MDH Minnesota Department of Health

MINNESOTA CANCER SURVEILLANCE SYSTEM

Cancer Occurrence in St. Louis Park, 1993-2012

Main Finding

A detailed study encompassing 20 years of cancer data firmly establishes that overall cancer incidence and mortality rates in St. Louis Park are virtually identical to cancer rates in the Twin Cities Metro area.

Summary

There have been long-standing cancer concerns among many St. Louis Park residents related to drinking water contamination and a federal Superfund site in the city. The purpose of this report is to provide a complete and accurate profile of cancer occurrence among St. Louis Park residents. Data from the Minnesota Cancer Surveillance System was used to compare cancer rates among individuals living in St. Louis Park at the time of their diagnosis with cancer rates in the Twin Cities metropolitan area during the most recent twenty-year period for which complete data were available (1993-2012).

Overall cancer rates in St. Louis Park were virtually identical to Metro-area rates. For both genders combined, 5,523 cancers were diagnosed over the 20-year period, compared to the expected number of 5,499. As an annual average, 276 new cancers were diagnosed each year among St. Louis Park residents. Overall cancer death rates were also comparable to those of the Metro area.

Due to their smaller numbers and greater variability (over time or from one location to another), the rates of specific types of cancer at a community (or even county) level are generally much less stable or informative and permit few conclusions. Among males, a deficit of lung cancer and an excess of soft tissue cancers were observed but these differences were not consistent over time and were not seen among females. An 8% excess of breast cancer was observed in females and was consistent over time. The number of St. Louis Park residents currently living with any history of cancer likely exceeds 2,200 individuals.

While environmental contaminants are the frequent focus of community cancer concerns, the primary determinants of cancer risk include smoking, obesity, diet, lack of exercise, UV radiation, alcohol, viruses, genetics, reproductive history, medications, and occupation.

Background

St. Louis Park is an inner ring suburban city of approximately 47,000 residents located on the western border of Minneapolis. Concerns about cancer rates and risks in the community extend

back over 30 years. In 1978, the Minnesota Department of Health (MDH) determined that four municipal drinking water wells were contaminated with low levels of polycyclic aromatic hydrocarbons (PAHs) and these wells were removed from service. Some PAH compounds and mixtures were known at that time to be carcinogenic in animals and probably carcinogenic in humans (IARC, 1973). Investigations by state and federal agencies identified the primary source of the PAH contamination as the former Reilly Tar and Chemical Corporation plant that operated in the city from 1917 to 1972. Since 1978, additional wells began showing contamination and were also removed from service. The Reilly Tar site was one of first EPA Superfund sites (1981) targeted for remediation and remains under remediation to the present (EPA Reilly Tar Website).

Due to the nature of the contaminants, concerns arose regarding the public health impact of the contaminated drinking water. The Minnesota Cancer Surveillance System (MCSS) did not exist until 1988; however, limited cancer data was available for the Minneapolis-St. Paul Metro area from the Third National Cancer Survey conducted in 1969-1971. Analyses of those data found no significant differences in cancer rates among St. Louis Park males compared to the Metro area. However, among females, the analysis indicated a 45% elevation in breast cancer in the community and a 33% elevation in overall cancers (Dusich, 1980). Subsequent investigations and surveillance by MDH in 1984-87 determined that a known risk factor (Jewish heritage) was associated with the elevated rate of breast cancer in that community (MDH, 1985, 1987; MCSS, 1997: Bender et al, 1988; Dean et al, 1988). These investigations also indicated that people would have had greater exposure to carcinogenic PAHs from food, air, tobacco smoke, and other sources than from the drinking water.

Despite implementation of water treatment systems, contaminant controls, and monitoring of water quality by city, state, and federal agencies, community concerns about water quality and health risks persist. The purpose of this report is to provide an accurate and complete profile on cancer occurrence among St. Louis Park residents using the highest quality data available for such a purpose -- primarily from the Minnesota Cancer Surveillance System (MCSS).

Data Sources and Methods

The MCSS is Minnesota's statewide cancer registry (database) and has operated since 1988. It collects diagnostic and related data on all cancer diagnoses among Minnesota residents. The data come from hospitals, clinics, and pathology laboratories and are carefully reviewed for completeness and accuracy. Independent audits estimate completeness of the MCSS at over 99%.

Cancer cases for St. Louis Park were identified from the MCSS for the most recent 20-year period for which complete data were available: 1993-2012. Two ZIP codes -- 55416 and 55426 – were used to identify St. Louis Park residents who received a new diagnosis of cancer in that period. While these ZIP codes include over 98% of St. Louis Park's population, they also include some areas in several adjacent communities, mainly Minneapolis, Golden Valley, and Edina. Approximately 95% of residents in ZIP 55426 and 70% of residents in ZIP 55416 are St. Louis Park city residents (Missouri Census Data Center). ZIP codes were used rather than the named "city" in the patient's address since St. Louis Park residents may use Minneapolis in their address and this would lead to an undercount of cases.

