Abstract

The Florida Department of Health continued its investigation into changes in glioblastoma counts and rates in the Treasure Coast region at the request of the residents of St. Lucie County. This investigation used standard incidence ratios (SIR) to compare the actual number of cancer cases to the expected number of cancer cases based on the rate of glioblastoma at the state level. The time periods observed and compared were 2014-2018 and 2019-2023. The results of the analysis showed that there was not a statistically significant increased number of glioblastoma diagnoses over the ten-year period in any of the observed areas.

Purpose

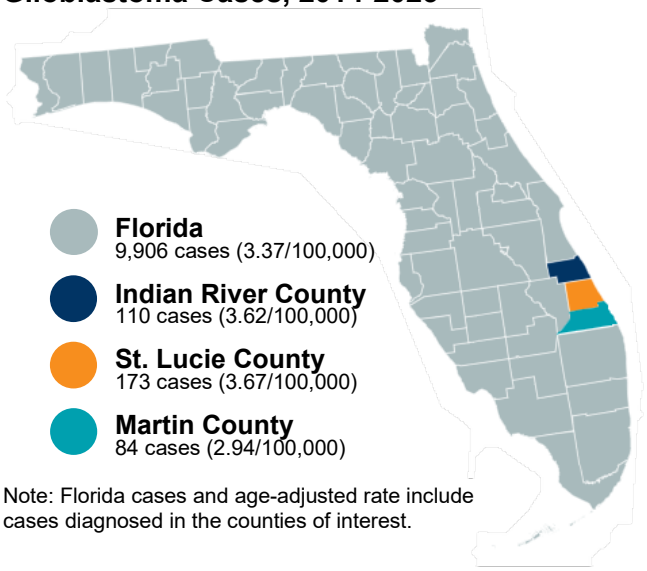
In August 2025, residents of St. Lucie County requested a renewed evaluation of the number of glioblastoma cases identified within their community using the most recent available data. Prompted by renewed community concerns, the Florida Department of Health in St. Lucie County (DOH-St. Lucie) requested an update to the glioblastoma analysis originally published in the 2019 DOH St. Lucie Cancer Report.

This supplement provides an updated assessment of glioblastoma occurrence for the areas of interest from 2014–2023, expanding upon the 2019 analysis completed in response to earlier community inquiries.

Summary

For this supplemental cancer data assessment, there were no statistically significant increases in the number of observed glioblastoma cases when compared with the number of expected cases for the areas of concern. Because the number of cases of glioblastoma at the county level varies so much year to year, a SIR analysis was performed for two time periods: Period 1 (2014–2018) to Period 2 (2019–2023). The SIR for St. Lucie, Martin, and Indian River Counties across both time periods were determined to not be statistically significant, meaning the number of glioblastoma cases has not increased more than expected based on population growth in those areas. Additionally, the SIR analysis conducted on the three St. Lucie County ZIP codes of concern (34952, 34982, and 34983) in each respective time period, found no statistically significant increase in glioblastoma.

Exhibit 1: Number and Age-Adjusted Rate of Glioblastoma Cases, 2014-2023



Note: Florida cases and age-adjusted rate include cases diagnosed in the counties of interest.

Rare cancers like glioblastoma can show substantial changes in incidence rate simply because so few cases occur each year. When a type of cancer is uncommon, even one or two additional diagnoses in a single year can make the rate look much higher, even though this may just be normal year-to-year variation. Statistical significance tests help us determine whether a cancer is being diagnosed more often than expected, rather than reflecting annual fluctuations.

Discussion

Florida Cancer Data System (FCDS)

The data from FCDS provides a rate of cancer diagnoses among the general population. Although FCDS data can be provided by county or ZIP Code, this reflects the residence of a patient at the time of diagnosis and represent a retrospective (historical) account of the burden of cancer for the areas of concern. Exposures leading to cancer could have occurred where the patient lived previously. There are a number of contributing factors that are not included in the available cancer data, such as the personal and family medical history and the length of time the person was living within that ZIP code. These factors can change a person's risk of developing cancer.

