Awareness of breast cancer risk related to a positive family history and alcohol consumption among women aged 15–44 years in United States

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ABSTRACT

Awareness of the link between breast cancer and risk factors such as family history of breast cancer and alcohol consumption may help modify health behaviors. To reduce risk factors for breast cancer among young women, it is important to understand overall levels of risk awareness and socioeconomic differences in awareness. Data from the National Survey of Family Growth 2011–2015 were used to examine awareness of two risk factors for breast cancer, positive family history and alcohol consumption, among women aged 15–44 years (n = 10,940) in the United States by presence of risk factors and by socioeconomic characteristics. Prevalence of positive family history, non-binge, and binge drinking was 30%, 29%, and 31%, respectively among women aged 15–44. Awareness of positive family history of breast cancer as a risk factor for breast cancer was 88%, whereas for alcohol consumption it was 25%. Awareness of family history as a risk factor was higher among women with positive family history of breast cancer compared to those without. Current drinkers were more likely to believe that alcohol was not a risk factor for breast cancer compared to those who did not drink. Racial/ethnic minority women and those with lower education and income had lower awareness of family history as a risk factor. Awareness of alcohol consumption as a risk factor for breast cancer was low across all socioeconomic groups. Evidence-based interventions to increase risk awareness and decrease excessive alcohol use among young women are needed to reduce the risk of developing breast cancer.

1. Introduction

In 2017, over 252,700 new cases of invasive breast cancer were diagnosed among American women, and nearly 9.7% of these cases were young women under age 45 years (CDC Wonder, 2018; Centers for Disease Control and Prevention, 2017). Breast cancer among young women is a heterogeneous disease, and incidence rates are very low before age 40 (Shoemaker et al., 2018). However, in order to disrupt the etiological pathway from susceptibility to clinical manifestation, it is important to control known breast cancer risk factors early in life (Burak and Boone, 2008). Family history of breast cancer and individual alcohol consumption are known risk factors for breast cancer (World Cancer Research, 2007). Alcohol consumption is a risk factor for breast cancer even at low to moderate levels of consumption (Cao et al., 2015; Bagnardi et al., 2015). The 2015–2020 U.S. Dietary Guidelines for Americans recommends that if alcohol is consumed, it should be consumed in moderation—up to one drink per day for women (US Department, 2017). However, there is no safe level of alcohol consumption in relation to breast cancer according to the World Cancer Research Fund/American Institute for Cancer Research (World Cancer

Research, 2007). Prevalence of positive family history of breast cancer among young women is approximately 7–13% (Ramsey et al., 2006). The prevalence of any alcohol consumption among adult women aged 18–44 years is 54% and nearly 13–18% of women in this age group binge drink (Tan et al., 2015; White et al., 2017). Previous literature has suggested that nearly 8.2% and 12.3% of breast cancer cases in premenopausal women were attributable to family history (Engmann et al., 2017) and alcohol consumption, (Ekwueme et al., 2017) respectively.

Even though a positive family history of breast cancer and a history of alcohol consumption are common risk factors for breast cancer, not much is known about the awareness of the link between these two risk factors and breast cancer, especially among women aged 15–44 years. A 2008 study of college-going women in New England found that 93% and 31% of the respondents were aware of breast cancer risk related to a family history and alcohol consumption, respectively (Burak and Boone, 2008). A recent review by Scheideler and Klein (2018) reported that awareness of the link between alcohol and cancer in the United States is low for all cancer sites and ranges from 8% to under 50% (Scheideler and Klein, 2018). However, a 2017 study of undergraduate

and graduate students found that 83% of respondents were aware of alcohol consumption as a risk factor for liver cancer, but their awareness of the association between alcohol consumption and breast cancer was less than 30% (Merten et al., 2017). The findings in these studies clearly indicate the gap in awareness of key risk factors for breast cancer among women aged 15–44 years.

