



Michigan PRAMS Delivery

Family History of Breast and Ovarian Cancer

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Hereditary breast and ovarian cancer (HBOC), often caused by mutations in the BRCA1 and BRCA2 genes, increases an individual's lifetime risk of breast cancer by as much as 87 percent and ovarian cancer by as much as 39 percent¹. Family history of ovarian cancer and/or breast cancer at a young age (BCYA) are strong indicators of HBOC.

In 2013, the Michigan Cancer Surveillance Program reported 1,540 new cases of breast cancer diagnosed before age 50 (Incidence Rate (IR): 48.0/100,000 women) and 714 new cases of ovarian cancer (IR: 11.5/100,000 women). National and state-level cancer prevention objectives (Healthy People 2020; Cancer Plan for Michigan, 2016-2020) seek to increase the percentage of individuals with family history of breast or ovarian cancer that are offered genetic counseling services. A greater awareness of one's family history will facilitate the appropriate use of genetic services, along with earlier and more frequent cancer screening among individuals found to have HBOC, with the goal of preventing a personal diagnosis of cancer.

KEY POINTS

- 1 in 10 new Michigan mothers self-report a family history of **breast** cancer at a young age.
- 1 in 12 new Michigan mothers self-report a family history of **ovarian** cancer at any age.
- **Racial disparities exist:** Non-Hispanic black mothers are more likely than non-Hispanic white mothers to report a family history of breast cancer at a young age.
- **Socio-economic disparities exist:** Michigan mothers with less than a high school education and those with an annual household income of less than \$15,000 are more likely to report a family history of either breast cancer at a young age or ovarian cancer at any age.

The MI PRAMS (Pregnancy Risk Assessment Monitoring System) and Cancer Genomics programs within the Michigan Department of Health and Human Services (MDHHS) have begun collaborating to estimate the prevalence of HBOC in close relatives of new Michigan mothers. MI PRAMS collected this information within the Phase 7 survey (2012-2015). This issue of PRAMS delivery examines the prevalence of family history of breast and ovarian cancer among Michigan mothers and self-reported prenatal discussions about family health history.

METHODS

MI PRAMS data from the 2012-2015 birth years were used in this analysis. The average weighted response rate across these years was 58.4 percent. Survey responses were aggregated into a single four-year data set; approximately 6,600 respondents representing 407,000 mothers of live births were used to generate population proportions. To account for the complex survey design, point estimates and 95 percent confidence intervals were

calculated using SAS-Callable SUDAAN version 11.0.1. Subgroup estimates for race/ethnicity, education, and income were age standardized. We performed significance tests at the $p < 0.05$ level; pairwise comparisons were made between point estimates across subgroups and tests for linear trends across ordinal variables (i.e. income, education) were performed using orthogonal polynomial contrasts.

Michigan Pregnancy Risk Assessment Monitoring System, PRAMS, is a population-based public health surveillance project of the Michigan Department of Health and Human Services and the Centers for Disease Control and Prevention (CDC). Since 1987, Michigan PRAMS has provided data not available from other sources on maternal attitudes and experiences before, during and after pregnancy. The data is used to identify groups of women and infants at high risk for health problems, monitor changes in health status and measure progress towards goals in improving the health of Michigan's mothers and babies.

PREVALENCE OF FAMILY HISTORY OF BREAST AND OVARIAN CANCER

One in ten Michigan mothers of live births between 2012 and 2015 reported a family history of BCYA (Table 1; 10.2%, 95% CI: 9.3-11.2%).

One in twelve reported a family history of ovarian cancer (Table 2; 8.1%, 95% CI: 7.2-9.0%). Only 2.7 percent of Michigan mothers reported that they had close relatives with both BCYA and ovarian cancer (95% CI: 2.2-3.3%; data not shown), while the majority of survey participants, 86.1 percent, reported no family history of either BCYA or ovarian cancer (95% CI: 85.0-87.2%; data not shown).

Analysis by maternal race and ethnicity found that a larger proportion of non-Hispanic Black mothers (Table 1; 12.6%, 95% CI: 11.3-14.0%) reported a family history of BCYA compared to non-Hispanic White women (Table 1; 9.6%, 95% CI: 8.4-10.8%). While more non-Hispanic White mothers (Table 2; 8.6%, 95% CI: 7.4-9.8%) reported a family history of ovarian cancer compared to non-Hispanic Black mothers (Table 2; 7.3%, 95% CI: 6.2-8.4%), the difference was not statistically significant.



Table 1. Family History of Breast Cancer at a Young Age*

Family History of Breast Cancer at a Young Age	Weighted Percent	95% Confidence Interval
Total**	10.2	9.3-11.2
Race/Ethnicity		
Hispanic	12.7	7.0-18.3
Non-Hispanic Black	12.6	11.3-14.0
Non-Hispanic White	9.6	8.4-10.9
Education		
< High School	15.2	10.6-19.7
High School or GED	11.0	8.9-13.2
Some College	10.4	8.7-12.1
College +	8.1	6.4-9.9
Income		
< \$15,000	15.9	13.2-18.6
\$15,000 to < \$22,000	10.9	7.7-14.0
\$22,000 to <\$37,000	9.2	6.6-11.8
\$37,000 to <\$56,000	8.1	5.5-10.6
\$56,000 +	7.8	5.8-9.8

*MI PRAMS 2012-2015 Question # 78D: Have any of your close family members who are related to you by blood (mother, father, sisters or brothers) had breast cancer before 50 years of age?

