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Relationships between sexual identity, weight, and health in a population-based sample of California women

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Abstract

Background—Most biomedical research has reported associations between weight and physical health problems; little is known about whether those associations vary by sexual identity.

Methods—Pooled data from the 2003 through 2013 waves of the California Health Interview Survey was used to construct logistic regression models to examine whether the associations between weight and four chronic conditions (type 2 diabetes, hypertension, heart disease, and asthma) varied by sexual identity.

Results—A total of 97,720 heterosexual and 2,822 lesbian/bisexual women comprised the analytic sample. There was a significant interaction between weight status and sexual identity ($p < .001$) for all four chronic diseases. Among lesbian/bisexual women, weight status was positively associated with heart disease, hypertension, asthma and diabetes, although the associations between any weight status and heart disease, and between overweight and asthma were not statistically significant. Among heterosexual women, weight status was positively and significantly associated with heart disease, hypertension, asthma and diabetes. Except for overweight and heart disease, these associations remained significant after adjustment for covariates.

Conclusion—This study underscores the importance of disaggregating analyses by sexual identity in studies that examine weight-chronic disease associations.

Keywords

sexual identity; lesbian; bisexual; BMI; weight; chronic health disorders

In the past twenty years, studies have observed significant health disparities associated with minority sexual identification in the areas of mental health, physical health, substance use, and access to and quality of healthcare services (IOM, 2011). Research to highlight these disparities has been made possible with the addition of sexual identity questions to population health surveillance instruments; yet, collectively these studies tell a partial and fragmented story.

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Promoting healthy weight is a major public health policy goal in the United States, given that greater body weight has been associated with elevated likelihood of chronic diseases (Franks, Atabaki-Pasdar, 2017). However, the limited but growing body of research involving sexual minorities has primarily examined differences in either body weight or in health outcomes according to sexual identity. Less clear is whether the associations between body weight and chronic diseases vary according to sexual identity among women.

In relation to body weight, a recent systematic review of the literature (Eliason, Ingraham, Fogel, et al., 2015) identified 37 studies since 2006, with two-thirds of the studies finding statistically significant differences in weight between sexual minority and heterosexual women. In contrast, research on physical health among sexual minority women (Eliason, 2014) has not revealed any substantial evidence for elevations of any chronic physical health problems measured on typical health surveillance surveys, except for asthma. For example, a review of the literature found that out of ten studies, only one study found higher diabetes prevalence among sexual minority women (and only for women over 40). None of 12 studies that reported hypertension rates found higher prevalence in sexual minority women. A more recent study using the National Health Interview Survey, a population-based survey of U.S. adults, provided age-adjusted estimates of physical health disorders by sexual identity and found higher diabetes prevalence and cancer rates among lesbian/bisexual women, but reported no differences in heart disease and asthma between heterosexual and sexual minority women (Ward, Joestl, Galinsky, & Dahlhamer, 2015).

Given that sexual minority women typically have greater body weight than heterosexual women, we would expect higher likelihood of chronic disease among sexual minority women. The adverse effects of body weight on chronic diseases among sexual minority women may be masked by combining all body weight groups or by not explicitly consider variations in chronic disease and body weight within and between women based on sexual identity. To tease out differences in body weight and chronic disease patterns between sexual minority and heterosexual women, this study investigated whether the associations between body weight and chronic diseases varied by sexual identity using data from one of the largest state health surveys in the United States.

METHODS

Study population

Data were drawn from cross-sectional samples combining the 2003, 2005, 2007, 2009 and 2011–12 waves of the California Health Interview Survey (CHIS). Conducted biennially from 2001–2009 and annually since 2011, CHIS is a population-based random-digit dial telephone survey of civilian households. CHIS has been previously found to be comparable to estimates from National Center for Health Statistics surveys such as the Behavioral Risk Factor Surveillance System (BRFSS). Respondents were interviewed in English, Spanish, Mandarin, Cantonese, Vietnamese, or Korean in all waves. CHIS data are weighted to adjust for differential non-response and households without telephones. Respondents with any “other” ethnicity or multiple ethnicities, and/or had missing information on the covariates of interest were excluded from the analysis. The final analytic dataset included 100,542 adult females: 97,720 heterosexual and 2,822 lesbian or bisexual women, ranging in age from 18

to 70. Since the study involved de-identified secondary data, it was exempted from IRB review from the authors' academic institution.