Awareness is an important condition for stimulating behavioral change. Breast cancer risk can be reduced by reducing exposure to modifiable breast cancer risk factors via behavioral changes (Colditz and Wei, 2012; Danaei et al., 2005). Awareness regarding both modifiable (e.g. alcohol consumption) and non-modifiable (e.g. family history of breast cancer) risk factors may promote positive health behaviors and the use of recommended preventive health services (Schwarzer, 2008). A meta-analysis conducted in 2014 observed a significant, modest relationship between risk perceptions and health behaviors (Sheeran et al., 2014). Modifying risk behaviors among younger women may not only reduce their likelihood of developing breast cancer at a younger age but also reduce their likelihood of developing post-menopausal breast cancer by decreasing exposure to risk factors over time (McTiernan, 2003). Public awareness of the link between risk factors and breast cancer can serve as a catalyst for policy change. Knowledge of alcohol as a risk factor for cancer was found to be a significant predictor of public support for policies to reduce alcohol consumption in other developed nations (Buykx et al., 2015). Higher public awareness of alcohol as a risk factor for breast cancer may garner more attention and support for strategies to reduce alcohol consumption. Thus, it is important to understand the level of awareness regarding risk factors among young women in order to improve awareness and stimulate behavioral change.

The "Knowledge Gap Hypothesis" states that access to information differs by socioeconomic characteristics such as income, education, race, ethnicity, and rurality, leading to socioeconomic differences in knowledge and behaviors (Viswanath et al., 2006). In addition to disparities in access to information, previous literature highlights socioeconomic disparities in health literacy (Kickbusch, 2001) and racial/ethnic differences in trusted sources of information regarding cancer risk factors (Oh et al., 2010). Thus, it is not only essential to examine the levels of awareness among the population at large, but also to examine the association between awareness of cancer risk factors and socioeconomic characteristics. This study has two objectives: 1) to determine the level of awareness for two known risk factors for breast cancer–family history and alcohol consumption among young women aged 15–44 years in the United States; and 2) to examine the socioeconomic factors associated with awareness of these risk factors.

2. Methods

Data for these analyses were from the National Survey of Family Growth (NSFG), a multistage, probability-based, nationally representative sample of the U.S. households including women and men aged 15–44 years (Centers for Disease Control and Prevention, 2018). This study combined NSFG public use files for 2011–2013 and 2013–2015 and was restricted to women aged 15–44 years without personal history of cancer (n = 10,940). Personal history of cancer was ascertained by the question, "Have you ever been told by a doctor or other health care provider that you had cancer?" The overall response rate for the NSFG 2011–2015 was 72.3% for women.

Presence of family history of breast cancer was ascertained by the question, "Thinking of your blood relatives, dead or alive, had your mother, sister, aunt or grandmother been diagnosed with breast cancer on either side of the family?" Patterns of recent alcohol consumption were ascertained based on two questions. Respondents were first asked, "During the past 30 days, did you have at least one drink of any alcoholic beverage such as beer, wine, a malt beverage or liquor?" Those who reported consuming one or more alcoholic beverages were asked, "Considering all types of alcoholic beverages, how many times during

the past 30 days did you have 4 or more drinks on an occasion?" Binge drinking was defined as a "yes" response to this question about consuming ≥ 4 alcoholic drinks on one or more occasions during the past 30 days (Kanny et al., 2018). Current non-binge drinking was defined as current drinking (i.e. those who consumed at least one alcoholic beverage in the last 30 days) but remained below binge levels. Previous literature has suggested that those with high risk awareness may consume lower amounts of alcohol (Chen, 2018). Thus, we examined risk awareness separately among non-binge and binge drinkers. In addition, it would be useful to understand this relationship between awareness and drinking behavior because it may shape the type of interventions used to target these groups.

In order to determine levels of awareness regarding risk factors, the two questions examined were "Do you think that having a family history of breast cancer increases a woman's chances of getting breast cancer a lot, a little, or not at all or do you have no opinion?" and "Do you think that drinking alcoholic beverages increases a woman's chances of getting breast cancer a lot, a little, or not at all or do you have no opinion?" Women who responded 'a lot' and 'a little' were coded as 'perceived risk', those who responded 'not at all' were coded as 'no perceived risk,' and those who had no opinion were coded as is.

In order to generate estimates that represent women aged 15–44 years in the United States, we used sampling weights and design variables provided by the CDC's National Center for Health Statistics to account for the complex sampling design and differential response rates. All percentages reported in this study are weighted. Chi-square tests were used to test differences in presence of risk factors and awareness of perceived risk by socioeconomic characteristics such as age, race/ethnicity, education, poverty level, health insurance, marital status and rurality. Comparisons between individual categories of socioeconomic variables were based on 95% confidence intervals, where non-overlapping intervals suggest statistically significant differences. We used SAS version 9.4 Survey procedures (SAS Institute, Cary, NC) for the analyses.

