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Key Findings

This report explores five main points:

1. Significant breast cancer disparities persist between Black and White cisgender women in Wisconsin.
2. The breast cancer mortality rate for White women has decreased since 1995; however, the mortality rate for Black women has held steady during the same period.
3. Black women are disproportionately diagnosed with breast cancer at later stages.
4. Black women are disproportionately diagnosed with breast cancer at earlier ages.
5. This report cannot speak to the causes of these disparities; more in-depth research into health disparities and social determinants of health in southern and southeastern Wisconsin will help to reveal paths forward.

Background

Breast cancer is the most common cancer affecting women in the United States (US). The American Cancer Society estimates that approximately 340,000 women will be diagnosed with breast cancer in 2022.¹ Roughly 1 in 8 women will be diagnosed with breast cancer at some point in their lifetime.²

There is a well-documented history of breast cancer disparities between Black and White women in the US. Though Black women across the country experience similar (or lower) incidence rates of breast cancer compared to White women, mortality rates remain 41% higher for Black women.³ This report will investigate how breast cancer disparities between non-Hispanic Black and non-Hispanic White women are playing out in Wisconsin, historically and in recent years.

In 2019, over 85% of Wisconsin's non-Hispanic Black population lived in six Southern or Southeastern counties: Milwaukee, Dane, Racine, Kenosha, Rock, and Waukesha.⁴ When looking at state-level comparisons of Black and White women, it is important to remember that the Black population

of Wisconsin is almost entirely situated in just a few counties. Most of these counties are more urban than the state, and nearly all of them are in Southern or Southeastern Wisconsin. Statistics for Black women at the state level and Black women in the Southeast will be very similar in general, as the Southeast makes up most of the state's Black population.

Definitions and Methods

This report will look at breast cancer disparities between non-Hispanic Black and non-Hispanic White cisgender women in the state of Wisconsin from 1995-2019. For simplicity, the term "non-Hispanic" will be excluded and we will refer only to White or Black women in the rest of the report, but all analyses looked exclusively at non-Hispanic Black and non-Hispanic White women.

Incidence data for Wisconsin were provided by the Wisconsin Cancer Reporting System (WCRS), Wisconsin's population-based cancer registry.⁵ Incidence data for the SEER22 registries were provided by the Surveillance, Epidemiology, and End Results

Program (SEER), and pulled from existing SEER*Stat databases.⁶ Mortality data for Wisconsin and the US were pulled using SEER*Stat version 8.4.0 and provided by the National Center for Health Statistics.⁷ Additional data for county-level and regional-level Wisconsin mortality statistics were provided by the National Center for Health Statistics. Age-adjusted incidence and mortality rates used the 2000 US Standard Population (19 age groups - Census P25-1130), which is the default standard population for age-adjusted statistics in SEER*Stat.⁸

All incidence and mortality rates, rate ratios, and confidence intervals were calculated using SEER*Stat version 8.4.0,⁹ while frequency statistics and OLS trend lines were estimated using R version 4.2.1.¹⁰ Plots were generated using the ggplot2 package¹¹, and the report itself was generated in Rmarkdown.¹²

Many plots show rates (points) and trends (lines). Trend lines are based on simple OLS regression for the full-time period shown in the plot for each racial group. Rates are year-specific and have vertical lines representing the 95% Confidence Interval for each year-specific rate. Incidence and mortality rates are age-adjusted unless otherwise specified.

Definitions are taken from the National Cancer Institute Dictionary of Cancer Terms¹³:

- **Age-adjusted rate:** Age-adjusting the rates ensures that differences in incidence or deaths from one year to another, or between one geographic area and another, are not due to differences in the age distribution of the populations being compared.
- **Confidence intervals:** Confidence intervals demonstrate the variation in the estimation of cancer rates. The height of a confidence interval differs based on the amount of variability in the data.
- **Crude rate:** Crude rates are rates (such as incidence and mortality) that have not been age-adjusted and are influenced by the underlying age distribution of the state's population.
- **Incidence rate:** The number of new cases in a population over a specified period.

- **Late-stage breast cancer:** Within this report, “late-stage” breast cancer is defined as invasive cancer diagnosed at the Regional or Distant stage. Stage describes how far the cancer has spread and advanced within the body.
- **Mortality rate:** A measure of the frequency of occurrence of death in a defined population during a specified interval.
- **N=:** refers to the sample size.
- **Rate ratio:** A rate ratio compares the incidence or mortality rates of two groups. The rate for the group of interest is divided by the rate for a selected reference group. A rate ratio of 1.0 indicates equal rates in the two groups, a rate ratio greater than 1.0 indicates an increased risk for the group of interest, and a rate ratio less than 1.0 indicates a decreased risk for the group of interest. Rate ratios are statistically significant if the lower and upper confidence intervals do not include 1.0. For example, if an incidence rate ratio is 1.5, with a 95% Confidence interval [1.3, 2.0], the incidence rate for the group of interest is significantly higher than the incidence rate of the reference group. If the 95% Confidence Interval was instead [0.5, 3.0], the incidence rate for the group of interest would not be statistically significantly higher than the incidence rate of the reference group.

Breast Cancer in Wisconsin

Incidence

In the last 25 years, breast cancer incidence rates among White women have remained relatively stable, while incidence rates for Black women have risen by an average of 1.16 incident cases (per 100,000 women) per year.

From 1995-2008, breast cancer incidence rates among Black women in Wisconsin were generally lower than rates for White women. Around 2009, incidence rates for the two groups converged, with Black incidence rates slightly exceeding White incidence rates after 2011. Statistically, though, the incidence rates for Black and White women were broadly similar over the last five years, and the incidence rate ratio between the two populations from 2015-2019 was 1.03 (95% CI 0.97, 1.1).

Comparing the 1995-1999 breast cancer incidence rate with the 2015-2019 incidence rate, rates among White women rose about 2.4%, from 133.5 per 100,000 to 136.7 per 100,000. During the same period, incidence rates for Black women rose about 16.1%, from 121.5 per 100,000 in 1995-1999 to 141.1 per 100,000 in 2015-2019 (Figure 1).