Measures

Dependent variables—The dichotomous dependent variables included four chronic health outcomes: heart disease, hypertension, asthma and type II diabetes. These outcomes were assessed with the following questions: “Has a doctor ever told you that you have diabetes or sugar diabetes?” followed by “Were you told that you had Type 1 or Type 2 diabetes?” Questions for other conditions were “Has a doctor ever told you that you have [high blood pressure, heart disease, asthma]?” For descriptive purposes, we also created a continuous composite measure of chronic diseases by summing the presence of the four chronic diseases (range of 0 to 4).

Independent variables—Based on widely used standards, the CHIS reports body mass index (BMI), calculated as weight in kilograms divided by height in meters squared, using self-reported height and weight. Respondents were grouped using standard classifications as follows: underweight and normal weight (BMI <24.99 kg/m²), overweight (BMI 25–29.99kg/m²), obese class I (BMI 30–34.99kg/m²), and obese classes II & III (BMI 35+kg/m²). Because of small sample sizes, we grouped respondents in obese classes II and III, as well as underweight and normal weight categories. *Sexual identity* was defined by the following question: “Do you think of yourself as straight or heterosexual, as gay (lesbian) or homosexual, or bisexual?” Respondents over the age of 70 were excluded from this analysis, because data on sexual identity was not collected in this population.

Other covariates—CHIS collects race or ethnicity using the Office of Management and Budget race or ethnicity classifications: African American, Asian, Latino/Hispanic and White. Other racial or ethnic groups were excluded because of small sample sizes (fewer than 3.5% of the sample and too diverse to make meaningful inferences for this combined group). Other covariates in the analyses were age (in years as a continuous variable), nativity, marital status (married, separated/divorced/widowed, living with partner, never married), educational attainment (less than high school, completed high school, some college, college degree, some graduate school or higher), annual household income adjusted for household size, based on a standard measure previously employed in the Luxemburg income studies (Smeeding 2000; <\$15,000; \$15,001–\$30,000; \$30,001–\$50,000; \$50,001–\$75,000; \$75,001+) insurance status (currently uninsured, uninsured anytime during the past 12 months, and insured all past 12 months), current smoking status (defined as having smoked 100 or more cigarettes in a lifetime and currently smoke cigarettes daily or some days), and household smoking (smoking in the home none of the time, sometimes, or every day).

Statistical Analysis

We estimated rates of chronic diseases, weight status and distributions of other variables for the sample overall, and compared those by sexual identity, using chi-square statistics and t-tests to assess the statistical significance of any observed differences. To formally test whether the associations between weight status and each chronic disease varied significantly

by sexual identity, we used the overall sample to estimate an unadjusted logistic regression model with each of the chronic diseases (separately) as a dichotomous outcome and a cross-product term between the levels of weight status and sexual identity. We subsequently adjusted the model for demographic characteristics (age and marital status), socioeconomic factors (income adjusted for household size and educational attainment), insurance status, current smoking, household smoking, nativity and survey year. Following recommendations (Hennekens and Buring, 1987), we present the data and report results separately for each sexual identity group. All analyses were conducted using Stata statistical software, version 14.0, taking into account CHIS's complex sampling design. After pooling multiple cross-sectional cycles of CHIS data, weight variables generated by the University of California Los Angeles Center for Health Policy Research were adjusted to reflect the California population represented by the CHIS 2007 cycle. The variance of estimates was obtained through design-based jackknife replicate weights. Effects associated with p-values < 0.05 were considered statistically significant, including the tests of interaction.

RESULTS

Table 1 shows the sample characteristics for women overall and by sexual identity. There were significant differences between heterosexual and lesbian/bisexual women on most of the characteristics examined. The lesbian/bisexual women were younger, more likely to be U.S. born, and a higher proportion were White. A greater proportion of sexual minority women completed some graduate school or higher, and had income levels of more than \$75,000 per year than heterosexual women. On health measures, lesbian/bisexual women had slightly higher mean BMI, and a higher percentage of lesbian/bisexual women were classified as obese II & III categories relative to heterosexual women. There were no differences by sexual identity on mean number of chronic health conditions, but there were differences by individual health markers. Lesbian/bisexual women reported lower rates of type 2 diabetes and higher rates of asthma, but did not differ from heterosexual women on heart disease or hypertension. Nearly half of lesbian/bisexual women were current and ever smokers, and a higher proportion were exposed to household smoking. A slightly higher percentage of lesbian/bisexual women were food insecure, but a greater proportion had been insured in the past 12 months.

