

Risk of Breast Cancer Mortality Among Women Cohabiting with Same Sex Partners: Findings from the National Health Interview Survey, 1997–2003

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Abstract

Background: Lesbians and bisexual women are more likely than other women to evidence a unique mix of common breast cancer risk factors. It is not known if this results in greater breast cancer mortality risk. We investigate possible sexual orientation-related differences in risk for fatal breast cancer in a large representative U.S. sample of married and cohabiting women.

Methods: Between 1997 and 2003, the National Health Interview Survey (NHIS) interviewed married or cohabiting female participants, aged 18–80 years inclusively, who reported either a male ($n=136,174$) or female ($n=693$) coresidential relationship partner. These records are linked to the National Death Index to provide information on mortality status as of December 31, 2006. Employing these data, we estimated the age-adjusted relative risk (RR) and its 95% confidence interval (CI) for mortality attributed to breast cancer using a Cox proportional hazard model.

Results: Women in same-sex couples, compared to women in different-sex relationships, had greater age-adjusted risk for fatal breast cancer (RR=3.2, CI 1.01-10.21) but did not differ in their overall risk for mortality.

Conclusions: Our findings provide tentative support that sexual orientation is differentially linked to risk of fatal breast cancer. These findings underscore the need to investigate further breast cancer morbidity and mortality risk among women with minority sexual orientation.

Introduction

WHETHER LESBIANS AND BISEXUAL women experience greater risk for breast cancer compared to women in general is a continuing debate.¹ Over the years, researchers have observed that sexual minority women, as a whole, are more likely to experience a multidimensional constellation of common risk factors² that, in sum, may increase their risk for developing breast cancer.³ One dimension is reproduction related, where sexual minority women experience higher rates of nulliparity, lower rates of abortion, fewer pregnancies, lower rates of breastfeeding, and older age at first childbirth compared to heterosexual women.^{4–6} A second dimension involves behavioral risk factors. Here, it has been observed that sexual minority women report more frequent alcohol consumption and tobacco use and higher rates of obesity.^{6–14} A third dimension reflects possible difficulties in access to and use of early detection methods, such as breast

self-examination, clinical breast examination and mammograms, although the evidence for this third dimension is somewhat mixed.^{4,6,9,15}

Direct findings of anticipated elevated breast cancer risk among sexual minority women, however, are relatively lacking in the research literature. This reflects the dearth of studies on lesbian health in general and, more specifically, the fact that tumor registry records do not record sexual orientation.¹⁶ Findings from the two population-based studies reported to date are suggestive that elevated risk for breast cancer may not be present. In the first population-based study¹⁷ investigating possible associations between sexual orientation and breast cancer risk, Frisch et al. used data from 1,614 Danish women in registered same-sex domestic partnerships (RDP) who were followed up for an average of 4 years. These investigators did not observe a higher than expected incidence of breast cancer in women living in same-sex RDPs. However, the sample was relatively young (median

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age 37 years), whereas breast cancer is typically a disease of older women,¹⁸ undercutting the predictive use of these findings. In the second study,¹⁹ Boehmer et al. investigated self-reported prevalence of lifetime cancer diagnoses among women aged 18–70 years interviewed in the California Health Interview Survey (CHIS). They observed no differences in reports of lifetime breast cancer events linked to sexual orientation. Given the cross-sectional study design, these findings are reassuring but may nevertheless underestimate sexual orientation differences if breast cancer survivorship is strongly associated with sexual orientation. Thus, the question of whether sexual minority women experience greater risk for breast cancer remains unanswered.

Evidence for elevated risk might also be observed in greater risk for breast cancer mortality, but here, too, indicators of sexual orientation are not typically measured in studies with mortality outcomes, nor is sexual orientation reported on death certificates in the United States.⁷ Indeed, only one population-based study of mortality risk among sexual minority women worldwide has been published.²⁰ In that study, Danish women in same-sex RDPs evidenced somewhat elevated all-cause mortality rates over those of the general female population, but the underlying causes of death were not reported.