How do Wisconsin's breast cancer incidence rate trends compare to trends in the US as a whole? The SEER22 registry dataset is the "national" comparison. The SEER22 registries are not a perfect representation of the US, as they only cover ~48% of the US population, based on comparisons of the SEER state populations to 2020 Census data.¹⁴ Coverage of White

Figure 1: Breast Cancer Incidence
Black and White women, Wisconsin state, 1995-2019

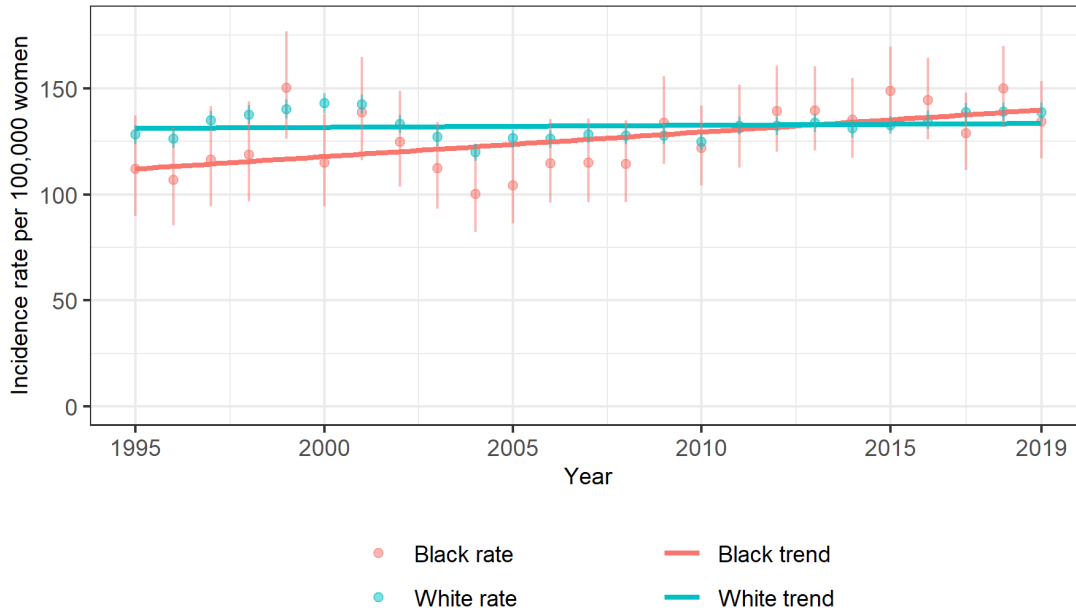
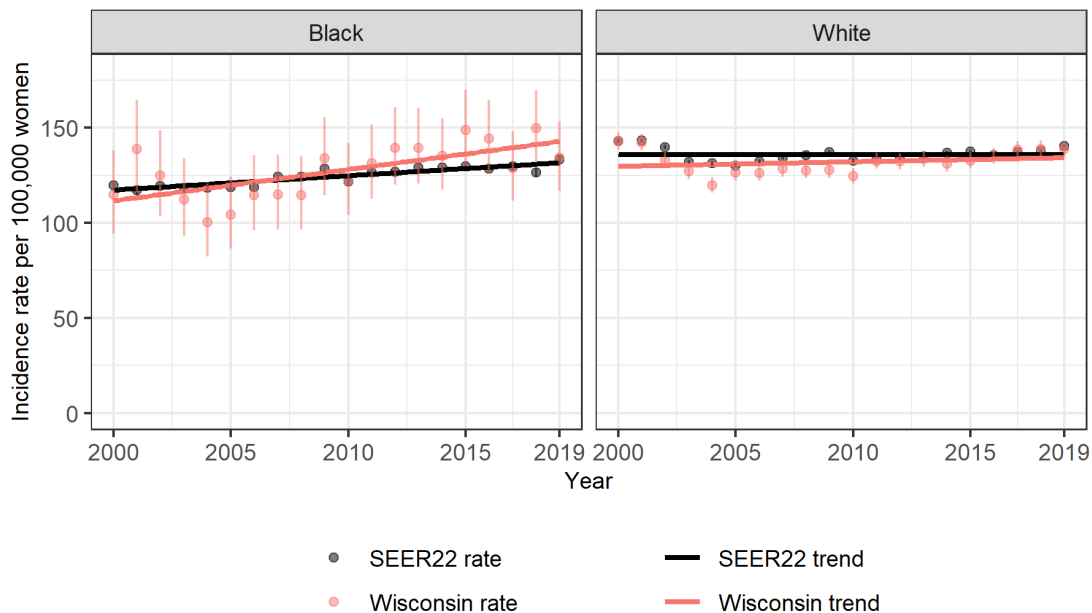


Figure 2: Breast Cancer Incidence
Black and White women, SEER22 registries and Wisconsin state, 2000-2019



and Black populations is slightly lower than overall population coverage, at 32-34% coverage for the US White and Black populations, respectively.¹⁵ Data for SEER22 registries is available starting in the year 2000, so there will be a more limited set of years in this report.

Wisconsin's recent incidence rates are broadly similar to rates seen in the SEER22 registries for both Black and White women. Both groups had incidence rates slightly below our national comparison during the 2000s. Since 2010, however, White Wisconsinites' breast cancer incidence rates have risen to almost the same rate as observed among White women in the SEER22 registries. Over the same period, rates for Black women in Wisconsin began to consistently exceed incidence rates among Black women in the SEER22 registries (Figure 2).

Incidence Rate Ratios, Wisconsin and SEER22 registries

	Wisconsin rate ratio (95%CI)	SEER22 rate ratio (95%CI)
2000-2004	0.89 (0.82, 0.96)	0.86 (0.85, 0.87)
2005-2009	0.91 (0.85, 0.99)	0.92 (0.91, 0.93)
2010-2014	1.02 (0.96, 1.09)	0.94 (0.93, 0.95)
2015-2019	1.03 (0.97, 1.10)	0.94 (0.93, 0.95)