** N=6,517

There are notable differences in the prevalence of family history of cancers across maternal education and income categories, even after adjusting for maternal age. Significantly more mothers in the lowest income category report a family history of either breast cancer (Table 1) or ovarian cancer (Table 2) compared to mothers in all higher categories (all $p < 0.05$). Mothers in the highest education category were less likely to report a family history of breast cancer (Table 1) compared to mothers in all other categories (all $p < 0.05$). A statistically significant linear relationship exists across categories for both education ($p < 0.0001$) and income ($p < 0.0001$); the risk of family history for both breast (Table 1) and ovarian (Table 2) cancers decreases as maternal education and income increase.

PRE-PREGNANCY PROVIDER DISCUSSIONS ABOUT FAMILY MEDICAL HISTORY

Though referral from a health care provider is the most prominent facilitator to the receipt of genetic counseling for high-risk women, in the year before

conception few Michigan mothers had a discussion with their health care provider about their family medical history (35.7%; 95% CI: 34.2-37.2%; data not shown). Although discussions about family history were rare, mothers with a family history of either cancer type were 26 percent more likely to report discussing their family health history than mothers with no family history of either cancer (RR 1.26, 95% CI:1.13-1.41; data not shown)

Table 2. Family History of Ovarian Cancer*

Family History of Ovarian Cancer	Weighted Percent	95% Confidence Interval
Total**	8.1	7.2-9.0
Race/Ethnicity		
Hispanic	8.0	3.7-12.4
Non-Hispanic Black	7.3	6.2-8.4
Non-Hispanic White	8.6	7.4-9.8
Education		
< High School	14.5	9.6-19.4
High School or GED	10.4	8.1-12.7
Some College	9.0	7.3-10.8
College +	3.7	2.6-4.8
Income		
< \$15,000	12.8	10.1-15.4
\$15,000 to < \$22,000	8.9	6.1-11.6
\$22,000 to <\$37,000	8.1	5.5-10.6
\$37,000 to <\$56,000	6.4	3.9-8.9
\$56,000 +	4.7	3.0-6.4

*MI PRAMS 2012-2015 Question # 78D: 78E: Have any of your close family members who are related to you by blood (mother or sisters) had ovarian cancer?

** N=6,514

CONCLUSION

The current results provide a population representative view of the family history of cancer among new mothers in Michigan. Results of this analysis invite additional exploration of potential health care disparities based on race/ethnicity, education level, and household income.

It is estimated that 1.5 percent of the general population will develop ovarian cancer in their lifetime.¹ The large proportion of PRAMS participants reporting a family history of ovarian cancer may reflect the need for additional clarification during future survey administration.

FUTURE DIRECTIONS

Pregnancy is a window of increased health care use where providers could potentially raise awareness of HBOC, assess family history, and make appropriate referrals for genetic services based on national guidelines. This is particularly important for this population of young women, a majority of whom have no personal history of breast and/or ovarian cancer.

In 2016, MI PRAMS was awarded funding from the Centers for Disease Control and Prevention (CDC) for a new module of survey questions on family history of breast and ovarian cancer in women who recently delivered a live birth. This question module provides the MI PRAMS and Cancer

Genomics programs the opportunity to expand population representative hereditary cancer surveillance efforts, especially among Black women, who are purposefully over-sampled. Responses to these questions (Figure 1) will provide additional surveillance information regarding high-risk HBOC indicators (ex. family history of bilateral breast cancer, Ashkenazi Jewish heritage) as well as the use of genetic counseling and testing. Recent clinical surveillance estimates suggest that Black women are less likely to utilize genetic counseling and testing services. Increased sampling of Black women in PRAMS will further explore this difference, with additional usage estimates, filling a current gap in Michigan hereditary cancer surveillance.

Figure 1. MI PRAMS Phase 8: Family History of Breast and Ovarian Cancer Module Questions

1. Have any of your family members listed below (mother, mother's mother, father's mother) who are related to you by blood had ovarian cancer?
2. Have any of your *other* family members [sister(s), aunt(s), female cousin(s)] who are related to you by blood had ovarian cancer?
3. Have any of your family members listed below (mother, mother's mother, father's mother, father, mother's father, father's father) who are related to you by blood had breast cancer?
4. Have any of your other family members [sister(s), brother(s), aunt(s), uncle(s), cousin(s)] who are related to you by blood had breast cancer?
5. Has any *woman* in your family who is related to you by blood had breast cancer at *age 50 or younger*?
6. Has any *woman* in your family who is related to you by blood had both breast **AND** ovarian cancer?
7. Have *any* of your family members related to you by blood had bilateral breast cancer (breast cancer on both sides)?
8. Do you have Ashkenazi Jewish heritage?
9. Have you ever talked to a genetic counselor about your *risk for cancer* based on your family history?
10. What was the **MAIN** reason you talked to a genetic counselor about your *risk for cancer*?
11. Thinking about your **MOST RECENT** visit to a genetic counselor for cancer risk, what kind of cancer was it for?
12. Have you ever had *genetic testing* for a gene mutation connected to breast or ovarian cancer?

References

1. Petrucelli N, Daly MB, Tuya P. BRCA1 and BRCA2 Associated Hereditary Breast and Ovarian Cancer. GeneReviews [Internet]. 1998Sep4 [cited 2018Mar13]; Available from: <https://www.ncbi.nlm.nih.gov/books/NBK1247/>

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