Age-Adjusted Rates and the SIR Analyses

Age-adjusting rates ensures that comparisons between populations are not biased due to differences in age. Cancer diagnosis increases significantly with age. When comparing a communities, variations in the community's age distribution can distort results. An older population may naturally show higher cancer rates even though there is no overall excess risk. The SIR compares the observed cases of cancer in the study population to the expected number, which is calculated using age-specific rates from Florida. This makes the comparison more accurate. Age-adjusted SIRs help separate true differences in risk from variations in the age of a community.

Population Increase

One important factor that helps explain why communities may perceive an increase in cancer cases is the substantial population growth that has occurred within these counties. Each county experienced population growth between 2014 and 2023, increasing by 25%, 20% and 9% for St. Lucie County, Indian River County, and Martin County, respectively. When a county's population grows, the number of cancer diagnoses will increase, even if the underlying cancer incidence rate (i.e., the risk of cancer in the population) remains unchanged. An increase in the number of reported cancer cases can therefore reflect population growth rather than a true change in cancer risk. Community members may notice more cases simply because there are more people living in the area, more households, and more interactions within neighborhoods, workplaces, or social circles. When population growth is uneven across counties, it can also make some communities feel like they are experiencing a sharper rise in cancer cases, even when cancer incidence rates remain stable. While communities in the areas of concern for this analysis may "hear" and "see" an increase in cancer, the SIR findings indicate that the number of newly diagnosed cancer cases is consistent with what would be expected given the expanding populations in the counties assessed in this supplement.

Cancer Concern Investigations

Cancer can occur randomly among populations. It is important to keep in mind that most investigations of suspected cancer concerns in a community do not lead to the identification of a causal disease association or an associated environmental contaminant. There are many factors included in cancer identification, including the fact that cancer is not a single disease, but has many different forms that each have their own causes and risk factors. Furthermore, there is no national threshold or set number of cancer cases to determine or signal there is an elevated number of cancer cases occurring in a specific group of people, defined geographic area, or over a specified time period. The number of cancer cases may vary from year to year even if there is no change in the population or environment. Although cancer is a serious and often frightening diagnosis, it is a common disease. Current information shows that approximately one out of three Americans will develop cancer in their lifetime, and cancer will affect three out of four families[1]. The risk of developing cancer increases with age; as the population ages, more cases of cancer are expected in our communities.

[1] American Cancer Society. (n.d.). *All About Cancer*. Retrieved July 14, 2026, from https://www.cancer.org/cancer.html

The Department will continue to monitor cancer incidence in the suspected areas of concern in addition to staying abreast of any new medical and scientific discoveries to better understand the occurrence of glioblastoma. Moreover, the Department will continue to work with local cancer stakeholders to provide education on cancer and what constitutes a suspected cancer cluster.

Advancing Glioblastoma Treatment

Exhibit 2: Florida Department of Health Funded Glioblastoma Research, 2024 – 2025

Total Grants	11
Total Amount Funded	$9,533,631.45
Numbers of Institutions Funded	8

The Department supports ongoing research into Glioblastoma. These grants center on advancing brain cancer outcomes through diverse precision-medicine approaches. Topics span drug repurposing, statewide infrastructure for collaborative clinical trials, development of novel therapeutic compounds, early-phase trials for first-in-class agents, metabolic and nanotherapeutic strategies, emerging molecular targets, AI-enabled early detection, mRNA-based degraders, blood–brain-barrier-penetrating chemotherapies with immune agonists, and integrated radiation-chemotherapy frameworks for functional precision medicine. The Department will recommend to the respective advisory boards that fund legislative allocations for cancer research through the William G. “Bill” Bankhead, Jr., and David Coley Cancer Research Program, the Florida Cancer Innovation Fund, and the Live Like Bella Pediatric Cancer Research Initiative to continue support local studies aimed at understanding the burden and addressing potential risk factors for brain cancer sub-types, particularly those focused on glioblastoma.

Environmental Health Assessment

The Department’s Bureau of Radiation Control (BRC) and Bureau of Environmental Public Health (BEPH) were consulted to review and analyze the most recent available data for this supplement.