3. Results

Table 1 shows the weighted prevalence of having a positive family history of breast cancer as well as drinking patterns (i.e., binge vs. non-binge) based on the socioeconomic characteristics of young women aged 15–44 years. Overall, 29.2% of young women reported a positive family history of breast cancer. 28.9% of women aged 15–44 years reported current non-binge drinking and 30.8 reported binge drinking. The percentage of women with a family history of breast cancer increased with age and was higher among non-Hispanic whites compared to racial/ethnic minorities, college educated women compared to those who did not graduate from high school, those with private insurance compared to public insurance, and with income greater than or equal to 139% of the federal poverty level (FPL). Non-binge drinking was higher among older women, non-Hispanic Whites, those with higher levels of education and income, and private health insurance. Binge drinking was higher among younger women, Hispanic women, women who did not attend college and with incomes less than 139% FPL.

Table 2 presents awareness of risk factors by socioeconomic characteristics and presence of risk factors. Overall, 88.0% (95% CI: 86.7–89.2%) of young women were aware of positive family history as a risk factor for breast cancer. 3.6% (95% CI: 3.1–4.2%) women did not believe alcohol to be a risk factor for breast cancer and 8.4% (7.2%–9.5%) women did not know about or had no opinion about the link between alcohol consumption and breast cancer. Women who had a family history of breast cancer had higher risk awareness regarding family history (91.8%, 95% CI: 90.3–93.2%) compared to those without a positive family history for breast cancer (86.6%, 95% CI: 85.0–88.1%). Racial/ethnic minorities compared to non-Hispanic white women had lower levels of awareness regarding the association between family history and breast cancer. Similarly, awareness regarding

Table 1

Distribution of family history and alcohol consumption by socioeconomic characteristics among women aged 15–44 years in the United States, National Survey of Family Growth 2011–2015.

| Socioeconomic characteristics | Have family history of breast cancer | | Pattern of alcohol consumption | | |
| | | | Current non-binge drinking | Binge drinking | |
	Percent (95% CI)	P value	Percent (95% CI)	Percent (95% CI)	P value
Overall	29.2 (27.7–30.7)		28.9 (27.5–30.3)	30.8 (29.2–32.4)	
Age at survey (year)		0.032			< 0.001
15–20	27.7 (24.9–30.6)		16.4 (14.1–18.8)	23.2 (20.6–25.9)	
21–29	28.8 (26.6–31.0)		29.3 (27.3–31.4)	39.3 (36.7–41.8)	
30–39	28.3 (26.0–30.6)		31.1 (28.5–33.8)	29.9 (27.2–32.7)	
40–44	33.3 (29.6–37.0)		38.4 (34.6–42.2)	25.2 (21.6–28.8)	
Race/ethnicity		0.001			< 0.001
Hispanic	21.5 (19.5–23.9)		21.4 (19.1–23.7)	31.2 (28.4–34.1)	
White, non-Hispanic	33.7 (31.4–36.0)		32.9 (30.9–34.9)	32.6 (30.1–35.1)	
Black, non-Hispanic	26.0 (23.6–28.5)		26.2 (23.3–29.2)	27.5 (24.7–30.4)	
Other, non-Hispanic	24.6 (20.5–28.8)		26.2 (21.2–31.1)	24.9 (21.1–28.7)	
Education[b]		0.006			< 0.001
Less than high school	23.8 (20.2–27.5)		20.3 (16.5–24.2)	28.2 (24.5–31.8)	
High school	28.4 (25.2–31.6)		23.6 (20.8–26.4)	34.6 (30.9–38.4)	
Some college	29.6 (26.7–32.6)		32.7 (29.9–35.5)	34.2 (31.4–37.0)	
College or higher	32.2 (29.4–35.0)		40.2 (37.3–43)	30.7 (27.8–33.5)	
Poverty Level Income[a,c]		0.001			< 0.001
< 139% of FPL[a]	25.4 (23.3–27.6)		23.4 (21.4–25.4)	30.5 (27.9–33.2)	
139%–400% of FPL	31.6 (28.9–34.3)		32.5 (29.8–35.1)	33.4 (30.7–36.0)	
> 400% of FPL	31.6 (28.5–34.8)		40.8 (37.3–44.3)	34.6 (31.0–38.2)	
Health insurance[c]		0.001			< 0.001
Private	31.5 (29.2–33.8)		36.8 (34.6–38.9)	33.0 (30.8–35.2)	
Public	26.2 (23.8–28.6)		22.8 (20.1–25.4)	28.2 (25.6–30.9)	
None	26.7 (23.7–29.6)		23.8 (20.6–26.9)	36.5 (32.6–40.4)	
Metropolitan residence		0.176			0.008
Metropolitan, central city	27.6 (25.4–29.9)		28.4 (26.2–30.6)	33.4 (30.8–36.1)	
Metropolitan, suburban	29.5 (27.1–31.9)		30.6 (28.5–32.6)	29.6 (27.5–31.8)	
Nonmetropolitan	31.6 (28.2–35.0)		24.3 (20.3–28.3)	28.7 (23.3–34.2)	
Marital status[d]		0.770			< 0.001
Married	29.9 (27.4–32.3)		36.5 (33.9–39.2)	23.0 (20.9–25.0)	
Widowed/Divorced/Separated	30.0 (26.9–33.1)		30.9 (26.8–35)	35.6 (30.8–40.3)	
Never married	28.9 (26.7–31.2)		24.7 (23.0–26.5)	40.8 (38.6–43.0)	

