

Cancer Survivorship and Sexual Orientation

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BACKGROUND: Lesbian, gay, and bisexual populations are not part of cancer surveillance, resulting in scarce information about the cancer survivorship of these populations. To address this information gap, the authors examined the prevalence of cancer survivorship by sexual orientation and cancer survivors' self-reported health by sexual orientation. **METHODS:** The authors explored these issues by analyzing pooled data from the California Health Interview survey from 2001, 2003, and 2005. By using descriptive statistics and logistic regressions, they examined the cancer prevalence in men and women by sexual orientation and subsequently compared the self-reported health of male and female cancer survivors by sexual orientation. **RESULTS:** Among women, the authors found no significant differences in cancer prevalence by sexual orientation, but lesbian and bisexual female cancer survivors had 2.0 and 2.3× the odds of reporting fair or poor health compared with heterosexual female cancer survivors. Among men, we found significant differences in cancer prevalence, with gay men having 1.9× the odds of reporting a cancer diagnosis compared with heterosexual men. There were no differences by sexual orientation in male cancer survivors' self-reported health. **CONCLUSIONS:** Our novel findings suggest sex differences in the impact of cancer on lesbian, gay, and bisexual cancer survivors. Lesbian and bisexual cancer survivors need to be targeted by programs and services to assist these cancer survivors in improving their health perceptions, whereas healthcare providers and public health agencies need to be made aware of the higher prevalence of cancer in gay men to prevent future cancers through increased screening and primary prevention. *Cancer* 2011;117:3796-804. © 2011 American Cancer Society.

KEYWORDS: cancer, survivorship, quality of life, prevalence, homosexuality.

Cancer survivors are individuals who are living with, through, and beyond a diagnosis of cancer. Year 2006 estimates indicate 11.4 million cancer survivors are living in the United States (<http://survivorship.cancer.gov>), representing about 4% of the US population. Factors that include the aging of the population, earlier cancer detection, and better cancer treatments contribute to the steady increase in the number of cancer survivors. Federal and nonfederal agencies, including the Centers for Disease Control and Prevention, the National Cancer Institute, and the American Cancer Society, address cancer survivorship in the context of their cancer control efforts and have devised plans to include survivor-specific goals such as disease management and prevention of secondary cancers.¹

Currently these plans do not specify recommendations for the subpopulation of lesbian, gay, or bisexual cancer survivors. Because cancer surveillance efforts are lacking data on sexual orientation,² it is unknown how many cancer survivors identify as lesbian, gay, or bisexual. The absence of data on this subpopulation is an important oversight, because available evidence shows that lesbian/gay/bisexual populations have greater levels of risk behaviors for cancer. For example, the President's Cancer Panel noted lesbian/gay/bisexuals have a higher cancer risk because they smoke at twice the rate of heterosexual populations.³ Lesbians have been identified as having additional risk factors, including higher alcohol consumption and greater rates of overweight and obesity.⁴⁻⁶ Among men, same-sex sexual contact has been linked to cancer.^{7,8} These risk profiles of lesbian/gay/bisexual populations suggest greater cancer morbidity compared with heterosexual populations. This question of cancer disparities cannot be settled as long as cancer incidence is not recorded by sexual orientation.

General population studies indicate the long-term implications of a cancer diagnosis, in that cancer survivors are more likely to report being in fair or poor health, having limitations of activities of daily living, and being unable to work because of a health condition.⁹ For example, in a population-based national sample, significantly more cancer survivors reported their health as fair or poor compared with an age-, sex-, and educational attainment-matched control sample

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DOI: 10.1002/cncr.25950, **Received:** August 31, 2010; **Revised:** November 22, 2010; **Accepted:** January 3, 2011, **Published online** May 9, 2011 in Wiley Online Library (wileyonlinelibrary.com)

(31% vs 17%).¹⁰ Therefore, knowing who belongs to the 4% of the US population who are cancer survivors is important to adequately plan for these survivors' demands for comprehensive survivorship care, which include psychosocial and medical care¹¹⁻¹³ and psychosocial support services¹⁴ for secondary survivors, meaning the family members of the person with cancer.