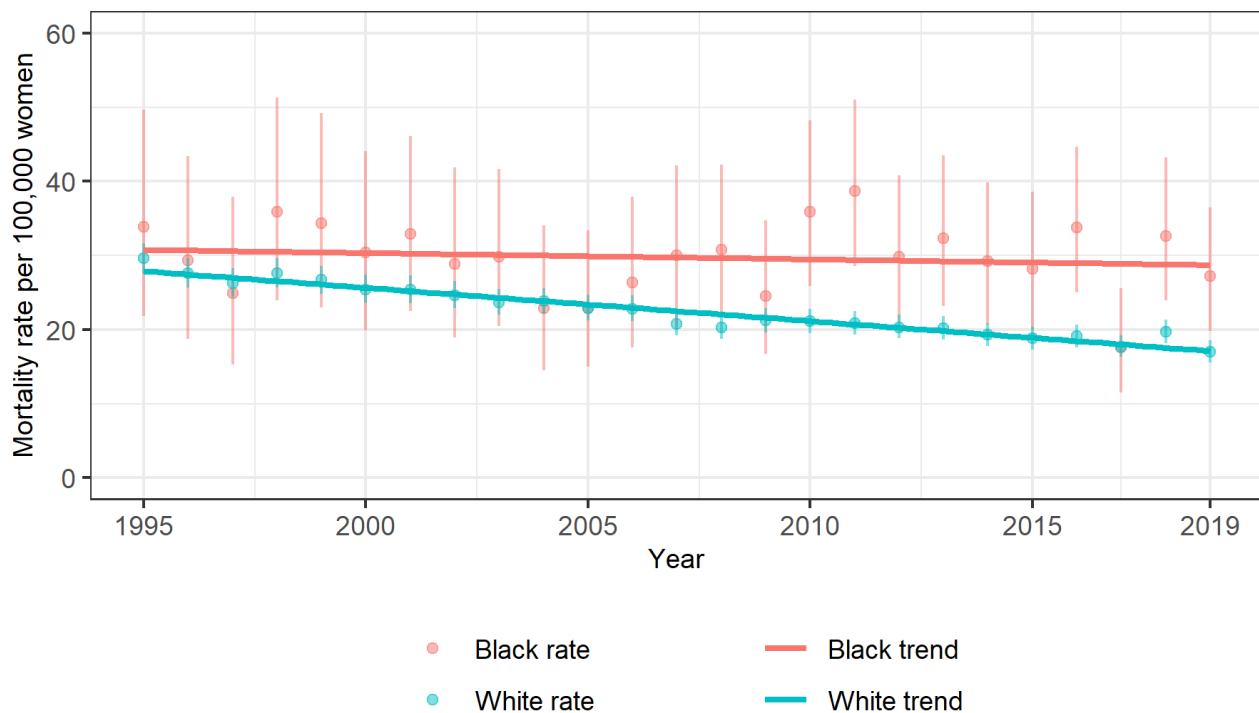
Incidence rate ratios show these patterns more clearly. Before 2010, rate ratios, which compared the incidence of breast cancer in Black women with White women, were relatively similar in Wisconsin and the SEER22 registries. After 2010, incidence rate ratios show similar or slightly higher (though not statistically significantly higher) breast cancer incidence for Black women compared to White women in Wisconsin. SEER22 rate ratios suggest that the national incidence of breast cancer remained lower among Black women than White women during this period.

Mortality

Previous research has shown that breast cancer mortality rates are higher for Black women than White women in the US.^{16, 17} Wisconsin is faring particularly poorly, as the state with the third-largest Black-White disparity in female breast cancer mortality.^{16, 18}

The breast cancer mortality rate for White women in Wisconsin has been steadily decreasing since 1995. Despite wide confidence intervals, the mortality rates for Black women in Wisconsin, seems to have held roughly steady for the last 25 years (Figure 3).

Figure 3: Breast Cancer Mortality
Black and White women, Wisconsin state, 1995-2019



During the 1995-1999 period, the Black female breast cancer mortality rate (31.6 per 100,000, 95%CI 26.3-37.6) was 14.9% higher than the White mortality rate (27.5 per 100,000, 95%CI 26.7-28.4). By the 2015-2019 period, the Black breast cancer mortality rate (27.8 per 100,000, 95%CI 24.1-31.9) was 50.3% higher than the White mortality rate (18.5 per 100,000, 95%CI 17.8-19.1).

To get the clearest picture of the breast cancer mortality disparity, the estimated mortality rate ratios are for aggregated periods of years. These rate ratios estimate whether Black mortality rates are statistically different than White mortality rates for a specified period, and the magnitude of that difference. Using periods rather than individual years lends more stability to estimates.

Mortality Rate Ratios, Wisconsin and US
Age-Adjusted Rates for 2000 US Standard Population

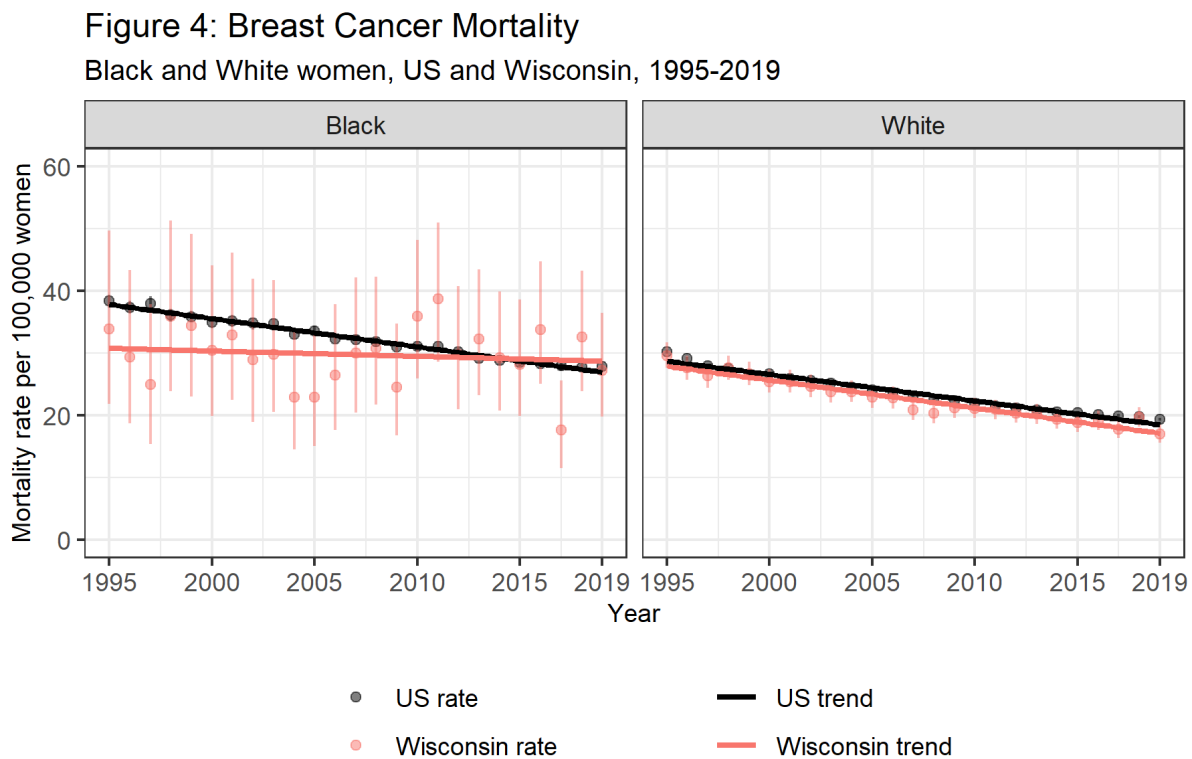
	Wisconsin rate ratio (95%CI)	US rate ratio (95%CI)
1995-1999	1.15 (0.95, 1.37)	1.31 (1.30, 1.33)
2000-2004	1.18 (0.99, 1.39)	1.35 (1.33, 1.37)
2005-2009	1.25 (1.06, 1.47)	1.39 (1.37, 1.41)
2010-2014	1.63 (1.41, 1.87)	1.42 (1.40, 1.44)
2015-2019	1.51 (1.30, 1.74)	1.41 (1.39, 1.43)

