ROCKY MOUNTAIN ARSENAL MEDICAL MONITORING PROGRAM

ANALYSIS OF DIAGNOSED VS. EXPECTED CANCER CASES FOR THE NORTHEAST DENVER METROPOLITAN AREA IN THE VICINITY OF THE ROCKY MOUNTAIN ARSENAL, 1979-1996

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TABLE OF CONTENTS

EXECUTIVE SUMMARY

This document reports the initial findings of cancer surveillance for communities in the northeast Denver metropolitan area, surrounding the Rocky Mountain Arsenal (RMA) in southern Adams County, Colorado. Cancer surveillance is one of the community health activities conducted by the Rocky Mountain Arsenal Medical Monitoring Program at the Colorado Department of Public Health and Environment (CDPHE). Cancer surveillance in the communities surrounding the arsenal was undertaken in response to recommendations made to the department by the Rocky Mountain Arsenal Medical Monitoring Advisory Group.

Cancers are common diseases within the population, and therefore remain at the forefront of public health concern. Over 16,000 new cases of cancer are registered annually in Colorado, and Coloradans have, on average, an individual lifetime risk of developing cancer of approximately one chance in three. Whether an individual develops a cancer during his or her lifetime may be greatly influenced by a variety of complex factors that make determining causes a difficult task. We may, however, monitor incidence rates so as to be alert to significant deviation from the expected background rates. In Colorado, such monitoring is possible by using data available from the Colorado Central Cancer Registry (CCCR), which is based at the Department of Public Health and Environment. All cancers diagnosed in Colorado are reported to the Cancer Registry with the exception of non-melanoma skin cancers.

The objectives of this cancer surveillance project are to: 1) establish existing rates of cancer incidence prior to the soil remediation, 2) analyze cancer incidence rates for significant temporal or spatial changes during and after the arsenal's soil remediation, and 3) investigate any increased, or otherwise unexplained, rates of cancer. This report addresses objectives 1 and 3 above for an 18-year period leading up to the beginning of the arsenal's soil remediation, 1979 through 1996. Subsequent reports will continue this analysis as described in objectives 2 and 3 for the period beginning 1997 onward.

The study design used in this analysis focuses on a numerical summary of cancer incidence in each of the communities surrounding the arsenal. The results aid in determining whether the number of certain cancers is greater or less than expected and whether that difference is statistically significant. The study does not make detailed examinations of individual cases and does not allow conclusions to be made about causal association between exposure and any single cancer or group of cancers.

The study examined three areas: Area 1 (north and west of the Rocky Mountain Arsenal including north Commerce City), Area 2 (Commerce City), and Area 3 (Montbello and Green Valley Ranch). Area 1 has been further subdivided into Areas 1a, 1b, and Area 1 Combined, to better track cancer incidence in this region of rapid population growth.

This analysis of cancer incidence for the period 1979-1996 is further divided into two time periods, 1979-1988 and 1989-1996. This subdivision was made so as to detect possible variation in cancer incidence between the smaller time periods.

Cancer rates from the Denver metropolitan area (excluding the study area) over this time period were used as standards for estimating the expected numbers of cancers.

No generalized elevation of cancer was observed in the study areas. Elevations of cancer that were observed were of specific anatomical sites. Among the specific sites, only cancers of the lung and larynx (Areas 1b, 1, and 2) were seen in both genders at statistically significantly elevated rates for part or all of the time period addressed in this study.

Many or most of the lung and laryngeal cancers reported from these areas may be related to smoking. This conclusion is based on the known strong association between smoking and each of these cancers and the large number of reported cases with smoking histories. Other factors, such as exposure to carcinogens in the occupational, indoor, and ambient air may also contribute to the overall individual and population risk.

Other cancers for which tobacco use is an important risk factor and which were elevated among segments of the study population for certain time periods are of the kidney (Area 1a males and Area 1b females), bladder (Area 1 males), cervix (Area 2 females), and salivary gland (Area 3 females). Statistically significant elevations were not observed in both genders. Cancer Registry records show that among these cancer types, 50-100 percent of the individual cases had known smoking histories, suggesting that smoking may have played an important role in the incidence of these cancers. Again, other factors may have also played a role. For example, the epidemiological literature reports associations between a history of bladder infection and bladder cancer, certain occupations or occupational exposures to certain chemicals and kidney or bladder cancer, and infection with the human papillomavirus, in combination with smoking, and cervical cancer.

In this study, cancers of the oro- and hypopharynx were statistically elevated among males in Area 1b during 1979-1996, and elevated among males and females in Area 3 during 1989-1996, though within expected statistical limits. In both of these instances, smoking histories and alcohol consumption are likely to be factors in the development of the disease as both risk factors were noted in Cancer Registry abstracts for most cases and this linkage has been reported in the epidemiological literature.

The number of childhood cases of acute lymphoblastic leukemia (ALL) in Area 2 were statistically significantly elevated for the period 1989-1996, but not for 1979-1988. Leukemia is a complex set of diseases with a variety of known and potential risk factors. The cases of ALL in Area 2 children do not appear to have a familial association, to be linked with the presence of congenital anomalies, or to show any geographical pattern of occurrence. Other risk factors that may be important contributors to the elevation of leukemia in Area 2 may include prenatal exposures, such as parental smoking or from the parent's occupation, other factors in the residential environment, and certain medical procedures. That all of the reported childhood leukemia cases were ALL is, however, consistent with the pattern of leukemia in the general population.

Unlike the cancers addressed thus far, the other two cancer types that were statistically elevated, stomach (Area 1 males) and multiple myeloma (Area 3 females), do not have known associations with smoking. Stomach cancer has not been associated with environmental factors but rather dietary and gastric health conditions. The multiple myeloma elevation observed in Area 3 on the other hand, may have been related to occupational or related exposures. Unlike certain acute myelocytic leukemias, multiple myeloma has not been associated with benzene exposure. The age distribution of the multiple myeloma cases was consistent with the typical age distribution reported in the epidemiological literature.

The information that is available in Cancer Registry abstracts did not reveal any apparent unique or uncommon occupational patterns among cases of kidney, laryngeal, multiple myelomas, lung, and bladder cancer. Many cases, however, had at least some experience with industrial activities that may have included exposure to carcinogenic substances.

Statistically significant elevations were not observed among all racial/ethnic segments of the population. Statistically significant elevations were limited to White, non-Hispanic cases. This difference may be attributable to the size of each population segment within the study areas, though this is less likely to be relevant in Area 3, which is demographically more diverse. The lack of inter-racial and ethnic similarity may suggest an absence of a common environmental exposure. Certain cancers among the general population, however, are more common within specific race/ethnicities. For example, while multiple myeloma is more frequently diagnosed among Blacks than among Whites, bladder cancer is more common among Whites.

The most consistent time trends identified, that is, statistically significant elevations for the full time duration of the study (1979-1996), were dominated by cancers associated with behavioral and preexisting disease risk factors such as smoking or bacterial or viral infections. These included cancer of the bladder and stomach (males, Area 1 Combined), oro- and hypopharynx (males, Area 1b), lung (males and females, Areas 1 and 2), and cervix (females, Area 2).

The findings of this report will be communicated to the Comprehensive Cancer Control Section at CDPHE to improve cancer control strategies in the northeast Denver metropolitan area. The findings of this report will also be communicated to Denver Health, the Denver Environmental Health Department, and the Tri-County Health Department to assist these agencies in characterizing cancer incidence and the presence of known and potential risk factors in their respective jurisdictions.

Finally, the Rocky Mountain Arsenal Medical Monitoring Program at the Colorado Department of Public Health and Environment now will begin identifying appropriate time intervals for continued monitoring of the cancer incidence patterns in the northeast Denver metropolitan area.

INTRODUCTION

This document reports the initial findings of cancer surveillance for communities in the northeast Denver metropolitan area, surrounding the Rocky Mountain Arsenal (RMA) in southern Adams County, Colorado. Cancer surveillance is one of the community health activities conducted by the Rocky Mountain Arsenal Medical Monitoring Program at the Colorado Department of Public Health and Environment (CDPHE)[1]. Cancer surveillance in the communities surrounding the arsenal was undertaken in response to recommendations made to the department by the Rocky Mountain Arsenal Medical Monitoring Advisory Group[2].

Cancer is a general term applied to a wide variety of different diseases characterized by uncontrolled growth and spread of abnormal cells. These diseases are common within the population, and therefore remain at the forefront of public health concern. Over 16,000 new cases of cancer are registered annually in Colorado, and Coloradans have, on average, an individual lifetime risk of developing cancer of approximately one chance in three[3]. Whether an individual develops a cancer during his or her lifetime may be greatly influenced by a variety of factors, many of which are not currently understood. We do know that the development of cancer is a complex, multistage[4], process involving both external (chemical, radiation, and viruses) and internal factors (hormonal, immune conditions, and inherited mutations). Unfortunately, this complexity and its associated latencies, that is, the time period between the initiation of the cancer and subsequent diagnosis[5], have limited scientific efforts to identify causative factors or combinations of factors. We may, however, monitor incidence rates so as to be alert to significant deviation from the expected background rates. This in turn allows investigation of deviations with respect to potential environmental associations.

In Colorado, surveillance of cancer incidence is possible using data collected by the Colorado Central Cancer Registry (CCCR) at CDPHE. All cancers diagnosed in Colorado are reported to the Cancer Registry with the exception of non-melanoma skin cancers. The registry is mandated by Colorado law and by Colorado Board of Health

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1 The RMA Medial Monitoring Program, created by the RMA On-Post Record of Decision (ROD), was signed by the U.S. Army, the U.S. Environmental Protection Agency (EPA) and the CDPHE on June 11, 1996 with concurrence of the U.S. Fish and Wildlife Service and Shell Oil Company. The U.S. Army, serving as the lead agency, and Shell implement the ROD, which includes 31 restoration projects for contaminated soil, structures and ground water. Federal, state and local public health agencies conduct regulatory oversight.

2 The ROD stipulated that a Medical Monitoring Advisory Group (MMAG) be formed to evaluate information concerning exposure pathways and to identify and recommend appropriate public health actions and to communicate this information to the community. The Advisory Group recommendations defined goals, objectives and the methods of a program designed to respond effectively to RMA-related health concerns of the community. The ROD directed that the MMAG include representatives from the affected communities, regulatory agencies, local governments, Army, Shell Oil Company, U.S. Fish and Wildlife Service, and independent technical advisors. The ROD stated that the primary goals of the Medical Monitoring Program are to monitor any off-post impact on human health due to the remediation and provide mechanisms for evaluation of human health on an individual and community basis, until such time as the soil remedy is completed.

3 The cumulative lifetime risk of cancer in Colorado is 1 in 2 for males and 1 in 3 for females.

4 The development of cancer, or carcinogenesis, is believed to be a multistage process involving replication of damaged DNA, reduced control of cell division and function, and transformation into a malignant tumor.

5 Latency is the period between the causative event and the diagnosis of the disease. Cancer latency may last a few years to as many as 30 years or more.

regulation. Information is collected from all Colorado hospitals, pathology labs, outpatient clinics, physicians solely responsible for diagnosis and treatment, and state Vital Statistics. Pertinent data is registered on all malignant tumors, except basal and squamous cell carcinomas of the skin. All individual patient, physician, and hospital information is confidential as required by Colorado law.

OBJECTIVES

The objectives of cancer surveillance are to use cancer incidence data collected by the Colorado Central Cancer Registry to: 1) establish existing rates of cancer incidence prior to the RMA soil remediation, 2) analyze cancer incidence rates for significant temporal or spatial changes during and after the RMA soil remediation, and 3) investigate any increased, or otherwise unexplained, rates of cancer.

This report addresses objectives 1 and 3 above for an eighteen-year period leading up to the beginning of the Rocky Mountain Arsenal soil remediation, 1979 through 1996. Subsequent reports will continue this analysis as described in objectives 2 and 3 for the period beginning 1997 onward.

METHODS

The epidemiological study design used in this analysis of diagnosed and expected numbers of cancer cases is descriptive and ecological. The descriptive element provides a numerical summary of disease frequency, whereas the ecological component examines entire communities or populations, rather than individuals. Ecological studies have been conducted frequently in communities adjacent to potential environmental exposures, since they are efficient and can be completed within a reasonable period of time. Ecological studies are usually viewed as exploratory and hypothesis generating because the analyses made are for large or small groups of people, rather than for individuals. A weakness inherent in studies in which the analysis is at the group level, rather than the individual, is that information on potential confounders, for example, lifestyle, occupation, or residential history, is lacking or limited and the data cannot be fully examined for their effects. Another weakness of ecological studies is that, because potential exposure is not actually measured, geographical area of residence is used as a crude substitute. The use of a geographical area raises the likelihood of exposure misclassification, which reduces the ability of the study to observe a statistically significant difference between groups. Lastly, the design of this cancer incidence analysis does not allow conclusions to be made about causal association between exposure and any single cancer or group of cancers. The study design and results only aid in determining whether the number of certain cancers is greater or less than expected and whether that difference is statistically significant.

As part of this present investigation, cancer diagnosis counts were compared to expected counts for an area in the vicinity of the Rocky Mountain Arsenal for the time period of 1979-1996 when cancer reporting was complete and the 1980, 1990, and 2000 Census

years of population could be used. The boundaries of this area were selected for this analysis based on 1990 U.S. Census tract designations. The study area was composed of three smaller areas (Areas 1 through 3) based on the geography first described in the 1993 report *Cancer Incidence in the Northeastern Denver Metro Area: Report of the Ad Hoc Panel* (CDPHE 1993). In the present investigation, however, Area 1 has been further subdivided into Areas 1a, 1b, and Area 1 Combined, to better track cancer incidence in this region of rapid population growth. All five of these subdivisions of the overall study area are described below and shown in Figure 1.

Area 1a, north of the Rocky Mountain Arsenal, was defined as census tract 85.12 with a population of 1,334 in 1980, 1,405 in 1990, and 2,194 in 2000. Its boundaries were Henderson Rd., E. 124th Ave., State Hwy. 51, E. 120th Ave., Tower Rd., Irondale Rd. (E. 88th Ave.), Buckley Rd., E. 96th Ave., McKay Rd., and the South Platte River.

Area 1b, northwest of the Rocky Mountain Arsenal, was defined as census tracts 88.01 and 88.02 with a combined population of 7,766 in 1980, 6,971 in 1990, and 8,513 in 2000. Its boundaries were McKay Rd., E. 96th Ave., State Hwy. 2, E. 72nd Ave., U.S. Hwy. 85, E. 74th Ave. (State Hwy. 224), and the South Platte River.

Area 1 was defined as Area 1a and Area 1b together with a combined population of 9,100 in 1980, 8,376 in 1990, and 10,707 in 2000.

Area 2, west of the Rocky Mountain Arsenal, was defined as census tracts 87.03, 87.05, 87.06, and 89.01 with a combined population of 17,292 in 1980, 15,740 in 1990, and 18,939 in 2000. Its boundaries were E. 74th Ave. (State Hwy. 224), U.S. Hwy. 85, E. 72nd Ave., State Hwy. 2, Quebec, Denver-Adams County Line, and the South Platte River.

Area 3, south of the Rocky Mountain Arsenal, was defined as census tracts 41.05, 83.03, 83.04, 83.05, 83.06, 83.10, 83.11, and 83.12 with a combined population of 16,828 in 1980, 21,626 in 1990, and 39,311 in 2000. Its boundaries were the Denver-Adams County Line, E. 56th Ave., Picadilly Rd., Denver-Adams County Line, Tower Rd., Denver-Adams County Line, E. 46th Ave., Denver-Adams County Line, Montview Blvd., Syracuse, E. 23rd Ave., Quebec, E. 48th Ave., Denver-Adams County Line, and Quebec.

This analysis of cancer incidence for the period 1979-1996 is further divided into two time periods, 1979-1988 and 1989-1996. This subdivision of the full time period was made so as to discern possible variation in cancer incidence between the smaller time segments.