When examining cancer rates in a community or county with a relatively small population, the preferred approach is to compare the actual "observed" number of newly-occurring cancers to the estimated "expected" number (calculated with the assumption that the community had the same cancer rates as some larger comparison population). For this analysis, cancer rates for the seven-county Twin Cities Metro area during 1993-2012 were used for comparison to St. Louis Park. The "expected" number of cancers was estimated by applying Metro area cancer rates (by age and gender) to the population of the two ZIP codes at three census periods: 1990, 2000, and 2010. Eighteen age categories were used to estimate expected cancer cases separately for males and females. Only the age and gender distributions of the population are taken into account when determining "expected" cancers since these important risk factors are known. However, other significant determinants of cancer risk such as smoking history, medical history, family history, obesity, diet, occupation, reproductive history, infectious agents (e.g. human papilloma virus, hepatitis viruses), or other established risk factors are unknown and are not taken into account.

For ease of comparison, the observed number of cancers divided by the expected number gives an observed-to-expected ratio (also called the Standardized Incidence Ratio). If the two numbers were identical (which only rarely happens), this ratio would be 1.00. If there were twice as many cancers as expected, the ratio would be 2.00; if there were half as many cancers as expected, the ratio would be 0.50. For each such ratio, a 95% confidence interval was calculated and is also shown in this report. The confidence intervals represent a range in which the ratio is expected to be 95% of the time; this means there is a 5% chance that the ratio could be outside the range. The confidence intervals give an additional measure of the variability and uncertainty that is encountered when examining cancer rates in a community and comparing them to expected rates.

If a confidence interval does not encompass a value of 1.00, the ratio is considered "statistically significant" – meaning that the difference is less likely to be due to random chance. However, there is still some further uncertainty that is not reflected in the confidence intervals which do not take into account random differences which can be expected whenever multiple comparisons are made (e.g., comparing a large number of different types of cancer) or the effects of errors in estimating the population of the community.

This report provides information about total cancers for males and for females, as well as 20 specific types of cancers among males and 22 types of cancer among females (representing about 93% of the total cancer incidence for each gender). Two other measures of cancer occurrence are also described: cancer prevalence and cancer mortality. The prevalence of cancer refers to the estimated number (or proportion) of people in a population living with any history (previous diagnosis) of cancer. Limited data are presented on cancer mortality, which refers to the number of people who have died as a result of their cancer.

Findings

Cancer Incidence

Cancer incidence describes the rates and number of newly-diagnosed cancers over a specified time period. Table 1 (page 11) shows the observed and expected numbers of cases for all cancers combined and for the most frequent types of cancer among males in the two St. Louis

Park ZIP codes. The observed-to-expected ratios and statistical 95% confidence intervals are also shown. Table 2 (page 12) provides the same information for females. The same ratios and confidence intervals are also shown graphically in Figures 1 and 2 for males and females, respectively.

For all cancers combined over the 20-year period 1993-2012, there were no significant differences between the observed and expected numbers of cancers (based on Metro area rates) for males or for females. For males, there were 2,624 newly-diagnosed cancers versus 2,681 expected cancers (ratio of 0.98). For females, there were 2,899 observed cancers compared to 2,818 expected cancers (ratio of 1.03). For both genders combined, there were 5,523 newly diagnosed cancers over the 20-year time period, compared to the expected number of 5,499 for an overall ratio of 1.00. Over this 20-year period, an average of 276 new cases of cancer were diagnosed each year among St. Louis Park residents, almost exactly the number expected based on Metro area rates. In short, the overall cancer rate in St. Louis Park is virtually identical to the Metro area rate.

For many specific types of cancers, there is a greater degree of variability and uncertainty because the small numbers of cases are less stable even when they are aggregated over 20-years. Among males, only two cancer types differed statistically from the Metro rate: a deficit of lung cancer (282 observed, 335 expected; ratio of 0.84) and an excess of soft tissue cancers (30 observed, 19 expected; ratio of 1.58). To examine these two cancers further, the 20-year period of analysis was divided into 10-year intervals to examine variability over time.

- For lung cancer, during 1993-2002, there were 135 lung cancers versus 178 expected; a significant and even larger deficit. However, for the most recent 10-year period (2003-2012), a smaller and non-significant deficit was found with 147 cases observed and 158 expected.
- For soft tissue cancers among males, during the earlier 10-year period (1993-2002), there were 17 observed soft tissue cancers, while approximately 9 were expected; a statistically significant excess. However, during the 2003-2012 period, there were 13 observed soft tissue cancers compared to 10 expected; a non-significant difference.

Among females, an 8% excess of breast cancer (941 observed, 872 expected; ratio of 1.08) was the only marginally significant difference from Metro area rates. This pattern was similar for the two successive 10-year time periods, although the excess was no longer statistically significant in either time period due to the smaller numbers of cases in each time period. A more detailed statistical analysis of trends using eight three-year intervals of time for the period 1990-2013 indicated no significant trends upward or downward.

Cancer Prevalence

While some cancers are rapidly fatal, survival rates for many cancers are quite high. Consequently, at any one point in time in a community, there will be people whose cancer was newly-diagnosed, but a much greater number of people whose cancer was diagnosed in some previous year. The number of people currently living in a community who have ever had a cancer (whether recent or many years ago) is referred to as cancer prevalence. Cancer prevalence is a measure that reflects both the rate of new cancers and survivorship at a point in time. It only refers to people who are currently living and have had cancer; those who had cancer and died (regardless of the cause of death) are not included. Prevalence can be thought

of as the statistic that would result from interviewing every household in a community on a given day and asking if anyone currently living in that household has ever had cancer.