Last, let's compare Wisconsin breast cancer mortality rates to national rates. Breast cancer mortality rates can be estimated from truly national mortality data provided by the National Center for Health Statistics.⁷

Wisconsin and US overall breast cancer mortality trends and levels followed nearly identical paths over the last 25 years. Meanwhile, the mortality rates among Black women tell a different story. The US started the period with notably higher Black breast cancer mortality rates than Wisconsin. But the national trend shows steady progress in reducing mortality rates among Black women. Meanwhile, the Wisconsin trend has remained roughly stable since 1995, with only slight overall declines. Mortality rates for Black women in Wisconsin are now similar to national rates, though they were generally lower until 2010 (Figure 4).

Stage at Diagnosis

A late-stage breast cancer diagnosis is associated with lower survival.¹⁹ Historically within the US and Wisconsin, Black women have had higher rates of late-stage breast cancer diagnosis than White women. In Figure 5, diagnoses at the regional and distant stages are grouped as late-stage. But it is worth noting



that 5-year relative survival rates for breast cancers diagnosed at the distant stage are starkly lower than relative survival at the localized or regional stages, so trends in distant diagnoses may be especially important to watch.¹⁹

Stage information will be examined at a more granular level below, to better understand the specific stages at which Black and White women are being diagnosed. Five-year periods allow for a large enough sample size in each stage category and exclude cases where the stage at diagnosis was unknown.

During the 2005-2009 period, roughly 50% of Black women with a known stage were diagnosed with breast cancer at the Localized stage, compared to 65% among White women. In other words, roughly 50% of Black women and 35% of White women were diagnosed at a later stage (regional or distant), which is associated with lower survival.

The difference in diagnoses made at the Distant stage is especially concerning, with a consistently larger share of Black women receiving breast cancer diagnoses at the Distant stage. The most recent five years of data show improvement, though. The 2015-2019 period shows the largest proportion of diagnoses made at

the Localized stage since 1995 for both Black and White women (Figure 6). In 2015-2019, there are the following breakdowns for the stage at diagnosis by race (excluding cases where the stage at diagnosis is unknown):

Percent of diagnoses made at each stage, White and Black Women, 2015-2019

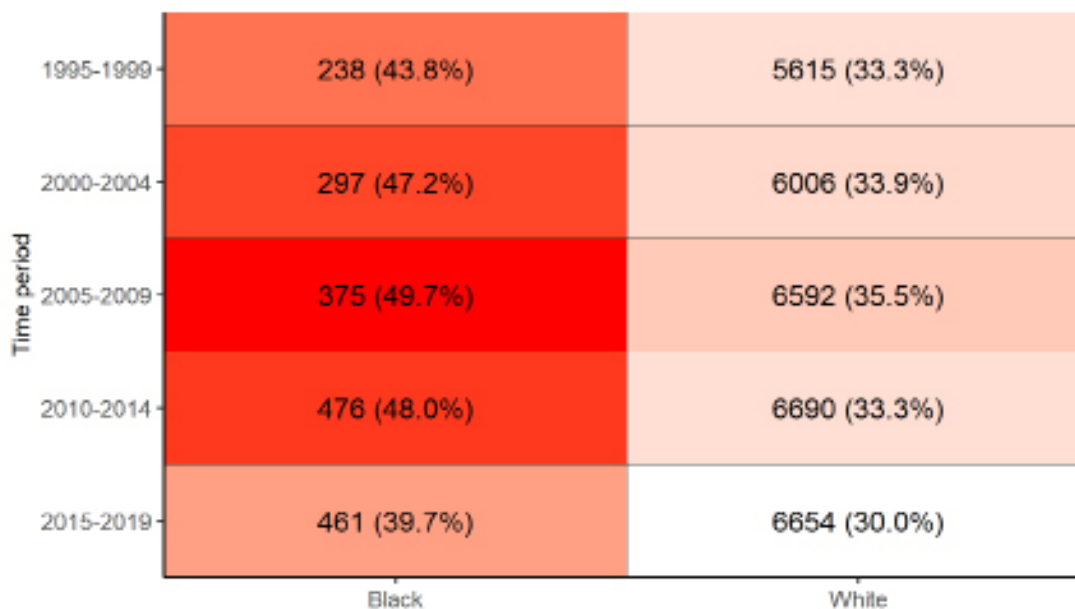
	Black	White
Localized	60.3% (N = 700)	70.0% (N = 15492)
Regional	32.0% (N = 372)	25.0% (N = 5541)
Distant	7.7% (N = 89)	5.0% (N = 1113)

In summary, even in the most recent five years of data, Black women in our state are still disproportionately diagnosed at later stages than White women. This disparity in stage at diagnosis could be contributing to higher mortality rates for Black women in Wisconsin.

Age at Diagnosis

Studies show that nationally, the median age at diagnosis of breast cancer is younger for Black women

Figure 5: Number (Percent) Late-Stage Breast Cancer Diagnoses Black and White women, Wisconsin, 1995-2019



than White women.²⁰ Does this age difference exist in women diagnosed with breast cancer in Wisconsin?