To investigate possible sexual orientation differences in risk for breast cancer mortality among women, we use information available from multiple years of the National Health Interview Survey (1997–2003 NHIS). These years of the NHIS recently have been linked by NHIS to up to 9 years of mortality follow-up. Although the NHIS does not assess individual's sexual orientation identity directly, persons living in same-sex partnerships can be identified through their self-reported relationships to household members.²¹ We use this information to compare breast cancer mortality experiences of married and cohabiting women, aged 18–80 years, who vary in the gender of their relationship partner.

Population and Methods

Source of the data

The NHIS is an annual, population-based household interview conducted by the National Center for Health Statistics (NCHS).²² Its purpose is to provide health information representative of the resident, civilian, noninstitutionalized U.S. population. Households are selected for participation by multistage area probability sampling methods. Each year, the NHIS conducts approximately 45,000 of these household-based interviews during which the marital status and gender of each resident adult (approximately 86,000 persons) are ascertained.

Although the National Health Interview Survey does not directly measure individuals' sexual orientation, it is possible to classify most married and cohabiting respondents by the gender of their relationship partner, provided the partner resides within the household. Using information available in the dataset, we identified unique dyads (both married and cohabiting) within families within households where both members of the couple resided. In the 7-year period of interest, 262,076 women, aged ≥ 18 years, were interviewed in the NHIS. Of these, 155,427 indicated that they were coresiding with either a cohabiting partner or a marital spouse. Nearly all ($n=155,150$) were in identifiable dyads. NHIS successfully

linked approximately 89% of these women ($n=138,464$) by either probabilistic or direct match to records in the National Death Index through December 31, 2006. Because mortality matches of individuals $>$ age 80 have somewhat lower levels of accuracy,²³ the current study limits its investigational sample to the 136,867 women who were aged 18–80 years inclusively at the time of interview. In the 1997–2003 NHIS, response rates for the household survey ranged from 87.6% to 91.8%.

Although mortality data are also available for individuals interviewed in the 2004 NHIS, we excluded this survey year from the current study. In 2004, changes by NHIS in methods for correcting anomalous values before public release led to decrements in the validity of same-sex partnership coding. Whereas in prior years $< 5\%$ of same-sex partnered individuals reported being legally married, in 2004 nearly 50% of all same-sex partnered individuals reported being legally married. Personal communication with NHIS staff revealed that many of these 2004 cases were probably miscoded in regard to gender of the respondent or the respondent's partner. Hence, the current study limits its focus to the cohort assessed in the years 1997–2003, where data quality has greater assurance. Further information on both the NHIS and the NHIS Linked Mortality Files is provided elsewhere.²²

Measures

Individual characteristics. We classified women into one of two groups: (1) presumptive heterosexual women who were either married ($n=124,823$) or cohabiting ($n=11,351$) with a male partner or (2) presumptive lesbian/bisexual women either married ($n=32$) or cohabiting ($n=661$) with a female partner. Given the changing landscape in America and elsewhere on the legality of same-sex marriage,²⁴ it cannot be determined if these 32 married women represented literal self-reports by NHIS respondents of married status or data coding inaccuracies or both. The NHIS dataset also includes information on women's demographic backgrounds. We coded age into three categories: 18–44 years, 45–64 years, and 65–80 years; race/ethnicity into non-Hispanic white vs. other; education into high school diploma or less vs. some college or more; and family income into above or below 200% of the Federal Poverty Level. Respondents were also coded for presence or absence of health insurance coverage at the time of the NHIS interview. The NHIS person file does not include information on other important breast cancer risk factors,³ such as genetic profile, family history of breast cancer, parity, or exogenous hormone exposure.

