Methods and Limitations Overview

Geographic Description of Cuyahoga County

Cuyahoga County is comprised of 36 neighborhoods within the City of Cleveland and 58 suburban municipalities. To better understand the diversity of the county, data has been analyzed at the neighborhood/municipality level, when possible. Additionally, to help illustrate this diversity, the rates displayed in many tables break down the neighborhoods/municipalities into three sections:

> 1) City of Cleveland neighborhoods (those neighborhoods comprising the city itself),
> 2) First Ring municipalities (those municipalities that share a border with the City of Cleveland), and
> 3) Outer Ring municipalities (those Cuyahoga County municipalities that do not share a border with the City of Cleveland).

For a map and listing of the City of Cleveland neighborhoods and suburban municipalities see Appendix I.

Data Sources

Ohio Cancer Incidence Surveillance System

Cancer incidence data used in these analyses were obtained in part from the Ohio Cancer Incidence Surveillance System (OCISS), Ohio Department of Health (ODH), a cancer registry partially supported in the National Program of Cancer Registries at the Centers for Disease Control and Prevention (CDC) through Cooperative Agreement # 5U58DP000795-05. Use of these data does not imply that ODH or CDC agrees or disagrees with the analyses, interpretations or conclusions in this report (or publication or presentation. Information about OCISS can be obtained at: http://www.odh.ohio.gov/healthstats/ocisshs/ci_surv1.aspx[1]

Ohio Revised Code Section 3701.26 requires that all physicians, dentists, hospitals, and other persons providing diagnostic services to patients with cancer report the diagnosis within six months of the date of diagnosis to OCISS.[2] Basal and squamous cell skin cancer and cervical cancer, *in situ*, are not required to be reported.[1] Cancer cases were classified as to residence at diagnosis obtained from the source reporting the cases.[1] Data included in this report were confirmed cases of cancer based on data quality assurance procedures determined by the OCISS, with a 93% compliance rate for case completeness for Cuyahoga County.[1]

Ohio Department of Health's Bureau of Vital Statistics

Cases of cancer mortality were identified in the death files obtained from the Ohio Department of Health's Bureau of Vital Statistics. Information about ODH's Bureau of Vital Statistics can be found at: http://www.odh.ohio.gov/vitalstatistics/vitalstats.aspx.[3]

Surveillance Epidemiology and End Results (SEER)

SEER is a program that provides cancer statistics in the United States. This program provided the age-adjusted and age-specific national incidence and mortality rates by race and sex for 2002-2006.[4] SEER is also the source of the 5-year relative survival rates by stage at diagnosis for cancer from 1999-2006.[4]

Rate Calculations and Definitions

Data in this report are presented as incidence or mortality rates per 100,000 persons. **Incidence** rates are the number of new cases of cancer within a specified time period divided by the total population at risk in that time period. **Mortality** rates are the number of cancer deaths within a specified time period divided by the total population at risk in that time period. Rates were calculated using the 2000 U.S. Census to determine the population at risk. Each cancer site/type was analyzed according to geography, age, gender, and race to assist with the identification of disparities/inequities.

This five year timeframe (2002-2006) was selected because counts and rates are subject to random variation and often fluctuate from year to year. This is especially the scenario when counts are very low, thus rates can become unstable and sometimes need to be interpreted with caution. For these reasons, rates have not been calculated when there are fewer than five cases in any given category and are denoted with a "*". Also, please note that according to the United States Cancer Statistics Report Technical Notes, rates may be unstable when case counts are less than 16. Therefore, in these instances, these rates should be interpreted with caution.[5]

Furthermore, to help limit disclosure of confidential personal information, the *Ohio Department of Health Disclosure Limitation Standard* was used.[6] This *Standard* requires data to be suppressed when the denominator value minus the numerator value is less than 10 for any given tabulation/level of analysis.[6]

Age-Adjustment
Rates have been adjusted based on the age distribution of the population, because increasing age is strongly associated with cancer.[1] In this report, rates are direct age-adjusted to the U.S. 2000 standard population. This method is useful in comparing incidence and mortality rates from one population to rates in another population.[1]

Average Annual Cases/Deaths
The average annual number of cancer cases and deaths were calculated for the time period 2002-2006.[1] This was done by adding the number of cases or deaths diagnosed during 2002-2006 and then dividing that number by 5, and rounding the value to the nearest whole number.[1]
The average annual number of cases was calculated for 24 cancer sites/types. This included an all sites/types category which encompasses cancer histologies that may not necessarily be defined in one of the other 23 cancer sites/types. Because of this, cancer cases in individual sites/types may not reflect the same number of cases that are included in the all sites/types category. See Appendix III for specific cancer histologies and respective sites/types.