Radiation

The BRC has oversight of the nuclear power plants in Florida under section 404.051, Florida Statutes. The BRC conducts an environmental monitoring program in the vicinity of the St. Lucie Nuclear Power Plant site. The monitoring program meets the U.S. Nuclear Regulatory Commission’s (NRC) requirements for a Radiological Environmental Monitoring Program and the results are incorporated into the plant’s Annual Radiological Environmental Operating Report submitted to the NRC.

The updated data from the St. Lucie - Annual Radiological Environmental Operating Report for 2023 (https://www.nrc.gov/docs/ML2406/ML24060A179.pdf, published April 17, 2024) obtained through the St. Lucie Plant Radiological Environmental Monitoring Program verifies that the levels of radiation and concentrations of radioactive materials in the environmental samples, representing the highest potential pathways to members of the public, are not increasing. Measured exposure rates are consistent with exposure rates that were observed during the data review for the 2019 Report.

The BRC conducts environmental monitoring programs around the St. Lucie power plant. Thermoluminescent detectors surrounding each site identify direct radiation and special air sampling stations identify radioactive particulate emissions. Department staff also collect and analyze other samples, including vegetation, fish, citrus, watermelon, milk, garden vegetables, shoreline sediment, beach sand, drinking water, surface water, and ground water. Owned and operated by the Florida Power and Light (FP&L), the St. Lucie Nuclear Power Plant’s design safely keeps radiation inside the plant. Radiation releases from the plant measure less than 1 millirem per year.

Water Quality & Testing

Because ingestion can be a route of chemical exposure, BEPH reviewed drinking water records from public utilities and available private well data in the areas of interest in St. Lucie County.

Most residents in St. Lucie County receive water from public utilities. These systems conduct required quarterly testing for chemical and biological contaminants, and any violations must be corrected to meet safe drinking water standards. Residents who use private wells are responsible for testing and maintaining their own water. BEPH can assist private well owners in determining whether their drinking water may be at risk.

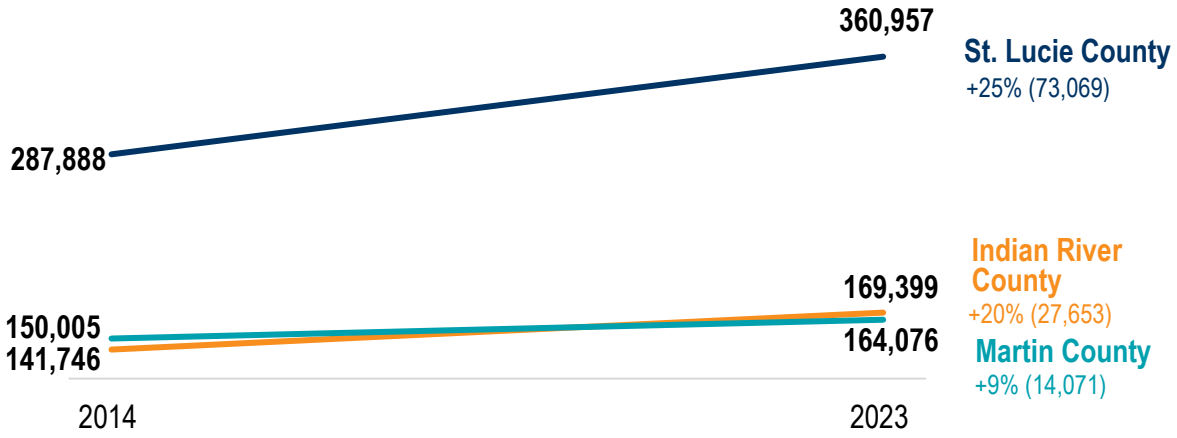
Based on the review, BEPH did not identify drinking water contaminated with chemicals linked by the U.S. Environmental Protection Agency (EPA) to glioblastoma or other brain related health concerns.

Analysis of Data

Population Data

The population in the Treasure Coast Region increased substantially from 2014 to 2023. The Florida population also increased by 16% during this time. Both Indian River and St. Lucie Counties experienced a larger population increase than the State (25% and 20%, respectively). The population growth in St. Lucie County was greater than the other two counties of interest combined.