Prevalence is not routinely ascertained by state cancer registries since it requires information that is not routinely available (such as ongoing follow-up of all cancer cases to determine whether a person is alive or has died). However, prevalence can be estimated using statistical models and other cancer data from the longest running cancer registry in the U.S., the National Cancer Institute SEER Program (National Cancer Institute SEER Program). Using those data, it can be estimated that approximately 4.0% of the U.S. population living on Jan. 1, 2012, had experienced cancer sometime in the past. The prevalence differed by race: 4.6% for whites and 2.6% for blacks.

Several prevalence estimates are available for Minnesota. A detailed analysis of the prevalence of cancer among Minnesota residents was included in a 2012 MCSS report (MCSS, 2012). This analysis estimated that 217,170 Minnesotans (4.2% of the Minnesota population) were living with a previous diagnosis of cancer as of Jan. 1, 2009. The American Cancer Society (ACS) estimated that 282,090 Minnesotans (roughly 5.2% of the population) were cancer survivors as of Jan. 1, 2014 (ACS, 2014). Another prevalence estimate for Minnesota for the year 2015 indicated 268,000 cancer survivors, a prevalence of approximately 4.7% (State Cancer Profiles). These estimates vary depending on the year, population estimates, and the statistical models used. Assuming an overall cancer prevalence of 4.7% (both genders) and a population of 47,502 for the city of St. Louis Park for 2014, a very rough estimate of the number of people living in St. Louis Park with a previous history of cancer is over 2,200. This figure is much larger, of course, than the average number of newly-diagnosed cases each year (276) since many cancers (such as breast and prostate) have high rates of survivorship. As the population increases in size and age and as survivorship increases, the proportion of people living with a history of cancer also increases.

Cancer Mortality

Cancer mortality represents deaths in which a tumor was the underlying cause of death. Cancer mortality data are based on the underlying cause of death noted on death certificates; these data are available from MDH. Cancer mortality rates were examined for the twenty-year period 1993-2012 for residents whose address at the time of death included either of the two primary St. Louis Park ZIP codes (55416, 55426). These rates were compared to Metro area mortality rates for the same period. In addition to overall cancer mortality rates, cancer mortality was examined for the specific cancers that differed statistically from Metro rates when comparing the incidence of newly-diagnosed cancers: specifically, these were lung cancer and soft tissue cancers among males, and breast cancer among females.

Over that twenty-year period, there were 1,027 total cancer deaths among males and 1,188 total cancer deaths among females. For both genders, the overall cancer mortality rates were comparable to (if slightly lower than) Metro area rates. The rate of lung cancer deaths paralleled the pattern of lung cancer incidence with a statistically significant deficit of approximately 15% based on 242 deaths over the twenty-year period. There were nine soft tissue cancer deaths among males over the twenty-year period, the same as the number expected based on Metro area rates. The female breast cancer mortality rate in St. Louis Park (based on188 deaths) was not significantly different from the Metro rate. However, the

observed 5% excess was consistent with the pattern of newly-diagnosed breast cancers in St. Louis Park.

Discussion

The MCSS data that was used to examine the most recent 20 years of cancer data for St. Louis Park residents is the most complete and accurate source of data for cancer incidence in Minnesota. These data show quite clearly that the overall cancer incidence rates in St. Louis Park are virtually identical to the Metro area rates. An average of 276 new cases of cancer were diagnosed each year among St. Louis Park residents, almost exactly matching the expected 275 cases expected each year based on the population of St. Louis Park. Overall cancer death rates based on death certificate data were also the same as Metro area rates.

For specific types of cancer, very few differences were found between the numbers that were observed and what would be expected. For those cancers where apparent differences were seen, it is not possible to explain why these differences occurred and even whether they represent random variations. While some 90% of lung cancer is attributable to smoking, it's unclear whether the overall deficit of lung cancer among males reflects previous smoking rates or just random variation. The deficit of lung cancer among males was only observed for the period 1993-2002: no deficit was seen among males for 2003-2012, and no significant deficit was found among females. There was also no consistent deficit in either males or females of other cancers for which smoking is a significant risk factor (primarily cancers of the esophagus, oral cavity, larynx, bladder, and pancreas). Death certificate data showed a similar pattern for lung cancer.

The apparent excess of newly-diagnosed soft tissue cancers – a grouping of relatively rare cancers – is even more difficult to interpret. Soft tissue cancers represent a heterogeneous grouping of tumors of "soft tissues" such as muscle, fat, fibrous tissue, blood vessels, and the peripheral nervous system. They can occur in many parts of the body and at all ages. Studies have explored many possible risk factors for soft tissue cancers. These studies demonstrate that an increased risk of some soft tissue cancers are associated with exposure to therapeutic radiation, HSV8 virus (associated only with Kaposi's Sarcoma), as well as many immunologic and inherited genetic syndromes (American Cancer Society; Mayo Clinic). Vinyl chloride has also been associated with an increased risk of a specific soft tissue cancer—angiosarcoma of the liver—among workers with high occupational exposures. In cancer registries, these very rare tumors are typically grouped with liver tumors; none occurred among St. Louis Park residents. There is less consistent but suggestive evidence of an increased risk associated with phenoxy herbicides used in agricultural or forestry (e.g., 2,4-d), dioxin, and chlorophenols (Burningham, 2012). These risk factors, however, account for only a small portion of soft tissue cancers and most patients will likely have no identifiable exposures. The excess of soft tissue cancers among males was not seen among females and was not persistent over time. No excess of deaths from soft tissue cancers were found based on a very small number of deaths. Over a dozen Minnesota counties have soft tissue cancer incidence rates among males comparable to St. Louis Park. Given the variability in rates of rare cancers in small populations and the likelihood of finding several significant differences when making multiple comparisons of rates, random variation cannot be ruled out as an explanation for the observed rate.