Overall, there are higher crude incidence rates observed for young Black women than young White

women in Wisconsin, based on cases diagnosed during the 2015-2019 period (Figure 7). Incidence rates are consistently higher for Black women ages 20-44 than White women in the same age groups, and are strikingly higher for Black women in the 55-

Figure 6: Breast Cancer Diagnoses by Stage
Black and White women, Wisconsin, 1995-2019

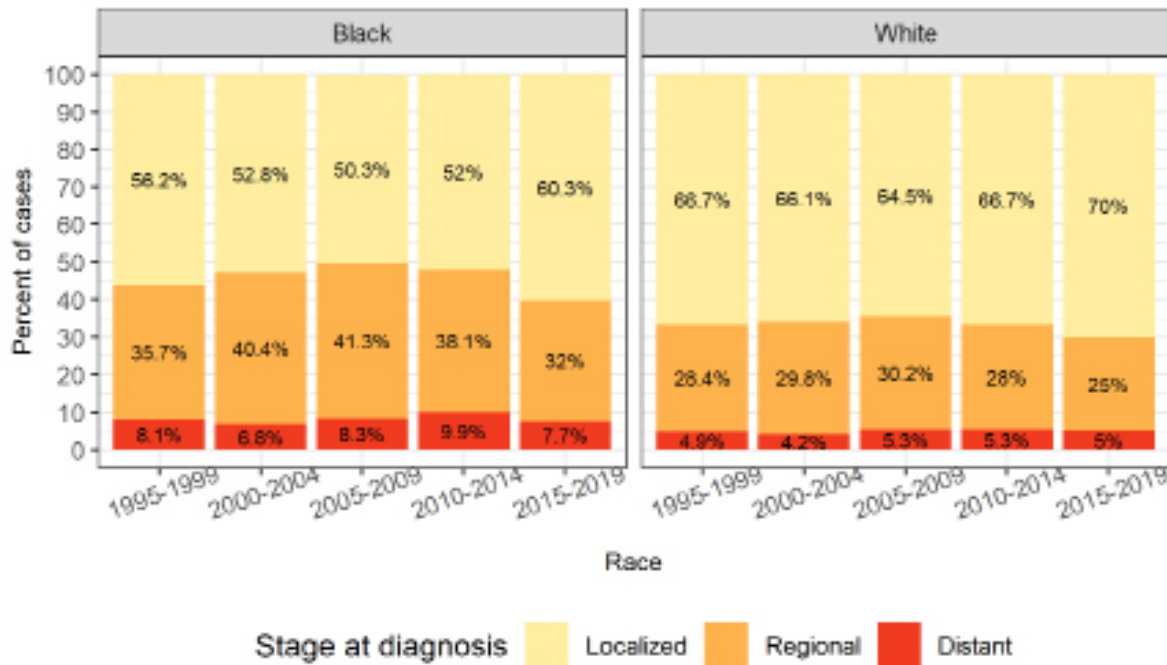
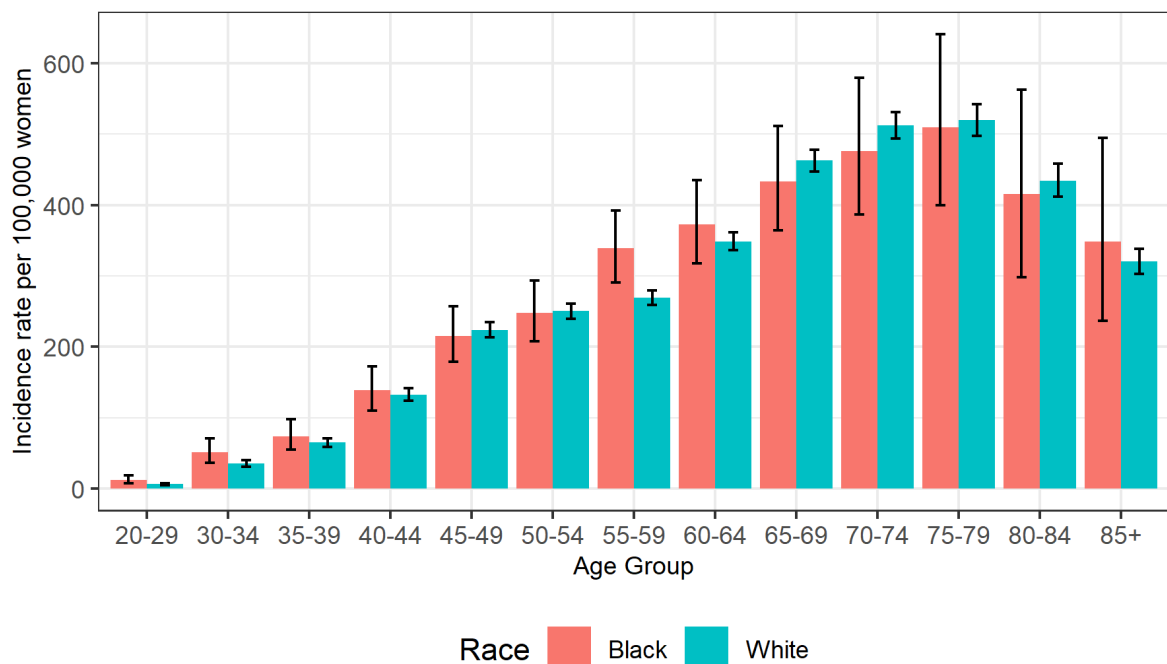


Figure 7: Age-specific Breast Cancer Incidence Rates
Black and White women, Wisconsin, 2015-2019



59 age group. Though comparisons at younger age groups are hampered by much smaller sample sizes, the magnitude of these differences is still noteworthy. For example, the crude incidence rate of breast cancer among 20-29-year-old Black women from 2015-2019 was 12.1 per 100,000 women (95%CI 7.5, 18.5), nearly double the rate for White 20-29 year-olds at 6.2 per 100,000 women (95%CI 5, 7.6).

Existing research at the national level confirms this younger age distribution among Black women.²¹ There is evidence that factors, like genetics, can predispose Black women to a younger onset of breast cancer, for example through a higher rate of triple-negative breast cancer in Black vs White women. Still, other factors such as health care access, behaviors, and environmental risk factors likely play a role. Further research is needed to determine how these interrelated factors are related to breast cancer diagnoses at younger ages in Wisconsin's Black population, and how health care providers and public health programs can best support women diagnosed at a young age.