This analysis examined all diagnosed malignancies combined, as well as cancers of the 30 anatomical sites listed in Table 1. All cases of cancer diagnosed between 1979 and 1996 that were residents in the study areas at the time of diagnosis were identified. Data for an analysis of this type is obtained from the Colorado Central Cancer Registry. The address at the time of diagnosis for each case was used to assign residence within the census boundaries.

Identification and registration of cancer cases by the Cancer Registry involves standard processes including searching hospital medical charts, pathology laboratory records, and examining death certificate information.

Figure 1. Analysis of diagnosed vs. expected cancer cases for the northeast Denver area in the vicinity of the Rocky Mountain Arsenal, Colorado, 1979-1996 – Surveillance Areas 1a, 1b, 2, and 3.

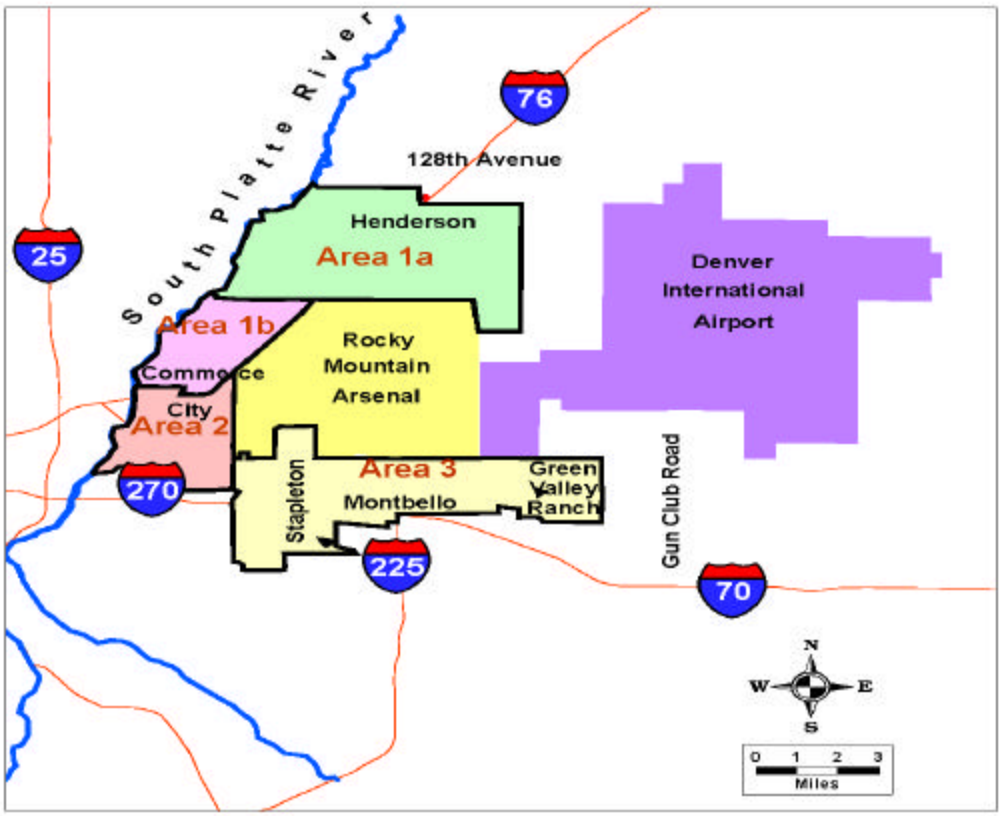

Table 1 – Anatomical sites of cancers included in the *Analysis of Diagnosed vs. Expected Cancer Cases for the Northeast Denver Area in the Vicinity of the Rocky Mountain Arsenal, 1979-1996.*

Salivary Gland	Kidney
Oral	Thyroid
Nasopharynx	Other Endocrine
Other Pharynx	Brain
Esophagus	Bone
Stomach	Leukemia
Small Intestine	Multiple Myeloma
Colorectal	Lymphoma
Liver	Soft Tissue
Other Biliary	Prostate
Pancreas	Testis
Larynx	Female Breast
Lung	Cervix
Melanoma	Uterus
Bladder	Ovary

U.S. Census counts of population by age, race/ethnicity, and gender for 1980, 1990, and 2000 were obtained from the Colorado Division of Local Government (State Demographers Office) or from the U.S. Census website.

Cancer rates from the Denver metropolitan area (excluding the study area) over this time period were used as standards for calculating expected numbers of cancers for the areas because: (1) complete age-specific rates by race/ethnicity and gender were available from the CCCR, and (2) the Denver metropolitan area serves as a local standard of comparison, which is preferable to using a statewide or national standard since these areas may be less likely to reflect local background cancer rates. The Denver metropolitan area is defined as the 6 counties of Adams, Arapahoe, Boulder, Douglas, and Jefferson, and the City and County of Denver. This local standard area included what is now the new City and County of Broomfield, except for a small section in Weld County, which has a population of 9 people.

Cancer rates from the Cancer Registry for men and women of comparable race/ethnic groups and ages were used to calculate the expected number of cancers for the areas. A cancer rate is the number of new cancer cases diagnosed per 100,000 population in a one-year period of time. The population in each area, stratified by age, gender, and

race/ethnicity, was multiplied by the cancer rate for each age, gender, and race/ethnic group in the comparison population to produce the expected number of cancers.

A diagnosed-to-expected ratio is then calculated by dividing the number of cancers diagnosed in the area by the number of expected cases. If the ratio is greater than 1, then more cancer cases than expected were reported in the area. When this occurs, the next step is to look more closely at that relationship. It is important to know if that ratio could have been higher by chance alone, so a confidence interval is calculated for the ratio. The confidence interval has a lower number (minimum value) and a higher number (maximum value). It is common to use a 95 percent confidence interval which means that we are 95 percent sure that the true ratio is within the range between the lower and higher values. If the ratio is greater than 1 but the confidence interval includes the number 1, then the ratio is within expected statistical limits. If the confidence interval does not include the number 1, then the ratio is statistically significant. A statistically significant elevated ratio means that there were more diagnosed cases than expected and that there is less than a 5 percent chance that this greater number is due to chance alone.

Because the estimate of expected cancers is based on the larger Denver metropolitan region population, this estimate will be a central tendency, or average number, of expected cases for the time period, 1979-1996. Cancer rates for specific populations, such as in smaller cities, towns, or neighborhoods, will likely be either higher or lower than the "expected average." Smaller populations tend to show greater variability. The variability of small populations is statistically reflected in the 95 percent confidence interval for the ratio of diagnosed to expected cases. Confidence intervals for small populations are wider than for large populations. When the expected number of cancer cases is small, slight increases can result in seemingly large diagnosed to expected ratios. For example, if only one case of cancer is expected in a small population in a given year, and two were actually diagnosed, the ratio would of course show a doubling of cases. But, in this situation, twice the number of expected cases would be within expected statistical limits. Statistical testing was not done on ratios with less than three diagnosed cases because of the inherent variability in such small numbers.

When statistically significant elevations of diagnosed-to-expected ratios were observed, other data recorded in the Cancer Registry abstract were also reviewed. These data help to characterize potential exposure commonalities among the cases, including the presence of important known risk factors for certain cancers, and separating selected anatomical categories of cancer into cell types. The case abstract data reviewed included occupation, smoking history, and cell type.

Lastly, for cervical cancer, the frequency of *in situ* and invasive disease diagnoses was noted. The relative frequency of disease stage may suggest late access to preventive medical care. Preventive care may prevent some cancers from occurring by diagnosing and treating pre-cancerous conditions.

FINDINGS

Tables A1- A45, located in the Appendix, display the number of diagnosed cancers in each of the study areas (Area 1a, 1b, 1 Combined, 2, and 3) by cancer type and gender, and by three different time periods, 1979-1996, 1979-1988, and 1989-1996, compared to the number that would be expected based on the population of male and female residents in the areas by race/ethnicity and age for each time period. Tables A46-A51, also located in the Appendix, display additional detail for selected areas, cancer types, and/or time periods that had statistically high findings. Cancer rates from the Cancer Registry for men and women of comparable race/ethnic groups and ages were used to calculate the expected number of cancers for the areas. The ratios of diagnosed to expected cases along with the 95 percent confidence intervals for these ratios provide information about the relative rate of cancer in these areas. Note that observed/expected ratios and confidence intervals are displayed with rounding to two decimal points. In Tables A5, A36, and A51, where the displayed lower bound of a confidence interval rounded to 1.00, the third decimal place was considered when determining that the confidence interval did not include 1.00, thus resulting in a statistically significant ratio.

Area 1a, 1b and Combined Area 1 – Tables A1-A27 display statistics for Areas 1a, 1b, and the combined Area 1 for the complete period 1979-1996 and the sub-periods 1979-1988 and 1989-1996, for males and females separately and combined.

Area 1a - Tables A1-A9 show that the numbers of cancers diagnosed in Area 1a were generally close to or slightly lower than the number expected in this area during these time periods. There were a few exceptions to this general finding. Table A5 shows that for 1979-1988 there were more male kidney cancers diagnosed in Area 1a than expected (three cases compared to about one expected). All 3 cases were renal cell adenocarcinomas, which are the predominant type in the Denver area. One of these three cases had a history of smoking. This finding did not persist in the 1989-1996 data as seen in Table A8 where no kidney cancer cases in males were diagnosed. For the full 1979-1996 time period, Table A1 shows that the number of male kidney cancer cases was within expected statistical limits. Table A6 shows that for 1979-1988 there were more female lung cancer cases diagnosed than expected in Area 1a (five cases compared to about two cases expected for a statistically high ratio of 3.15). Lung cancer elevations were repeatedly found in Area 1 and Area 2 for both genders and both time periods and this is discussed later in this report (see Table A28).

Area 1b – Tables A10-A18 show that the number of all cancers combined diagnosed in Area 1b was generally close to the number expected in this area during these time periods. Tables A10, A11, A14, and A16-A18 display several specific types of cancer statistically high for selected genders and time periods in this area. Table A16 also shows that all cancers combined were elevated for males and females combined for the 1989-1996 time period. There were 257 cancers diagnosed compared to about 224 cases expected for a statistically high ratio of 1.15. Most of this elevation was due to higher ratios for stomach, lung, and bladder cancers, all of which are described later as they pertain to a combined effect seen for these three cancers in the combined Area 1 (see Tables A19 and A20).

Other specific findings in Area 1b are as follows: Table A11 shows that the category "other cancers of the pharynx" in males was elevated during 1979-1996 (six cases compared to about 2 cases expected for a statistically high ratio of 2.89). According to Cancer Registry abstracts, five of these six cases (83%) had histories of both smoking and alcohol use. No information was available for the sixth case. All six cases were squamous cell carcinomas.

Table A17 shows that male laryngeal cancers were elevated during 1989-1996 (five cases compared to about two cases expected for a statistically high ratio of 3.21). Three of these five cases (60%) had a history of smoking. Considering only cases where information about smoking was recorded, three out of three (100%) were smokers. All of these larynx cases were squamous cell carcinomas, the predominant histological cell type for this type of cancer.

Table A18 shows that female kidney cancers were elevated during 1989-1996 (six cases compared to about two cases expected for a statistically high ratio of 3.25). Three of these six cases (50%) had a history of smoking. No information about smoking history was available for the remaining three cases. The distribution of histological cell types among these six cases was comparable to Denver metropolitan female kidney cancer cases with adenocarcinomas (renal cell carcinomas and other adenocarcinomas) accounting for all of the cases and 74 percent of cases in the Denver area. There was very little occupational data available in Cancer Registry abstracts.

Combined Area 1 - Tables A19-A27 show that the number of all cancers combined diagnosed in Area 1 was generally close to the number expected in this area during these time periods. However, during the 1979-1996 time period, two cancers among males and females combined, lung and bladder, had statistically high ratios, and stomach cancer among females also had a statistically high ratio.

Table A19 shows that there were 84 lung cancer diagnoses compared to about 61 cases expected during 1979-1996 for a statistically high ratio of 1.38. Tables A21, A25, and A26 also indicate elevations in lung cancer for selected genders and time periods in Area 1. As noted above, lung cancers were elevated consistently in Areas 1 and 2; they are evaluated later in this report (see Table A28).

Table A19 also shows that there were 36 male and female bladder cancer cases compared to about 24 cases expected during 1979-1996, resulting in a statistically high ratio of 1.53. Tables 20 and 21 show similar findings for the male ratio (1.54) and the female ratio (1.50) individually, with the male ratio being statistically high. Table A46 shows that almost all of these male and female bladder cancer cases were among White, non-Hispanic persons (33 out of 36 cases), and the ratio for White, non-Hispanic cases only was statistically high at 1.63 (33 cases compared to about 21 cases expected). The distribution of cases by age showed elevations in every age group from 35 to 74 with the ratio of 2.87 for the age group 45-54 (seven cases compared to about three cases expected being statistically high). CCCR abstracts showed a variety of occupations. Nineteen of

the 36 cases (53%) had a history of smoking documented in Cancer Registry abstracts. Including only abstracts where smoking information was recorded, 19 of 19 cases were smokers with none listed as non-smokers. All 36 bladder cancers were transitional cell carcinomas, consistent with the predominance of this cell type for this cancer.

Table A20 shows that there were 13 male stomach cancers diagnosed in Area 1 during 1979-1996 compared to about six or seven cases expected resulting in a statistically high ratio of 2.03. (Table A25 also indicates a stomach cancer elevation for males and females combined for 1989-1996 but Table A26 shows that this elevation is confined to stomach cancer among males during this time period). Table A47 shows that nearly all of these stomach cancer cases were White, non-Hispanic (10 out of 13 cases) and their ratio of 2.46 (10 cases compared to about four cases expected) was statistically high. The distribution of cases by age showed elevations in every age group from 35 to 74 with the ratio of 6.39 for the age group 45-54 (four cases compared to about one case expected) being statistically high. Smoking and alcohol consumption were very common among these 13 cases. Cancer Registry abstracts for these 13 cases documented smoking histories among nine cases (69%) and alcohol usage among six cases (46%); five of the six cases indicating alcohol consumption had descriptions of "heavy drinking", "chronic ethanol use", and/or "alcohol abuse" mentioned on the abstract. Similar information was not available for the remaining cases. Almost all (12 of 13, or 92%) of these stomach cancers were adenocarcinomas, consistent with the predominance of this cell type for this cancer.

Area 2 - Tables A28-A36 show that the number of all cancers combined diagnosed in Area 2 was generally close to the number expected in this area during these time periods. However, there were several exceptions to this finding, especially the strong finding of elevated lung cancer ratios in almost every gender and time period category. Also notable, Table A31 shows that the ratio of all cancers combined was statistically elevated during 1979-1988, mostly due to larynx, lung, and cervix cancer being higher. Much of this finding in Table A31 was attributable to the higher number of cancers among females, as seen in Table A33, during this time period (331 cancers diagnosed compared to about 279 cases expected) resulting in a statistically high ratio of 1.19. Again, lung and cervix cancer elevations explained much of this finding in females.

Table A31 shows that the larynx cancer ratio of 1.99 during 1979-1988 in Area 2 was statistically high (13 cases compared to about seven cases expected). Table A48 shows detail for these larynx cancers by race/ethnicity and age. Most cases were White, non-Hispanic with 12 cases compared to about five expected resulting in a statistically high ratio of 2.36. Age-group ratios were elevated in the 45-54, 55-64, and 75+ ranges with the ratio of 2.86 in the 55-64 age range (seven cases compared to about two or three cases expected) being statistically high. Cancer Registry abstracts showed a variety of occupational histories for these 13 larynx cases. Eight of the 13 cases (62%) were smokers according to Cancer Registry abstracts. Considering only cases where information about smoking was recorded, eight of eight cases were smokers. Ten of the 13 larynx cancer cases (77%) were squamous cell carcinomas, the predominant histological cell type for this type of cancer.