Table 2 shows the prevalence of chronic health problems by sexual identity and body weight categories. The rates of reporting each health condition were higher with greater levels of body weight for both lesbian/bisexual and heterosexual samples. For example, the percent of respondents reporting having type 2 diabetes for the lesbian/bisexual sample was 0.26% of underweight and normal weight women and 8.66% for those classified as obese II/III. Among heterosexual women, the prevalence of diabetes was highest (16%) for those who were classified as obese II/III.

The association between body weight and each of the four chronic diseases varied significantly according to sexual identity ($p < .001$ for all tests of interactions). Although there was a positive association between weight status and the likelihood of chronic disease among both heterosexual and sexual minority women, the patterns of association differed in

terms of magnitude and statistical significance. Table 3 provides analysis data for heart disease, hypertension, asthma and diabetes separately as described below.

Heart Disease

Among heterosexual women, overweight, obese class I, and obese class II/III women had higher likelihoods of reporting heart disease (OR: 1.34, 1.84, and 2.27 respectively) relative to their normal weight counterparts, with those in the heaviest body weight groups (class II and III) having the highest likelihood of reporting heart disease. After controlling for demographics, socioeconomic factors, smoking, and insurance status, the associations diminished in magnitude but remained significant, except for overweight women for whom the likelihood of heart disease became null and non-significant (adjusted OR, 1.0; 95% CI, 0.87–1.14). Among lesbian/bisexual women, weight status was positively but not significantly associated with heart disease in adjusted and unadjusted models (adjusted OR, 1.38 [95% CI, 0.68–2.78] for overweight; adjusted OR, 2.18 [95% CI, 0.69–6.89] for obese class I; and adjusted OR, 1.42 [95% CI, 0.70–2.96] for obese class II & III women relative to underweight/normal weight women).

Hypertension

The weight status-hypertension association was positive and significant, and diminished in magnitude, but remained significant, after controlling for covariates among both sexual identity groups. Among heterosexual women, relative to those in the normal weight range, the likelihood of hypertension was significantly higher with each increasing weight classification, and was highest among women in obese II and III groups. After adjustment for covariates, overweight (OR, 1.91; 95% CI, 1.78–2.04), obese class I (OR, 2.97; 95% CI, 2.74–3.22) and obese class II/III women (OR, 4.78; 95% CI, 4.33–5.27) were more likely to report having been diagnosed with hypertension than their heterosexual peers. Among lesbian/bisexual women, the likelihood of hypertension was also higher among overweight (OR, 1.93; 95% CI, 1.22–3.07), obese class I (OR, 3.93; 95% CI, 2.32–6.65) and obese class II/III women (OR, 4.79; 95% CI, 2.62–8.72), compared with underweight/normal weight counterparts.

Asthma

Among heterosexual women, body weight was positively and significantly associated with asthma; overweight (OR, 1.23; 95% CI, 1.14–1.33), obese class I (OR, 1.63; 95% CI, 1.48–1.78) and obese class II/III women (OR, 2.18; 95% CI, 2.02–2.47) were each 23%, 63% and 118% respectively more likely to report asthma relative to their underweight/normal weight peers after adjustment for covariates. Although increasing weight status was positively associated with asthma among lesbian/bisexual women, overweight was not significantly associated with asthma in unadjusted and adjusted models (Adjusted OR, 1.16; 95% CI, 0.79–1.70). Obese class I (Adjusted OR, 1.61; 95% CI, 1.04–2.51) and obese class II/III women (Adjusted OR, 1.91; 95% CI, 1.28–2.85) were each more likely to report asthma diagnosis than underweight/normal weight lesbian/bisexual women.