The marginally significant 8% excess of newly-diagnosed female breast cancer (and a non-significant 5% excess of breast cancer deaths) is roughly comparable to the finding from a 1981-85 MDH study, but a substantial difference from the 45% excess in St. Louis Park observed from data from the 1969-71 Third National Cancer Survey, which included the Metro region. As previously noted, investigation of that excess and the subsequent study of breast cancer incidence from 1981-85 concluded that most of the excess was within the Jewish population, a finding consistent with many previous epidemiologic studies of breast cancer demonstrating an increased risk of breast cancer among Jewish women. While not known at that time, subsequent research identified several inherited genetic mutations in the genes BRCA1 and BRCA2 that are more common in people of Ashkenazi Jewish descent that greatly increase the risk of breast and ovarian cancers. Since the expected number of female breast cancers in St. Louis Park is based only on the age structure of the population, it is not possible to determine to what extent, if any, the rate reflects any of the many established risk factors for breast cancer (American Cancer Society, National Cancer Institute). For additional perspective, it should be noted that 18 Minnesota counties had a 5% or greater excess of breast cancer over this same time period (compared to the statewide average). The range among counties went from a 28% deficit to a 12% excess.

Study Strengths and Limitations

The major strength of this study is the use of data from the MCSS to examine and compare cancer incidence rates. All newly-diagnosed cancers among Minnesota residents are reported to the MCSS. MCSS data has been shown to meet the highest standards of data completeness and accuracy. Examining rates of newly-diagnosed cancers provides the most detailed and complete profile of cancer occurrence among Minnesota residents statewide. A limitation is that the MCSS was only started in 1988 and doesn't include data on diagnoses made before then.

Cancer mortality data are based on death certificates. These data are available for a much longer time period and are available on a national level for follow-up studies. However, they provide a much less complete picture of cancer occurrence since many people survive their cancer and die from other causes. Cancer data from death certificates are also considered less accurate than cancer incidence data reported to the MCSS.

To identify St. Louis Park cancer cases, the address from the MCSS (new cases) or death certificate (deceased cases) was used. Specifically, any address with a ZIP code of 55416 or 55426 was used to identify St. Louis Park residents. As previously noted, while over 98% of St. Louis Park residents reside in these ZIP codes, neither of these ZIP codes is exclusive for St. Louis Park. ZIP code 55426 is approximately 95% St. Louis Park residents, while ZIP code 55416 is approximately 70% St. Louis Park residents. The small proportion of non-residents is unlikely to have had a meaningful impact on the cancer findings.

Detailed population data (18 age categories for each gender) for St. Louis Park was required to determine the expected number of new cancers. Given the relatively small changes in the population over the period of study, data from three census periods (1990, 2000, 2010) were averaged to provide an annual average population distribution. A limitation of ZIP code population data is that ZIP codes are postal delivery areas and do not necessarily correspond to census areas such as city boundaries and census divisions. The US Census estimates ZIP code

populations based on several criteria; for example, the single most frequent ZIP code in a census block will be assigned to the whole block (US Census Zip Code Tabulation Areas). Over- or under-estimates of the population will affect the estimated number of expected cancers.

While this study provides a relatively clear picture of overall cancer incidence among St. Louis Park residents, the picture is much less clear for many specific types of cancer due to the relatively small numbers of cases at a community level. This problem was only partially overcome by aggregating cancer data over a twenty-year period.

Finally, these cancer data represent the occurrence of cancer among people who lived in the community at the time of diagnosis (cancer incidence) or death (cancer mortality). Census data indicate that people may reside in many different locations during their lifetimes. So, for example, one St. Louis Park cancer patient may have moved into a St. Louis Park nursing home from another city one month before the cancer was diagnosed, while another cancer patient may have lived in the community his/her entire lifetime prior to diagnosis. This issue is discussed further in the next section.

Usefulness and Limitations of Community Cancer Rates in Addressing Environmental Cancer Concerns

The MCSS is a vital tool for examining cancer rates and trends in Minnesota and MCSS data are extremely useful in facilitating epidemiologic studies of specific cancers, quality of care studies, evaluating screening and prevention programs, and many other purposes. While community cancer rates have a high degree of statistical uncertainty and must be interpreted cautiously, such data are also very useful in addressing public concerns over cancer rates in a county or a community by providing a more complete and accurate profile of cancer occurrence. However, for many reasons, analyses of community cancer rates are rarely useful in documenting potential cancer risks from low levels of environmental pollutants.