[a] Poverty level income is the annual combined family income of the respondent in the calendar year before the interview divided by the average annual family income that is considered to be the poverty threshold, as defined by the U.S. Census Bureau for a family of the same size as the respondent's. A poverty level income of 100% means that the respondent's family income is at the threshold federal poverty level (FPL). 139% of FPL means that the respondent's income is 39% higher than the federal poverty level.

[b] Restricted to women aged ≥22 years because a large proportion of respondents aged < 22 years may still be in school.

[c] Restricted to women aged ≥20 years because reporting of these variables is less reliable for teen survey respondents.

[d] Restricted to women aged ≥18 years because the legal age for marriage is ≥18 years in most states.

family history as a risk factor was lower among those with less than college education compared to those with college or higher education, those with income lower than 139% FPL compared to income ≥139% FPL, and among uninsured or those with public insurance compared to privately insured women. Lastly, those residing in metropolitan central cities compared to suburban and non-metropolitan areas, and those who were widowed, divorced or separated compared to women who were married or never married had lower levels of awareness regarding the association between family history and breast cancer. Women who did not drink and binge drinkers had lower risk awareness regarding family history as compared to women who were current non-binge drinkers.

Overall, the awareness of alcohol consumption as a risk factor for breast cancer was 24.6% (95% CI: 23.1–26.2%). 47.9% (95% CI: 46.0–49.8%) women did not believe alcohol to be a risk factor for breast cancer and 27.4% (95% CI: 25.6%–29.3%) women did not know about or had no opinion about the link between alcohol consumption and breast cancer. Among women who were current non-binge drinkers, 21.0% (95% CI: 18.6–23.5%) were aware of the risk compared to 25.1% (95% CI: 22.6–27.5%) of binge drinkers who perceived that alcohol was a risk factor for breast cancer. In addition, 53.7% (95% CI: 50.9–56.5%) of current non-binge drinkers and 50.0% (95% CI: 46.8–53.2%) of binge drinkers believed that alcohol consumption is not

a risk factor for breast cancer. Among non-drinkers, 26.6% (95% CI: 24.7–28.6%) were aware of the risk, whereas 42.5% (95% CI: 40.1%–45.0%) believed that alcohol consumption is not a risk factor for breast cancer. Awareness regarding alcohol as a risk factor was lower among non-Hispanic whites compared to Hispanics and other non-Hispanic races. Awareness regarding alcohol as a risk factor for breast cancer was lower than 30% across all socioeconomic characteristics, and did not vary significantly by education, income, insurance, rurality, marital status, and family history of breast cancer. However, women with college or higher education were significantly less likely to have "no opinion" about the breast cancer risk related to alcohol consumption as compared to women with some college or less than high school education level.