Diabetes

Greater body weight was associated with greater likelihoods of type 2 diabetes for both sexual identity groups. Among heterosexual women, weight status was strongly and significantly associated with elevated likelihood of diabetes before and after adjustment for covariates; relative to underweight/normal weight women, overweight (Adjusted OR, 2.87; 95% CI, 2.46–3.36), obese class I (Adjusted OR, 5.54; 95% CI, 4.77–6.43) and obese class II/III women (Adjusted OR, 9.40, 95% CI, 7.92–11.15) were significantly and many times more likely to report diabetes. There was a pronounced increase in diabetes for lesbian/bisexual women in the obese II/III categories (OR 26.6); however, these results should be interpreted with caution given small cell sizes in this group.

DISCUSSION

We found that the association between weight and each of the four chronic diseases studied (heart disease, hypertension, asthma and diabetes) varied significantly by sexual identity. The most pronounced difference in associations was for heart disease; among heterosexual women, there was a monotonic pattern of association with weight increases significantly associated with higher likelihoods of heart disease; unadjusted odds ratios ranged between 1.34 and 2.27. After covariate adjustments, overweight was no longer significantly associated with heart disease. However, among lesbian/bisexual women the pattern of association appeared quadratic, with elevated likelihoods of heart disease among overweight (OR 1.71) and obese class I women (OR 2.82) and higher likelihood (though in smaller magnitude) among obese class II/III women. However, none of the body weight categories were significantly associated with heart disease before or after adjustment for covariates. The lack of a significant association between weight and heart disease among sexual minority women may be partly explained by recent research that observed lesbian/bisexual women had a higher quality diet with lower glycemic index compared with heterosexual women (VanKim, Austin, Jun, Hu, & Corliss, 2016). Future research should examine whether diet quality may explain differential weight-heart disease associations among heterosexual and sexual minority women.

When women were examined by sexual identity without considering weight status, lesbian/bisexual women had greater prevalence of asthma, but not diabetes, heart disease or hypertension. However, when we examined the combined associations between weight status and sexual identity, greater body weight was associated with elevated likelihoods of chronic disorders among both groups of women, though the statistical significance and magnitude of the associations differed somewhat between the two groups. Relatively recent studies have reported lower rates or no difference in diabetes rates in lesbian/bisexual women compared to heterosexuals, though lesbian women tend to have higher rates of elevated body mass (e.g. Eliason, 2014; Simoni, Smith, Oost, Lehavot, & Fredriksen-Goldsen, 2017; Ward et al., 2015). Our study adds to this body of work by observing that within sexual minority women, weight status is positively and significantly associated with hypertension, asthma and diabetes. This finding highlights the need to examine chronic disease patterns for sexual minority women separately. Small sample size among sexual

minority women in the highest weight classifications are of concern, thus the diabetes findings should be interpreted with caution.

The high rates of asthma among lesbian/bisexual women found in this study are consistent with previous reports (Blosnich, Farmer, Lee, et al, 2014; Boehmer, Miao, Linkletter, & Clark, 2014; Dilley, Simmons, Boysum, et al., 2010; Fredriksen-Goldsen, Kim, Barkan et al, 2013) and warrants additional research. In one nationally representative dataset, women with same sex partners were more likely to report asthma if they were overweight or obese with an OR of 7.13 for overweight/obese same-sex partnered women compared to 1.58 for overweight/obese women with other-sex partners (Blosnich, Lee, Bossarte, et al, 2013). Our study found that relative to normal weight women, overweight status was not significantly associated with likelihood of asthma among sexual minority women (adjusted OR, 1.16).

Many authors have proposed theoretical models for understanding health disparities in sexual minority populations. The most often cited theory hypothesizes that minority stress may be implicated in the higher rates of substance abuse and mental health disorders among lesbian/bisexual women (Feinstein, Goldfried, & Davila, 2012; Lehavot & Simoni, 2011; McCabe, Bostwick, Hughes, West, & Boyd, 2010), as well as physical health outcomes (Frost, Lehavot, & Meyer, 2015). Minority stress (Meyer, 2003) stems from societal stigma related to different sexual identities, and has internal (shame, guilt, fear) and external (discrimination, harassment, invalidation, rejection) components. The CHIS had no questions that would allow us to examine minority stress, so this area requires further study. A more recent, theoretical framework that warrants additional empirical work, the Health Equity Promotion model, expands on minority stress by attending to resilience and life course development as well as stress and risk factors (Fredriksen-Goldsen, Simoni, Kim, et al, 2014). In our study, we were able to control for some factors that can promote resilience, such as education and income, but these did not appear to substantially influence our findings. Studies that collect more information about individual, interpersonal, community and structural forms of risk and resilience are needed. Finally, intersectionality, the idea that multiple oppressed minority identifications may produce unique effects rather than being additive, has been promoted as a lens for viewing health disparities (Bowleg, 2008, 2012). Yet, there are considerable methodological challenges in conducting intersectional research, including a need for significantly larger sample sizes and available population-based data that includes robust samples of diverse women and sexual identity indicators.