- Cancer is not a single disease but a group of more than 100 different diseases. Cancers differ in their rates of occurrence, risk factors, treatment, and survivorship. Unfortunately, cancer is not a rare disease, especially when considered in terms of lifetime risk. Not including the most common forms of skin cancer, the average lifetime risk of developing some type of cancer (in situ or malignant) is approximately 44% among males and 41% among females (National Cancer Institute). On average then, almost one in two people will have a diagnosis of cancer during their lifetimes. For any individual, of course, the lifetime risk will be dependent on many personal factors such as smoking history, obesity, family history, and many other risk factors.

- The time period for the development of cancer (latency period) is typically several decades, such that many cancers diagnosed today are due to exposures and lifestyle experiences that began or occurred many years ago. Unfortunately, it is often not possible to know when newly-identified contaminants would have first entered the

drinking water in a community. Furthermore, due to the high mobility of our population, many residents in a community may not reside there for more than five years prior to their diagnosis of cancer. Thus, community cancer rates are frequently comprised of individuals who differ in their residential histories in the community, their personal risk factors for cancer, as well as in their potential exposures to environmental contaminants.

- While we have no control over risk factors such as age, race, family history, and genetics, much of our cancer risk is strongly influenced by lifestyle factors that we can control. Such lifestyle risk factors include cigarette smoking, obesity, alcohol consumption, ionizing and solar radiation, certain infectious agents (e.g., hepatitis viruses), occupation, and physical inactivity (Figure 3). Those factors account about 60% of cancer deaths in the U.S. Other lifestyle factors that increase risk include reproductive patterns, sexual behavior, and medications, (Colditz and Wei, 2012; Harvard Report, 1996; Shottenfeld et al, 2013). However, even when no modifiable risk factors are known that can reduce the risk of developing a cancer, screening and early diagnosis may prevent or reduce the risk of death.

- While little is known about the causes of some types of cancer (e.g., brain tumors), for many types of cancer, specific risk factors have been identified. For some cancers, these known risk factors account for a significant proportion of cancer occurrence (e.g., 85-90% of lung cancer is attributable to smoking; 95% of cervical cancer is due to the Human Papilloma Virus). Communities and counties can vary widely in terms of known risk factors for cancer, contributing to the variability of cancer rates. While age and gender distributions in a community can routinely be accounted for, lack of information about other known determinants of cancer incidence (such as smoking histories) in a given population makes it difficult to attribute any observed excess or deficit in cancer rates to a given cause.

- Well-designed epidemiological studies, in addition to toxicological research, are necessary to answer questions about the extent to which an environmental exposure may be contributing to the occurrence of cancers in human populations. Indeed, most known human carcinogens have been identified through epidemiologic studies of occupational groups. Cancer risks are much more likely to be detected in the workplace rather than in a community settings since (1) occupational exposures are generally much greater than community exposures; (2) it is frequently possible to estimate past exposures in a workplace using industrial hygiene data, job histories, and other data; and (3) it is usually possible to identify all the people who worked at a workplace for a particular time period using personnel records.

- State and federal regulatory standards and guidelines are intended to limit exposures to potential carcinogens to very low risks, for example, one additional cancer in 100,000 people with lifetime exposure. This level of cancer risk is purposefully many thousands of times lower than cancer risks that can be detected by epidemiologic studies or examination of community cancer rates.

Conclusions

Cancer incidence rates in St. Louis Park are comparable to the cancer rates in the entire Metro region over the past twenty years (1993-2012). An average of 276 newly-diagnosed cancers occurred each year; this is virtually identical to the number that would be expected based on the population of the community and the rates observed for the Twin Cities population. The overall cancer mortality rates in St. Louis Park were also comparable to Metro area rates.

Few conclusions are possible about rates of specific types of cancer due to the small numbers of cases and variability in the incidence rates in a specific community. The deficit of lung cancer incidence and mortality among males was not seen among females and was not consistent over time. While smoking is the primary cause of lung cancer, there was no consistent deficit of other smoking-related cancers in either gender. The excess of soft tissue cancer incidence among males was not observed among females, was not consistent over time, and was not seen in mortality data. The 8% excess of breast cancer incidence among females did appear consistent over time with no apparent upward or downward trend. Breast cancer mortality data provided a similar pattern. While previous studies of breast cancer incidence in St. Louis Park identified a known risk factor (Jewish heritage) as the primary cause of an elevated rate of breast cancer, data on this and other known risk factors for breast cancer (other than age and gender) were not available for this analysis and consequently, no conclusions are possible. Similar excesses, however, can be found even at the county level throughout Minnesota.

Because many cancers have high rates of survivorship, the number of people who are currently living with some previous history of cancer in a community the size of St. Louis Park is likely to exceed 2,200.

While environmental contaminants are the frequent focus of community cancer concerns, the primary determinants of cancer risk include smoking, obesity, diet, lack of exercise, UV radiation, alcohol, viruses, genetics, reproductive history, medications, and occupation (Figure 3).