4. Discussion

Overall, the prevalence of a positive family history for breast cancer among women aged 15–44 years was 29%, and, 88% of young women knew that a positive family history of breast cancer is a risk factor for developing it as well. Women with a family history of breast cancer had higher risk awareness (92%) than women without a family history, which aligns with previous literature (Peipins et al., 2018). Results from this study suggest that higher socioeconomic status is associated with

Table 2

Awareness of breast cancer risk related to family history and alcohol consumption by presence of risk factors and socioeconomic characteristics among women aged 15–44 years in the United States, National Survey of Family Growth 2011–2015.

Characteristics	Family history of breast cancer				Alcohol use			
	Perceived risk percent (95% CI)	No perceived risk percent (95% CI)	No opinion percent (95% CI)	P value	Perceived risk percent (95% CI)	No perceived risk percent (95% CI)	No opinion percent (95% CI)	P value
Overall	88.0 (86.7–89.2)	3.6 (3.1–4.2)	8.4 (7.2–9.5)		24.6 (23.1–26.2)	47.9 (46–49.8)	27.4 (25.6–29.3)	
Presence of risk factor								
Family history of breast cancer				< 0.001				0.702
Yes	91.8 (90.3–93.2)	2.5 (1.7–3.4)	5.7 (4.5–6.9)		24.4 (21.9–26.9)	49.0 (45.6–52.4)	26.6 (23.6–29.6)	
No	86.6 (85–88.1)	4.1 (3.5–4.7)	9.4 (8–10.7)		24.9 (23.2–26.5)	47.6 (45.6–49.6)	27.5 (25.6–29.5)	
Alcohol consumption pattern				< 0.001				< 0.001
Non-drinker	83.8 (81.5–86.0)	5.5 (4.4–6.5)	10.8 (8.9–12.6)		26.6 (24.7–28.6)	42.5 (40.1–45.0)	30.8 (28.5–33.2)	
Current non-binge drinker	93.0 (91.7–94.3)	2.1 (1.4–2.7)	4.9 (3.7–6.2)		21.0 (18.6–23.5)	53.7 (50.9–56.5)	25.3 (22.6–28.0)	
Binge drinker	89.0 (87.5–90.6)	2.6 (1.8–3.5)	8.3 (6.9–9.7)		25.1 (22.6–27.5)	50.0 (46.8–53.2)	25.0 (22.3–27.6)	
Socioeconomic characteristics								
Age at survey (year)				0.137				0.157
15–20	88.0 (85.6–90.4)	3.0 (2.3–3.8)	9.0 (6.9–11)		25.9 (23.4–28.4)	49.0 (45.9–52.1)	25.1 (22.3–28.0)	
21–29	87.3 (85.5–89.1)	3.3 (2.5–4)	9.4 (7.8–11.1)		24.9 (22.6–27.3)	47.9 (45.2–50.5)	27.2 (24.7–29.7)	
30–39	88.3 (86.4–90.2)	4.1 (3.2–5.1)	7.6 (5.9–9.2)		23.4 (20.7–26.0)	49.1 (46.0–52.1)	27.6 (24.9–30.2)	
40–44	88.6 (86.3–90.9)	4.2 (2.5–5.8)	7.2 (5.6–8.9)		25.2 (22.1–28.4)	44.4 (40.9–47.9)	30.4 (26.7–34.1)	
Race/ethnicity				< 0.001				< 0.001
Hispanic	83.5 (81.5–85.4)	6.3 (5–7.6)	10.2 (8.6–11.9)		29.2 (26.5–31.8)	42.1 (38.8–45.5)	28.7 (25.6–31.9)	
White, non-Hispanic	92.9 (91.9–93.9)	1.7 (1.2–2.1)	5.4 (4.5–6.4)		22.2 (20.3–24.2)	51.3 (48.6–54.0)	26.5 (24.1–28.8)	
Black, non-Hispanic	80.5 (78.3–82.7)	6.1 (4.5–7.6)	13.4 (11.4–15.5)		23.8 (20.9–26.7)	48.6 (45.4–51.7)	27.6 (24.6–30.6)	