There are several limitations to this study that highlight challenges in better understanding women's health overall, but particularly that of sexual minority women given the scarcity of research in this group. Although combining several years of survey data yielded a large sample of sexual minority women, it was necessary to combine lesbian and bisexual groups to obtain sufficient cell sizes to classify women based on both BMI status and sexual identity. Some studies report differences in the magnitude of adverse health outcomes for bisexual women compared to lesbian women (Bostwick, 2012; Coulter, Kinsky, Herrick, Stall, & Bauermeister, 2015; Dahlhamer, Galinsky, Joestl, & Ward, 2016; Fredriksen-Goldsen, Kim, Barkan, Balsam, & Mincer, 2010) although these differences are sometimes quite small (Bostwick, Hughes, & Everett, 2015).

We did not have sufficient power to further examine potential differences by race/ethnicity or other characteristics known to influence health status, although we did adjust for race/ethnicity in the analyses. Very large numbers are needed for the type of analysis that would allow us to consider the intersections of oppressed minority identities by race/ethnicity, socioeconomic, or immigrant status along with sexual identity (Hsieh & Ruther, 2016). We were also limited by the questions available on the CHIS, and by the use of BMI as the weight measure, given its limitations as an indicator of body fat. Tomiyama, Hunger, Nguyen-Cuu, & Wells (2016) found that half of overweight, 29% of obese, and 16% of individuals categorized as obese II/III had no signs of cardio-metabolic disease, whereas 30% of normal weight individuals, were unhealthy. Nevertheless, despite these limitations, CHIS is one of the most comprehensive health surveys in the nation, and has a large and diverse sample of adults from California, the most populous and one of the most diverse states in the nation. This study and others reported in the literature, confirm that body weight is associated with some health problems, but association is not causation, and increased weight may be a consequence of other problems, not the immediate cause of health conditions (Lustig, Schmidt & Brindis, 2012). Indeed, some investigators have postulated that being overweight may be a protective factor for some health problems (Amundson, Djurkovic, & Matwiyoff, 2010; Childers & Allison, 2010; Curtis, 2005) and is associated with similar mortality compared with normal weight individuals (Flegal et al., 2013). Genetic variations in body size and shape have been pathologized by an overly thin-conscious society. Health problems, both mental and physical, can be caused or exacerbated by weight stigma and discrimination that occurs in a fat-phobic society, and that may lead to unhealthy weight cycling or eating disorders (Bacon & Aphramor, 2011; Major, Hunger, Bunyan, & Miller, 2014). Unhealthy weight management strategies and/or psychological responses to weight stigma may also contribute to negative health outcomes than weight alone.

Implications for Practice and/or Policy

A growing body of evidence, called the Obesity Paradox, challenges whether weight or BMI are good predictors of body fat (Bacon & Aphramor, 2011; Campos et al., 2006; Flegal et al., 2013). Some authors propose that social determinants of health such as structural inequalities, societal stigma, and environmental factors are more critical than individual factors in determining health status among lesbian and bisexual women (Elliason & Fogel, 2015). In sexual minority women's communities, there have been conscious efforts to reclaim "natural" bodies and defy mainstream society body standards (that typically emphasize thinness). A few studies find that some sexual minority women reject thinness as a heterosexual body standard, have higher levels of body satisfaction, and are more likely to be involved in fat positive movements than heterosexual women (Rothblum, 2014). These body acceptance activities may promote positive social norms about women's body satisfaction and protect against weight shaming, weight discrimination and stigma, dieting, weight cycling, and eating disorders (Morrison et al, 2004; Rothblum, 2002; Yost & Chmielewski, 2011). Many of these factors that might be stronger drivers of chronic health problems like diabetes and heart disease than body weight alone (Bacon & Aphramor, 2011) have not been examined systematically using population-based data disaggregated by sexual identities. Rather than focusing on individual-level factors, we call for more

ecological considerations of lesbian/bisexual women's health that take into account social determinants of health as well as intersections of oppressed minority identities that complicate the health status of these populations. Only when we deeply understand the mechanisms of negative health outcomes in these understudied groups, can we develop structurally relevant and culturally sensitive, respectful interventions that successfully promote health and prevent disease.