The lack of sexual orientation data in cancer surveillance and many national data sets does not allow for characterizing survivorship by sexual orientation. Therefore the consequences of cancer and the needs for support for sexual minority survivors are unknown. This absence of information prevents public health and healthcare agencies from planning for the specific demands of lesbian/gay/bisexual survivors and their family members. To illuminate some of these issues, we describe cancer survivorship by sexual orientation for 1 state for which representative population-based data are available.

MATERIALS AND METHODS

The institutional review board deemed this study exempt from protocol review. Data for this research project are taken from the California Health Interview Survey, the largest state health survey conducted in the United States. The California Health Interview Survey employs a 2-stage geographically stratified random-digit-dial sample of households, surveying 1 randomly selected adult from each sampled household. The survey is administered in multiple languages, resulting in a large multiethnic/multi-racial sample that accurately represents the California population living in households. The California Health Interview Survey response rate shows no significant non-response bias by demographic characteristics such as age, sex, income, education, or employment status¹⁵; however, because of the absence of a sampling frame, nonresponse by sexual orientation has not been evaluated. More detailed information about the survey methodology can be obtained from the website <http://www.chis.ucla.edu/>. We combined 3 years of data, using the adult California Health Interview Surveys from 2001, 2003, and 2005 to increase the number of individuals who report a sexual minority orientation. As recommended by the California Health Interview Survey, we weighted our analyses to obtain estimates that are an unbiased representation of the California population.

Our data are restricted to participants who were asked about their sexual orientation; these were respondents aged 18 to 65 years in the California Health Interview

Survey 2001, any adult aged >18 years in the California Health Interview Survey 2003, and adults aged 18 to 70 years in the California Health Interview Survey 2005. To ascertain sexual orientation, respondents were asked about their sexual identity, providing answer choices of heterosexual, lesbian, gay, or bisexual along with celibate or other, while recording refusals and "do not know" responses. Two hundred (0.39%) men and 406 (0.57%) women responded celibate, other, or "do not know," or refused to answer. We are excluding these individuals, retaining only heterosexual, lesbian, gay, or bisexual respondents. This resulted in a sample size of 122,394, consisting of 51,259 men and 71,135 women.

Estimates of cancer prevalence are derived from the survey question, "Has a physician ever told you that you had a cancer of any kind?" Adults who confirmed having been told about a cancer diagnosis were further questioned about their age at diagnosis and their type of cancer, inquiring about 29 specific cancer sites and a generic, other cancer. These responses resulted in a variable that distinguished melanoma, prostate, cervical, breast, uterine, and colon cancer from other and multiple cancers. Because in 2001, 49 individuals were not asked about this question, our sample size is further reduced to 122,345, consisting of 51,233 men and 71,112 women.

Demographic characteristics were ascertained from all individuals, including sex, race, current age, educational attainment, income (defined as total annual household income), health insurance status, and nativity, distinguishing US-born from foreign-born respondents. General health distinguished self-reports of health as excellent, very good, or good from self-reports of health as fair or poor.

Analysis

All statistical analyses were performed using the SURVEY procedures in SAS 9.2 (SAS Institute, Cary, NC), which incorporate the final sampling weight and the replicate weights to account for the complex sampling design of the California Health Interview Survey. The jackknife repeated replication method was used to obtain accurate standard errors of the estimates of the means, proportions, and odds ratios. The Rao-Scott chi-square test was used to test for differences in frequencies by sexual orientation groups, and the F test was used to test for differences in means by sexual orientation groups. Logistic regression was used to assess the association between adult cancer and sexual orientation, as well as the association between

self-reported poor health and sexual orientation. A .05 significance level was used for all statistical tests.