Other, non-Hispanic	81.2 (74.1–88.3)	5.6 (3.6–7.6)	13.2 (6.8–19.6)		29.6 (25.0–34.3)	40.8 (36.4–45.2)	29.6 (25.2–34.0)	
Education[b]				< 0.001				< 0.001
< high school	74.4 (70.9–77.9)	7.3 (4.9–9.6)	18.3 (15.2–21.5)		23.0 (19.5–26.5)	42.8 (38.6–47.0)	34.1 (29.8–38.4)	
High school	83.3 (80.5–86.1)	6.3 (4.4–8.1)	10.4 (8.4–12.4)		22.7 (19.6–25.8)	48.7 (44.9–52.4)	28.7 (24.6–32.7)	
Some college	89.4 (87.2–91.6)	2.9 (1.9–3.8)	7.7 (5.7–9.8)		20.6 (18.3–22.9)	49.3 (46.8–51.8)	30.1 (27.3–32.9)	
College or higher	94.1 (92.7–95.6)	2 (1.2–2.8)	3.8 (2.6–5.1)		27.9 (24.9–30.8)	47.7 (44.5–51.0)	24.4 (22.0–26.8)	
Poverty Level Income[a,c]				< 0.001				< 0.001
< 139% of FPL[a]	81.0 (78.8–83.2)	5.7 (4.5–6.9)	13.3 (11.3–15.2)		24.9 (22.8–27.0)	44.2 (41.6–46.8)	30.9 (28.1–33.7)	
139%–400% of FPL	89.9 (88.3–91.5)	3.5 (2.3–4.6)	6.6 (5.3–7.9)		22.2 (20.2–24.3)	51.1 (48.1–54.2)	26.6 (23.8–29.4)	
> 400% of FPL	94.8 (93.3–96.2)	1.4 (0.8–2.1)	3.8 (2.5–5.1)		26.8 (23.3–30.3)	48.1 (44.5–51.6)	25.1 (22.0–28.2)	
Health insurance[c]				< 0.001				0.223
Private	92 (90.8–93.3)	2.6 (1.8–3.3)	5.4 (4.4–6.4)		24.2 (21.9–26.4)	49.1 (46.4–51.7)	26.7 (24.4–29.1)	
Public	81.3 (78.6–83.9)	5.7 (4.3–7.1)	13.1 (10.8–15.3)		24.3 (21.7–26.8)	47.7 (44.2–51.2)	28.0 (24.7–31.4)	
None	82.6 (79.6–85.7)	5.5 (3.9–7.1)	11.9 (9.1–14.7)		24.7 (21.8–27.6)	44.9 (41.7–48.0)	30.5 (27.3–33.6)	
Metropolitan residence				0.022				0.475
Metropolitan, central city	86.0 (84.1–88)	4.3 (3.3–5.3)	9.7 (8.1–11.3)		25.2 (23.3–27.1)	47.4 (44.7–50.0)	27.4 (25.1–29.8)	
Metropolitan, suburban	90.0 (88.7–91.4)	3.2 (2.3–4.1)	6.7 (5.6–7.9)		25.2 (22.9–27.4)	48.1 (45.4–50.7)	26.8 (24.4–29.2)	
Nonmetropolitan	85.5 (79.9–91.1)	3.6 (2.3–4.9)	10.9 (5.9–15.9)		21.6 (17.7–25.5)	48.7 (43.4–54.0)	29.7 (24.5–34.9)	
Marital status[d]				< 0.001				0.013
Married	90.0 (88.3–91.7)	3.8 (2.6–5)	6.2 (5–7.4)		25.4 (23.0–27.8)	46.4 (43.4–49.4)	28.2 (25.7–30.7)	
Widowed/divorced/ separated	84.5 (81.7–87.3)	5.1 (3.3–6.9)	10.4 (8.1–12.7)		24.9 (21.1–28.7)	44.2 (40.2–48.3)	30.9 (27.0–34.8)	
Never married	86.9 (84.9–88.9)	3.2 (2.6–3.9)	9.9 (8.1–11.6)		22.9 (20.9–24.8)	50.9 (48.7–53.2)	26.2 (23.7–28.7)	

[a] Poverty level income is the annual combined family income of the respondent in the calendar year before the interview divided by the average annual family income that is considered to be the poverty threshold, as defined by the U.S. Census Bureau for a family of the same size as the respondent's. A poverty level income of 100% means that the respondent's family income is at the threshold federal poverty level (FPL). 139% of FPL means that the respondent's income is 39% higher than the federal poverty level.