Relative Survival Rate
Relative survival is a way to measure the excess mortality that is associated with a cancer diagnosis.[4] Five-year relative survival rates are calculated as ratios of patients with cancer who are alive five years after diagnosis to those of the general population.[4]

Standardized Incidence Ratio (SIR) and Standardized Mortality Ratio (SMR)
Standardized incidence/mortality ratio is an estimation of the cancer burden in a population relative to what is expected for that population based on cancer rates of a standard population (such as the United States) and the age structure of the population of interest.

1. *Standardized Incidence Ratio (SIR)*
   a. A comparison of the "observed" and "expected" number of cases is commonly referred to as the Standardized Incidence Ratio (SIR) and is defined as:
      SIR = (observed cases / expected cases)
      An SIR > 1.0 indicates more cases are observed than expected and an SIR < 1.0 indicates that fewer cases were observed than expected.

2. *Standardized Mortality Ratio (SMR)*
   a. A comparison of the "observed" and "expected" number of deaths due to cancer is commonly referred to as the Standardized Mortality Ratio (SMR) and is defined as:
      SMR = (observed cases / expected cases)
      An SMR > 1.0 indicates more deaths are observed than expected and an SMR < 1.0 indicates that fewer deaths were observed than expected.

95% Confidence Interval

To assess significant differences in SIR/SMRs, a 95% confidence interval is calculated for the SIR/SMR since the number of "observed" cases can frequently differ than the "expected" number.

In general:
- if the 95% confidence interval contains 1.0, one would conclude that there is no statistical difference in the "observed" number of cases than what would be "expected".
- if the lower limit of the 95% confidence interval is higher than 1.0, one would conclude that the "observed" number of cases is statistically significant and HIGHER than what would be "expected".
- if the upper limit of the 95% confidence interval is lower than 1.0, one would conclude that the "observed" number of cases is statistically significant and LOWER than what would be "expected."

Example: This is a 95% CI of an observed SIR/SMR that would differ significantly from the expected incidence or mortality rate because it does not include 1.

Observed rates are lower than expected   1   Observed rates are higher than expected
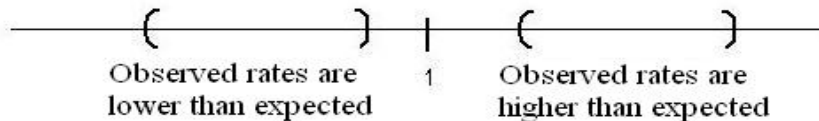
Example: This is a 95% CI of an observed SIR/SMR that would not differ significantly from the expected incidence or mortality rate because it does include 1.

1

Observed rates are not different than expected
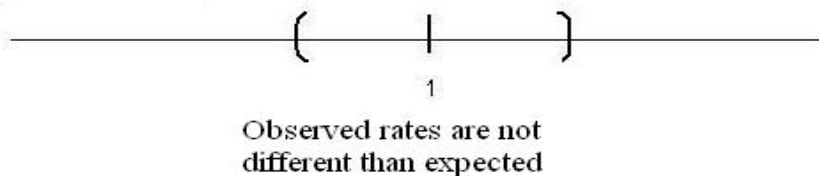
To assess significant differences in age-adjusted rates, a 95% confidence interval is calculated for each age-adjusted rate where the number of cases is 20 or greater during the five year time period of 2002-2006.[7]

> In general:
>> - if one 95% confidence interval overlaps another 95% confidence interval, then there is no significant difference between the two rates.
>> - if one 95% confidence interval **does not overlap** another 95% confidence interval, then the two rates are considered to be statistically significantly different at the 95% confidence level.