RESULTS

Table 1 presents the demographic characteristics of California women and men by sexual orientation. Sexual orientation was significantly associated with women's age, race, education, income, and nativity but not health insurance. Bisexuals were younger than heterosexual women and lesbians. More bisexuals and lesbians were white compared with heterosexual women. Lesbians were the most educated and had higher income, in that the majority had completed college or higher education and more than 1/3 of lesbians had an income of \$70,000 or higher compared with other sexual orientation groups. Finally, the majority of lesbians and bisexuals were US-born compared with heterosexual women.

Among men, sexual orientation was significantly associated with race, education, income, insurance, and nativity but not age. Race reflected the pattern seen in women; more gay and bisexual men reported white race. Gay men were more educated compared with heterosexual or bisexual men. Income differences existed, with more gay men in the higher income groups compared with heterosexual and bisexual men. Fewer bisexual men had insurance coverage. More gay men were US-born compared with heterosexual and bisexual men.

In Table 2 we report the prevalence of cancer survivorship and the demographic characteristics of cancer survivors. Of the 71,112 women in our sample, 7252 reported a cancer diagnosis as adults, at age 18 years or later. Of the 51,233 men, 3690 reported a cancer diagnosis at age 18 years or later. To determine differences by sexual orientation, we used chi-square or F tests. Cancer prevalence among women was similar across sexual orientation groups; between 6% and 9% of women reported a cancer diagnosis. There were no significant differences with respect to women's age at diagnosis or time since diagnosis; all women were living with this disease for about 8 to 11 years. When considering cancer type, the prevalence of melanoma, breast cancer, or multiple cancers did not significantly differ by sexual orientation. We found significant differences by sexual orientation in the prevalence of cervical, uterine, and other cancer types. Forty-one percent of bisexual women reported cervical cancer, more than twice the prevalence in other women. Uterine cancer was most prevalent among lesbians, whereas the prevalence of other cancers was most prevalent among

heterosexual women. As there were no bisexual colon cancer survivors in our sample, we compared lesbians to heterosexuals, finding no significant differences between these 2 groups of women. With respect to cancer survivors' self-reported general health, we found a trend of more lesbians and bisexual women reporting fair or worse health compared with heterosexual cancer survivors.

Among men of different sexual orientations, gay men had significantly higher prevalence of cancer survivorship, about 8% or almost double the prevalence of heterosexual or bisexual men ($P < .0001$). For male cancer survivors, we found gay men to have a significantly younger age of diagnosis (mean age, 41 years) compared with other sexual orientation groups. The amount of time men were living with cancer did not differ significantly by sexual orientation, on average 8 years. The prevalence of men's melanoma, colon, or multiple cancers did not significantly differ by sexual orientation. However, gay men reported a significantly lower rate of prostate cancer, with 5%, or about 1/3 of the prevalence in other men. Both gay and bisexual men reported a greater prevalence of other cancers. Contrary to our results for women, men's self-reported health did not differ by sexual orientation.

We also used chi-square tests for pairwise comparisons, evaluating each sexual minority orientation against our reference group of heterosexuals. There were no significant differences between lesbians and heterosexual women with respect to their health perception or any of the cancer sites (results not shown). Bisexual women, however, differed significantly from heterosexual women, with bisexual women reporting worse health ($P < .05$), greater prevalence of cervical cancer ($P < .0001$), fewer uterine cancer ($P < .001$), and fewer other cancer ($P < .05$) (results not shown). We conducted pairwise comparisons among men, using heterosexual men as the reference group. Gay men were less likely than heterosexual men to report prostate cancer ($P < .001$). Bisexual men were mostly similar to heterosexual men with respect to their health perception and any of the cancer sites (results not shown).

In Table 3 we present results of multiple logistic regressions, modeling the likelihood for California women and men to report a cancer diagnosis. After adjusting for age, race, education, income, and nativity, women's likelihood of reporting a diagnosis of cancer did not significantly differ by sexual orientation. Increasing age, white race, more education, and being US-born were each associated with a greater likelihood of having a cancer diagnosis among women.