Mortality. The NHIS Linked Mortality Files include information on the vital status of NHIS respondents, aged ≥ 18 . For deceased respondents, the underlying, or primary, cause of death, if available, is coded into 1 of 113 cause-of-death categories using the ICD-10 classification system. For deaths occurring before 1999 when ICD-9 classifications were used, NCHS has recoded cause of death into the newer ICD-10-based categories. The current study classified women as fatal cases of breast cancer if their deaths were attributed to malignant neoplasm of the breast (ICD-10 code C50). Although attributions of underlying cause of death are vulnerable to misclassification, neoplasms in general are more likely to be coded correctly in death certificates compared to other causes of death, and among neoplasms, there is typically very high

agreement between hospital records and death certificates.²⁵ Total individual follow-up time was available in calendar quarters between the original NHIS interview and December 31, 2006, or death.

Data analysis

All analyses were conducted using SUDAAN 10,²⁶ and we employed both design information (strata and primary sampling units) and sampling weights.²² We first evaluated sexual orientation differences in both demographic backgrounds and insurance coverage using Wald chi-square tests. As well, we used Wald chi-square tests to investigate bivariate associations between sexual orientation and other individual characteristics and mortality status, both all-cause and that attributed to breast cancer. Possible sexual orientation differences in follow-up time were evaluated using linear regression. We then used Cox proportional hazard survival analysis methods to investigate sexual orientation-related differences in all-cause and breast cancer-related mortality. Because of the small sample size of women in same-sex partnerships and the relative rarity of mortality events, we limited our adjustments for possible confounding to the demographic and insurance characteristics described above. Confidence intervals (CIs) were estimated with 95% certainty; all significance tests were based on the criterion of $p < 0.05$. Because we used publicly available, anonymous data, this study was exempt from the UCLA Institutional Review Board requirements.

Results

Characteristics of sample

At the time of interview, approximately 0.5% (CI 0.46%-0.58%) of women cohabiting with a marital or relationship

partner indicated that their partner was another woman. The great majority of same-sex partnered women reported they were in a cohabiting relationship (Table 1). In contrast, most heterosexually partnered women were married ($p < 0.001$). On average, women in same-sex partnerships were somewhat younger than women in different-sex partnerships ($p < 0.001$), had obtained higher levels of education ($p < 0.001$), reported higher family incomes ($p < 0.05$), and were more likely to be without health insurance coverage ($p < 0.05$).

Estimates of mortality

By the end of 2006, 4,396 women (3.1% of the weighted sample, CI 3.0%-3.2%) had died, including 274 deaths from breast cancer. On average, women's mortality status was tracked for approximately 24.9 calendar quarters (CI 24.83-24.98) following their NHIS interview. This varied by sexual orientation even after adjusting for potential confounding ($p < 0.01$), with same-sex partnered women followed for approximately 4 months less than women in different-sex partnerships because of the increasing numbers of same-sex partnerships in the NHIS over time. In bivariate comparisons, deaths from any cause ($p = 0.10$) or breast cancer specifically ($p = 0.31$) did not differ significantly between women in same-sex or different-sex partnerships. However, age, race, educational attainment, family income, and health insurance coverage were strongly associated with number of deaths from any cause (all $p < 0.001$). Deaths from breast cancer in particular were strongly associated with age alone ($p < 0.001$).

Consistent with the bivariate analysis, confounding-adjusted estimates of all-cause mortality indicated that women living in same-sex partnerships compared to presumptive heterosexual women living in different-sex relationships did not differ significantly in their mortality risk during the follow-up period (adjusted hazard ratio [HR] 1.23, CI 0.66-2.32)

TABLE 1. DEMOGRAPHIC CHARACTERISTICS AND MORTALITY STATUS, AS OF DECEMBER 31, 2006, AMONG MARRIED/COHABITING U.S. WOMEN, AGED 18–80 YEARS, BY SELF-REPORTED GENDERS OF SPOUSAL OR COHABITING PARTNERS, NATIONAL HEALTH INTERVIEW SURVEY, 1997–2003