[b] Restricted to women aged ≥ 22 years because a large proportion of respondents aged < 22 years may still be in school.

[c] Restricted to women aged ≥ 20 years because reporting of these variables is less reliable for teen survey respondents.

[d] Restricted to women aged ≥ 18 years because the legal age for marriage is ≥ 18 years in most states.

higher awareness of family history as a risk factor. These results support the "Knowledge Gap" hypotheses.

Family history is not a modifiable risk factor for breast cancer. However, there are a number of personal and health seeking behavioral changes that can mitigate the risk for women getting breast cancer. Personal behavioral changes may include a nutritious diet, regular exercise, and limiting exposure to risk factors such as alcohol and smoking (American Cancer Society, 2017a; Hertz-Picciotto et al., 2012). In a qualitative study of women with a positive family history of breast cancer in North Carolina, none of the women associated alcohol with breast cancer risk and the awareness regarding other risk factors was low (Spector et al., 2009). Thus, it is important to raise awareness regarding other risk factors for breast cancer among women with a positive family history. The National Comprehensive Cancer Network

(NCCN) and American Cancer Society recommend early and frequent breast cancer screening among patients with a positive family history of breast cancer based on shared decision making between patients and providers (National Comprehensive Cancer Network (NCCN), 2018; American Cancer Society, 2017b). Women with a positive family history of breast cancer can discuss various risk reduction options with their healthcare providers (American Cancer Society, 2017a; Afonso, 2009). However, it is important for women to be aware regarding the risk associated with family history in order to seek the necessary healthcare interventions.

The prevalence of current non-binge drinking and binge drinking among women aged 15–44 years was 29% and 31%, respectively. The prevalence of binge drinking in this study is higher than the prevalence of binge drinking among 18–44 year old women in the National Health

Interview Survey sample (White et al., 2017). Despite alcohol consumption being illegal for the population under the age of 21 in the United States, 16% of underage women were current non-binge drinkers and 23% were binge drinkers. These estimates are consistent with previous reports (Tan et al., 2015). The prevalence of current non-binge drinking and binge drinking varied by socioeconomic characteristics.

While the awareness of family history is high, only about one-quarter (25%) of women aged 15–44 years were aware that alcohol consumption is a risk factor for breast cancer. This is similar to the findings reported by American Society of Clinical Oncology (ASCO) 2018 National Cancer Opinion Survey wherein 31% of US adults believed that alcohol was a risk factor for cancer (ASCO, 2018). About half of non-binge and binge drinkers did not believe alcohol to be a risk factor for breast cancer. This could be because current drinkers are in denial of their risk of breast cancer. This is similar to findings reported by Peretti-Watel et al. (2014) that smokers were like to underestimate their own risk of cancer and were more likely to deny the carcinogenicity of smoking (Peretti-Watel et al., 2014). Peretti-Watel (2014) also found that smokers who denied the cancer risk of smoking were more likely to get their information from the internet and from relatives (Peretti-Watel et al., 2014). This highlights specific challenges related to messaging strategies for those current drinkers who may be in denial about the risk of breast cancer. Further research is needed to understand why drinkers may be more certain than nondrinkers that alcohol is not a risk factor for breast cancer.

While nondrinkers were not significantly more likely to believe that alcohol is risk factor for breast cancer than current drinkers, they were significantly more likely to report that they "don't know" or have "no opinion" regarding the link between alcohol and breast cancer. Women with less than high school education level were also more likely than college educated women to report that they "don't know" or have "no opinion" regarding the breast cancer risk related to alcohol consumption. According to Krosnick (2002), "no opinion" or "don't know" could be due to actual lack of information about the subject or it could be due to ambivalence resulting from contradictory messages about the subject (Krosnick, 2002). This has important implications for communication strategies used to target this group. "No opinion" responses could also occur due to the confusing nature of the survey question or due to length of the survey (Krosnick, 2002). This has implications for designing survey instruments that elicit awareness regarding risk factors for breast cancer. Lastly, Krosnick (2002) also reported that women with lower levels of education may be more likely to select "don't know" or "no opinion options" in surveys which is in line with the findings reported in this paper (Krosnick, 2002).

