derive HSV-2 seroprevalence estimates—and estimates of HIV, gonorrhea, chlamydia, and syphilis prevalence, all of which are nationally notifiable.[1,2]

There were some noteworthy limitations to these results. In studying MSM using NHANES, obtaining statistically reliable estimates required combining multiple cycles of data, due to the relatively small size of the subpopulation and the relatively small sample sizes used in each NHANES cycle.[26,27] This limitation was compounded when estimating the prevalence of the MSM-current and MSM-past subgroups, and may also be compounded if deriving estimates of STD prevalences. Here, we combined 8 cycles (16 years) of NHANES data. As a result, monitoring trends over time among MSM may not be possible using NHANES. The most recent NCHS analytic guidelines suggest population estimates for the 2011–2012 NHANES cycle be based on the year 2000 population projections from the US Census Bureau.[27] At the time of publication, analytic guidelines for subsequent NHANES survey cycles are not yet available. When combining years of data, NCHS cautions that 2

assumptions are made: (1) there are no differences in the estimates over the cycles being pooled, and (2) results should be interpreted as the average during the 16-year period,[26] limiting interpretation of the results. We were unable to include data on those aged 18 and 19 years in most years used and data on younger adolescents, because these data were not collected or were not publicly available. In addition, because of the target ages of NHANES sexual behavior variables, we were also unable to include data on those 60 years and older. We were able to include neither the type of sexual intercourse (anal or oral)—because of this distinction becoming available in later cycles—nor the practice (insertive or receptive). Although NHANES data are designed to produce national-level estimates and therefore cannot address geographic variation of MSM,[8,29] this precludes the need to make assumptions about prevalence within counties or states. Finally, respondents may have underreported sexual risk behavior. However, the use of audio computer-assisted self-interview, compared with face-to-face interviewing, may have increased the likelihood of response.[34]

We have provided recommendations for identifying MSM respondents in NHANES using 16 years of sexual behavior data. The prevalence of MSM-ever behavior found here, 5.5% of sexually active men between 18 and 59 years, is comparable to previous estimates. This is also the first article, to our knowledge, to compare NHANES designation of MSM by recall period (recent vs. lifetime behavior) of last same-sex sexual behavior. Because NHANES has been designed to be nationally representative, researchers can use these data to generate a variety of estimates by characteristics, including MSM behavior with caveats of pooling multiple survey cycles and obtaining potentially large relative SEs (e.g., >20%). Furthermore, this article highlighted that MSM are nonhomogenous, as we found differences in sociodemographic and sexual behavioral characteristics between MSM subgroups by recall periods of last same-sex sexual behavior—MSM-current versus MSM-past (recent vs. lifetime). With sufficient pooling across cycles, researchers using NHANES will be able to explore characteristics and answer epidemiologic questions within the MSM subpopulation, both current and past.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments:

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TABLE 1.

Selected NHANES Sexual Behavior Data Variable Names and Descriptions, 1999 to 2014

Survey Cycle	Have You Ever Had Sex?	Have You Ever Had Sex With a Man?*	Male Partners, Lifetime	Male Partners, past 12 mo
1999–2000	SXQ020 Have you ever had sex?	Not available	SXQ200 In your lifetime, with how many men have you had sex?	SXQ220 In the past 12 mo, with how many men have you had sex?
2001–2002				
2003–2004				
2005–2006	SXQ021 Have you ever had vaginal, anal, or oral sex?		SXQ410 In your lifetime, with how many males have you had anal or oral sex?	SXQ550 In the past 12 mo, with how many males have you had anal or oral sex?
2007–2008				
2009–2010	SXD021† Have you ever had vaginal, anal, or oral sex?	SXQ809 Have you ever had any kind of sex with a man, including oral or anal?		
2011–2012				
2013–2014				

*
Introduced in the 2009–2010 survey cycle.

†
Derived from whether or not the respondent reported having any of the specific types of sex (vaginal, anal, oral) with a man or a woman.

TABLE 2.