Conclusions

We found that the associations between body weight and the likelihood of chronic diseases varied by sexual identity, with differences most pronounced by the non-significant association between weight and heart disease among sexual minority women. This study highlights the need to disaggregate analyses by sexual identity and weight status in studies of chronic disease among women. Additional research is needed to better understand the full spectrum of influence on physical health among both lesbian/bisexual and heterosexual women.

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Table 1.

Characteristics of the sample overall and according to sexual identity, California Adult Women, 2003 – 2011.[‡]

| | Women Overall (n=100,542) | Heterosexual (n=97,720) | Lesbian/Bisexual (n=2,822) |
|---|------------------------------|-----------------------------|-------------------------------|
| | Mean (SE) ^a or % | Mean (SE) ^a or % | Mean (SE) ^a or % |
| Age in years *** | 41.3 (.084) | 41.4 (.085) | 37.1 (.394) |
| US-born *** | 65.3 | 64.9 | 82.6 |
| Marital status *** | | | |
| Married with partner | 62.8 | 63.2 | 49.1 |
| Widowed, separated or divorced | 15.2 | 15.3 | 13.5 |
| Never married | 21.9 | 21.5 | 37.4 |
| Education *** | | | |
| Less than high school | 16.3 | 16.5 | 10.4 |
| High school or equivalent | 23.6 | 23.7 | 20.1 |
| Some college | 26.4 | 26.3 | 30.0 |
| College | 21.2 | 21.2 | 21.6 |
| Some graduate school or higher | 12.6 | 12.4 | 17.9 |
| Race/Ethnicity *** | | | |
| Hispanic | 33.9 | 34.0 | 29.4 |
| White, Non-Hispanic | 46.0 | 45.7 | 56.7 |
| African American, Non-Hispanic | 6.3 | 6.3 | 7.3 |
| Asian, Non-Hispanic | 13.8 | 14.0 | 6.6 |
| Equivalentized annual income ^{*d} | | | |
| Less than \$15,000 | 29.4 | 29.4 | 28.7 |
| \$15,001-\$30,000 | 21.6 | 21.7 | 20.9 |
| \$30,001-\$50,000 | 20.4 | 20.4 | 18.2 |
| \$50,001-\$75,000 | 14.3 | 14.3 | 14.3 |
| More than \$75,001 | 14.3 | 14.2 | 17.9 |
| WHO Weight Classification ***^c | | | |
| Underweight/Normal | 51.9 | 52.0 | 47.9 |
| Overweight | 26.8 | 26.8 | 25.7 |
| Obese I | 12.6 | 12.6 | 13.6 |
| Obese II & III | 8.8 | 8.6 | 12.9 |
| Mean BMI *** | 26.3 (0.04) | 26.3 (0.04) | 27.1 (0.2) |
| Mean No. of chronic conditions (Heart Disease, Hypertension, Type 2 Diabetes, Asthma) | .428 (.004) | .427 (.003) | .467 (0.21) |
| Heart Disease | 3.9 | 3.9 | 3.7 |
| Hypertension | 20.3 | 20.4 | 18.3 |
| Asthma *** | 14.2 | 14.0 | 22.0 |
| Type 2 Diabetes *** | 4.8 | 4.8 | 2.9 |