Table 3. Multiple Logistic Regression of the likelihood of Having a Diagnosis of Cancer Among California Women and Men

Predictor in the Model	Female Population, n=71,112				Male Population, n=51,233			
	AOR	95% CI of OR	P	Type 3 Analysis of Effect, P	AOR	95% CI of OR	P	Type 3 Analysis of Effect, P
Sexual orientation				.7733				<.0001
Lesbian/gay vs heterosexual	1.066	0.792-1.435	.6729		1.932	1.476-2.528	<.0001	
Bisexual vs heterosexual	1.107	0.782-1.566	.5663		1.080	0.679-1.718	.7438	
Self-reported age	1.056	1.054-1.059	<.0001	<.0001	1.091	1.087-1.095	<.0001	<.0001
Race				<.0001				<.0001
African American vs white	0.462	0.381-0.560	<.0001		0.358	0.270-0.476	<.0001	
Asian vs white	0.345	0.287-0.414	<.0001		0.256	0.180-0.364	<.0001	
Latino vs white	0.541	0.463-0.634	<.0001		0.419	0.316-0.556	<.0001	
Other vs white	0.883	0.733-1.064	.1895		0.658	0.501-0.864	.0026	
Education				.0006				.0186
Some college/vocational school vs HS or lower	1.077	0.975-1.190	.1427		1.115	0.947-1.313	.1912	
Complete college vs HS or lower	1.128	1.034-1.229	.0063		1.164	1.012-1.339	.0330	
Greater than college vs HS or lower	1.264	1.129-1.415	<.0001		1.281	1.098-1.495	.0016	
Annual household income				.0999				.0019
\$30k-\$70k vs below \$30k	1.019	0.926-1.120	.7049		1.185	1.012-1.386	.0348	
\$70k-\$100k vs below \$30k	1.130	1.008-1.266	.0355		1.222	1.029-1.451	.0225	
\$100k+ vs below \$30k	0.991	0.881-1.115	.8863		1.372	1.164-1.616	.0002	
Nativity								
Born in US, yes vs no	1.503	1.321-1.710	<.0001	<.0001	1.631	1.348-1.973	<.0001	<.0001

AOR indicates adjusted odds ratio; CI, confidence interval; OR, odds ratio.

Men's likelihood to report a diagnosis of adult cancer significantly differed by sexual orientation, indicating that gay men had almost twice the odds of a cancer diagnosis compared with heterosexual men. This association was adjusted for age, race, education, annual household income, and nativity, showing that increasing age, white race, higher educational achievement, higher income, and being US-born increased the probability of having adult cancer.

In Table 4, we focus on cancer survivors only, modeling the likelihood of cancer survivors to report fair or poor health. Sexual orientation is significantly associated with female cancer survivors' fair or poor health, even after adjusting for age, race, education, income, and nativity. Lesbian cancer survivors had twice and bisexuals 2.3× the odds of heterosexuals of reporting fair or poor health. In the same model, increasing age, being African American, Asian, Latina, or other race was significantly associated with greater likelihood of fair or poor health, whereas women with advanced education (college or more), women with higher income, and US-born women were significantly less likely to report fair or poor health.

Male cancer survivors' self-reported health did not significantly differ by sexual orientation. African American and Latino men were significantly more likely to report fair or poor health. Similar to the pattern noted for female cancer survivors, being older, and being of a race/ethnicity other than white increased the likelihood of reporting fair or poor health. Having more education and greater income was protective against reporting fair or poor health. Nativity had no impact on self-reported health.

DISCUSSION

We believe this is the first study to provide generalizable results about men and women's cancer prevalence and cancer survivors' self-reported health by sexual orientation. Our results show a different impact of sexual orientation by sex. Cancer prevalence was up to 8% for women, regardless of sexual orientation, whereas among men, the cancer prevalence was about 8% for gay men, significantly higher than in heterosexual or bisexual men.