Characteristic	Female partner (n=693)		Male partner (n=136,174)		p
	%	(SE)	%	(SE)	
Demographic background					
Age, years at interview*					< 0.001
18–44	63.2	(2.5)	53.7	(0.2)	
45–64	33.9	(2.4)	34.8	(0.2)	
65–80	2.9	(0.8)	11.5	(0.1)	
Partnered status*	45.3	(7.6)	55.2	(1.6)	< 0.001
Married	4.6	(1.2)	91.9	(0.1)	
Cohabiting	95.4	(1.2)	8.1	(0.1)	
Non-Hispanic white	81.5	(2.0)	78.4	(0.3)	0.13
High school or less*	30.1	(2.3)	46.2	(0.3)	< 0.001
Family income below 200% of FPL*	17.0	(2.0)	21.8	(0.2)	0.02
Uninsured at time of NHIS interview*	15.6	(1.7)	12.2	(0.2)	0.04
Mortality status					
Mean quarters of follow-up*	23.6	(0.5)	24.9	(0.04)	0.002
Assumed dead by end of follow-up (December 31, 2006)	2.0	(0.6)	3.1	(0.05)	0.10
Breast cancer-attributed death	0.5	(0.3)	0.2	(0.01)	0.31

Demographic and mortality differences evaluated by a Wald chi-square test. Sexual orientation differences in follow-up calendar quarters evaluated by linear regression, adjusting for demographic confounding.

* $p < 0.05$.

FPL, Federal Poverty Level; NHIS, National Health Interview Survey; SE, standard error.

TABLE 2. ADJUSTED MORTALITY HAZARD RATIOS AS OF DECEMBER 31, 2006, AMONG MARRIED/COHABITING U.S. WOMEN, AGED 18–80 YEARS, BY SELF-REPORTED GENDER OF SPOUSAL OR COHABITING PARTNERS, NATIONAL HEALTH INTERVIEW SURVEY, 1997–2003

Predictor	Breast cancer-related mortality, HR (95% CI) ^a	All-cause mortality, HR (95% CI) ^a
Sexual orientation (referent male partner)		
Female partner	3.24 (1.01-10.37)*	1.23 (0.66-2.32)
Age (referent 18–44 years)		
45–64 years	4.53 (3.26-6.31)*	5.17 (4.67-5.73)*
65–80 years	7.92 (5.40-11.60)*	22.23 (20.17-24.50)*
Ethnicity/race (referent non-Hispanic white)		
Ethnic/racial minority	NA	1.04 (0.96-1.12)
Education (referent high school or less)		
Post-high school	NA	0.67 (0.62-0.72)*
Family income (referent ≥200% of Federal Poverty Level)		
Income below 200% of Federal Poverty Level	NA	1.48 (1.38-1.59)*
Health insurance (referent Has health insurance)		
No health insurance	NA	1.03 (0.92-1.16)

^aHazard ratios (HR) estimated by Cox proportional hazards survival analysis entering all predictors simultaneously.

* $p < 0.05$.

CI, confidence interval; NA, not applicable, predictor not in equation.

(Table 2). In a second model investigating risk specifically from breast cancer-related causes, however, findings suggest that women in same-sex partnerships are at elevated risk for breast cancer-related mortality (adjusted HR 3.21, CI 1.01-10.21, $p < 0.05$) compared to similarly coresident women in different-sex relationships.