Table A28, as well as most gender and time periods for Area 2 and Area 1, shows that lung cancer ratios were statistically elevated for both time periods. For Area 2, there were 188 lung cancers diagnosed during 1979-1996 compared to about 123 cases expected for a statistically high ratio of 1.54. As shown earlier, lung cancers were also statistically higher in Area 1. Table A49 shows detail for these lung cancers in both Area 1 and Area 2 by race/ethnicity and age. For all race/ethnicities combined, there were 272 lung cancers diagnosed in Area 1 and Area 2 during 1979-1996 compared to about 183 cases expected for a statistically high ratio of 1.48. Most of these cases were White, non-Hispanic with 237 cases compared to about 151 expected for a statistically high ratio of 1.57. Ratios for Hispanics and Blacks were not elevated. Ratios by age group showed elevations in every category with the age groups 45-54, 55-64, and 65-74 each having statistically high ratios of 2.21, 1.61, and 1.37, respectively. Cancer Registry abstracts showed a variety of occupations. About 73 percent of these cases (199 out of 272 cases) had a history of smoking. Limiting this calculation to only cases with smoking information recorded on the abstracts, 98 percent of lung cancer cases (199 out of 204) were smokers. There were no uncommon histological cell types recorded and the distribution of types of lung cancer in Areas 1 and 2 during 1979-1996 were similar to the Denver metropolitan area. The cases included the major forms of lung cancer, squamous cell carcinomas (23% vs. 26% in metropolitan Denver), large cell carcinomas (13% vs. 9%), small cell carcinomas (20% vs. 19%), adenocarcinomas (32% vs. 31%), and all other types (12% vs. 16%).

Table A34 shows that leukemia cases were diagnosed more often in Area 2 than expected during 1989-1996. There were 23 leukemias compared to about 13 cases expected resulting in a statistically high ratio of 1.74. Table A50 shows detail for these leukemias by race/ethnicity and age. There were no cases in Blacks and the ratio for Hispanics was not elevated. The ratio of 1.76 for the 17 White, non-Hispanic leukemias compared to about 10 cases expected was statistically high. None of the 10+ age-group ratios were statistically elevated and the ratio of 1.42 for all cases age 10+ (17 cases compared to about 12 expected) was within expected statistical limits. Ratios were elevated for the 0-4 and 5-9 age groups, however, with the 5-9 age group ratio being statistically high. Pooling the two age groups into a 0-9 age category also showed a statistically high ratio of 4.75 (six cases compared to about one or two cases expected). All six of these cases were acute lymphoblastic leukemias. The 0-9 age group was also evaluated for the earlier 1979-1988 time period and the ratio of 2.56, four cases compared to about two cases expected, was within expected statistical limits.

Table A30 shows that cervical cancer cases were diagnosed more often in Area 2 than expected during 1979-1996. There were 85 cervical cancers diagnosed compared to about 47 cases expected resulting in a statistically high ratio of 1.82. Many of these cervical cancers (41%) were invasive while only 27 percent of cervical cancers in the Denver metropolitan area for this time period were reported to be invasive. The distributions of cancer cell types among the *in situ* cervix cancers in Area 2 (70% carcinomas and 30% squamous cell carcinomas) and the Denver metropolitan area (56% carcinomas and 42% squamous cell carcinomas) were fairly comparable. The

distribution of cell types among the invasive cervix cancer cases was also similar. In Area 2 and the Denver metropolitan area, squamous cell carcinomas accounted for 74 percent of invasive cervical cancers. For adenocarcinomas the percentages of invasive cases were 23 percent in Area 2 and 21 percent in the Denver metropolitan area. For all other cell types, the percentages were 3 percent in Area 2 and 5 percent in the Denver metropolitan area. Twenty-five out of 85 cases in Area 2 (29%) had a known history of smoking according to CCCR abstracts. Limiting this calculation only to cases with information about smoking history recorded, 25 out of 30 cases (83%) were smokers. Table A51 shows detail for these cervix cancers by race/ethnicity and age. There were no cases in Blacks and the ratio for Hispanics was not elevated. The ratio of 2.38 for the 70 White, non-Hispanic cervix cancers compared to about 30 cases expected was statistically high. All age-group ratios were elevated except the 45-54 age group. Four age-group ratios were statistically high, 20-24, 25-34, 35-44, and 55-64, each showing nearly double the expected count.

Area 3 - Tables A37-A45 show that the number of all cancers combined diagnosed in Area 3 was generally close to or slightly lower than the number expected in this area during these time periods. However, the exceptions to this finding were higher ratios found among salivary gland and other pharynx cancers during 1989-1996 and multiple myelomas during 1979-1988.

Table A37 shows that the ratio of 2.78 for salivary gland cancers diagnosed in Area 3 during 1979-1996 (six cases compared to about two cases expected) was statistically high, but Tables A38 and A39 shows that the elevation is mainly in females rather than males. More importantly, Tables A43-A45 indicate this elevation was confined to females during the 1989-1996 time period, where the ratio of 7.91, four female cases compared to about one case expected, was statistically high. Two of these cases (50%) had a history of smoking according to Cancer Registry abstracts. Considering only cases where information about smoking was recorded, two out of three cases (67%) were smokers.

Table A43 shows that the ratio of 2.14 for other pharynx cancers diagnosed in Area 3 during 1989-1996 (nine cases compared to about four cases) was elevated, though within expected statistical limits. A majority of these cases, seven of the nine, were squamous cell carcinomas, and the remainder was other types of carcinomas. According to Cancer Registry abstracts, four of these nine cases (44%) were smokers while six of the nine cases (67%) had histories of alcohol use. Four of the six cases reporting alcohol use had comments on the abstract indicating "alcohol abuse" or "excessive alcohol usage." Considering only cases where information about smoking and alcohol use were recorded, four of six cases (67%) were smokers and six of seven cases (86%) had histories of alcohol use.

Table A42 shows that the ratio of 3.79 for female multiple myelomas diagnosed in Area 3 during 1979-1988 (five cases compared to about one or two cases expected) was statistically high. All five cases were over age 40. Cancer Registry abstracts showed little information about smoking and a variety of occupations for these cases. The

elevation did not persist into the 1989-1996 time period where three female cases were diagnosed compared to about three cases expected. For the full 1979-1996 time period, the ratio of 2.00 (eight female cases compared to about four cases expected) was within expected statistical limits.

MULTIPLE COMPARISONS

Studies examining multiple health outcomes in several subpopulations may observe statistically elevated rates of those outcomes simply due to chance. This statistical phenomenon is commonly referred to as the "multiple comparisons" problem. If these tests are conducted at a 95 percent confidence level, about 5 percent of the tests are predicted to be statistically significant by chance alone; about 2.5 percent may be statistically higher than expected and 2.5 percent lower. In this study of cancer in the northeast Denver area, with 432 independent statistical tests conducted on separate cancer sites by gender and time periods for several different areas, there were 14 ratios statistically higher than expected (3.2% of the tests compared to about 2.5% predicted by chance alone) and three ratios statistically lower than expected (0.7% of the tests compared to about 2.5% predicted by chance alone). Evaluating all 1272 comparisons made, including all cancers combined, both genders combined for all cancers and cancers of individual anatomical sites, and additional tests done by race/ethnicity and age for several cancers, 63 ratios were statistically higher than expected (5% of the tests) and 13 ratios were statistically lower than expected (1% of the tests).

DISCUSSION

Cancer incidence, when compared to a standard population with statistical testing procedures, allows the identification of subpopulations with "higher than average" rates of specified categories of cancer. To interpret this information, however, other information may be readily available from the Cancer Registry, including potential risk factors (occupation, smoking history, and alcohol consumption), the frequency of cancer of specific anatomical sites, and the distribution of histological cell type within those anatomical sites. An equally important source of information for interpretation of cancer incidence data is the epidemiological literature. The significance of this information is discussed below.

Review of occupational data may reveal patterns suggesting areas for further study. Certain occupations may have exposures to specific carcinogenic agents, and broad categories of occupation, such as farming and industrial work, may involve exposures to a variety of carcinogens. Occupational data contained in the Cancer Registry case abstract do not, however, provide a complete picture of the life-long working experience.

In many cases, a history of tobacco smoking is recorded in the Cancer Registry abstract, and this information provides at least some information about a significant exposure to a known carcinogen. Registry abstracts do not provide information about other forms of tobacco exposure. Exposure to tobacco and tobacco smoke, including smoking, passive

inhalation, and use of smokeless tobacco, accounts for nearly one-third of all cancer cases in developed countries (American Cancer Society, 2001). Continuous, active smoking involves by far the greatest risk. The most pronounced risk is for cancer of the lung and larynx, and this risk may be 10-30 times greater than for nonsmokers (Wynder, 1998; Doll et al., 1994). Increased cancer risk is also evident for other organ tissues including the oropharynx, esophagus, pancreas, bladder, kidney, colorectal, and acute myelocytic leukemia. Suggestive evidence has associated smoking with hepatocellular cancer, squamous cell carcinoma of the uterine cervix, and possibly, breast cancer (Morabia et al., 1996; Lash and Aschengrau, 1999).

Excess consumption of alcohol is associated with cancer of the oral cavity, pharynx, esophagus, and liver. Epidemiological evidence suggests that approximately 5 percent of cancer deaths in the U.S. are related to alcohol consumption, but other factors may also be involved (American Cancer Society, 2001).

The distribution of reported cancers among the three most common anatomical sites can be reviewed for consistency with the expected distributions based on the comparison population. Nationally and in Colorado, the three most prominent cancer sites among males are prostate, lung/bronchus, and colorectal. Among females, the most common cancer sites are breast, colorectal, and lung/bronchus. The percentage at which these cancers are represented among all cancer in Colorado is shown in Table 2.

Table 2 – Major sites and percentages of cancer among male and female Colorado residents			
Males		Females	
Prostate	29.5%	Breast	37.0%
Lung & Bronchus	12.1%	Colorectal	9.9%
Colorectal	10.9%	Lung & Bronchus	9.4%

Information on the type of cancer cell or cancer cell morphology for specific anatomical sites may be obtained from Cancer Registry records. For example, reference may be made to both squamous and small cell carcinoma of the lung. The distinction of cell type is important for the pathologist as it provides important information related to treatment and prognosis. To the epidemiologist, however, the distinction aids in separating cancer of a specific site into different diseases and etiologies. Differentiation also allows the epidemiologist to compare the distribution, or relative frequency, of cancer cell types among cases in the study population to that of the comparison population. Comparing distributions is yet another way to search for similar or differing patterns of disease within the study population that might suggest a unique causative or associated factor.

Lastly, a substantial body of scientific and medical information has been collected describing the relationship between cancer, population incidence, and the known associated risk factors. This information is recorded in the epidemiological literature.

Summary of Cancer Incidence - A variety of cancers were found to be statistically elevated within the study areas of the northeast Denver metropolitan area. This information is summarized in Table 3 and discussed in detail in the following paragraphs.

All Cancers Combined – The distribution of reported cancers among the three most common anatomical sites were reviewed and found to be generally consistent with the expected distributions (Table 2, above) based on the comparison population. In Area 1a, 1b and the combined Area 1, for all combinations of time and gender, the incidence of all cancers combined were generally lower or close to the number of diagnoses expected. The single exception was the total diagnoses for males and females in Area 1b during 1989-1996. Most of this elevation was due to the higher incidence of stomach, lung, and bladder cancers, each of which are discussed below. The number of all cancers combined diagnosed in Area 2 was also generally close to the number expected; however, there were exceptions that are largely attributable to elevated findings for cancer of the larynx, lung, and cervix. These are also addressed below. In Area 3, the number of all cancers combined was generally close to or slightly lower than the number expected in this area during the study time periods.

Table 3. Summary of statistically significantly elevated cancer incidence in the Northeast Denver Metropolitan Area, by study area, time period, gender, and anatomical site for the period 1979-1996.

Area	Time Period	Gender	Cancer Site	Appendix Table Number
1a	1979-1988	Males	Kidney	A5
1b	1979-1996	Males	Other Pharynx	A11
1b	1989-1996	Males	Larynx	A17
1b	1989-1996	Female	Kidney	A18
1 Combined	1979-1996	Males	Bladder	A19, A46
1 Combined	1979-1996	Males	Stomach	A20, A26, A47
1 & 2	1979-1996	Males & Females	Lung	A6, A10, A11, A16, A17, A19, A21, A25, A26, A28-A35
2	1979-1988	Males & Females	Larynx	A31, A48
2	1979-1996	Females	Cervix	A30, A51
2	1989-1996	Males & Females	Leukemia	A34, A50
3	1989-1996	Females	Salivary Gland	A39, A43-45
3	1979-1988	Females	Multiple Myeloma	A42

Gender and Race/Ethnicity – An elevation of a particular cancer in one gender, but not the other, tends to argue for a causative or co-factor not present among the entire population. Conversely, an elevation in both genders may suggest shared risk factors. Patterns of elevated cancer incidence among both males and females within time periods and geographic areas were generally not observed in this investigation. One exception is the general trend toward elevated ratios, some statistically significant, for lung and laryngeal cancers in Areas 1b, 1 Combined, and 2. The number of bladder cancer cases was higher than expected among both males and females in Area 1 during the 1979-1996 time period. The ratio for males was statistically significant. Most cases observed among males or females came from Area 1b. Leukemia cases were observed more frequently than expected in Area 2 during 1989-1996 among both males and females. Statistically significant findings were limited to females only, females and males combined, and children. Each of these specific observations, for lung, larynx,

bladder, and leukemia are discussed in greater detail below.

As described in the methods section of this report, this evaluation entailed comparing cancer incidence to expected cancer counts based on age, gender, and race/ethnicity. The distribution of the number of diagnosed cancer cases was expressly reviewed where there were at least ten cancers and significant elevations were observed by time and gender. Anatomical sites, or types, of cancer for which the race/ethnicity distribution was reviewed for selected genders and time periods were the bladder, cervix, larynx, lung, stomach, and leukemia. Statistically significant elevations were not observed among all racial/ethnic segments of the population. In each of these cases, statistically significant elevations were limited to White, non-Hispanic cases. This difference may be attributable to the size of each population segment within the study areas. Additionally, and as with differences in rates of diagnosis between genders, an elevation of a particular cancer in one race/ethnicity, but not the other, tends to argue for a causative or co-factor not present among the entire population. And again similar to gender differences, an elevation in more than one race/ethnic group may suggest shared risk factors.

Laryngeal, Pharyngeal and Salivary Gland Cancers – Cancers of the laryngeal, pharyngeal and salivary gland have been associated with tobacco use and heavy use of alcohol (Talamini et al, 1998; Thun, 1997), as well as poor nutrition (Amer. Cancer Soc., 2001) and human papillomavirus (McKaig et al, 1998). Tobacco use is the most important risk factor, accounting for about 85 percent of all head and neck cancers. Risks to smokers for cancer of the larynx and hypopharynx are 5 to 35 times that for nonsmokers, depending on the level of use. Occupational exposures associated with increased risk of developing laryngeal and hypopharyngeal cancer include exposure to wood dust, paint fumes and other chemicals used in the plastics, textile, petroleum and metalworking industries. Asbestos has been linked in some studies.

Cancer of the larynx was found to be elevated in males in Area 1b during 1989-1996 and in both males and females in Area 2 during 1979-1988. Sixty percent of the cases in Area 1b had documented smoking histories, a known risk factor for this form of cancer, as noted above. In Area 2, 100 percent of the cases that had recorded smoking histories were smokers. Nearly all cases in both Area 1b and 2 were squamous cell carcinomas, the predominant histological cell type for this type of cancer.

"Other cancers of the pharynx," that is, of the oro- and hypopharynx, was found to be significantly elevated among males in Area 1b during 1979-1996. Smoking and excess alcohol consumption are known risk factors for this type of cancer. Among these cases, 83 percent had recorded histories of smoking and alcohol use. Cancers of oro- and hypopharynx were also found to be elevated in Area 3, though the elevation was not statistically significant. Similar to Area 1b, several of the case records reported both smoking and alcohol consumption.

Area 3 had a statistically high number of salivary gland cancers diagnosed among females during 1989-1996. Half of the cases had a history of smoking, a known risk factor for this form of cancer.

Lung Cancer – Both Areas 1 and 2 showed statistically elevated incidence of lung cancer among males and females during 1979-1996. Most cases were among persons aged 45 years and older. Among cases for which information about smoking was recorded, 98 percent had a history of smoking. There were no uncommon histological cell types recorded and the distribution of types of lung cancer in Areas 1 and 2 during 1979-1996 were similar to the Denver metropolitan area. The cases included the major forms of lung cancer; squamous cell carcinomas, large cell carcinomas, small cell carcinomas, and adenocarcinomas.