The greater cancer prevalence among gay men may be caused by a higher rate of anal cancer, as suggested by earlier studies that point to an excess risk of anal cancer

Table 4. Multiple Logistic Regression of the Likelihood of Being in Fair or Poor Health Among California Women and Men Who Are Cancer Survivors

Predictor in the Model	Women, n=7252				Men, n=3690			
	AOR	95% CI of OR	P	Type 3 Analysis of Effect, P	AOR	95% CI of OR	P	Type 3 Analysis of Effect, P
Sexual orientation				.0068				.2081
Lesbian/gay vs heterosexual	1.980	1.147-3.417	.0141		1.631	0.938-2.836	.0831	
Bisexual vs heterosexual	2.324	1.121-4.816	.0234		0.913	0.448-1.862	.8022	
Self-reported age	1.014	1.008-1.020	<.0001	<.0001	1.010	1.001-1.020	.0359	.0359
Race				<.0001				<.0001
African American vs white	3.219	2.241-4.623	<.0001		5.086	2.790-9.272	<.0001	
Asian vs white	1.611	1.074-2.417	.0213		2.910	1.172-7.227	.0213	
Latino vs white	2.213	1.669-2.934	<.0001		1.874	1.105-3.180	.0198	
Other vs white	2.237	1.500-3.337	<.0001		2.338	1.352-4.045	.0024	
Education				<.0001				<.0001
Some college/vocational sch vs HS or lower	0.797	0.652-0.975	.0271		0.688	0.478-0.991	.0447	
Complete college vs HS or lower	0.687	0.560-0.843	.0003		0.546	0.401-0.742	.0001	
Greater than college vs HS or lower	0.520	0.407-0.665	<.0001		0.429	0.297-0.619	<.0001	
Annual household income				<.0001				<.0001
\$30k-\$70k vs below \$30k	0.462	0.387-0.552	<.0001		0.423	0.323-0.553	<.0001	
\$70k-\$100k vs below \$30k	0.295	0.224-0.388	<.0001		0.274	0.196-0.384	<.0001	
\$100k+ vs below \$30k	0.257	0.195-0.339	<.0001		0.188	0.129-0.274	<.0001	
Nativity								
Born in US, yes vs no	0.689	0.537-0.884	.0034	.0034	0.801	0.518-1.239	.3189	.3189

AOR indicates adjusted odds ratio; CI, confidence interval; OR, odds ratio; HS, high school.

among gay men,¹⁶⁻¹⁸ including an ecological study that linked high incidence rates of anal cancer to the high proportion of gay men living in San Francisco.¹⁹ We did not have data available on the rate of human immunodeficiency virus (HIV) infection, which is higher among gay men, and may have contributed to the significant association of cancer prevalence and sexual orientation. HIV infection has been linked to certain cancers, both acquired immune deficiency syndrome (AIDS)-defining cancers (Kaposi sarcoma and non-Hodgkin lymphoma) and non-AIDS-defining cancers, which are anal, lung, and testicular cancer and Hodgkin lymphoma.^{20,21} Our study, which indicates that gay men report the least amount of prostate cancer, is consistent with epidemiological studies linking HIV infection to lower rates of prostate cancer, including men who have sex with men.²²

Among women, cancer prevalence did not differ by sexual orientation. However, we were able to show that lesbians had the highest rate of uterine cancer. Bisexual women were the least likely group to report a diagnosis of uterine cancer, yet they reported most often a diagnosis of cervical cancer, identifying bisexual women as a new risk group for cervical cancer. Current information indicates a higher incidence of cervical cancer in California than

many other US states.²³ Within California, the groups with the highest incidence of cervical cancer are Latinas and poor women.²⁴ Given the existence of a screening test for cervical cancer, the Papanicolaou test, our findings suggest a need to target bisexual women with screening interventions to reduce the prevalence of cervical cancer in this population.