Discussion

Concerns about a possible elevation in breast cancer risk among sexual minority women were raised more than a decade ago in an Institute of Medicine report.¹ This report outlined in detail the unique concentration of common breast cancer risk factors among lesbian and bisexual women resulting from differences in reproductive behaviors, lifestyle factors, and use of routine preventive screening methods. Since that time, additional studies^{4-6,8-15,21,27} have provided further support for these concerns. However, whether this concentrated pattern of breast cancer risk factors causes detectably higher rates of incident breast cancer for women with minority sexual orientation is unclear at this juncture. Two studies to date, one from a brief longitudinal study of relatively young women in Denmark¹⁷ and the other from a large cross-sectional study of potential breast cancer survivors,¹⁹ found no elevation of risk that was linked to sexual orientation. Lack of routine measurement of sexual orientation in many of the national health surveillance systems is the cause of this dearth of studies and has hampered public health's efforts to monitor health disparities that might affect lesbian and bisexual women.²⁸ In that regard, our findings provide important, though tentative, evidence that sexual minority women may, in fact, experience greater risk for breast cancer mortality. During up to a 9-year follow-up period, women first interviewed in the 1997–2003 NHIS who reported living with a same-sex relationship partner experienced a 3.2 times greater age-adjusted hazard of dying from breast cancer than did women who reported living with a male spouse or cohabiting relationship partner. This increased risk for breast cancer-related mortality, in partic-

ular, was not accompanied by an overall increase risk for mortality.

Several study limitations warrant consideration in conjunction with these results. One obvious concern is that the NHIS does not directly assess sexual orientation identity. Although estimates²⁹ suggest that perhaps 50%-60% of lesbian and bisexual women live in same-sex cohabiting relationships, many do not. Whether the risk for breast cancer mortality is equally shared among partnered and single lesbian and bisexual women is unknown. However, if partnered status confers protective benefit similar to that seen among married women compared to their unmarried counterparts,³⁰ we anticipate that breast cancer mortality may be somewhat higher among single, as opposed to partnered, women with minority sexual orientation. Nevertheless, generalizing our findings to that of lesbian and bisexual women in general should come with some caution.

A second, equally important concern is that the number of women in the NHIS who reported living in same-sex partnerships is small and the mortality follow-up period for the combined 7 years of NHIS surveys is as yet relatively short. This limited our ability to adjust for potential confounding factors that are known to covary with both sexual orientation and risk for breast cancer mortality, such as race/ethnicity, poverty, family and reproductive histories, obesity, and region of country.⁴ It is possible that with larger samples, longer follow-up, and better control for potential confounding that the reported findings might change. Third, differences in follow-up time linked to sexual orientation might have somewhat biased our estimates toward the null. Disclosure of minority sexual orientation in large health and social life surveys is increasing over time³¹ and is probably the source of these differences. Fourth, misclassification of some individual respondents' putative sexual orientation likely occurred, given the limits of NHIS public datasets. Because of the relatively lower proportion of same-sex partnered women in the sample, the effect of this misclassification would be most concentrated in the group classified as sexual minority, where an unknown proportion of women with male partners might

be incorrectly coded as having a same-sex partner. This, however, would tend to bias findings toward the null. Further, some women in same-sex couples may have reported their partner as a roommate out of privacy concerns, further complicating the generalizability of our results. Finally, differences in breast cancer-related mortality may or may not reflect differences in breast cancer incidence. If women with minority sexual orientation experienced somewhat later detection of incident breast cancer, mortality rates could be higher even in the face of similar or even lower incidence rates.

Despite these limitations, our findings contribute to an emerging literature linking minority sexual orientation and important health outcomes in women. We have documented sexual orientation-related differences in breast cancer mortality for at least one segment of this population: women in cohabiting same-sex partnerships. Some of the factors that might place lesbian and bisexual women at greater risk for breast cancer are modifiable at the individual or community level, such as reducing levels of alcohol consumption, reducing obesity,³² and encouraging effective use of early detection strategies.³³ Others may be modified by institutional changes in healthcare coverage²⁷ and provision of more tailored services to women with minority sexual orientation.^{34,35}

Tracking breast cancer risk among women with minority sexual orientation is dependent on adequate data systems that include the routine measurement of sexual orientation. Despite an awareness for more than a decade that lesbian and bisexual women are likely to experience increased risk for breast cancer, the United States currently lacks a public health data strategy to determine if this is so.

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Disclosure Statement

The authors have no conflicts of interest to report.

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