The lung cancer risk associated with tobacco is discussed in greater detail above. Cigarette smoking specifically, however, is by far the most important risk factor for the development of lung cancer (American Cancer Society, 1995). For example, a woman smoking 1 to 20 cigarettes per day has a greater than 10-fold increase in risk of developing lung cancer than a woman that has never smoked.

Other known environmental risk factors for lung cancer include exposure to asbestos, arsenic, radon, and other forms of air pollution. Other air pollutants that may be carcinogenic to the lung are diesel exhaust, pitch and tar, dioxin, chromium, cadmium and nickel compounds.

Stomach Cancer – Stomach cancer was statistically more frequently diagnosed among males in Area 1 during 1979-1996 than expected. The greatest frequency of cases was in age groups over 35. Though not documented as risk factors for stomach cancer, smoking and alcohol consumption were very common among the cases of cancer for this anatomical site in the Combined Area 1. In several cases, the registry abstract characterized alcohol consumption as excessive. An increased general risk of stomach cancer may be due to potentially poorer health and/or nutrition, which in turn are often linked with smoking and alcohol usage. Almost all of these stomach cancers were adenocarcinomas, consistent with the predominance of this cell type for this cancer.

Chronic gastric infection with the bacteria *Helicobacter pylori* has been associated with a condition known as atrophic gastritis, which in turn has been associated with some forms of stomach cancer. The general decline in stomach cancer in the United States in recent decades may be related to antibiotic control of *Helicobacter pylori* (Tally, N.J. et al., 1991). Another potential risk factor for stomach cancer is pathologic conditions associated with reduced gastric acidity, including atrophic gastritis, and increased production of carcinogenic nitrosamines from dietary nitrates and nitrites (American Cancer Society, 2001). Additionally, some studies have suggested that certain nutrients and improved food preservation are important factors in the control of stomach cancer (Harrison et al., 1997).

Kidney Cancer- A statistically elevated incidence of kidney cancer was reported among males in Area 1a during the period 1979-1988, and among females in Area 1b during the period 1989-1996. Smoking is a known risk factor for this type of cancer and a review of the case records showed that 33 percent of the reported cases in

males in Area 1a during 1979-1988 and 50 percent of the reported female cases in Area 1b during 1989-1996 had a documented history of smoking. Additionally, the distribution of histological cell types among these cases was comparable to Denver metropolitan area female kidney cancer cases.

Current epidemiological literature indicates that the incidence of renal cell carcinoma represents approximately two to three percent of new cancers per year. Men are affected twice as often as women, and the average age at diagnosis is sixty years (Greenlee, 2000). Risk factors that have been proved or implicated in the causes of renal cancer include obesity, analgesic abuse, and certain occupational exposures to agents such as cadmium and trichloroethylene (Wartenberg et al., 2000). Approximately 1 percent of renal cancers cluster in families.

Also, there are studies that show that individuals who smoke, whether they are men or women, have an increased risk of renal carcinoma. (La Vecchia, 1990; Talamini, 1990; Yuan, 1998).

Bladder Cancer - Bladder cancer was statistically elevated among both males and females in the combined Area 1 during the period 1979-1996. While the elevated ratios were each about 1.50, the ratio for males was statistically significant. Most cases were observed in persons aged 35 years and older.

Smoking is a primary risk factor for bladder cancer accounting for as many as 60 percent of all cases. Cancer Registry case abstracts showed that 100 percent of the individual cases diagnosed in the northeast Denver study area had a smoking history.

One-fourth of bladder cancer cases in the United States are estimated to be associated with occupational exposures. Associated occupations that have been reported in the literature include those in the rubber, textile, leather, paint, chemical and petroleum industries. Other risk factors for bladder cancer include arsenic exposure, chronic bladder infections, and other diseases of the urinary tract. Men are two to three times more likely than women to get bladder cancer and people with family members who have bladder cancer are more likely to get the disease.

A bladder cancer elevation in Area 1 males was also described in the 1993 report *Cancer Incidence in the Northeastern Denver Metro Area: Report of the Ad Hoc Panel* (CDPHE 1993). Using a subset of the Cancer Registry data presented in this current report, the elevation was observed for the period 1981-1985; the ratio for a longer time period, 1979-1988 was elevated, but not significantly. Subsequent to the 1993 report, a case-control study of bladder cancer in Adams County, Colorado, was conducted by Colorado State University in cooperation with the Agency for Toxic Substances and Disease Registry (ATSDR 1996). The study examined all known male and female cases for the period 1982 through part of 1991. The case-control study found that for these cases, a history of bladder infection and smoking were significant risk factors, as has been demonstrated in the literature. The ability of the study to detect other risk factors was, however, limited by the small number of cases and controls who could be located for

interview.

Cervical Cancer - Cervical cancer cases were diagnosed more often in Area 2 than expected during 1979-1996, and this elevation was statistically significant. Forty-one percent of these cervical cancers were invasive while only 27 percent of cervical cancers in the Denver metropolitan area for this time period were reported to be invasive, indicating late detection among these cases in Area 2. The distributions of cancer cell types among the *in situ* cervix cancers in Area 2 and the Denver metropolitan area were fairly comparable and the distribution of cell types among the invasive cervix cancer cases was also similar. Smoking is considered a risk factor for cervical cancer and 83 percent of the Area 2 cases for which smoking information is available had a known history of smoking. All age-group ratios were elevated except the 45-54 age group. Four age-group ratios were statistically high, 20-24, 25-34, 35-44, and 55-64, each showing nearly double the expected count.

Other risk factors for cervical cancer include infection with certain sexually transmitted infections called human papillomavirus (HPV), sexual intercourse before age 18, multiple sex partners, and poor nutrition (Amer. Cancer Soc., 2001). Recent studies suggest that tobacco exposure may function as a cofactor with HPV in producing cancer cells.

Leukemia - The 1989-1996 diagnosed to expected ratios for leukemia in Area 2 were elevated for the 0-4 and 5-9 age groups with the 5-9 age group ratios being statistically high. Pooling the two age groups into a 0-9 age category also showed a statistically high ratio of 4.75 (six cases compared to about one or two cases expected). All six of these cases, which were dispersed throughout Area 2, were acute lymphoblastic leukemias (ALL), the predominant type of leukemia among children generally. The 0-9 age group was also evaluated for the earlier 1979-1988 time period in Area 2 and both time periods, 1979-1988 and 1989-1996, for Areas 1 and 3; these ratios were found to be within expected statistical limits.

Leukemias are cancers of white blood cells (leukocytes). In the United States, leukemias constitute approximately 3 percent of all cancer. Leukemias are classified as either acute or chronic. Acute lymphocytic leukemia is the most common type of leukemia in young children, represents approximately 75 percent of all pediatric leukemias, most of the remainder being acute mylelocytic leukemia (AML). This disease can also affect adults; especially those age 65 and older.

No single factor has been shown to cause all leukemias. Genetic factors, drugs, and environmental and occupational exposures have each been implicated in both children and adults. Multiple cases of leukemia occurring within the same family, particularly among siblings, are one source of evidence of a genetic etiology for ALL and AML. Studies of twins with leukemia also suggest a genetic factor, but do not rule out an intrauterine event or exposure. Other evidence of a genetic predisposition to develop acute leukemia is suggested by the increased leukemia incidence associated with a number of hereditary or congenital disorders. Most notable among congenital disorders is Down syndrome, and both childhood acute leukemia and Down syndrome have similar

risk factors (prenatal radiation exposure, older maternal age at birth, abnormal maternal reproductive history). Readily available information made it possible to determine that none of the childhood ALL cases reported within the study areas were among siblings nor were any reported to have a congenital anomaly. Older maternal age was not a characteristic of any ALL case.

Heavy cigarette smoking has been associated with the development of both ALL and AML in adults, and small excesses have been reported among children of mothers who smoked during pregnancy (Severson et al. 1992). Non-specific prenatal occupational exposures to pesticides and maternal employment in agriculture has been associated with increased risk of childhood ALL, as has postnatal residential exposure to pesticides (Shu et al, 1988; Lowengart et al 1987). Occupational benzene exposure is associated with an increased incidence of AML (Aksoy and Erdern, 1978). Important non-occupational sources of benzene exposure may be cigarette smoke and consumer products. Childhood ALL has been associated with parental occupation in chemical and other industries.

Nonionizing electromagnetic radiation from overhead power lines, home electrical wiring and home appliances, for example, has been weakly associated with childhood leukemia. Interpretation of these studies is difficult because of limitations in exposure assessment, other methodological problems, and the small numbers of cases (Savitz et al, 1989; Cartwright, 1989; Poole and Trichopoulos, 1991; National Radiological Protection Board, 1992).

An increased incidence of AML occurs in patients who have received chemotherapy for other disorders. Exposure to a combination of chemotherapy and radiotherapy further increases affected patient's risk of developing leukemia (Smith et al., 1996). Exposure to even moderate doses of ionizing radiation, weapons or therapy related, appears to be associated with an increased risk for developing leukemia (Stevens et al., 1990; Adamson and Seiber,1981).

Multiple Myeloma – Multiple myeloma was statistically elevated among females in Area 3 during 1979-1988; however, the number of cases was very close to that expected for the 1989-1996 time period.

Multiple myeloma is characterized by the overgrowth and malfunction of plasma cells in the bone marrow. While there are few established risk factors for multiple myeloma, age is generally recognized as the most significant. Multiple myeloma diagnoses are most common among persons 65 to 70 years old, and is uncommon among persons less than 40 years of age (Durie, 2001). The five female cases for Area 3 during 1979-1988 were over 40. Children and siblings of patients who have this disease have a slightly increased risk, and this disease affects Blacks more often than Whites and men more often than women (Brown et al., 1999). Multiple myeloma has not been associated with tobacco use and few occupational exposures have been identified as risk factors for multiple myeloma (Stagnaro et al., 2001). Some studies have suggested a potential link between farming and petroleum related occupations, although benzene exposure does not appear to be causal factor (Bergsagel et al., 1999). Exposure to large amounts of ionizing

radiation does increase the risk of this disease (Durie, 2001). Weak supportive data of an association between trichloroethylene exposure and multiple myeloma has been reported (Wartenberg et al., 2000).

Multiple Comparisons - The evaluation of the statistical outcome of the multiple comparisons made in this analysis predicted that 2.5 percent of the comparisons made would be statistically significantly high, and 2.5 percent statistically significantly low. Among the independent comparisons made, 3.2 percent were high and 0.7 percent were low. This outcome does not suggest an overall marked departure from that predicted.

CONCLUSIONS

No generalized elevation of cancer was observed in the northeast Denver metropolitan study areas. Elevations of cancer that were observed were of specific anatomical sites. Among the specific sites, only cancers of the lung and larynx (Areas 1b, 1, and 2) were seen in both genders at statistically significantly elevated rates for part or all of the time period addressed in this study.

Many or most of the lung and laryngeal cancers reported from these areas may be related to smoking. This conclusion is based on the known strong association between smoking and each of these cancers and the large number of reported cases with smoking histories. Other factors, such as exposure to carcinogens in the occupational, indoor, and ambient air may also contribute to the overall individual and population risk.

Other cancers for which tobacco use is an important risk factor and which were elevated among segments of the study population for certain time periods are of the kidney (Area 1a males and Area 1b females), bladder (Area 1 males), cervix (Area 2 females), certain structures of the pharynx (Area 1b males), and salivary gland (Area 3 females). As indicated, statistically significant elevations were not observed in both genders. Cancer Registry records show that among these cancer types, 50-100 percent of the individual cases had smoking histories, suggesting that smoking may have played an important role in the incidence of these cancers. Again, other factors may have also played a role. For example, the case-control study of both males and females reported by Colorado State University and ATSDR in 1996 showed that both smoking, and another important known risk factor, history of bladder infection, was associated with the observed cases of bladder cancer. Furthermore, the epidemiological literature also reports association between certain occupations or occupational exposures to certain chemicals and kidney or bladder cancer. Separate or in combination with smoking, the human papillomavirus (HPV) is an additional risk factor for cervical cancer.

In this study, cancers of the oro- and hypopharynx were statistically elevated among males in Area 1b during 1979-1996, and elevated among males and females in Area 3 during 1989-1996, though within statistical limits. In both of these instances, smoking histories and alcohol consumption are likely to be factors in the development of the disease as both risk factors were noted in Cancer Registry abstracts for most cases and

this linkage has been reported in the epidemiological literature.

Leukemia is a complex set of diseases with a variety of known and potential risk factors. The cases of ALL in Area 2 children do not appear to have a familial association, to be linked with the presence of congenital anomalies, or to show any geographical pattern of occurrence.
Other risk factors that may be important contributors to the elevation of leukemia in Area 2 may include prenatal exposures, such as parental smoking or from the parent's occupation, other factors in the residential environment, and certain medical procedures. That all of the reported childhood leukemia cases were ALL is, however, consistent with the pattern of leukemia in the general population.

Unlike the cancers addressed thus far, the other two cancer types that were statistically elevated, stomach (Area 1 males) and multiple myeloma (Area 3 females), do not have known associations with smoking. Stomach cancer has not been associated with other environmental factors but rather dietary and gastric health conditions. The multiple myeloma elevation observed in Area 3 on the other hand, may have been related to occupational or related exposures. Unlike certain acute myelocytic leukemias, multiple myeloma has not been associated with benzene exposure. The age distribution of the multiple myeloma cases was consistent with the typical age distribution reported in the epidemiological literature.

The information that is available in Cancer Registry abstracts did not reveal any apparent unique or uncommon occupational patterns among cases of kidney, laryngeal, multiple myelomas, lung, and bladder cancer. Many cases, however, had at least some experience with industrial activities that may have included exposure to carcinogenic substances.

Statistically significant elevations were not observed among all racial/ethnic segments of the population. Statistically significant elevations were limited to White, non-Hispanic cases. This difference may be attributable to the size of each population segment within the study areas, though this is less likely to be relevant in Area 3, which is more demographically diverse. The lack of inter-racial and ethnic similarity may suggest an absence of a common environmental exposure. Certain cancers among the general population, however, are more common within specific race/ethnicities. For example, while multiple myeloma is more frequently diagnosed among Blacks than among Whites, bladder cancer is more common among Whites.

The most consistent time trends identified, that is, statistically significant elevations for the full time duration of the study (1979-1996), were dominated by cancers associated with behavioral and preexisting disease risk factors such as smoking and bacterial or viral infections. These included cancer of the bladder and stomach (males, Area 1 Combined), "other pharynx" (males, Area 1b), lung (males and females, Areas 1 and 2), and cervix (females, Area 2).

Recommendations

Cancer surveillance is one of the community health activities conducted by the Rocky Mountain Arsenal Medical Monitoring Program, which is based at the Colorado Department of Public Health and Environment and was undertaken in response to recommendations made by the Rocky Mountain Arsenal Medical Monitoring Advisory Group. This report covers the period 1979-1996, prior to the initiation of the arsenal soil remediation activities. Appropriate time intervals should now be determined for continued surveillance so as to monitor cancer incidence patterns in the future.

The findings of this report should be communicated to Denver Health, the Denver Environmental Health Department, and the Tri-County Health Department to assist these agencies in characterizing cancer incidence and the presence of known and potential risk factors in their respective jurisdictions.

The findings of this report should also be communicated to the Comprehensive Cancer Control Section at the State Department of Public Health and Environment to improve cancer control strategies in the northeast Denver metropolitan area.

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APPENDIX

ANALYSIS OF DIAGNOSED VS. EXPECTED CANCER CASES FOR THE NORTHEAST DENVER AREA IN THE VICINITY OF THE ROCKY MOUNTAIN ARSENAL, 1979-1996

DATA TABLES

Tables A1- A45 display the number of diagnosed cancers in each of the study areas (Area 1a, 1b, 1, 2, and 3) by cancer type and gender, and by three different time periods, 1979-1996, 1979-1988, and 1989-1996, compared to the number that would be expected based on the population of male and female residents in the areas by race/ethnicity and age for each time period. Tables A46-A51 display additional detail for selected areas, cancer types, and/or time periods that had statistically high findings.