Table 1. Observed and Expected Cancer Incidence Among Males, St. Louis Park, 1993-2012

Cancer	Observed Cases	Expected Cases	Observed to Expected Ratio	95% Confidence Interval of Ratio
All Cancers Combined	2624	2681	0.98	0.94—1.02
Brain	35	37	0.94	0.65—1.30
Colorectal	240	253	0.95	0.83—1.07
Esophagus	28	39	0.72	0.48—1.05
Hodgkin Lymphoma	25	19	1.31	0.85—1.94
Kidney	86	94	0.92	0.74—1.14
Larynx	21	29	0.71	0.44—1.09
Leukemia	96	105	0.92	0.74—1.12
Liver	30	33	0.90	0.60—1.28
Lung	282	335	0.84	0.75—0.95
Melanoma	147	125	1.18	0.99—1.38
Multiple Myeloma	38	34	1.10	0.78—1.51
Non-Hodgkin Lymphoma	147	133	1.11	0.93—1.30
Oral	80	81	0.99	0.79—1.24
Pancreas	67	57	1.18	0.92—1.50
Prostate	785	832	0.94	0.88—1.01
Soft tissue	30	19	1.58	1.07—2.26
Stomach	39	43	0.91	0.65—1.25
Testes	54	41	1.31	0.98—1.70
Thyroid	30	24	1.25	0.84—1.79
Urinary Bladder	197	192	1.03	0.89—1.18

Table Notes:

1. "Observed" cases are the newly-diagnosed cancers among residents living in ZIP codes of 55416 or 55426 at the time of cancer diagnosis.

2. "Expected" cases are the estimated number of new cancer cases based on the number, age, and gender of residents in those ZIP codes and applying Twin Cities Metro cancer rates.

3. The "Observed to Expected Ratio" is the number of Observed cancers divided by the Expected number of cancers. A ratio of 2.00 would indicate twice as many cancers as expected, while a ratio of 0.50 would indicate half as many cancers as expected.

4. The "95% Confidence Interval" shows the statistical variability or uncertainty of the ratio.

Table 2. Observed and Expected Cancer Incidence Among Females, St. Louis Park, 1993-2012

Cancer	Observed Cases	Expected Cases	Observed to Expected Ratio	95% Confidence Interval of Ratio
All Cancers Combined	2899	2818	1.03	0.99—1.07
Brain	35	31	1.12	0.78—1.56
Breast	941	872	1.08	1.01—1.15
Cervix	28	40	0.69	0.46—1.00
Colorectal	262	297	0.88	0.78—1.00
Esophagus	16	14	1.15	0.66—1.87
Hodgkin Lymphoma	19	16	1.17	0.71—1.83
Kidney	54	60	0.90	0.68—1.18
Larynx	8	9	0.94	0.41—1.85
Leukemia	97	82	1.18	0.95—1.44
Liver	13	18	0.73	0.39—1.25
Lung	334	348	0.96	0.86—1.07
Melanoma	117	113	1.04	0.86—1.25
Multiple Myeloma	33	34	0.98	0.67—1.38
Non-Hodgkin Lymphoma	122	126	0.96	0.80—1.15
Oral	54	50	1.07	0.80—1.40
Ovary	98	87	1.13	0.92—1.38
Pancreas	76	61	1.25	0.99—1.56
Soft tissue	21	18	1.20	0.74—1.83
Stomach	34	29	1.19	0.82—1.66
Thyroid	77	77	1.00	0.79—1.25
Urinary Bladder	59	76	0.78	0.59—1.01
Uterus	180	174	1.03	0.89—1.20

Table Notes:

1. "Observed" cases are the newly-diagnosed cancers among residents living in ZIP codes of 55416 or 55426 at the time of cancer diagnosis.

2. "Expected" cases are the estimated number of new cancer cases based on the number, age, and gender of residents in those ZIP codes and applying Twin Cities Metro cancer rates.

3. The "Observed to Expected Ratio" is the number of Observed cancers divided by the Expected number of cancers. A ratio of 2.00 would indicate twice as many cancers as expected, while a ratio of 0.50 would indicate half as many cancers as expected.

4. The "95% Confidence Interval" shows the statistical variability or uncertainty of the ratio.

Figure 1. Cancer Rates Among Males, St. Louis Park Compared to Twin Cities Metro, 1993-2012.