Frequency of MSM-Ever, Non-MSM, and Exclusions Among Men (Ages 18–59 Years) by NHANES Survey Cycle, 1999 to 2014

Survey Cycle	MSM-Ever[*]	Non-MSM	Never Had Sex[†]	Missing Ever Had Sex[‡]	Missing Male Partners[§]	Total
1999–2000	57	1022	95	93	6	1273
2001–2002	56	1335	60	128	5	1584
2003–2004	57	1159	48	154	7	1425
2005–2006	79	1062	212	166	3	1522
2007–2008	83	1311	200	191	10	1795
2009–2010	85	1674	107	238	7	2111
2011–2012	84	1501	117	231	0	1933
2013–2014	97	1586	108	183	1	1975
Total	598	10,650	947	1384	39	13,618

During the survey cycles between 1999 and 2008, data were not publicly available on participants aged 18 to 19 years and are subsequently not included in the analysis.

[*]
MSM-ever indicates participants reported at least 1 lifetime male sexual partner (during the cycles between 1999 and 2008) or reported ever having any kind of sex with a man (during the cycles between 2009 and 2014).

[†]Participants who reported never having sex met the criteria for neither MSM-ever nor non-MSM and were excluded.

[‡]Participants who had missing data on ever having sex met criteria for neither MSM-ever nor non-MSM and were excluded.

[§]Participants who responded "yes" to ever having sex and had missing data on number of male sex partners (1999–2008), or ever having sex with a man (2009–2014) met the criteria for neither MSM-ever nor non-MSM and were excluded.

TABLE 3.

Estimated Prevalence of Sociodemographic Characteristics and Behaviors Among Men Who Reported Ever Having Sex by MSM Behavior, NHANES, 1999 to 2014

	MSM-Ever* (n = 598)	MSM-Current† (n = 304)	MSM-Past‡ (n = 289)	Non-MSM (n = 10,650)	P (MSM-Ever vs. Non-MSM)	P (MSM-Current vs. MSM-Past)
Prevalence, % (95% CI)	5.5 (4.8–6.1)	2.9 (2.3–3.4)	2.6 (2.2–3.0)	94.5 (93.9–95.2)	—	—
Age, median (IQR), y	39.0 (18.0)	37.9 (15.0)	44.0 (17.0)	39.0 (20.0)	0.05	<0.001
Age group, % (95% CI)					0.005	<0.001
18–24 y	8.8 (6.5–11.9)	12.4 (8.2–18.4)§	4.1 (2.2–7.3)§	14.0 (13.0–15.1)		
25–29 y	10.2 (7.7–13.3)	11.7 (8.0–16.7)	8.6 (5.6–13.0)§	12.1 (11.4–12.8)		
30–39 y	31.2 (26.4–36.5)	35.8 (28.7–43.6)	26.5 (20.7–33.1)	24.4 (23.4–25.4)		
40–49 y	24.9 (20.8–29.6)	22.9 (17.0–30.1)	27.2 (21.2–34.1)	26.6 (25.5–27.7)		
50–59 y	24.8 (20.2–30.2)	17.1 (11.7–24.4)	33.7 (26.0–42.3)	22.9 (21.8–24.0)		
Race/ethnicity, % (95% CI)					0.33	0.75
White	72.3 (68.7–75.5)	71.4 (65.1–76.9)	74.0 (68.9–78.5)	68.9 (66.5–71.1)		
Black	9.9 (8.0–12.3)	10.3 (7.4–14.2)	9.1 (6.5–12.6)	10.6 (9.6–11.8)		
Hispanic	13.2 (10.9–15.9)	14.0 (10.3–18.6)	11.8 (9.0–15.5)	14.9 (13.1–16.9)		
Other	4.6 (3.0–7.1)§	4.3 (2.5–7.4)§	5.0 (2.8–8.7)§	5.6 (5.0–6.2)		
Education, % (95% CI)					<0.001	0.28
12 y	27.7 (23.3–32.5)	25.3 (19.6–32.1)	30.1 (23.9–37.2)	42.2 (40.4–44.1)		
>12 y	72.3 (67.5–76.7)	74.7 (67.9–80.4)	69.9 (62.8–76.1)	57.8 (55.9–59.6)		
Marital status, % (95% CI)					<0.001	<0.001
Married	25.6 (21.4–30.3)	8.6 (5.3–13.8)§	43.9 (36.6–51.5)	58.6 (57.0–60.1)		
Never married	41.5 (35.8–47.3)	56.7 (48.2–64.8)	25.2 (19.2–32.2)	21.5 (20.1–23.0)		
Living with partner	18.7 (14.5–23.7)	23.3 (16.5–31.8)	13.6 (9.5–19.1)	8.9 (8.2–9.7)		
Widowed/divorced/separated	14.3 (10.7–18.8)	11.4 (7.1–17.7)§	17.4 (12.5–23.6)	11.0 (10.2–11.8)		
Poverty, % (95% CI)					0.87	0.99
At or above poverty	86.6 (83.4–89.3)	86.7 (81.7–90.5)	86.7 (82–90.3)	86.9 (85.7–88.0)		
Below poverty	13.4 (10.7–16.6)	13.3 (9.5–18.3)	13.3 (9.7–18.0)	13.1 (12.0–14.3)		
Sexual orientation, % (95% CI)¶					<0.001	<0.001