Exhibit 3: Population Size in Martin, Indian River, and St. Lucie Counties, 2014-2023



Source: Florida Legislature Office of Economic and Demographic Research Mid-Year Population Estimates, July 1, 2026.
Note: Graphic shows the total population for each county in 2014 and 2023. The metrics under the county labels describe the percent increase in population size from 2014 to 2023 and the total difference in population size.

Exhibit 4: Martin, St. Lucie, Indian River County Population Counts

	Population Counts			
Year	**Florida**	**Indian River County**	**Martin County**	**St. Lucie County**
2014	19,548,031	141,746	150,005	287,888
2015	19,860,805	143,743	150,165	287,366
2016	20,231,092	147,163	151,081	294,144
2017	20,555,728	149,930	152,333	299,962
2018	20,957,705	152,079	155,705	304,743
2019	21,268,553	155,308	158,006	309,073
2020	21,640,766	158,238	161,017	316,620
2021	22,005,587	162,826	163,920	335,202
2022	22,329,178	164,306	160,196	351,381
2023	22,685,583	169,399	164,076	360,957
% Change	16%	20%	9%	25%

Source: Florida Legislature Office of Economic and Demographic Research Mid-Year Population Estimates, July 1, 2026.

Exhibit 5: ZIP Code 34952, 34982, 34983 Population Count Estimates

	ZIP Code Population Counts* – St. Lucie County		
Year	**34952**	**34982**	**34983**
2014	37,284	24,914	39,980
2015	38,026	24,770	39,922
2016	38,951	23,833	41,469
2017	38,936	25,492	42,223
2018	40,063	25,981	42,737
2019	41,567	25,135	42,818
2020	43,317	26,034	44,005
2021	42,196	25,825	44,999
2022	41,779	26,727	45,943
2023	41,679	27,447	47,983
% Change	12%	10%	20%

Source: United States Census Bureau

*ZIP Code Tabulation Areas (ZCTA) population is an estimate based on American Community Survey (ACS) 5-year rolling estimates of ZCTAs. ZCTAs are generalized populations representative of the ZIP Codes in the respective ACS survey.

Age-Adjusted Rates

Exhibit 6: Malignant Glioblastoma Age-Adjusted Incidence Rates, 2014–2023*

	2014-2018 (per 100,000)	2019-2023 (per 100,000)
National	3.2	3.2
Florida	3.3	3.4
Indian River County	3.7	3.6
Martin County	3.2	2.7
St. Lucie County	3.6	3.7
34952	3.8	4.5
34983	2.3	5.5
34982	1.6	3.9

* Random fluctuations in cancer rates should not be compared across different time periods or geographic areas (such as counties versus ZIP codes). Rate patterns alone are not sufficient to quantitatively assess community differences in a standardized incidence ratio (SIR) analysis, particularly when evaluating potential cancer concerns in a specific community.

Standardized Incidence Ratios (SIR)

None of the SIRs for any of the observed areas or periods represent a significant change in glioblastoma diagnoses. SIRs with confidence intervals that include one are not statistically significant.

Five-Year SIR Intervals

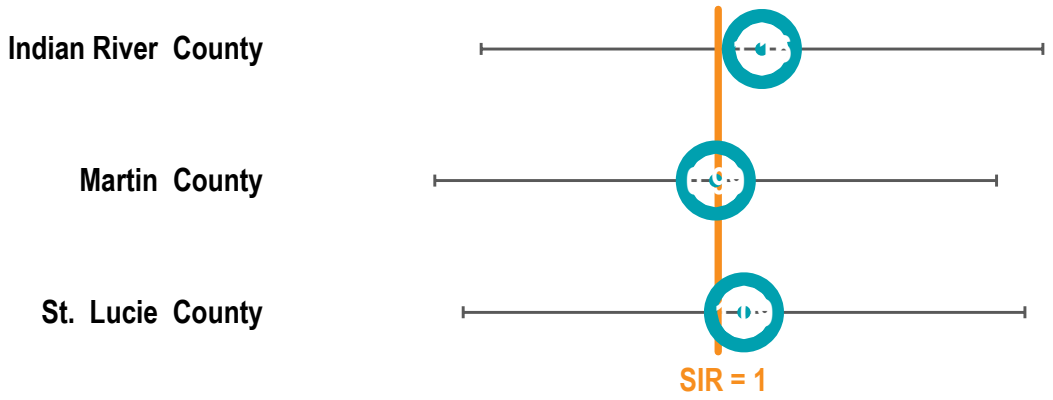
Exhibit 7: Five-Year SIR Intervals by County 2014-2018