Table A1 – Number of Cancer Diagnoses Compared to the Expected Number in Area 1a, 1979-1996 – Males and Females

	Cancers Diagnosed	Cancers Expected	Diagnosed / Expected	95% C.I. for Ratio
All Cancers	82	97.800	0.84	(0.67-1.04)
Salivary Gland	0	0.265	0.00	NC
Oral	1	1.162	0.86	NC
Nasopharynx	0	0.122	0.00	NC
Other Pharynx	0	0.610	0.00	NC
Esophagus	2	0.676	2.96	NC
Stomach	2	1.666	1.20	NC
Small Intestine	0	0.296	0.00	NC
Colorectal	7	10.962	0.64	(0.26-1.32)
Liver	0	0.630	0.00	NC
Other Biliary	0	0.484	0.00	NC
Pancreas	2	1.990	1.01	NC
Larynx	0	0.999	0.00	NC
Lung	12	11.150	1.08	(0.55-1.88)
Melanoma	2	4.655	0.43	NC
Bladder	4	4.424	0.90	(0.25-2.31)
Kidney	3	1.993	1.51	(0.31-4.40)
Thyroid	0	1.411	0.00	NC
Other Endocrine	0	0.156	0.00	NC
Brain	0	1.600	0.00	NC
Bone	0	0.223	0.00	NC
Leukemia	4	2.524	1.58	(0.43-4.05)
Mult. Myeloma	0	0.917	0.00	NC
Lymphoma	4	4.088	0.98	(0.27-2.50)
Soft Tissue	0	0.616	0.00	NC

Note: Diagnosed/Expected ratios that have a 95% Confidence Interval that brackets the value 1.00 are not considered statistically high or low.

* Ratio is statistically significant at p=0.05 level. (** p=0.01 level)

NC = not calculated due to less than 3 diagnoses (see text for explanation).

Table A2 – Number of Cancer Diagnoses Compared to the Expected Number in Area 1a, 1979-1996 – Males

	Cancers Diagnosed	Cancers Expected	Diagnosed / Expected	95% C.I. for Ratio
All Cancers	46	52.723	0.87	(0.64-1.16)
Salivary Gland	0	0.180	0.00	NC
Oral	1	0.780	1.28	NC
Nasopharynx	0	0.083	0.00	NC
Other Pharynx	0	0.446	0.00	NC
Esophagus	2	0.544	3.68	NC
Stomach	2	1.220	1.64	NC
Small Intestine	0	0.184	0.00	NC
Colorectal	5	6.555	0.76	(0.25-1.78)
Liver	0	0.434	0.00	NC
Other Biliary	0	0.246	0.00	NC
Pancreas	1	1.153	0.87	NC
Larynx	0	0.821	0.00	NC
Lung	5	7.605	0.66	(0.21-1.54)
Melanoma	2	2.566	0.78	NC
Prostate	13	14.349	0.91	(0.48-1.55)
Testis	0	0.739	0.00	NC
Bladder	3	3.521	0.85	(0.18-2.49)
Kidney	3	1.358	2.21	(0.46-6.46)
Thyroid	0	0.418	0.00	NC
Other Endocrine	0	0.092	0.00	NC
Brain	0	0.959	0.00	NC
Bone	0	0.138	0.00	NC
Leukemia	2	1.622	1.23	NC
Mult. Myeloma	0	0.558	0.00	NC
Lymphoma	4	2.507	1.60	(0.43-4.08)
Soft Tissue	0	0.366	0.00	NC

Note: Diagnosed/Expected ratios that have a 95% Confidence Interval that brackets the value 1.00 are not considered statistically high or low.

* Ratio is statistically significant at p=0.05 level. (** p=0.01 level)

NC = not calculated due to less than 3 diagnoses (see text for explanation).

Table A3 – Number of Cancer Diagnoses Compared to the Expected Number in Area 1a, 1979-1996 – Females				
	Cancers Diagnosed	Cancers Expected	Diagnosed / Expected	95% C.I. for Ratio
All Cancers	36	45.077	0.80	(0.56-1.11)
Salivary Gland	0	0.085	0.00	NC
Oral	0	0.382	0.00	NC
Nasopharynx	0	0.039	0.00	NC
Other Pharynx	0	0.164	0.00	NC
Esophagus	0	0.132	0.00	NC
Stomach	0	0.446	0.00	NC
Small Intestine	0	0.112	0.00	NC
Colorectal	2	4.407	0.45	NC
Liver	0	0.196	0.00	NC
Other Biliary	0	0.238	0.00	NC
Pancreas	1	0.837	1.19	NC
Larynx	0	0.178	0.00	NC
Lung	7	3.545	1.97	(0.79-4.07)
Melanoma	0	2.089	0.00	NC
Female Breast	15	15.171	0.99	(0.55-1.63)
Cervix	6	4.014	1.49	(0.55-3.26)
Uterus	0	2.440	0.00	NC
Ovary	1	1.821	0.55	NC
Bladder	1	0.903	1.11	NC
Kidney	0	0.635	0.00	NC
Thyroid	0	0.993	0.00	NC
Other Endocrine	0	0.064	0.00	NC
Brain	0	0.641	0.00	NC
Bone	0	0.085	0.00	NC
Leukemia	2	0.902	2.22	NC
Mult. Myeloma	0	0.359	0.00	NC
Lymphoma	0	1.581	0.00	NC
Soft Tissue	0	0.250	0.00	NC

Note: Diagnosed/Expected ratios that have a 95% Confidence Interval that brackets the value 1.00 are not considered statistically high or low.
* Ratio is statistically significant at p=0.05 level. (** p=0.01 level) NC=not calculated (see text)

Table A4 – Number of Cancer Diagnoses Compared to the Expected Number in Area 1a, 1979-1988 – Males and Females				
	Cancers Diagnosed	Cancers Expected	Diagnosed / Expected	95% C.I. for Ratio
All Cancers	45	47.048	0.96	(0.70-1.28)
Salivary Gland	0	0.152	0.00	NC
Oral	0	0.579	0.00	NC
Nasopharynx	0	0.066	0.00	NC
Other Pharynx	0	0.284	0.00	NC
Esophagus	1	0.318	3.14	NC
Stomach	0	0.905	0.00	NC
Small Intestine	0	0.139	0.00	NC
Colorectal	5	6.107	0.82	(0.27-1.91)
Liver	0	0.282	0.00	NC
Other Biliary	0	0.265	0.00	NC
Pancreas	1	1.112	0.90	NC
Larynx	0	0.556	0.00	NC
Lung	6	5.735	1.05	(0.38-2.28)
Melanoma	0	1.812	0.00	NC
Bladder	2	2.253	0.89	NC
Kidney	3	0.881	3.41	(0.70-9.96)
Thyroid	0	0.675	0.00	NC
Other Endocrine	0	0.087	0.00	NC
Brain	0	0.777	0.00	NC
Bone	0	0.122	0.00	NC
Leukemia	2	1.261	1.59	NC
Mult. Myeloma	0	0.458	0.00	NC
Lymphoma	4	1.850	2.16	(0.59-5.53)
Soft Tissue	0	0.315	0.00	NC

Note: Diagnosed/Expected ratios that have a 95% Confidence Interval that brackets the value 1.00 are not considered statistically high or low.

* Ratio is statistically significant at p=0.05 level. (** p=0.01 level)

NC = not calculated due to less than 3 diagnoses (see text for explanation).

Table A5 – Number of Cancer Diagnoses Compared to the Expected Number in Area 1a, 1979-1988 – Males				
	Cancers Diagnosed	Cancers Expected	Diagnosed / Expected	95% C.I. for Ratio
All Cancers	21	25.480	0.82	(0.51-1.26)
Salivary Gland	0	0.104	0.00	NC
Oral	0	0.393	0.00	NC
Nasopharynx	0	0.049	0.00	NC
Other Pharynx	0	0.196	0.00	NC
Esophagus	1	0.254	3.94	NC
Stomach	0	0.675	0.00	NC
Small Intestine	0	0.087	0.00	NC
Colorectal	3	3.735	0.80	(0.17-2.35)
Liver	0	0.186	0.00	NC
Other Biliary	0	0.144	0.00	NC
Pancreas	1	0.671	1.49	NC
Larynx	0	0.467	0.00	NC
Lung	1	4.150	0.24	NC
Melanoma	0	1.004	0.00	NC
Prostate	6	5.791	1.04	(0.38-2.26)
Testis	0	0.342	0.00	NC
Bladder	1	1.819	0.55	NC
Kidney	3	0.618	4.85*	(1.00-14.19)
Thyroid	0	0.213	0.00	NC
Other Endocrine	0	0.052	0.00	NC
Brain	0	0.463	0.00	NC
Bone	0	0.075	0.00	NC
Leukemia	0	0.826	0.00	NC
Mult. Myeloma	0	0.288	0.00	NC
Lymphoma	4	1.126	3.55	(0.97-9.08)
Soft Tissue	0	0.191	0.00	NC

Note: Diagnosed/Expected ratios that have a 95% Confidence Interval that brackets the value 1.00 are not considered statistically high or low.

* Ratio is statistically significant at p=0.05 level. (** p=0.01 level)

NC = not calculated due to less than 3 diagnoses (see text for explanation).

Table A6 – Number of Cancer Diagnoses Compared to the Expected Number in Area 1a, 1979-1988 – Females

	Cancers Diagnosed	Cancers Expected	Diagnosed / Expected	95% C.I. for Ratio
All Cancers	24	21.568	1.11	(0.71-1.66)
Salivary Gland	0	0.048	0.00	NC
Oral	0	0.186	0.00	NC
Nasopharynx	0	0.017	0.00	NC
Other Pharynx	0	0.088	0.00	NC
Esophagus	0	0.064	0.00	NC
Stomach	0	0.230	0.00	NC
Small Intestine	0	0.052	0.00	NC
Colorectal	2	2.372	0.84	NC
Liver	0	0.096	0.00	NC
Other Biliary	0	0.121	0.00	NC
Pancreas	0	0.441	0.00	NC
Larynx	0	0.089	0.00	NC
Lung	5	1.585	3.15*	(1.02-7.37)
Melanoma	0	0.808	0.00	NC
Female Breast	8	6.750	1.19	(0.51-2.33)
Cervix	5	2.347	2.13	(0.69-4.98)
Uterus	0	1.270	0.00	NC
Ovary	1	0.878	1.14	NC
Bladder	1	0.434	2.30	NC
Kidney	0	0.263	0.00	NC
Thyroid	0	0.462	0.00	NC
Other Endocrine	0	0.035	0.00	NC
Brain	0	0.314	0.00	NC
Bone	0	0.047	0.00	NC
Leukemia	2	0.435	4.60	NC
Mult. Myeloma	0	0.170	0.00	NC
Lymphoma	0	0.724	0.00	NC
Soft Tissue	0	0.124	0.00	NC

Note: Diagnosed/Expected ratios that have a 95% Confidence Interval that brackets the value 1.00 are not considered statistically high or low.
*Ratio is statistically significant at p=0.05 level. (** p=0.01 level)
NC=not calculated (see text)

Table A7 – Number of Cancer Diagnoses Compared to the Expected Number in Area 1a, 1989-1996 – Males and Females				
	Cancers Diagnosed	Cancers Expected	Diagnosed / Expected	95% C.I. for Ratio
All Cancers	37	50.752	0.73	(0.51-1.01)
Salivary Gland	0	0.113	0.00	NC
Oral	1	0.583	1.72	NC
Nasopharynx	0	0.056	0.00	NC
Other Pharynx	0	0.326	0.00	NC
Esophagus	1	0.358	2.79	NC
Stomach	2	0.761	2.63	NC
Small Intestine	0	0.157	0.00	NC
Colorectal	2	4.855	0.41	NC
Liver	0	0.348	0.00	NC
Other Biliary	0	0.219	0.00	NC
Pancreas	1	0.878	1.14	NC
Larynx	0	0.443	0.00	NC
Lung	6	5.415	1.11	(0.41-2.41)
Melanoma	2	2.843	0.70	NC
Bladder	2	2.171	0.92	NC
Kidney	0	1.112	0.00	NC
Thyroid	0	0.736	0.00	NC
Other Endocrine	0	0.069	0.00	NC
Brain	0	0.823	0.00	NC
Bone	0	0.101	0.00	NC
Leukemia	2	1.263	1.58	NC
Mult. Myeloma	0	0.459	0.00	NC
Lymphoma	0	2.238	0.00	NC
Soft Tissue	0	0.301	0.00	NC

Note: Diagnosed/Expected ratios that have a 95% Confidence Interval that brackets the value 1.00 are not considered statistically high or low.

* Ratio is statistically significant at p=0.05 level. (** p=0.01 level)

NC = not calculated due to less than 3 diagnoses (see text for explanation).

Table A8 – Number of Cancer Diagnoses Compared to the Expected Number in Area 1a, 1989-1996 – Males				
	Cancers Diagnosed	Cancers Expected	Diagnosed / Expected	95% C.I. for Ratio
All Cancers	25	27.243	0.92	(0.59-1.35)
Salivary Gland	0	0.076	0.00	NC
Oral	1	0.387	2.58	NC
Nasopharynx	0	0.034	0.00	NC
Other Pharynx	0	0.250	0.00	NC
Esophagus	1	0.290	3.45	NC
Stomach	2	0.545	3.67	NC
Small Intestine	0	0.097	0.00	NC
Colorectal	2	2.820	0.71	NC
Liver	0	0.248	0.00	NC
Other Biliary	0	0.102	0.00	NC
Pancreas	0	0.482	0.00	NC
Larynx	0	0.354	0.00	NC
Lung	4	3.455	1.16	(0.32-2.96)
Melanoma	2	1.562	1.28	NC
Prostate	7	8.558	0.82	(0.33-1.69)
Testis	0	0.397	0.00	NC
Bladder	2	1.702	1.18	NC
Kidney	0	0.740	0.00	NC
Thyroid	0	0.205	0.00	NC
Other Endocrine	0	0.040	0.00	NC
Brain	0	0.496	0.00	NC
Bone	0	0.063	0.00	NC
Leukemia	2	0.796	2.51	NC
Mult. Myeloma	0	0.270	0.00	NC
Lymphoma	0	1.381	0.00	NC
Soft Tissue	0	0.175	0.00	NC

Note: Diagnosed/Expected ratios that have a 95% Confidence Interval that brackets the value 1.00 are not considered statistically high or low.

* Ratio is statistically significant at p=0.05 level. (** p=0.01 level)

NC = not calculated due to less than 3 diagnoses (see text for explanation).