When we focused on the self-reported health perception of cancer survivors, the pattern reversed, in that sexual orientation significantly impacted the health perception of women, but not men. These results expand previous reports that profiled the demographic characteristics of the cancer population using responses to the National Health Interview Survey.^{9,10,25} Comparisons of cancer survivors to populations without cancer concluded that after adjusting for other characteristics, cancer survivors are more than twice as likely to report fair or poor health.⁹ Our study finds that after adjusting for other characteristics, lesbian and bisexual female cancer survivors have 2.0 and 2.3× the odds of reporting fair or poor health compared with heterosexual female cancer survivors. Therefore, the magnitude of sexual orientation's effect on self-reported health among female cancer survivors is similar to the effect of having a cancer history in the general population.

Despite this study's novelty and advantages, several limitations need consideration. This study's findings only represent California, making it inappropriate to conclude that these findings adequately represent lesbian/gay/bisexual cancer survivors in the United States. The demographic characteristics of the lesbian and gay respondents of the California Health Interview Survey, who were more likely to report white race, more advanced education, and higher income compared with heterosexual responders, may raise the question of whether they are representative of the lesbian/gay/bisexual population. Consistently population-based studies show higher educational levels for gays and lesbians, suggesting this may be a reflection of the educational attainment of lesbian/gay/bisexual populations and not a selection bias.²⁶ Nevertheless nonresponse by sexual orientation has not been thoroughly evaluated in the California Health Interview Survey. Furthermore, because sexual orientation has not been consistently assessed for older respondents, those older than 65 and 70 years of age, these findings do not represent the older population well. We relied on participants' self-reported cancer diagnosis, which may include biases. A prior comparison of prevalence estimates from cancer registry data to self-reported cancer diagnoses in the National Health Interview Survey indicated that cancer is underreported by respondents,²⁵ which may also apply to California Health Interview Survey respondents. Moreover, this prior study also pointed to sex differences, with men having higher rates of underreporting a cancer diagnosis than women.²⁵ Because sexual orientation data are not collected by cancer registries, similar comparisons cannot be made by sexual orientation; therefore, the amount of underreporting by sexual orientation is unknown. Finally these data only address self-reported survivorship; therefore, they do not adequately reflect cancer incidence. Survivorship data have an inherent selection bias, in that those diagnosed with late stage and those with a cancer diagnosis that has a short survival time are less likely to be represented among a sample of cancer survivors, because they have died or are too sick for survey participation.

Despite these limitations, these analyses of the California Health Interview Survey data provide an extraordinary source of population-based information about cancer survivorship by sexual orientation. They provide unique findings in light of the absence of cancer surveillance by sexual orientation in registries. These novel findings with respect to sexual orientation can be used to set priorities for lesbian/gay/bisexual populations with

respect to cancer, and inform the need for and the design of programs and services to assist these cancer survivors. Specifically for men, the greatest need is for interventions that target cancer prevention in gay men, given the disparity by sexual orientation in cancer prevalence. Our study indicates for women the greatest need is for interventions that target lesbian and bisexual cancer survivors to improve their health perceptions. Future research will need to identify the reasons for lesbian and bisexual cancer survivors' worse health perceptions to facilitate the development of appropriate interventions. Further explanations for the sex differences of the sexual orientation and cancer survivorship associations cannot be drawn from the California Health Interview Survey data; rather, we need other data sources to identify possible factors, such as discrimination, social support, coping, or the patient-physician relationship.

CONFLICT OF INTEREST DISCLOSURES

U. Boehmer has funding from the American Cancer Society grant # RSGT-06-135-01-CPPB to focus on sexual orientation disparities in the adjustment of breast cancer survivors. The analyses presented here were conducted in this context. There is no conflict of interest for any of the authors.

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