	2014-2018				
County	**Observed*/Expected** Cases**	**SIR**	**CI+ Lower**	**CI+ Upper**	**Significant++**
Indian River County	50/44	1.16	0.84	1.48	N
Martin County	44/45	0.99	0.70	1.28	N
St. Lucie County	78/72	1.09	0.85	1.33	N

*Observed = Observed number of cancer cases found within FCDS.
**Expected = Expected number of cancer cases, calculated using the state-specific rate for the respective cancer type and population estimation.
+CI = Confidence Interval.
++Significant - For an SIR to be considered statistically significantly higher than expected, the lower confidence interval must be above 1.0. If the confidence interval includes 1.0, then it is not considered statistically significant.

The county SIR confidence intervals for 2014-2018 include one and are not statistically significant.

Exhibit 8: SIRs and Confidence Intervals for Martin, Indian River, and St. Lucie Counties, 2014-2018



Note: SIR shown in the blue circle represents the ratio of observed cancer cases to expected cancer cases for each county. Confidence intervals are shown as the black bars. The orange line indicates an SIR of one (expected cases=actual cases). Confidence intervals including an SIR of one are not significant.

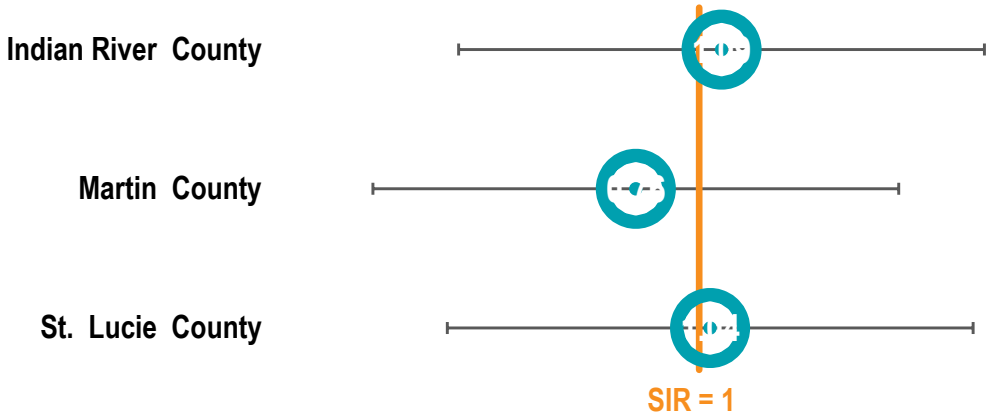
Exhibit 9: Five-Year SIR Intervals by County 2019-2023

	2019-2023				
County	**Observed*/Expected** Cases**	**SIR**	**CI+ Lower**	**CI+ Upper**	**Significant++**
Indian River County	60/56	1.09	0.81	1.36	N
Martin County	40/53	0.76	0.52	0.99	N
St. Lucie County	95/92	1.04	0.83	1.25	N

*Observed = Observed number of cancer cases found within FCDS.
**Expected = Expected number of cancer cases, calculated using the state-specific rate for the respective cancer type and population estimation.
+CI = Confidence Interval.
++Significant - For an SIR to be considered statistically significantly higher than expected, the lower confidence interval must be above 1.0. If the confidence interval includes 1.0, then it is not considered statistically significant.

The county SIR confidence intervals for 2019-2023 include one and are not statistically significant.

Exhibit 10: SIRs and Confidence Intervals for Martin, Indian River, and St. Lucie Counties, 2019-2023



Note: SIR shown in the blue circle represents the ratio of observed cancer cases to expected cancer cases for each county. Confidence intervals are shown as the black bars. The orange line indicates an SIR of one (expected cases=actual cases). Confidence intervals including an SIR of one are not significant.