Table A9 – Number of Cancer Diagnoses Compared to the Expected Number in Area 1a, 1989-1996 – Females				
	Cancers Diagnosed	Cancers Expected	Diagnosed / Expected	95% C.I. for Ratio
All Cancers	12	23.509	0.51*	(0.26-0.89)
Salivary Gland	0	0.037	0.00	NC
Oral	0	0.196	0.00	NC
Nasopharynx	0	0.022	0.00	NC
Other Pharynx	0	0.076	0.00	NC
Esophagus	0	0.068	0.00	NC
Stomach	0	0.216	0.00	NC
Small Intestine	0	0.060	0.00	NC
Colorectal	0	2.035	0.00	NC
Liver	0	0.100	0.00	NC
Other Biliary	0	0.117	0.00	NC
Pancreas	1	0.396	2.53	NC
Larynx	0	0.089	0.00	NC
Lung	2	1.960	1.02	NC
Melanoma	0	1.281	0.00	NC
Female Breast	7	8.421	0.83	(0.33-1.71)
Cervix	1	1.667	0.60	NC
Uterus	0	1.170	0.00	NC
Ovary	0	0.943	0.00	NC
Bladder	0	0.469	0.00	NC
Kidney	0	0.372	0.00	NC
Thyroid	0	0.531	0.00	NC
Other Endocrine	0	0.029	0.00	NC
Brain	0	0.327	0.00	NC
Bone	0	0.038	0.00	NC
Leukemia	0	0.467	0.00	NC
Mult. Myeloma	0	0.189	0.00	NC
Lymphoma	0	0.857	0.00	NC
Soft Tissue	0	0.126	0.00	NC

Note: Diagnosed/Expected ratios that have a 95% Confidence Interval that brackets the value 1.00 are not considered statistically high or low.
*Ratio is statistically significant at p=0.05 level. (** p=0.01 level)
NC=not calculated (see text)

Table A10 – Number of Cancer Diagnoses Compared to the Expected Number in Area 1b, 1979-1996 – Males and Females

	Cancers Diagnosed	Cancers Expected	Diagnosed / Expected	95% C.I. for Ratio
All Cancers	461	444.964	1.04	(0.94-1.13)
Salivary Gland	1	1.130	0.89	NC
Oral	5	5.254	0.95	(0.31-2.22)
Nasopharynx	1	0.515	1.94	NC
Other Pharynx	6	2.871	2.09	(0.77-4.55)
Esophagus	2	2.995	0.67	NC
Stomach	13	7.544	1.72	(0.92-2.95)
Small Intestine	2	1.338	1.49	NC
Colorectal	41	51.056	0.80	(0.58-1.09)
Liver	4	2.986	1.34	(0.37-3.43)
Other Biliary	0	2.654	0.00	NC
Pancreas	9	9.155	0.98	(0.45-1.87)
Larynx	7	4.762	1.47	(0.59-3.03)
Lung	72	49.912	1.44**	(1.13-1.82)
Melanoma	12	18.327	0.65	(0.34-1.14)
Bladder	32	19.061	1.68**	(1.15-2.37)
Kidney	8	9.450	0.85	(0.37-1.67)
Thyroid	8	6.676	1.20	(0.52-2.36)
Other Endocrine	0	0.732	0.00	NC
Brain	6	7.305	0.82	(0.30-1.79)
Bone	0	1.070	0.00	NC
Leukemia	10	11.680	0.86	(0.41-1.57)
Mult. Myeloma	6	4.291	1.40	(0.51-3.05)
Lymphoma	21	18.833	1.12	(0.69-1.70)
Soft Tissue	2	3.014	0.66	NC

Note: Diagnosed/Expected ratios that have a 95% Confidence Interval that brackets the value 1.00 are not considered statistically high or low.

* Ratio is statistically significant at p=0.05 level. (** p=0.01 level)

NC = not calculated due to less than 3 diagnoses (see text for explanation).

Table A11 – Number of Cancer Diagnoses Compared to the Expected Number in Area 1b, 1979-1996 – Males				
	Cancers Diagnosed	Cancers Expected	Diagnosed / Expected	95% C.I. for Ratio
All Cancers	247	224.627	1.10	(0.97-1.25)
Salivary Gland	0	0.713	0.00	NC
Oral	4	3.318	1.21	(0.33-3.08)
Nasopharynx	1	0.310	3.23	NC
Other Pharynx	6	2.074	2.89*	(1.06-6.30)
Esophagus	2	2.297	0.87	NC
Stomach	11	5.191	2.12*	(1.06-3.79)
Small Intestine	1	0.766	1.31	NC
Colorectal	24	28.132	0.85	(0.55-1.27)
Liver	3	1.971	1.52	(0.31-4.45)
Other Biliary	0	1.178	0.00	NC
Pancreas	7	4.747	1.47	(0.59-3.04)
Larynx	7	3.848	1.82	(0.73-3.75)
Lung	48	32.368	1.48*	(1.09-1.97)
Melanoma	5	9.686	0.52	(0.17-1.21)
Prostate	52	60.492	0.86	(0.64-1.13)
Testis	3	3.318	0.90	(0.19-2.64)
Bladder	25	14.646	1.71*	(1.10-2.52)
Kidney	2	6.060	0.33	NC
Thyroid	2	1.801	1.11	NC
Other Endocrine	0	0.408	0.00	NC
Brain	2	4.176	0.48	NC
Bone	0	0.684	0.00	NC
Leukemia	5	7.105	0.70	(0.23-1.64)
Mult. Myeloma	2	2.398	0.83	NC
Lymphoma	12	10.912	1.10	(0.57-1.92)
Soft Tissue	0	1.713	0.00	NC

Note: Diagnosed/Expected ratios that have a 95% Confidence Interval that brackets the value 1.00 are not considered statistically high or low.

* Ratio is statistically significant at p=0.05 level. (** p=0.01 level)

NC = not calculated due to less than 3 diagnoses (see text for explanation).

Table A12 – Number of Cancer Diagnoses Compared to the Expected Number in Area 1b, 1979-1996 – Females				
	Cancers Diagnosed	Cancers Expected	Diagnosed / Expected	95% C.I. for Ratio
All Cancers	214	220.337	0.97	(0.84-1.11)
Salivary Gland	1	0.417	2.40	NC
Oral	1	1.936	0.52	NC
Nasopharynx	0	0.205	0.00	NC
Other Pharynx	0	0.797	0.00	NC
Esophagus	0	0.698	0.00	NC
Stomach	2	2.353	0.85	NC
Small Intestine	1	0.572	1.75	NC
Colorectal	17	22.924	0.74	(0.43-1.19)
Liver	1	1.015	0.99	NC
Other Biliary	0	1.476	0.00	NC
Pancreas	2	4.408	0.45	NC
Larynx	0	0.914	0.00	NC
Lung	24	17.544	1.37	(0.88-2.04)
Melanoma	7	8.641	0.81	(0.33-1.67)
Female Breast	64	71.241	0.90	(0.69-1.15)
Cervix	22	20.532	1.07	(0.67-1.62)
Uterus	7	11.790	0.59	(0.24-1.22)
Ovary	6	8.896	0.67	(0.25-1.47)
Bladder	7	4.415	1.59	(0.64-3.27)
Kidney	6	3.390	1.77	(0.65-3.86)
Thyroid	6	4.875	1.23	(0.45-2.68)
Other Endocrine	0	0.324	0.00	NC
Brain	4	3.129	1.28	(0.35-3.27)
Bone	0	0.386	0.00	NC
Leukemia	5	4.575	1.09	(0.35-2.55)
Mult. Myeloma	4	1.893	2.11	(0.58-5.40)
Lymphoma	9	7.921	1.14	(0.52-2.16)
Soft Tissue	2	1.301	1.54	NC

Note: Diagnosed/Expected ratios that have a 95% Confidence Interval that brackets the value 1.00 are not considered statistically high or low.
*Ratio is statistically significant at p=0.05 level. (** p=0.01 level)
NC=not calculated (see text)

Table A13 – Number of Cancer Diagnoses Compared to the Expected Number in Area 1b, 1979-1988 – Males and Females				
	Cancers Diagnosed	Cancers Expected	Diagnosed / Expected	95% C.I. for Ratio
All Cancers	204	221.542	0.92	(0.80-1.06)
Salivary Gland	1	0.668	1.50	NC
Oral	3	2.732	1.10	(0.23-3.21)
Nasopharynx	0	0.251	0.00	NC
Other Pharynx	3	1.417	2.12	(0.44-6.19)
Esophagus	1	1.454	0.69	NC
Stomach	4	3.952	1.01	(0.28-2.59)
Small Intestine	1	0.654	1.53	NC
Colorectal	22	28.398	0.77	(0.48-1.17)
Liver	0	1.317	0.00	NC
Other Biliary	0	1.441	0.00	NC
Pancreas	6	4.956	1.21	(0.44-2.64)
Larynx	2	2.756	0.73	NC
Lung	30	25.799	1.16	(0.79-1.66)
Melanoma	4	8.041	0.50	(0.14-1.27)
Bladder	16	9.724	1.65	(0.94-2.67)
Kidney	1	4.397	0.23	NC
Thyroid	2	3.601	0.56	NC
Other Endocrine	0	0.425	0.00	NC
Brain	4	3.793	1.05	(0.29-2.70)
Bone	0	0.649	0.00	NC
Leukemia	5	6.138	0.81	(0.26-1.90)
Mult. Myeloma	4	2.068	1.93	(0.53-4.95)
Lymphoma	13	9.007	1.44	(0.77-2.47)
Soft Tissue	1	1.632	0.61	NC

Note: Diagnosed/Expected ratios that have a 95% Confidence Interval that brackets the value 1.00 are not considered statistically high or low.

* Ratio is statistically significant at p=0.05 level. (** p=0.01 level)

NC = not calculated due to less than 3 diagnoses (see text for explanation).

Table A14 – Number of Cancer Diagnoses Compared to the Expected Number in Area 1b, 1979-1988 – Males

	Cancers Diagnosed	Cancers Expected	Diagnosed / Expected	95% C.I. for Ratio
All Cancers	115	107.221	1.07	(0.89-1.29)
Salivary Gland	0	0.431	0.00	NC
Oral	2	1.719	1.16	NC
Nasopharynx	0	0.138	0.00	NC
Other Pharynx	3	0.951	3.15	(0.65-9.23)
Esophagus	1	1.108	0.90	NC
Stomach	4	2.691	1.49	(0.40-3.80)
Small Intestine	0	0.350	0.00	NC
Colorectal	14	15.535	0.90	(0.49-1.51)
Liver	0	0.814	0.00	NC
Other Biliary	0	0.659	0.00	NC
Pancreas	4	2.585	1.55	(0.42-3.96)
Larynx	2	2.289	0.87	NC
Lung	21	17.480	1.20	(0.74-1.84)
Melanoma	0	4.181	0.00	NC
Prostate	21	22.549	0.93	(0.57-1.42)
Testis	1	1.757	0.57	NC
Bladder	14	7.470	1.87*	(1.02-3.14)
Kidney	1	2.852	0.35	NC
Thyroid	1	1.041	0.96	NC
Other Endocrine	0	0.244	0.00	NC
Brain	1	2.133	0.47	NC
Bone	0	0.406	0.00	NC
Leukemia	3	3.791	0.79	(0.16-2.31)
Mult. Myeloma	1	1.165	0.86	NC
Lymphoma	7	5.086	1.38	(0.55-2.84)
Soft Tissue	0	0.942	0.00	NC

Note: Diagnosed/Expected ratios that have a 95% Confidence Interval that brackets the value 1.00 are not considered statistically high or low.

* Ratio is statistically significant at p=0.05 level. (** p=0.01 level)

NC = not calculated due to less than 3 diagnoses (see text for explanation).

Table A15 – Number of Cancer Diagnoses Compared to the Expected Number in Area 1b, 1979-1988 – Females

	Cancers Diagnosed	Cancers Expected	Diagnosed / Expected	95% C.I. for Ratio
All Cancers	89	114.321	0.78*	(0.63-0.96)
Salivary Gland	1	0.237	4.22	NC
Oral	1	1.013	0.99	NC
Nasopharynx	0	0.133	0.00	NC
Other Pharynx	0	0.466	0.00	NC
Esophagus	0	0.346	0.00	NC
Stomach	0	1.261	0.00	NC
Small Intestine	1	0.304	3.29	NC
Colorectal	8	12.863	0.62	(0.27-1.22)
Liver	0	0.503	0.00	NC
Other Biliary	0	0.782	0.00	NC
Pancreas	2	2.371	0.84	NC
Larynx	0	0.467	0.00	NC
Lung	9	8.319	1.08	(0.50-2.05)
Melanoma	4	3.860	1.04	(0.28-2.65)
Female Breast	19	34.762	0.55**	(0.33-0.85)
Cervix	13	12.916	1.01	(0.54-1.72)
Uterus	0	6.680	0.00	NC
Ovary	6	4.646	1.29	(0.47-2.81)
Bladder	2	2.254	0.89	NC
Kidney	0	1.545	0.00	NC
Thyroid	1	2.560	0.39	NC
Other Endocrine	0	0.181	0.00	NC
Brain	3	1.660	1.81	(0.37-5.28)
Bone	0	0.243	0.00	NC
Leukemia	2	2.347	0.85	NC
Mult. Myeloma	3	0.903	3.32	(0.68-9.71)
Lymphoma	6	3.921	1.53	(0.56-3.33)
Soft Tissue	1	0.690	1.45	NC

Note: Diagnosed/Expected ratios that have a 95% Confidence Interval that brackets the value 1.00 are not considered statistically high or low.

*Ratio is statistically significant at p=0.05 level. (** p=0.01 level)

NC=not calculated (see text)

Table A16 – Number of Cancer Diagnoses Compared to the Expected Number in Area 1b, 1989-1996 – Males and Females				
	Cancers Diagnosed	Cancers Expected	Diagnosed / Expected	95% C.I. for Ratio
All Cancers	257	223.422	1.15*	(1.01-1.30)
Salivary Gland	0	0.462	0.00	NC
Oral	2	2.522	0.79	NC
Nasopharynx	1	0.264	3.79	NC
Other Pharynx	3	1.454	2.06	(0.43-6.03)
Esophagus	1	1.541	0.65	NC
Stomach	9	3.592	2.51*	(1.15-4.76)
Small Intestine	1	0.684	1.46	NC
Colorectal	19	22.658	0.84	(0.51-1.31)
Liver	4	1.669	2.40	(0.65-6.13)
Other Biliary	0	1.213	0.00	NC
Pancreas	3	4.199	0.71	(0.15-2.09)
Larynx	5	2.006	2.49	(0.81-5.82)
Lung	42	24.113	1.74**	(1.26-2.36)
Melanoma	8	10.286	0.78	(0.34-1.53)
Bladder	16	9.337	1.71	(0.98-2.78)
Kidney	7	5.053	1.39	(0.56-2.86)
Thyroid	6	3.075	1.95	(0.71-4.25)
Other Endocrine	0	0.307	0.00	NC
Brain	2	3.512	0.57	NC
Bone	0	0.421	0.00	NC
Leukemia	5	5.542	0.90	(0.29-2.11)
Mult. Myeloma	2	2.223	0.90	NC
Lymphoma	8	9.826	0.81	(0.35-1.60)
Soft Tissue	1	1.382	0.72	NC

Note: Diagnosed/Expected ratios that have a 95% Confidence Interval that brackets the value 1.00 are not considered statistically high or low.

* Ratio is statistically significant at p=0.05 level. (** p=0.01 level)

NC = not calculated due to less than 3 diagnoses (see text for explanation).

Table A17 – Number of Cancer Diagnoses Compared to the Expected Number in Area 1b, 1989-1996 – Males

	Cancers Diagnosed	Cancers Expected	Diagnosed / Expected	95% C.I. for Ratio
All Cancers	132	117.406	1.12	(0.94-1.33)
Salivary Gland	0	0.282	0.00	NC
Oral	2	1.599	1.25	NC
Nasopharynx	1	0.172	5.81	NC
Other Pharynx	3	1.123	2.67	(0.55-7.81)
Esophagus	1	1.189	0.84	NC
Stomach	7	2.500	2.80*	(1.12-5.77)
Small Intestine	1	0.416	2.40	NC
Colorectal	10	12.597	0.79	(0.38-1.46)
Liver	3	1.157	2.59	(0.53-7.58)
Other Biliary	0	0.519	0.00	NC
Pancreas	3	2.162	1.39	(0.29-4.06)
Larynx	5	1.559	3.21*	(1.04-7.49)
Lung	27	14.888	1.81**	(1.19-2.64)
Melanoma	5	5.505	0.91	(0.29-2.12)
Prostate	31	37.943	0.82	(0.56-1.16)
Testis	2	1.561	1.28	NC
Bladder	11	7.176	1.53	(0.77-2.74)
Kidney	1	3.208	0.31	NC
Thyroid	1	0.760	1.32	NC
Other Endocrine	0	0.164	0.00	NC
Brain	1	2.043	0.49	NC
Bone	0	0.278	0.00	NC
Leukemia	2	3.314	0.60	NC
Mult. Myeloma	1	1.233	0.81	NC
Lymphoma	5	5.826	0.86	(0.28-2.00)
Soft Tissue	0	0.771	0.00	NC

Note: Diagnosed/Expected ratios that have a 95% Confidence Interval that brackets the value 1.00 are not considered statistically high or low.