	MSM-Ever [*] (n = 598)	MSM-Current [†] (n = 304)	MSM-Past [‡] (n = 289)	Non-MSM (n = 10,650)	P (MSM-Ever vs. Non-MSM)	P (MSM-Current vs. MSM-Past)
Heterosexual	36.9 (30.3–44.1)	7.5 (4.3–12.7)[§]	71.2 (62.3–78.8)	99.6 (99.5–99.8)		
Homosexual	44.8 (37.1–52.8)	70.4 (60.9–78.4)	14.9 (8.8–24.4)[§]	0.0 (0.0–0.1)[∥]		
Bisexual	18.3 (14.2–23.2)	22.1 (15.9–29.7)	13.8 (9.8–19.2)	0.3 (0.2–0.5)[§]		
Total sex partners (lifetime) [**]						
Median (IQR)	17.0 (28.0)	20.0 (40.0)	12.4 (19.0)	8.0 (15.0)	<0.001	0.003
10, % (95% CI)	69.8 (65.0–74.3)	75.6 (68.7–81.4)	63.3 (55.3–70.6)	43.1 (41.7–44.5)	<0.001	0.02
Total sex partners (past 12 mo) [**]						
Median (IQR)	1.0 (2.0)	2.0 (4.0)	1.0 (1.0)	1.0 (0.0)	<0.001	<0.001
2, % (95% CI)	42.4 (36.9–48.0)	62.4 (53.8–70.2)	20.0 (14.8–26.5)	18.8 (17.7–20.0)	<0.001	<0.001
Age at first sex						
Median (IQR), y	16.0 (5.0)	17.0 (5.0)	16.0 (4.0)	17.0 (4.0)	0.05	0.05
<15 y, % (95% CI)	28.3 (23.5–33.7)	26.2 (19.6–34.1)	30.9 (24.9–37.5)	17.3 (16.4–18.3)	<0.001	0.32

In some cases, data were not available for all participants.

During survey cycles between 1999 and 2008, data were not publicly available on participants aged 18–19 years and were subsequently not included in the analysis

[*] MSM-ever are participants who reported at least 1 lifetime male sexual partner (during the cycles between 1999 and 2008) or reported ever having any kind of sex with a man (during the cycles between 2009 and 2014).

[†] MSM-current, a subgroup of MSM-ever, are MSM who reported having sex with at least 1 man within the past 12 months.

[‡] MSM-past, a subgroup of MSM-ever, are MSM who reported having sex with zero men within the past 12 months.

[§] The relative SE is between 20% and 30% indicating the estimate may potentially be unreliable.

[¶] Sexual orientation was not collected during the 1999–2000 survey cycle.

[∥] The relative SE is greater than 30%, indicating that the estimate may potentially be unreliable.

[**] Total sex partners were derived from the sum of (zero or more) reported male and female sex partners.

IQR indicates interquartile range.