Women across the socioeconomic spectrum had low awareness of alcohol as a risk factor. This is similar to a previous study from Australia that did not find any relationship between socioeconomic factors such as education with identification of alcohol as a risk factor (Hill et al., 1991). Thus, there is a need to improve awareness of the link between alcohol and breast cancer among young women, regardless of their drinking pattern and across socioeconomic characteristics. Awareness regarding the link between alcohol and breast cancer is low across all socioeconomic strata which does not provide support for the "Knowledge Gap" hypotheses.

Further research could help identify and increase understanding of the barriers to awareness of alcohol as a risk factor overall and for family history as a risk factor among lower socioeconomic strata and could test evidence-based interventions to improve awareness. Small media, mass media and public awareness campaigns have had some success in increasing awareness of the link between alcohol and cancer in other countries (Buykx et al., 2016; Grønbæk et al., 2001; Martin et al., 2017). Increasing awareness of alcohol-breast cancer link among health providers, especially primary care providers, as well as providing them tools to educate their patients regarding the link between alcohol and breast cancer could be a good step in a right direction in increasing public awareness (LoConte et al., 2017). Another strategy is to

incorporate alcohol as a listed modifiable risk factor in existing breast cancer prevention materials and campaigns. Additionally, highlighting the message regarding alcohol-breast cancer link as part of existing public campaigns such as Breast Cancer Awareness Month and Bring Your Brave campaign may also help increase awareness (American Institute for Cancer Research, 2012; Centers for Disease Control and Prevention, 2018).

Given that current non-binge and binge drinking is common among women aged 15–44 years and that alcohol is a known risk factor for breast cancer, a comprehensive approach is needed for reducing excessive alcohol consumption that includes both community-based and clinical strategies for reducing excessive alcohol use. Effective community-based strategies for preventing excessive alcohol use include regulating alcohol outlet density (i.e., the number and concentration of stores that sell alcohol within a small geographic area); increasing alcohol taxes, maintaining existing restrictions on the hours and days when alcohol can be sold; and the enforcing of laws prohibiting sale of alcohol to minors (LoConte et al., 2017; The Community Guide, 2018). The US Preventive Services Task force recommends screening all adults aged 18 years or older for alcohol misuse and offering brief counseling/intervention for those who screen positive (O'connor et al., 2018). The results of this study underscore the need for implementation of effective interventions to screen alcohol misuse among young women aged 15–44 years.

This study has certain limitations. The specific questions in the NSFG are worded more as thoughts or opinions rather than awareness of risk factors. It is possible that a person may be aware of the association between higher levels of alcohol consumption and increased risk for breast cancers, but the awareness may not change their opinion. Similar to other survey data, alcohol consumption was based on self-reports, and social desirability bias may affect the results. Family history of breast cancer was assessed by a single question of any breast cancer in first- or second-degree female family members. Further details about family history may help better distinguish breast cancer risk (Qin et al., 2018).

5. Conclusion

The prevalence of current non-binge and binge drinking among young women was high, whereas the awareness of risk for breast cancer development was low, especially among those who consumed alcohol. Current non-binge drinking was higher among older women, non-Hispanic Whites, those with higher levels of education and income, and private health insurance whereas current binge drinking was higher among younger women, Hispanic women, women who did not attend college, and with incomes less than 139% FPL. Current non-binge drinking and binge drinking varied by socioeconomic characteristics such as age, race/ethnicity, education and income. However, awareness of alcohol as a risk factor for breast cancer was low across all socioeconomic characteristics. Awareness of positive family history as a risk factor was high overall but varied by socioeconomic characteristics. Awareness was lower among racial/ethnic minority women with less than college education, low income, and no insurance or public insurance. Further research could help identify barriers to awareness, especially among sub-populations with low awareness of breast cancer risk related to family history and alcohol consumption. Community-based and clinical strategies could include evidence-based interventions to increase awareness of alcohol as a risk factor for breast cancer, evidence-based policy strategies (e.g., increasing alcohol taxes and regulating the density of alcohol outlets), and clinical preventive services (e.g., alcohol screening and brief intervention for adults) to decrease excessive alcohol consumption, including binge drinking (LoConte et al., 2017; The Community Guide, 2018; O'connor et al., 2018).

commercial, or not-for-profit sectors.

Disclaimer

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention

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