* Ratio is statistically significant at p=0.05 level. (** p=0.01 level)

NC = not calculated due to less than 3 diagnoses (see text for explanation).

Table A18 – Number of Cancer Diagnoses Compared to the Expected Number in Area 1b, 1989-1996 – Females				
	Cancers Diagnosed	Cancers Expected	Diagnosed / Expected	95% C.I. for Ratio
All Cancers	125	106.016	1.18	(0.98-1.41)
Salivary Gland	0	0.180	0.00	NC
Oral	0	0.923	0.00	NC
Nasopharynx	0	0.092	0.00	NC
Other Pharynx	0	0.331	0.00	NC
Esophagus	0	0.352	0.00	NC
Stomach	2	1.092	1.83	NC
Small Intestine	0	0.268	0.00	NC
Colorectal	9	10.061	0.89	(0.41-1.70)
Liver	1	0.512	1.95	NC
Other Biliary	0	0.694	0.00	NC
Pancreas	0	2.037	0.00	NC
Larynx	0	0.447	0.00	NC
Lung	15	9.225	1.63	(0.91-2.68)
Melanoma	3	4.781	0.63	(0.13-1.84)
Female Breast	45	36.479	1.23	(0.90-1.65)
Cervix	9	7.616	1.18	(0.54-2.24)
Uterus	7	5.110	1.37	(0.55-2.82)
Ovary	0	4.250	0.00	NC
Bladder	5	2.161	2.31	(0.75-5.41)
Kidney	6	1.845	3.25*	(1.19-7.08)
Thyroid	5	2.315	2.16	(0.70-5.05)
Other Endocrine	0	0.143	0.00	NC
Brain	1	1.469	0.68	NC
Bone	0	0.143	0.00	NC
Leukemia	3	2.228	1.35	(0.28-3.94)
Mult. Myeloma	1	0.990	1.01	NC
Lymphoma	3	4.000	0.75	(0.15-2.19)
Soft Tissue	1	0.611	1.64	NC

Note: Diagnosed/Expected ratios that have a 95% Confidence Interval that brackets the value 1.00 are not considered statistically high or low.
*Ratio is statistically significant at p=0.05 level. (** p=0.01 level)
NC=not calculated (see text)

Table A19 – Number of Cancer Diagnoses Compared to the Expected Number in Area 1 Combined, 1979-1996 – Males and Females

	Cancers Diagnosed	Cancers Expected	Diagnosed / Expected	95% C.I. for Ratio
All Cancers	543	542.764	1.00	(0.92-1.09)
Salivary Gland	1	1.394	0.72	NC
Oral	6	6.416	0.94	(0.34-2.04)
Nasopharynx	1	0.637	1.57	NC
Other Pharynx	6	3.481	1.72	(0.63-3.76)
Esophagus	4	3.671	1.09	(0.30-2.79)
Stomach	15	9.210	1.63	(0.91-2.69)
Small Intestine	2	1.633	1.22	NC
Colorectal	48	62.019	0.77	(0.57-1.03)
Liver	4	3.614	1.11	(0.30-2.83)
Other Biliary	0	3.138	0.00	NC
Pancreas	11	11.145	0.99	(0.49-1.77)
Larynx	7	5.761	1.22	(0.49-2.51)
Lung	84	61.061	1.38**	(1.10-1.70)
Melanoma	14	22.983	0.61	(0.33-1.02)
Bladder	36	23.486	1.53*	(1.07-2.12)
Kidney	11	11.444	0.96	(0.48-1.72)
Thyroid	8	8.088	0.99	(0.43-1.95)
Other Endocrine	0	0.887	0.00	NC
Brain	6	8.095	0.67	(0.25-1.47)
Bone	0	1.292	0.00	NC
Leukemia	14	14.204	0.99	(0.54-1.65)
Mult. Myeloma	6	5.208	1.15	(0.42-2.51)
Lymphoma	25	22.921	1.09	(0.70-1.61)
Soft Tissue	2	3.629	0.55	NC

Note: Diagnosed/Expected ratios that have a 95% Confidence Interval that brackets the value 1.00 are not considered statistically high or low.

* Ratio is statistically significant at p=0.05 level. (** p=0.01 level)

NC = not calculated due to less than 3 diagnoses (see text for explanation).

Table A20 – Number of Cancer Diagnoses Compared to the Expected Number in Area 1 Combined, 1979-1996 – Males

	Cancers Diagnosed	Cancers Expected	Diagnosed / Expected	95% C.I. for Ratio
All Cancers	293	277.350	1.06	(0.94-1.18)
Salivary Gland	0	0.892	0.00	NC
Oral	5	4.098	1.22	(0.39-2.85)
Nasopharynx	1	0.393	2.54	NC
Other Pharynx	6	2.520	2.38	(0.87-5.19)
Esophagus	4	2.841	1.41	(0.38-3.60)
Stomach	13	6.412	2.03*	(1.08-3.46)
Small Intestine	1	0.950	1.05	NC
Colorectal	29	34.687	0.84	(0.56-1.20)
Liver	3	2.404	1.25	(0.26-3.65)
Other Biliary	0	1.424	0.00	NC
Pancreas	8	5.900	1.36	(0.58-2.67)
Larynx	7	4.669	1.50	(0.60-3.09)
Lung	53	39.973	1.33	(0.99-1.74)
Melanoma	7	12.253	0.57	(0.23-1.18)
Prostate	65	74.841	0.87	(0.67-1.11)
Testis	3	4.056	0.74	(0.15-2.16)
Bladder	28	18.168	1.54*	(1.03-2.23)
Kidney	5	7.417	0.67	(0.22-1.57)
Thyroid	2	2.219	0.90	NC
Other Endocrine	0	0.499	0.00	NC
Brain	2	5.135	0.39	NC
Bone	0	0.822	0.00	NC
Leukemia	7	8.727	0.80	(0.32-1.65)
Mult. Myeloma	2	2.956	0.68	NC
Lymphoma	16	13.419	1.19	(0.68-1.94)
Soft Tissue	0	2.079	0.00	NC

Note: Diagnosed/Expected ratios that have a 95% Confidence Interval that brackets the value 1.00 are not considered statistically high or low.

* Ratio is statistically significant at p=0.05 level. (** p=0.01 level)

NC = not calculated due to less than 3 diagnoses (see text for explanation).

Table A21 – Number of Cancer Diagnoses Compared to the Expected Number in Area 1 Combined, 1979-1996 – Females

	Cancers Diagnosed	Cancers Expected	Diagnosed / Expected	95% C.I. for Ratio
All Cancers	250	265.414	0.94	(0.83-1.07)
Salivary Gland	1	0.502	1.99	NC
Oral	1	2.318	0.43	NC
Nasopharynx	0	0.244	0.00	NC
Other Pharynx	0	0.961	0.00	NC
Esophagus	0	0.830	0.00	NC
Stomach	2	2.798	0.71	NC
Small Intestine	1	0.683	1.46	NC
Colorectal	19	27.332	0.70	(0.42-1.09)
Liver	1	1.210	0.83	NC
Other Biliary	0	1.714	0.00	NC
Pancreas	3	5.245	0.57	(0.12-1.67)
Larynx	0	1.092	0.00	NC
Lung	31	21.088	1.47*	(1.00-2.09)
Melanoma	7	10.730	0.65	(0.26-1.34)
Female Breast	79	86.412	0.91	(0.72-1.14)
Cervix	28	24.546	1.14	(0.76-1.65)
Uterus	7	14.231	0.49	(0.20-1.01)
Ovary	7	10.716	0.65	(0.26-1.35)
Bladder	8	5.318	1.50	(0.65-2.96)
Kidney	6	4.027	1.49	(0.55-3.25)
Thyroid	6	5.869	1.02	(0.37-2.23)
Other Endocrine	0	0.388	0.00	NC
Brain	4	3.770	1.06	(0.29-2.71)
Bone	0	0.470	0.00	NC
Leukemia	7	5.477	1.28	(0.51-2.64)
Mult. Myeloma	4	2.252	1.78	(0.48-4.54)
Lymphoma	9	9.502	0.95	(0.43-1.80)
Soft Tissue	2	1.550	1.29	NC

Note: Diagnosed/Expected ratios that have a 95% Confidence Interval that brackets the value 1.00 are not considered statistically high or low.

*Ratio is statistically significant at p=0.05 level. (** p=0.01 level)

NC=not calculated (see text)

Table A22 – Number of Cancer Diagnoses Compared to the Expected Number in Area 1 Combined, 1979-1988 – Males and Females				
	Cancers Diagnosed	Cancers Expected	Diagnosed / Expected	95% C.I. for Ratio
All Cancers	249	268.590	0.93	(0.82-1.05)
Salivary Gland	1	0.820	1.22	NC
Oral	3	3.311	0.91	(0.19-2.65)
Nasopharynx	0	0.317	0.00	NC
Other Pharynx	3	1.701	1.76	(0.36-5.16)
Esophagus	2	1.772	1.13	NC
Stomach	4	4.857	0.82	(0.22-2.11)
Small Intestine	1	0.793	1.26	NC
Colorectal	27	34.506	0.78	(0.52-1.14)
Liver	0	1.598	0.00	NC
Other Biliary	0	1.706	0.00	NC
Pancreas	7	6.068	1.15	(0.46-2.38)
Larynx	2	3.312	0.60	NC
Lung	36	31.534	1.14	(0.80-1.58)
Melanoma	4	9.853	0.41	(0.11-1.04)
Bladder	18	11.978	1.50	(0.89-2.37)
Kidney	4	5.278	0.76	(0.21-1.94)
Thyroid	2	4.277	0.47	NC
Other Endocrine	0	0.512	0.00	NC
Brain	4	4.570	0.88	(0.24-2.24)
Bone	0	0.770	0.00	NC
Leukemia	7	7.400	0.95	(0.38-1.95)
Mult. Myeloma	4	2.526	1.58	(0.43-4.05)
Lymphoma	17	10.857	1.57	(0.91-2.51)
Soft Tissue	1	1.947	0.51	NC

Note: Diagnosed/Expected ratios that have a 95% Confidence Interval that brackets the value 1.00 are not considered statistically high or low.

* Ratio is statistically significant at p=0.05 level. (** p=0.01 level)

NC = not calculated due to less than 3 diagnoses (see text for explanation).

Table A23 – Number of Cancer Diagnoses Compared to the Expected Number in Area 1 Combined, 1979-1988 – Males

	Cancers Diagnosed	Cancers Expected	Diagnosed / Expected	95% C.I. for Ratio
All Cancers	136	132.701	1.02	(0.86-1.21)
Salivary Gland	0	0.535	0.00	NC
Oral	2	2.112	0.95	NC
Nasopharynx	0	0.187	0.00	NC
Other Pharynx	3	1.147	2.62	(0.54-7.65)
Esophagus	2	1.362	1.47	NC
Stomach	4	3.366	1.19	(0.32-3.04)
Small Intestine	0	0.437	0.00	NC
Colorectal	17	19.270	0.88	(0.51-1.41)
Liver	0	1.000	0.00	NC
Other Biliary	0	0.803	0.00	NC
Pancreas	5	3.256	1.54	(0.50-3.59)
Larynx	2	2.756	0.73	NC
Lung	22	21.630	1.02	(0.64-1.54)
Melanoma	0	5.185	0.00	NC
Prostate	27	28.340	0.95	(0.63-1.39)
Testis	1	2.098	0.48	NC
Bladder	15	9.290	1.61	(0.90-2.67)
Kidney	4	3.469	1.15	(0.31-2.95)
Thyroid	1	1.254	0.80	NC
Other Endocrine	0	0.296	0.00	NC
Brain	1	2.596	0.39	NC
Bone	0	0.481	0.00	NC
Leukemia	3	4.618	0.65	(0.13-1.90)
Mult. Myeloma	1	1.453	0.69	NC
Lymphoma	11	6.212	1.77	(0.89-3.17)
Soft Tissue	0	1.133	0.00	NC

Note: Diagnosed/Expected ratios that have a 95% Confidence Interval that brackets the value 1.00 are not considered statistically high or low.

* Ratio is statistically significant at p=0.05 level. (** p=0.01 level)

NC = not calculated due to less than 3 diagnoses (see text for explanation).

Table A24 – Number of Cancer Diagnoses Compared to the Expected Number in Area 1 Combined, 1979-1988 – Females				
	Cancers Diagnosed	Cancers Expected	Diagnosed / Expected	95% C.I. for Ratio
All Cancers	113	135.889	0.83	(0.69-1.00)
Salivary Gland	1	0.285	3.51	NC
Oral	1	1.199	0.83	NC
Nasopharynx	0	0.130	0.00	NC
Other Pharynx	0	0.554	0.00	NC
Esophagus	0	0.410	0.00	NC
Stomach	0	1.491	0.00	NC
Small Intestine	1	0.356	2.81	NC
Colorectal	10	15.236	0.66	(0.32-1.21)
Liver	0	0.598	0.00	NC
Other Biliary	0	0.903	0.00	NC
Pancreas	2	2.812	0.71	NC
Larynx	0	0.556	0.00	NC
Lung	14	9.904	1.41	(0.77-2.37)
Melanoma	4	4.668	0.86	(0.23-2.19)
Female Breast	27	41.512	0.65*	(0.43-0.95)
Cervix	18	15.263	1.18	(0.70-1.86)
Uterus	0	7.951	0.00	NC
Ovary	7	5.524	1.27	(0.51-2.61)
Bladder	3	2.688	1.12	(0.23-3.26)
Kidney	0	1.809	0.00	NC
Thyroid	1	3.023	0.33	NC
Other Endocrine	0	0.216	0.00	NC
Brain	3	1.974	1.52	(0.31-4.44)
Bone	0	0.289	0.00	NC
Leukemia	4	2.782	1.44	(0.39-3.68)
Mult. Myeloma	3	1.073	2.80	(0.58-8.18)
Lymphoma	6	4.645	1.29	(0.47-2.81)
Soft Tissue	1	0.814	1.23	NC

Note: Diagnosed/Expected ratios that have a 95% Confidence Interval that brackets the value 1.00 are not considered statistically high or low.
*Ratio is statistically significant at p=0.05 level. (** p=0.01 level)
NC=not calculated (see text)

Table A25 – Number of Cancer Diagnoses Compared to the Expected Number in Area 1 Combined, 1989-1996 – Males and Females				
	Cancers Diagnosed	Cancers Expected	Diagnosed / Expected	95% C.I. for Ratio
All Cancers	294	274.174	1.07	(0.95-1.20)
Salivary Gland	0	0.574	0.00	NC
Oral	3	3.105	0.97	(0.20-2.82)
Nasopharynx	1	0.320	3.13	NC
Other Pharynx	3	1.780	1.69	(0.35-4.93)
Esophagus	2	1.899	1.05	NC
Stomach	11	4.353	2.53*	(1.26-4.52)
Small Intestine	1	0.840	1.19	NC
Colorectal	21	27.513	0.76	(0.47-1.17)
Liver	4	2.016	1.98	(0.54-5.07)
Other Biliary	0	1.432	0.00	NC
Pancreas	4	5.077	0.79	(0.21-2.02)
Larynx	5	2.449	2.04	(0.66-4.77)
Lung	48	29.527	1.63**	(1.20-2.16)
Melanoma	10	13.130	0.76	(0.37-1.40)
Bladder	18	11.508	1.56	(0.93-2.47)
Kidney	7	6.166	1.14	(0.46-2.34)
Thyroid	6	3.811	1.57	(0.58-3.43)
Other Endocrine	0	0.375	0.00	NC
Brain	2	4.335	0.46	NC
Bone	0	0.522	0.00	NC
Leukemia	7	6.804	1.03	(0.41-2.12)
Mult. Myeloma	2	2.682	0.75	NC
Lymphoma	8	12.064	0.66	(0.29-1.31)
Soft Tissue	1	1.682	0.59	NC

Note: Diagnosed/Expected ratios that have a 95% Confidence Interval that brackets the value 1.00 are not considered statistically high or low.

* Ratio is statistically significant at p=0.05 level. (** p=0.01 level)

NC = not calculated due to less than 3 diagnoses (see text for explanation).