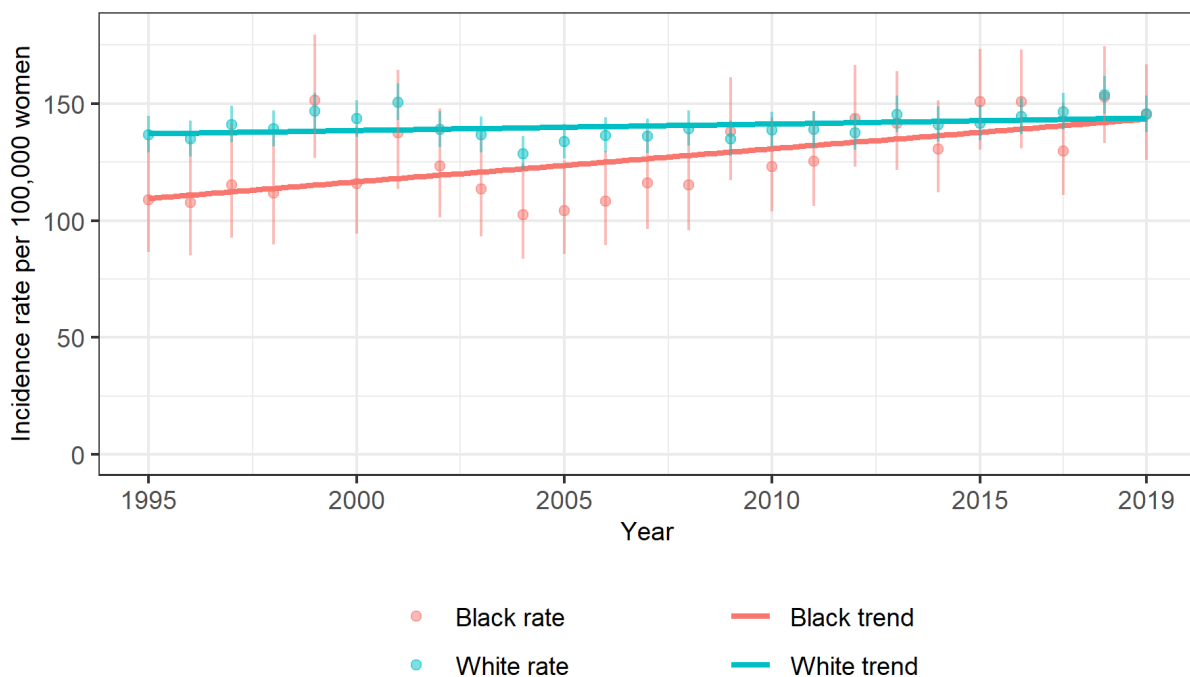
Breast Cancer in Southeastern Wisconsin

Roughly 85% of Wisconsin's non-Hispanic Black population lived in six Southern or Southeastern counties: Milwaukee, Dane, Racine, Kenosha, Rock, and Waukesha.⁴ In comparison, the White population is much more geographically distributed throughout the state, with 31.4% of the state's White population residing in the Southeastern region.⁴

Incidence

Incidence rates in the Southeast mirror those of the state for both Black and White women, with some notable differences. Statewide, Black breast cancer incidence rates shifted from being generally lower than White rates to generally higher than White rates in 2010. In the Southeast, there is more of an equalizing level in rates after 2010. This is mostly since incidence rates for White women in the Southeast are generally slightly higher than for White women statewide. Essentially, Southeast trends are similar to statewide trends (Figure 8).

Figure 8: Breast Cancer Incidence
Black and White Women, Southeastern Region, 1995-2019



The rates themselves are also roughly the same for the state and Southeastern region for Black women, but rates are typically higher in the Southeast than in the rest of the state for White women.

Mortality

Mortality rates in the southeast, in both trend and level, are almost identical to those observed at the state level. This holds true for both Black and White women, despite the higher incidence rates among White women in the Southeast (Figure 9).

Stage at Diagnosis

The proportion of late-stage diagnoses in the Southeast also follows the state story. A larger proportion of breast cancers are diagnosed at the Regional or Distant for Black women living in the Southeast, compared to White women living in the Southeast (Figure 10).

Breast Cancer at the County Level

In 2019, over 85% of Wisconsin’s non-Hispanic Black population lived in six Southern or Southeastern counties: Milwaukee, Dane, Racine, Kenosha, Rock, and Waukesha.⁴ Five of these counties (Milwaukee,

Dane, Racine, Kenosha, and Rock) made up over 83% of Wisconsin’s non-Hispanic Black population. Milwaukee county alone made up 63.5% of the state’s non-Hispanic Black population in 2019.⁴ The last ten years of breast cancer data for four of these counties are combined where necessary to increase sample size: Milwaukee, Dane, and Kenosha/Racine. Due to small sample sizes, Rock county will not be included in the analysis.

Incidence

During 2010-2019, incidence rates were relatively similar for Black and White women within and across counties, except for Dane County. In Dane County, the breast cancer incidence rate among Black women (124.7, 95% CI 100.0-153.4) was lower than for White women (136.5, 95% CI 131.9-141.3). In Milwaukee, incidence rates for Black and White women were nearly identical over the last ten years, at roughly 140 per 100,000 women (95% CI 133.4, 147.3). In Kenosha and Racine, incidence rates were just slightly higher for Black women (139.3, 95% CI 120.0-160.7) than White women (136.0, 95% CI 130.6-141.6) during the same period (Figure 11).

Figure 9: Breast Cancer Mortality, Black and White Women, Southeastern Region, 1995-2019