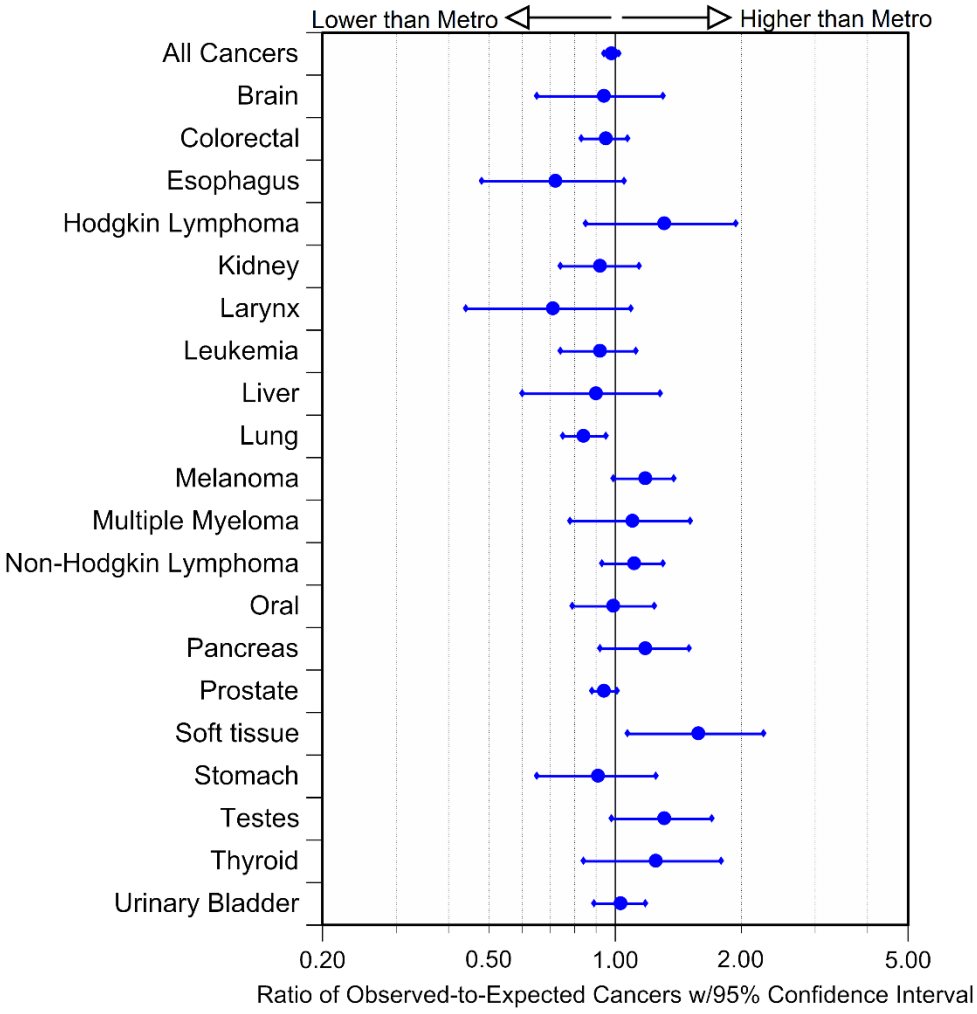


Figure 2. Cancer Rates Among Females, St. Louis Park Compared to Twin Cities Metro, 1993-2012.