Ten-Year SIR Intervals

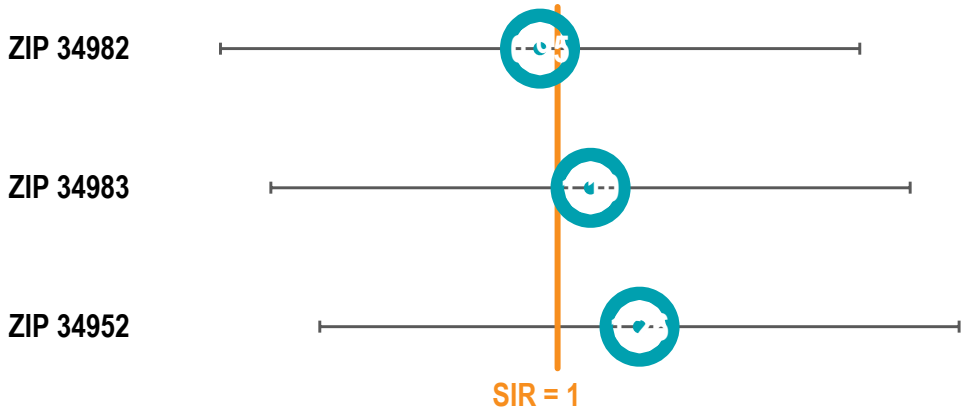
Exhibit 11: Ten-Year SIR Intervals 2014-2023

	St. Lucie ZIP Codes - 2014-2023				
St. Lucie County ZIP Code	**Observed*/Expected** Cases**	**SIR**	**CI+ Lower**	**CI+ Upper**	**Significant++**
34982	12/13	0.95	0.41	1.48	No
34952	32/26	1.26	0.82	1.69	No
34983	21/20	1.10	0.63	1.58	No

* Observed = Observed number of cancer cases found within FCDS.
** Expected = Expected number of cancer cases, calculated using the state-specific rate for the respective cancer type and population estimation.
+CI = Confidence Interval.
++Significant - For an SIR to be considered statistically significantly higher than expected, the lower confidence interval must be above 1.0. If the confidence interval includes 1.0, then it is not considered statistically significant.

The St. Lucie County ZIP code SIR confidence intervals for 2014-2023 include one and are not statistically significant.

Exhibit 12: SIRs and Confidence Intervals for St. Lucie County ZIP Codes, 2014-2023



Note: SIR shown in the blue circle represents the ratio of observed cancer cases to expected cancer cases for each ZIP code. Confidence intervals are shown as the black bars. The orange line indicates an SIR of one (expected cases=actual cases). Confidence intervals including an SIR of one are not significant.

Interpreting the Data

The FCDS is legislatively mandated per section 385.202, F.S. to collect incidence data (i.e., the number of new cancer cases per year) on all cancer cases diagnosed in the state of Florida. The FCDS has collected cancer incidence data from hospitals statewide since 1981 and from non-hospital sources (e.g., ambulatory surgical centers, radiation therapy centers, pathology laboratories, private physician offices) since 1997. The main goal of the FCDS is to gather complete, accurate, and timely data to assist policy makers and researchers in developing policy and programs to reduce death and illness due to cancer by better understanding cancer trends and possible causes of cancer.

However, there are limitations to using FCDS data to address community cancer concerns. Like other state cancer registries, the FCDS does not collect environmental exposures, complete genetic data, nor residential history. While the data submitted to the FCDS by hospital and non-hospital reporters can be used to describe “who”, “what”, “when”, and “where” of each cancer case, FCDS

data alone cannot determine why the occurrence of cancer in a specific area or population is happening.