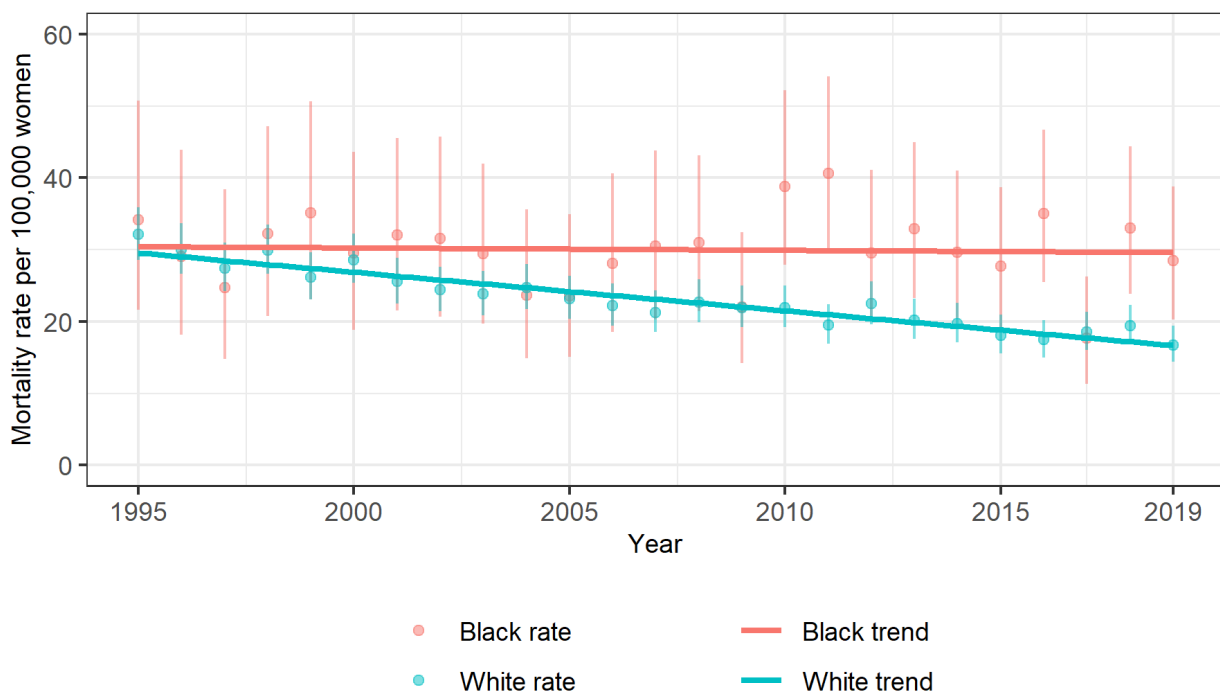


Figure 10: Proportion Late-Stage Breast Cancer Diagnoses
Black and White women, Southeastern Region, 1995-2019

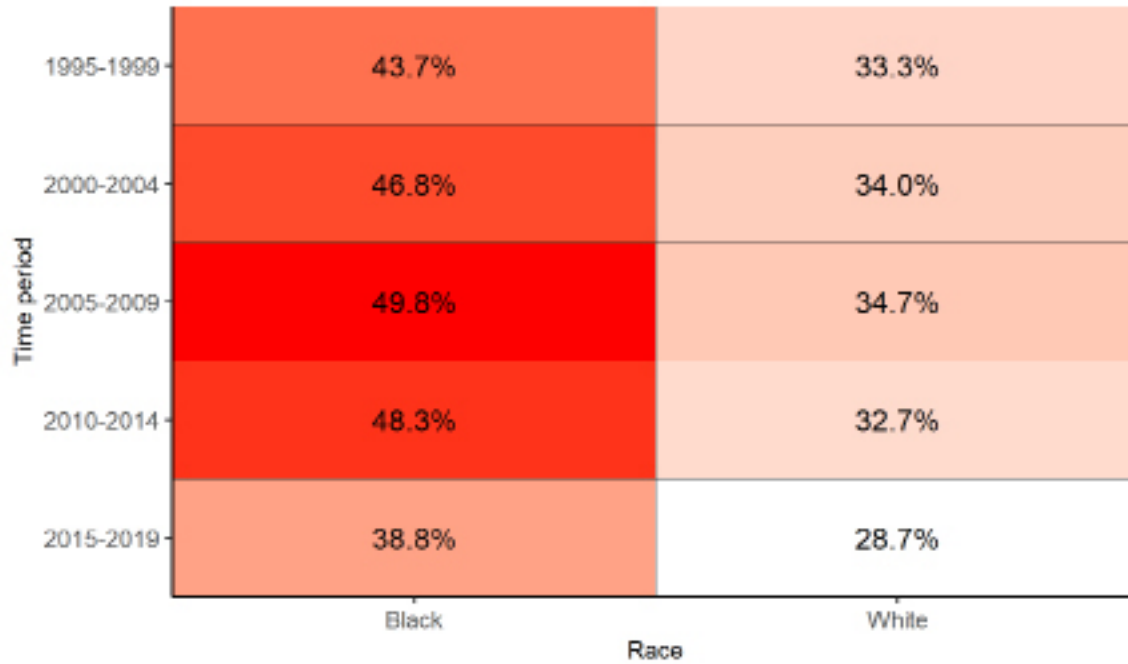
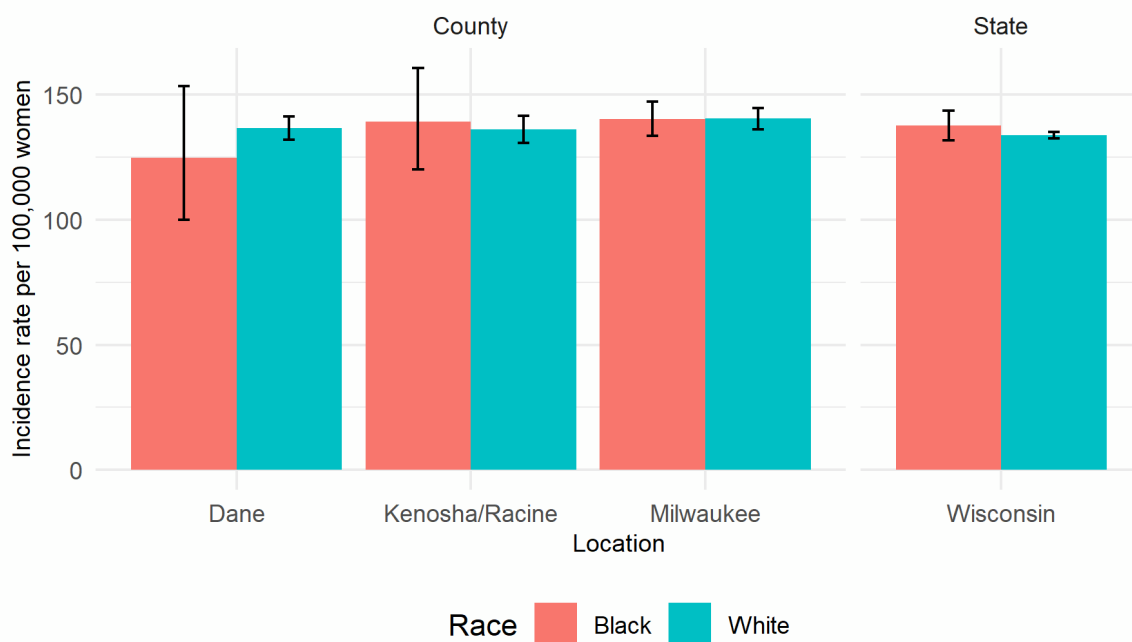


Figure 11: Breast Cancer Incidence Rates
Black and White Women, Wisconsin Counties and State, 2010-2019



Case counts and incidence rates for each county are also shown in the table below, with 95% Confidence Intervals for each rate in parentheses.