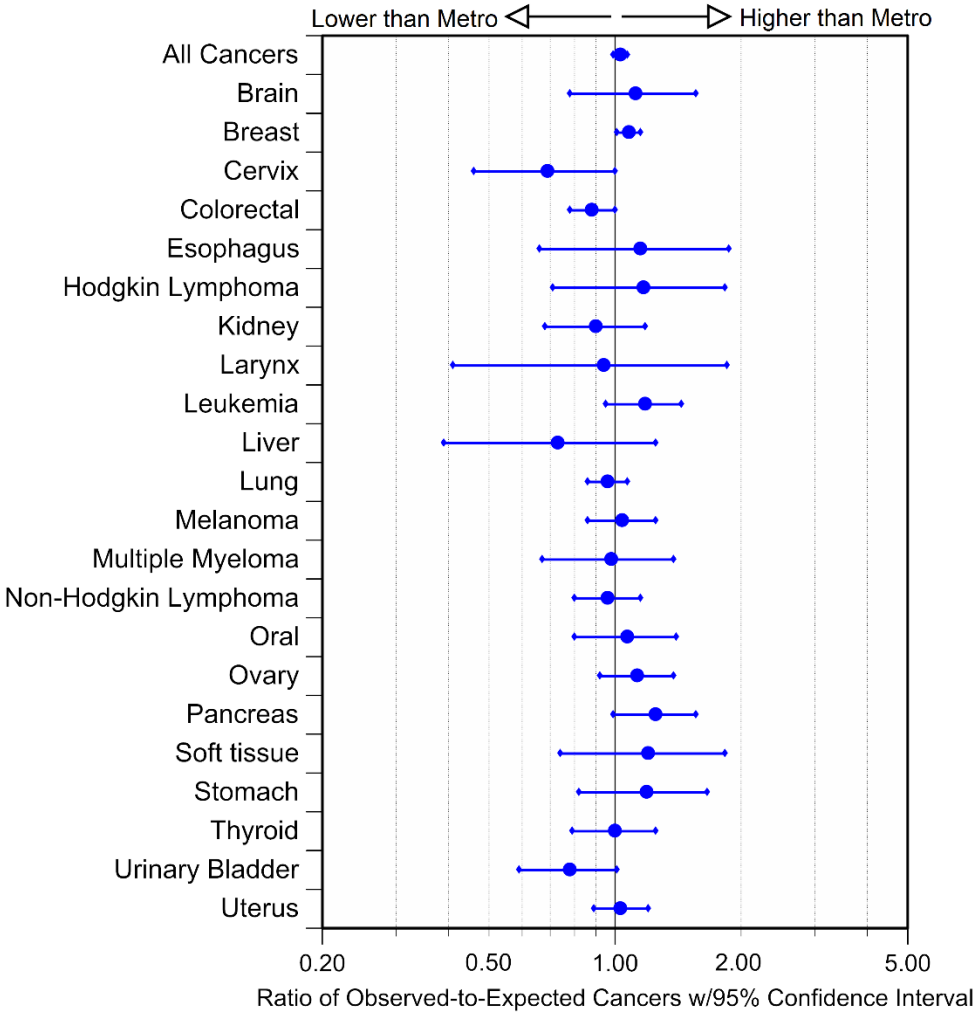
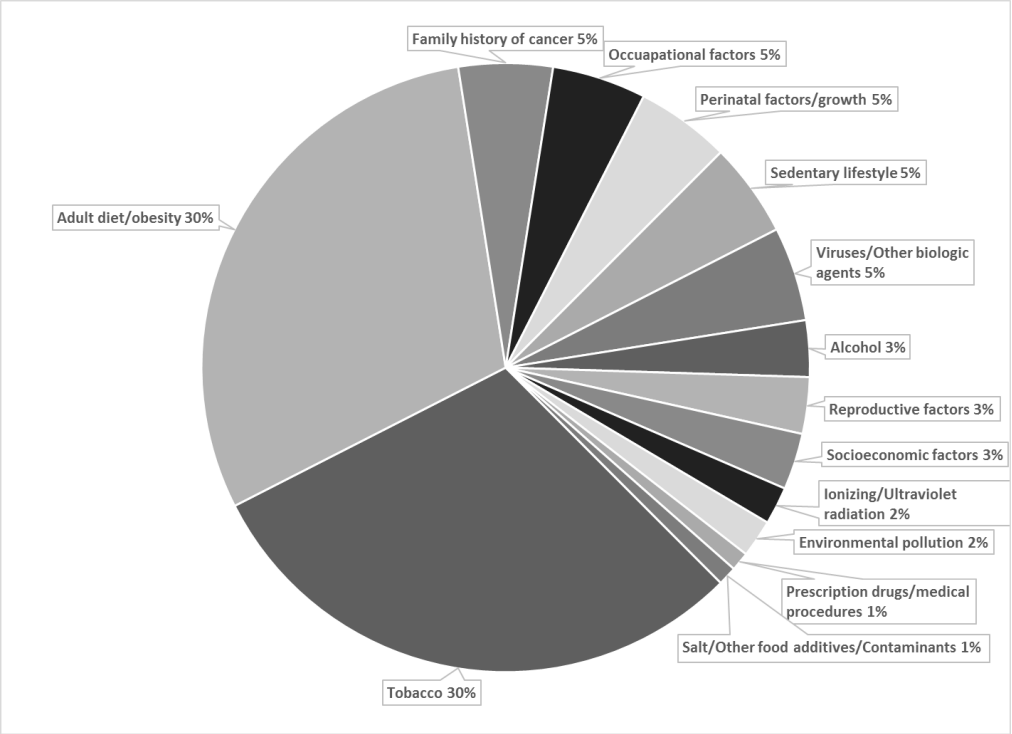
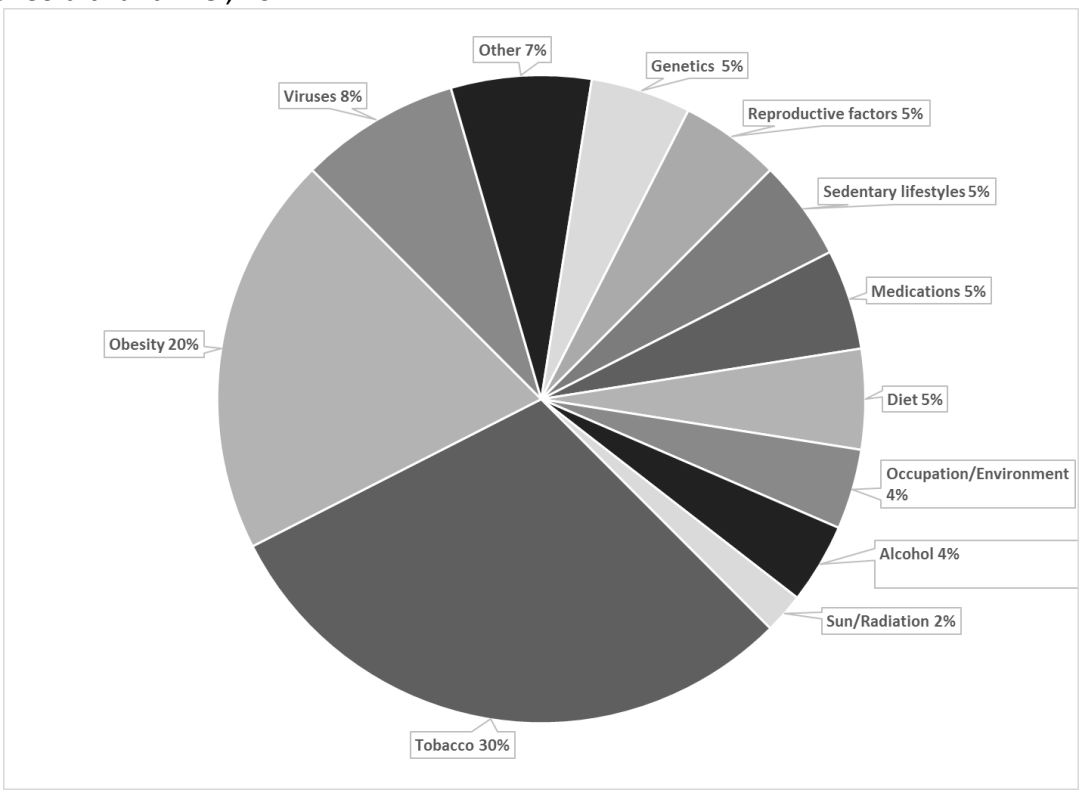


Figure 3. Two Estimates of Cancer Mortality Attributable to Various Known Risk Factors in the U.S.

Source: Harvard Report on Cancer Prevention, 1996.



Source: Colditz and Wei, 2012.



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