Standardized Incidence Ratio (SIR)

The SIR is calculated to determine if there was a greater than expected number of cases for glioblastoma, for each of the three counties and ZIP codes. This is done by comparing the actual number of new glioblastoma diagnoses (observed cases) to what would be expected for the area based on the rate of glioblastoma at the state level (expected cases). A statistically significant SIR greater than one indicates there were more cancer cases than expected, and an SIR of less than one shows fewer cases than expected. Confidence intervals are calculated and used alongside SIR to describe the stability and precision of the calculated SIR.[2] Confidence intervals determine if the results of the SIR are statistically significant and show a meaningful increase that is not due to random variations in case counts. Some of the difference in number of observed and expected cases shown in the SIR tables within the Analysis of Data section below is due to the incidence rates depicting an average community incidence rather than representing individual risk. These SIR rates represent the ratio of actual cases to the expected number of cases that occurred within the community, adjusting for age. Since individual cancer risk is influenced by many factors including age, family history, environment, lifestyle, etc., the statistical methods used to calculate SIR help to summarize that risk at a community level. For instance, although the SIR for ZIP code 34952 is 1.26 between 2014-2023, indicating a higher-than-expected number of cases, the difference in actual versus expected cases that are represented within this rate remains small. This SIR represents a difference of six cases over the entire 10-year period, equating to less than one additional case per year. For this ZIP code, the confidence interval indicates that the increase of six cases over 10 years is not statistically significant and may be the result of random variation of small numbers over the time period. The difference in observed and expected cases shown in the SIR rate calculations translates to a rare occurrence and was not significantly greater than what would be expected for each given area based on the population in that community.

Age-Adjusted Rates

Age-adjusted rates of reported glioblastoma remained relatively stable from Period 1 (2014–2018) to Period 2 (2019–2023) for Florida, St. Lucie County, and Indian River County, but slightly decreased for Martin County. ZIP code age-adjusted rates increased from Period 1 to Period 2. Part of this change may be explained by how the rates were calculated. For county-level rates, we can use annual county population estimates that adjust for year-to-year population changes. However, this option is not available for ZIP codes. For ZIP code calculations, we must rely on the fixed population counts from the decennial census. These counts do not change over time, so we multiply the one-year census population by the number of years in each comparison period, five years in this case, to create the population figures used in the rate calculations. While 5-year rolling population estimates exist for ZIP codes, they were not used because ZIP code boundaries can change, and these estimates become less reliable as we move farther from the decennial census year. Although ZIP code populations generally increased over the 10-year span, this growth is not reflected in our rate calculations. A larger population means more people could potentially develop cancer, but because the calculation uses a fixed population that does not capture this growth, the resulting rates can appear higher even when the increase in case counts is modest. Importantly, when looking at actual cancer counts, no ZIP code had more than six additional cases in the second 5-year period compared with the first. All analyses showed fluctuating glioblastoma case counts from year-to-year due to the small number of reported diagnoses. Florida age-adjusted incidence for malignant glioblastoma (3.3 and 3.4 per 100,000 for Period 1 and Period 2, respectively) is comparative to the national rate of 3.3 per 100,000 for 2017-2021 (*Central Brain Tumor Registry of the United States.* (2026). *https://cbtrus.org/wp-content/uploads/2025/07/GBM-CBTRUS-Factsheet.pdf*).

[2] https://www.cdc.gov/cancer-environment/media/pdfs/Standardized-Incidence-Ratio-Fact-Sheet-508.pdf

Methods

For this supplement, the Florida Department of Health (Department) used all available years of cancer incidence data from FCDS that had been finalized since the 2019 report was published, including data through 2023. The objective was to replicate the analytic methods used in the 2019 St. Lucie Cancer Report as closely as possible. However, there are some slight differences due to the data available for the analysis. The 2019 report examined two 10-year time periods, 1998-2007 and 2008-2017. Without two additional 10-year periods of data available for comparison, FCDS utilized two 5-year time periods, 2014-2018 and 2019-2023.

A glioblastoma case was defined as an FCDS record containing an International Classification of Oncology, 3rd edition (ICD-O-3) histology code for glioblastoma (9440, 9441, 9442, 9445) and a Behavior code of 3 to indicate malignancy.