Breast Cancer Incidence Rates, Black and White Women, Wisconsin Counties, 2010-2019
Age-Adjusted Rates for 2000 US Standard Population

Location	Black Incidence	White Incidence
Dane	124.7 (100.0, 153.4) N=114	136.5 (131.9, 141.3) N=3451
Kenosha/Racine	139.3 (120.0, 160.7) N=195	136.0 (130.6, 141.6) N=2577
Milwaukee	140.2 (133.4, 147.3) N=1680	140.4 (136.2, 144.6) N=4922

Mortality

There are more significant disparities in mortality rates by county. Black female breast cancer mortality rates are higher than White mortality rates in every county shown. The magnitude of the disparity is largest in Dane County. As seen above, incidence rates for Black women are lower than White incidence rates in Dane County, but mortality rates for Black women are higher than those of White women. The sample size

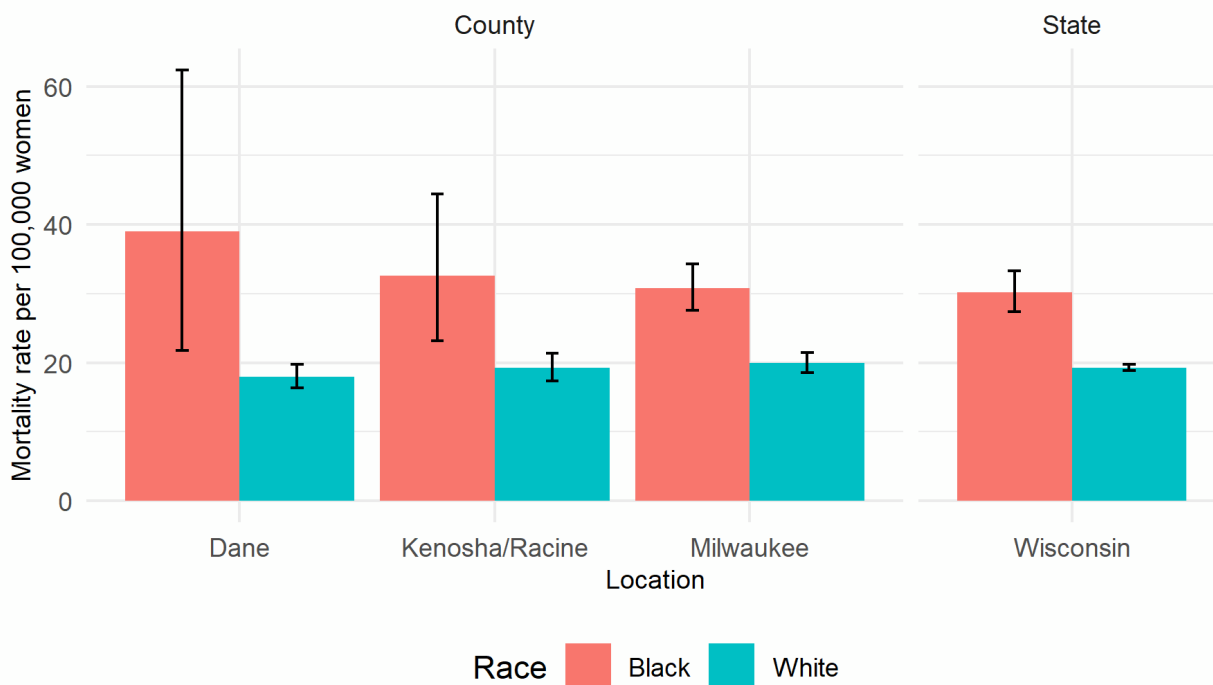
behind Dane County's statistics is quite low, though, and estimates are highly unstable (note the wide confidence intervals). Mortality rates in Milwaukee County, Kenosha/Racine counties, and the state are broadly similar, though Kenosha/Racine's estimated breast cancer mortality rate for Black women is far less precise than rates for Milwaukee and the state (Figure 12).

Cause-specific death counts and mortality rates can also be found in the following table, with 95% confidence intervals for each rate in parentheses.

Breast Cancer Mortality Rates, Black and White Women, Wisconsin Counties, 2010-2019
Age-Adjusted Rates for 2000 US Standard Population

Location	Black Mortality	White Mortality
Dane	39.0 (21.8, 62.4) N=19	18.0 (16.4, 19.8) N=479
Kenosha/Racine	32.6 (23.2, 44.4) N=41	19.3 (17.4, 21.4) N=397
Milwaukee	30.8 (27.6, 34.3) N=352	20.0 (18.6, 21.5) N=816

Figure 12: Breast Cancer Mortality Rates
 Black and White Women, Wisconsin Counties and State, 2010-2019



Discussion

Despite improvements in breast cancer incidence, mortality, and stage of diagnosis at the national level, significant disparities between Black and White women persist in Wisconsin.

Wisconsin has the nation's third largest Black-White disparity in female breast cancer mortality.^{16, 18} While breast cancer mortality rates for White women in Wisconsin have been steadily decreasing since 1995, the mortality rates for Black women have held steady in the same period. This growing disparity in mortality may be linked to the significant differences in stage at diagnosis. Black women are disproportionately diagnosed at later stages than White women in Wisconsin.

In addition to disparities in incidence, mortality, and stage at diagnosis, there are higher crude incidence rates for young Black women than young White

women. The incidence rates during the 2015-2019 period are consistently higher in Black women in the 20-44 age groups, and significantly higher in the 55-59 age group. Comparisons at younger age groups are hampered due to smaller sample sizes; however, the magnitude of these differences is still notable.

These results indicate there are continuing, substantial disparities in breast cancer incidence, mortality, stage of diagnosis, and age at diagnosis for Black women in Wisconsin. While this report cannot speak as to the causes of these disparities, more in-depth research into health disparities and social determinants of health in southern and southeastern regions of Wisconsin will help to reveal paths forward. Furthermore, increasing access to resources such as the Wisconsin Well Woman Program will help address these disparities. Additionally, this report highlights the need for continuous access to timely, high-quality data to better understand the degree of these disparities.

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