Stage at Diagnosis

Stage at Diagnosis describes the severity of a person's cancer and the extent to which it has or has not spread in the body.[8] Staging is important in prognosis and treatment determination.[8] Cancer diagnosed in the *in situ* and localized stages are generally referred to as early-stage tumors, whereas regional and distant tumors are referred to as late-stage tumors.[1] Detecting cancers at an early stage may increase long-term survival and can lead to a reduction in mortality.[1]

- *In situ*: Abnormal cells are present only in the layer of cells in which they developed.[8]
- **Localized**: Cancer is limited to the organ in which it began, without evidence of spread.[8]
- **Regional**: Cancer has spread beyond the primary site to nearby lymph nodes or organs and tissues.[8]
- **Distant**: Cancer has spread from the primary site to distant organs or distant lymph nodes.[8]
- **Unstaged/Unknown**: There is not enough information to determine the stage.[8]

There were 8 cancer sites/types where stage at diagnosis (early, late, and unknown) was analyzed. These include female breast, cervix, colon and rectum, lung and bronchus, melanoma of the skin, oral cavity and pharynx, prostate, and testicular cancer. These particular sites/types were chosen because of the established screening methods that have been identified, with the exception of lung and bronchus, and because Ohio reports the same data making it accessible to compare rates.[9] There is not a standard screening method for lung and bronchus at this time; however The National Lung Cancer Screening Trial is currently being analyzed and guidelines may be developed in the near future.[10]

Invasive Cancer

Invasive cancer is cancer that has spread beyond the layer of tissue in which it developed, and is growing into the surrounding healthy tissues.[11] Invasive cancers include ones that are diagnosed in the localized, regional, distant, and unstaged/unknown stages.[1] Incidence counts and rates include invasive cancers only, with the addition of *in situ* bladder cancers. The inclusion of *in situ* bladder cancers in the calculation of incidence rates is consistent with methodology of the SEER program.

Brain and Other CNS Cancers

CNS refers to central nervous system cancers.

Mapping

The maps presented in this report were created using ArcGIS, a geographic information system (GIS) software program. Class breaks are identified that best group similar values and that

maximize the differences between classes. The use of natural breaks in the data portrays a geographic visual representation of cancer incidence and mortality data, as well as cancer staging information in Cuyahoga County. Age-adjusted incidence and mortality rates, along with cancer staging percentages were suppressed if total case counts were less than 5 cases per 5 year time period. See rate calculations and definitions section above for additional details.

Resources

1. Ohio Cancer Incidence Surveillance System, Ohio Department of Health and The Ohio State University, Columbus, Ohio, December 2009. *Cancer Incidence and Mortality among Ohio Residents, 2002-2006*. http://www.odh.ohio.gov/ASSETS/79F9E92E210F477D885F8EAC864E2F27/0206Monograph_Final.pdf.

2. Ohio Revised Code 3701.26.2 (3701.262). *Rules; cancer registry; duty to report cancer cases and grant access to records; public reports.* http://codes.ohio.gov/ (Accessed January 20, 2011).

3. Bureau of Vital Statistics, The Ohio Department of Health. http://www.odh.ohio.gov/vitalstatistics/vitalstats.aspx (Accessed February 23, 2011).

4. Surveillance Epidemiology and End Results. http://seer.cancer.gov/. (Accessed January 20 , 2011).

5. Centers for Disease Control and Prevention. National Program for Cancer Registries. *Suppression for reliability.* http://www.cdc.gov/cancer/npcr/uscs/2006/technical_notes/stat_methods/suppression.htm. (Accessed January 20, 2011).

6. The Ohio Department of Health. *Data Methodology Standards for Public Health Practice.* http://www.odh.ohio.gov/ASSETS/7B4AC18605A64B058DEE1E0D611AEFFC/disclimit.pdf (Accessed January 20, 2011).

7. Pennsylvania Department of Health. Violence and Injury Prevention Program, Bureau of Health Promotion and Risk Reduction. *Injury Deaths and Hospitalizations in Pennsylvania 2001-2005.* http://www.health.state.pa.us (Accessed August 30, 2011).

8. National Cancer Institute. *Cancer Staging.* http://www.cancer.gov/cancertopics/factsheet/Detection/staging. (Accessed January 20, 2011).

9. Ohio Cancer Incidence Surveillance System, Ohio Department of Health and The Ohio State University, Columbus, Ohio, March 2006. *Stage at Diagnosis for Selected Cancer Sites & Types in Ohio, 1998-2002.* (Accessed February 23, 2011).

10. American Cancer Society. Lung Cancer Detailed Guide. http://www.cancer.org/Cancer/LungCancer-Non-SmallCell/DetailedGuide/non-small-cell-lung-cancer-detection. (Accessed September, 21, 2011).

11. National Cancer Institute. *Dictionary of Cancer Terms.* http://www.cancer.gov/dictionary/?CdrID=45741. (Accessed January 20, 2011).

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