A standardized incidence ratio (SIR) analysis was completed for glioblastoma at the county-level for St. Lucie, Indian River, and Martin counties across the two five-year time periods to determine whether the number of glioblastoma cases was greater than expected based on statewide incidence rates. Additionally, a SIR analysis was also completed for three St. Lucie County ZIP codes: 34982 (primary area of concern), 34952, and 34983 (secondary areas of concern) across the full time period (2014-2023). The SIR was calculated to determine if there was a greater than expected number of cases for glioblastoma, for each of the three counties and ZIP codes.

$$\text{Standardized Incidence Ratio (SIR)} = \frac{\text{Observed Incidence}}{\text{Expected Incidence}}$$

Observed cases are the number of cases found within the FCDS for the area of concern.
Statistical tests were performed to determine the likelihood of difference between observed and expected cases. Statistical testing was based on the 95% confidence interval of the SIR calculated. If the 95% confidence interval contained the value ‘1’, then the difference between “observed” and “expected” numbers was likely due to chance. If the 95% confidence interval did not contain the value ‘1’, then the difference in two numbers was unlikely due to random factors and would be considered “statistically significant”.

The total number of observed glioblastoma cases was also obtained from the FCDS and used to calculate age-specific rates for glioblastoma.

Population Estimates

For the county-level SIR analyses, the Florida population estimates maintained by Florida Legislature Office of Economic and Demographic Research (EDR) were used to provide county-specific denominator data that are more representative of the underlying population at risk over the study period than a single decennial census count. These estimates are designed for county-level surveillance and therefore provide the most appropriate denominator for county analyses. The EDR population estimates were also used to support the calcuation of county-level age-adjusted rates.

For the ZIP code-level SIR analyses and age-adjusted rate calcualations, comparable annual population estimates were not available from EDR for the age groups needed for analysis. Consequently, the 2020 U.S. Census population was used as the denominator, multiplied by the number of years in the study period to approximate person-time risk. Although this approach assumes a relatively stable population over the study period and does not account for annual population changes, it represents the most consistent and reliable population source available at the ZIP code level for the age-groups required for the SIR analysis and the calucation of age-adjusted rates.

Demographic Data

Due to the smaller number of cases identified over the reduced timeframe for the supplemental analysis, stratification of the data by gender or age was not provided. When the number of cases included in an analysis is very small, the results become statistically unstable. Small numbers fluctuate widely from year to year due to normal random variation, making it difficult to tell whether any observed increase or decrease reflects a true pattern or is simply caused by chance. This instability becomes more pronounced when the data are further divided into smaller groups, such as sex or age categories. When categories are too small, data outcomes cannot be interpreted reliably. For these reasons, and with only two 5-year segments available, it was determined that additional stratification would not produce reliable results.

Exhibit 13: Comparison Between 2019 and 2026 SIR Analysis Methodology

	2019 Report	2026 Supplement
Years of data	1998-2007 and 2008-2017	2014-2018 and 2019-2023
County data analyzed	Primary: St. Lucie County Secondary: Martin and Indian River Counties	Primary: St. Lucie County Secondary: Martin and Indian River Counties
St. Lucie County ZIP codes analyzed	34952, 34982, and 34983	34952, 34982, and 34983
Data displayed by age group	Yes	No (see Demographic Data)
Data displayed sex	Yes	No (see Demographic Data)
Age-adjusted tables	Included	Not included (see Demographic Data)
Histology codes*	9440, 9441, 9442, 9445, 9450*, 9451*; Behavior 3.	9440, 9441, 9442, 9445; Behavior 3
County-level population estimates	2000/2010 Decennial Census	FL population estimates by EDR **
ZIP code-level population estimates	ZIP code tabulation area (ZCTA) population x 10 from the 2000/2010 Decennial Census	2020 Decennial Census including ZCTA population estimates x 10

*Cancer registry histology and ICD coding evolve annually to stay current with diagnostic precision, support public health surveillance, and maintain comparability among registries; histology codes 9450 and 9451 were included in the case definition for glioblastoma at the time the analysis was conducted for the 2019 report. These codes are no longer included in the case definition for glioblastoma and were not included in the 2026 analysis.
** EDR population data were used because they provide county-specific denominator data that are more representative of the underlying population at risk over the study period than a single decennial census count.