| | Women Overall (n=100,542) | Heterosexual (n=97,720) | Lesbian/Bisexual (n=2,822) |
|--|------------------------------|-----------------------------|-------------------------------|
| | Mean (SE) ^a or % | Mean (SE) ^a or % | Mean (SE) ^a or % |
| Smoking | | | |
| Current smoking habits ^{***} | | | |
| Currently smokes | 11.7 | 11.4 | 24.6 |
| Quit smoking | 17.5 | 17.4 | 24.0 |
| Never smoked regularly | 70.7 | 71.3 | 51.4 |
| Household smoking (partner smoke) ^{***} | | | |
| None | 92.9 | 93.0 | 88.8 |
| Somedays | 3.2 | 3.2 | 4.3 |
| Everyday | 3.9 | 3.8 | 6.9 |
| Food Security ^{***} | | | |
| Inapplicable (Over 200% of FPL) | 65.2 | 66.0 | 65.2 |
| Food security | 21.0 | 21.1 | 15.8 |
| Food insecure without hunger | 8.9 | 8.9 | 10.0 |
| Food insecure with hunger | 4.9 | 4.8 | 4.9 |
| Health Insurance ^{**} | | | |
| Currently uninsured | 16.3 | 19.0 | 16.4 |
| Uninsured anytime during past 12 months | 5.7 | 5.7 | 7.8 |
| Insured all past 12 months | 78.0 | 73.2 | 77.9 |

‡ Data were pooled and reweighted. Thus, the above estimates reflect the state’s population in 2008, the midpoint of the pooled five years of CHIS data.

* $p < 0.05$

** $p < 0.01$

*** $p < 0.001$.

P values are for comparisons of each characteristic according to sexual identity.

^a Unless otherwise noted as mean and (standard error).

^b Based on chi square and t-tests.

^c Based on WHO cut points: Underweight/Normal BMI < 25.0; Overweight = 25–29.99; Obese Class I = 30.0–34.99; Obese Class II & III >35.0.

^d Total annual household income divided by the square root of household size. OECD (2008), *Growing Unequal? Income Distribution and Poverty in OECD Countries*, Paris; OECD (2011), *Divided We Stand – Why Inequality Keeps Rising*, Paris. (www.oecd.org/social/inequality.htm / www.oecd.org/fr/social/inegalite.htm)

Table 2.

Prevalence of chronic health conditions according to weight status, overall and by sexual identity; California Adult Women, 2003 – 2011.[‡]

| | Overall Sample (n=100,542) | Heterosexual (n=97,720) | Lesbian/ Bisexual (n=2,822) |
|-----------------------------|----------------------------|-------------------------|-----------------------------|
| | % | % | % |
| <i>Heart Disease</i> | | | |
| Underweight/Normal | 2.98 | 3.0 | 2.45 |
| Overweight | 3.98 | 3.98 | 4.09 |
| Obese class I | 5.4 | 5.36 | 6.58 |
| Obese II & III | 6.45 | 6.54 | 4.41 |
| X ² test p-value | *** | *** | ns |
| <i>Hypertension</i> | | | |
| Underweight/Normal | 11.52 | 11.58 | 9.36 |
| Overweight | 23.76 | 23.88 | 19.17 |
| Obese class I | 33.0 | 32.98 | 33.68 |
| Obese II & III | 43.71 | 44.03 | 36.25 |
| X ² test p-value | *** | *** | *** |
| <i>Asthma</i> | | | |
| Underweight/Normal | 12.04 | 11.86 | 18.86 |
| Overweight | 13.84 | 13.65 | 20.57 |
| Obese class I | 17.66 | 17.32 | 28.61 |
| Obese II & III | 23.0 | 22.71 | 29.75 |
| X ² test p-value | *** | *** | ** |
| <i>Type II Diabetes</i> | | | |
| Underweight/Normal | 1.43 | 1.47 | 0.26 |
| Overweight | 5.31 | 5.33 | 4.38 |
| Obese class I | 9.81 | 9.99 | 4.18 |
| Obese II & III | 15.79 | 16.09 | 8.66 |
| X ² test p-value | *** | *** | *** |

* $p < 0.05$

** $p < 0.01$

*** $p < 0.001$

ns = not significant

[‡] California Health Interview Survey Pooled data from 2003–2011. Estimates reflect the state’s population in 2008, the midpoint of the pooled five years of CHIS data.

p values are based on chi square tests for the overall sample, and within each of the sexual identity groups.

Weight status categories are based on WHO cut points: Underweight/Normal= BMI < 25.0; Overweight = 25–29.99; Obese Class I = 30.0–34.99; Obese Class II & III > 35.0.

Table 3.

Estimated odds ratios and 95% confidence intervals comparing the odds of each chronic disease^a among overweight and obese women relative to normal weight women, by sexual identity, California Adult Women 2003 – 2011.^b

| | Heterosexual | | Lesbian/Bisexual | |
|----------------------------------|--------------|-----------|------------------|------------|
| | OR | 95% CI | OR | 95% CI |
| Heart Disease | | | | |
| Unadjusted | | | | |
| Underweight/Normal weight (ref) | 1.0 | - | 1.0 | - |
| Overweight | 1.34 | 1.17–1.54 | 1.71 | .86–3.37 |
| Obese class I | 1.84 | 1.58–2.15 | 2.82 | .93–8.48 |
| Obese II & III | 2.27 | 1.94–2.67 | 1.88 | .91–3.87 |
| Adjusted ^c | | | | |
| Underweight /Normal weight (ref) | 1.0 | - | 1.0 | - |
| Overweight | 1.00 | .87–1.14 | 1.38 | .68–2.78 |
| Obese class I | 1.28 | 1.09–1.50 | 2.18 | .69–6.89 |
| Obese II & III | 1.48 | 1.25–1.76 | 1.43 | .70–2.96 |
| Hypertension | | | | |
| Unadjusted | | | | |
| Underweight/Normal weight (ref) | 1.0 | - | 1.0 | - |
| Overweight | 2.39 | 2.24–2.55 | 2.28 | 1.47–3.53 |
| Obese class I | 3.75 | 3.47–4.05 | 4.85 | 3.05–7.69 |
| Obese II & III | 5.98 | 5.49–6.52 | 5.43 | 3.32–8.90 |
| Adjusted ^c | | | | |
| Underweight /Normal weight (ref) | 1.0 | - | 1.0 | - |
| Overweight | 1.91 | 1.78–2.04 | 1.93 | 1.22–3.07 |
| Obese class I | 2.97 | 2.74–3.22 | 3.93 | 2.32–6.65 |
| Obese II & III | 4.78 | 4.33–5.27 | 4.79 | 2.62–8.72 |
| Asthma | | | | |
| Unadjusted | | | | |
| Underweight /Normal weight (ref) | 1.0 | - | 1.0 | - |
| Overweight | 1.17 | 1.09–1.26 | 1.11 | .75–1.63 |
| Obese class I | 1.55 | 1.42–1.70 | 1.71 | 1.11–2.64 |
| Obese II & III | 2.18 | 1.98–2.40 | 1.81 | 1.20–2.75 |
| Adjusted ^c | | | | |
| Underweight /Normal weight (ref) | 1.0 | - | 1.0 | - |
| Overweight | 1.23 | 1.14–1.33 | 1.16 | .79–1.70 |
| Obese class I | 1.62 | 1.48–1.78 | 1.61 | 1.04–2.51 |
| Obese II & III | 2.24 | 2.02–2.47 | 1.91 | 1.28–2.85 |
| Type II Diabetes | | | | |
| Unadjusted | | | | |
| Underweight /Normal weight (ref) | 1.0 | - | 1.0 | - |
| Overweight | 3.77 | 3.22–4.41 | 16.96 | 6.80–42.32 |

| | Heterosexual | | Lesbian/Bisexual | |
|----------------------------------|-----------------------|-------------|------------------|-------------|
| | OR | 95% CI | OR | 95% CI |
| Obese class I | 7.44 | 6.46–8.56 | 15.88 | 6.64–37.94 |
| Obese II & III | 12.81 | 11.01–14.89 | 34.64 | 14.80–81.09 |
| | Adjusted ^c | | | |
| Underweight /Normal weight (ref) | 1.0 | - | 1.0 | - |
| Overweight | 2.87 | 2.46–3.36 | 12.97 | 5.18–32.49 |
| Obese class I | 5.54 | 4.77–6.43 | 11.84 | 4.88–28.68 |
| Obese II & III | 9.40 | 7.92–11.15 | 26.65 | 11.35–62.55 |

^aBased on whether the doctor had ever diagnosed the participant with each of these chronic conditions.

^bCalifornia Health Interview Survey, Pooled data from 2003–2011.

^cEstimated odds ratios are based on logistic regression models adjusted for education, income adjusted for household size, insurance status in the past 12 months, age (centered at its mean), marital status, personal smoking habits, household smoking, nativity, and survey year, and include an interaction term between weight status and sexual identity.

Models are weighted to account for complex sample design of CHIS.

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