Table A26 – Number of Cancer Diagnoses Compared to the Expected Number in Area 1 Combined, 1989-1996 – Males				
	Cancers Diagnosed	Cancers Expected	Diagnosed / Expected	95% C.I. for Ratio
All Cancers	157	144.649	1.09	(0.92-1.27)
Salivary Gland	0	0.357	0.00	NC
Oral	3	1.986	1.51	(0.31-4.42)
Nasopharynx	1	0.206	4.85	NC
Other Pharynx	3	1.373	2.19	(0.45-6.39)
Esophagus	2	1.479	1.35	NC
Stomach	9	3.046	2.95**	(1.36-5.61)
Small Intestine	1	0.513	1.95	NC
Colorectal	12	15.417	0.78	(0.40-1.36)
Liver	3	1.404	2.14	(0.44-6.25)
Other Biliary	0	0.621	0.00	NC
Pancreas	3	2.644	1.13	(0.23-3.32)
Larynx	5	1.913	2.61	(0.85-6.11)
Lung	31	18.343	1.69*	(1.15-2.40)
Melanoma	7	7.068	0.99	(0.40-2.04)
Prostate	38	46.501	0.82	(0.58-1.12)
Testis	2	1.958	1.02	NC
Bladder	13	8.878	1.46	(0.78-2.50)
Kidney	1	3.948	0.25	NC
Thyroid	1	0.965	1.04	NC
Other Endocrine	0	0.203	0.00	NC
Brain	1	2.539	0.39	NC
Bone	0	0.341	0.00	NC
Leukemia	4	4.109	0.97	(0.27-2.49)
Mult. Myeloma	1	1.503	0.67	NC
Lymphoma	5	7.207	0.69	(0.22-1.62)
Soft Tissue	0	0.946	0.00	NC

Note: Diagnosed/Expected ratios that have a 95% Confidence Interval that brackets the value 1.00 are not considered statistically high or low.

* Ratio is statistically significant at p=0.05 level. (** p=0.01 level)

NC = not calculated due to less than 3 diagnoses (see text for explanation).

Table A27 – Number of Cancer Diagnoses Compared to the Expected Number in Area 1 Combined, 1989-1996 – Females

	Cancers Diagnosed	Cancers Expected	Diagnosed / Expected	95% C.I. for Ratio
All Cancers	137	129.525	1.06	(0.89-1.25)
Salivary Gland	0	0.217	0.00	NC
Oral	0	1.119	0.00	NC
Nasopharynx	0	0.114	0.00	NC
Other Pharynx	0	0.407	0.00	NC
Esophagus	0	0.420	0.00	NC
Stomach	2	1.307	1.53	NC
Small Intestine	0	0.327	0.00	NC
Colorectal	9	12.096	0.74	(0.34-1.41)
Liver	1	0.612	1.63	NC
Other Biliary	0	0.811	0.00	NC
Pancreas	1	2.433	0.41	NC
Larynx	0	0.536	0.00	NC
Lung	17	11.184	1.52	(0.88-2.43)
Melanoma	3	6.062	0.49	(0.10-1.45)
Female Breast	52	44.900	1.16	(0.86-1.52)
Cervix	10	9.283	1.08	(0.52-1.98)
Uterus	7	6.280	1.11	(0.45-2.30)
Ovary	0	5.192	0.00	NC
Bladder	5	2.630	1.90	(0.62-4.44)
Kidney	6	2.218	2.71	(0.99-5.89)
Thyroid	5	2.846	1.76	(0.57-4.11)
Other Endocrine	0	0.172	0.00	NC
Brain	1	1.796	0.56	NC
Bone	0	0.181	0.00	NC
Leukemia	3	2.695	1.11	(0.23-3.25)
Mult. Myeloma	1	1.179	0.85	NC
Lymphoma	3	4.857	0.62	(0.13-1.81)
Soft Tissue	1	0.736	1.36	NC

Note: Diagnosed/Expected ratios that have a 95% Confidence Interval that brackets the value 1.00 are not considered statistically high or low.
*Ratio is statistically significant at p=0.05 level. (** p=0.01 level)
NC=not calculated (see text)

Table A28 – Number of Cancer Diagnoses Compared to the Expected Number in Area 2, 1979-1996 – Males and Females

	Cancers Diagnosed	Cancers Expected	Diagnosed / Expected	95% C.I. for Ratio
All Cancers	1125	1078.370	1.04	(0.98-1.11)
Salivary Gland	2	2.676	0.75	NC
Oral	14	12.473	1.12	(0.61-1.88)
Nasopharynx	1	1.190	0.84	NC
Other Pharynx	5	6.757	0.74	(0.24-1.73)
Esophagus	9	7.382	1.22	(0.56-2.31)
Stomach	24	18.845	1.27	(0.82-1.90)
Small Intestine	1	3.277	0.31	NC
Colorectal	119	129.260	0.92	(0.76-1.10)
Liver	5	7.362	0.68	(0.22-1.59)
Other Biliary	8	6.969	1.15	(0.49-2.26)
Pancreas	29	23.178	1.25	(0.84-1.80)
Larynx	17	11.341	1.50	(0.87-2.40)
Lung	188	122.260	1.54**	(1.33-1.77)
Melanoma	23	40.562	0.57*	(0.36-0.85)
Bladder	44	46.958	0.94	(0.68-1.26)
Kidney	21	22.763	0.92	(0.57-1.41)
Thyroid	17	15.149	1.12	(0.65-1.80)
Other Endocrine	2	1.668	1.20	NC
Brain	18	16.799	1.07	(0.63-1.69)
Bone	4	2.344	1.71	(0.47-4.37)
Leukemia	39	28.203	1.38	(0.98-1.89)
Mult. Myeloma	11	10.890	1.01	(0.51-1.81)
Lymphoma	32	44.273	0.72	(0.49-1.02)
Soft Tissue	6	7.080	0.85	(0.31-1.85)

Note: Diagnosed/Expected ratios that have a 95% Confidence Interval that brackets the value 1.00 are not considered statistically high or low.

* Ratio is statistically significant at p=0.05 level. (** p=0.01 level)

NC = not calculated due to less than 3 diagnoses (see text for explanation).

Table A29 – Number of Cancer Diagnoses Compared to the Expected Number in Area 2, 1979-1996 – Males

	Cancers Diagnosed	Cancers Expected	Diagnosed / Expected	95% C.I. for Ratio
All Cancers	551	543.854	1.01	(0.93-1.10)
Salivary Gland	0	1.698	0.00	NC
Oral	8	7.654	1.05	(0.45-2.06)
Nasopharynx	1	0.692	1.45	NC
Other Pharynx	3	4.811	0.62	(0.13-1.82)
Esophagus	6	5.562	1.08	(0.40-2.35)
Stomach	15	12.641	1.19	(0.66-1.96)
Small Intestine	1	1.839	0.54	NC
Colorectal	61	69.650	0.88	(0.67-1.13)
Liver	4	4.746	0.84	(0.23-2.16)
Other Biliary	1	2.972	0.34	NC
Pancreas	13	11.696	1.11	(0.59-1.90)
Larynx	12	9.097	1.32	(0.68-2.30)
Lung	126	78.593	1.60**	(1.33-1.91)
Melanoma	11	21.329	0.52*	(0.26-0.92)
Prostate	125	151.860	0.82*	(0.68-0.98)
Testis	4	7.059	0.57	(0.15-1.45)
Bladder	35	35.826	0.98	(0.68-1.36)
Kidney	15	14.254	1.05	(0.59-1.74)
Thyroid	5	3.994	1.25	(0.41-2.93)
Other Endocrine	0	0.896	0.00	NC
Brain	11	9.390	1.17	(0.59-2.10)
Bone	2	1.486	1.35	NC
Leukemia	22	16.878	1.30	(0.81-1.97)
Mult. Myeloma	8	5.996	1.33	(0.58-2.63)
Lymphoma	19	24.977	0.76	(0.46-1.19)
Soft Tissue	3	3.917	0.77	(0.16-2.24)

Note: Diagnosed/Expected ratios that have a 95% Confidence Interval that brackets the value 1.00 are not considered statistically high or low.

* Ratio is statistically significant at p=0.05 level. (** p=0.01 level)

NC = not calculated due to less than 3 diagnoses (see text for explanation).

Table A30 – Number of Cancer Diagnoses Compared to the Expected Number in Area 2, 1979-1996 – Females				
	Cancers Diagnosed	Cancers Expected	Diagnosed / Expected	95% C.I. for Ratio
All Cancers	574	534.511	1.07	(0.99-1.17)
Salivary Gland	2	0.978	2.04	NC
Oral	6	4.819	1.25	(0.46-2.71)
Nasopharynx	0	0.498	0.00	NC
Other Pharynx	2	1.946	1.03	NC
Esophagus	3	1.820	1.65	(0.34-4.82)
Stomach	9	6.204	1.45	(0.67-2.75)
Small Intestine	0	1.438	0.00	NC
Colorectal	58	59.613	0.97	(0.74-1.26)
Liver	1	2.616	0.38	NC
Other Biliary	7	3.997	1.75	(0.70-3.61)
Pancreas	16	11.482	1.39	(0.80-2.26)
Larynx	5	2.244	2.23	(0.72-5.21)
Lung	62	43.670	1.42*	(1.09-1.82)
Melanoma	12	19.233	0.62	(0.32-1.09)
Female Breast	136	169.524	0.80**	(0.67-0.95)
Cervix	85	46.605	1.82**	(1.46-2.26)
Uterus	32	28.410	1.13	(0.77-1.59)
Ovary	21	21.412	0.98	(0.61-1.50)
Bladder	9	11.132	0.81	(0.37-1.53)
Kidney	6	8.509	0.71	(0.26-1.54)
Thyroid	12	11.155	1.08	(0.55-1.88)
Other Endocrine	2	0.772	2.59	NC
Brain	7	7.409	0.94	(0.38-1.95)
Bone	2	0.858	2.33	NC
Leukemia	17	11.325	1.50	(0.87-2.40)
Mult. Myeloma	3	4.894	0.61	(0.13-1.79)
Lymphoma	13	19.296	0.67	(0.36-1.15)
Soft Tissue	3	3.163	0.95	(0.20-2.77)

Note: Diagnosed/Expected ratios that have a 95% Confidence Interval that brackets the value 1.00 are not considered statistically high or low.

*Ratio is statistically significant at p=0.05 level. (** p=0.01 level)

NC=not calculated (see text)

Table A31 – Number of Cancer Diagnoses Compared to the Expected Number in Area 2, 1979-1988 – Males and Females				
	Cancers Diagnosed	Cancers Expected	Diagnosed / Expected	95% C.I. for Ratio
All Cancers	602	544.945	1.11*	(1.02-1.20)
Salivary Gland	2	1.614	1.24	NC
Oral	9	6.543	1.38	(0.63-1.38)
Nasopharynx	1	0.600	1.67	NC
Other Pharynx	1	3.442	0.29	NC
Esophagus	4	3.599	1.11	(0.30-2.84)
Stomach	11	10.101	1.09	(0.54-1.95)
Small Intestine	0	1.635	0.00	NC
Colorectal	72	72.960	0.99	(0.77-1.24)
Liver	5	3.289	1.52	(0.49-3.55)
Other Biliary	4	3.839	1.04	(0.28-2.66)
Pancreas	14	12.609	1.11	(0.61-1.86)
Larynx	13	6.584	1.99*	(1.06-3.39)
Lung	96	63.906	1.50**	(1.22-1.83)
Melanoma	12	18.064	0.66	(0.34-1.16)
Bladder	22	24.488	0.90	(0.56-1.36)
Kidney	13	10.755	1.21	(0.64-2.07)
Thyroid	7	8.165	0.86	(0.34-1.77)
Other Endocrine	1	0.947	1.06	NC
Brain	7	8.723	0.80	(0.32-1.66)
Bone	2	1.425	1.40	NC
Leukemia	16	14.966	1.07	(0.61-1.74)
Mult. Myeloma	6	5.356	1.12	(0.41-2.44)
Lymphoma	20	21.279	0.94	(0.57-1.45)
Soft Tissue	3	3.844	0.78	(0.16-2.28)

Note: Diagnosed/Expected ratios that have a 95% Confidence Interval that brackets the value 1.00 are not considered statistically high or low.

* Ratio is statistically significant at p=0.05 level. (** p=0.01 level)

NC = not calculated due to less than 3 diagnoses (see text for explanation).

Table A32 – Number of Cancer Diagnoses Compared to the Expected Number in Area 2, 1979-1988 – Males				
	Cancers Diagnosed	Cancers Expected	Diagnosed / Expected	95% C.I. for Ratio
All Cancers	271	266.275	1.02	(0.90-1.15)
Salivary Gland	0	1.065	0.00	NC
Oral	5	4.018	1.24	(0.40-2.91)
Nasopharynx	1	0.310	3.23	NC
Other Pharynx	1	2.277	0.44	NC
Esophagus	3	2.693	1.11	(0.23-3.26)
Stomach	9	6.747	1.33	(0.61-2.53)
Small Intestine	0	0.850	0.00	NC
Colorectal	30	39.307	0.76	(0.52-1.09)
Liver	4	2.016	1.98	(0.54-5.07)
Other Biliary	0	1.689	0.00	NC
Pancreas	6	6.405	0.94	(0.34-2.04)
Larynx	9	5.398	1.67	(0.76-3.16)
Lung	64	43.123	1.48**	(1.14-1.90)
Melanoma	4	9.330	0.43	(0.12-1.10)
Prostate	50	60.198	0.83	(0.62-1.10)
Testis	2	3.827	0.52	NC
Bladder	15	18.732	0.80	(0.45-1.32)
Kidney	10	6.833	1.46	(0.70-2.69)
Thyroid	2	2.330	0.86	NC
Other Endocrine	0	0.533	0.00	NC
Brain	4	4.785	0.84	(0.23-2.14)
Bone	1	0.874	1.14	NC
Leukemia	10	9.162	1.09	(0.52-2.01)
Mult. Myeloma	3	3.033	0.99	(0.20-2.89)
Lymphoma	12	11.783	1.02	(0.52-1.78)
Soft Tissue	2	2.183	0.92	NC

Note: Diagnosed/Expected ratios that have a 95% Confidence Interval that brackets the value 1.00 are not considered statistically high or low.

* Ratio is statistically significant at p=0.05 level. (** p=0.01 level)

NC = not calculated due to less than 3 diagnoses (see text for explanation).

Table A33 – Number of Cancer Diagnoses Compared to the Expected Number in Area 2, 1979-1988 – Females

	Cancers Diagnosed	Cancers Expected	Diagnosed / Expected	95% C.I. for Ratio
All Cancers	331	278.670	1.19**	(1.06-1.32)
Salivary Gland	2	0.549	3.64	NC
Oral	4	2.525	1.58	(0.43-4.05)
Nasopharynx	0	0.290	0.00	NC
Other Pharynx	0	1.165	0.00	NC
Esophagus	1	0.906	1.10	NC
Stomach	2	3.354	0.60	NC
Small Intestine	0	0.785	0.00	NC
Colorectal	42	33.653	1.25	(0.90-1.69)
Liver	1	1.273	0.79	NC
Other Biliary	4	2.150	1.86	(0.51-4.76)
Pancreas	8	6.204	1.29	(0.56-2.54)
Larynx	4	1.150	3.48	(0.95-8.90)
Lung	32	20.783	1.54*	(1.05-2.18)
Melanoma	8	8.734	0.92	(0.39-1.80)
Female Breast	67	83.458	0.80	(0.62-1.02)
Cervix	60	29.045	2.07**	(1.58-2.66)
Uterus	19	16.245	1.17	(0.70-1.83)
Ovary	10	11.247	0.89	(0.43-1.63)
Bladder	7	5.756	1.22	(0.49-2.51)
Kidney	3	3.922	0.76	(0.16-2.24)
Thyroid	5	5.835	0.86	(0.28-2.00)
Other Endocrine	1	0.414	2.42	NC
Brain	3	3.938	0.76	(0.16-2.23)
Bone	1	0.551	1.81	NC
Leukemia	6	5.804	1.03	(0.38-2.25)
Mult. Myeloma	3	2.323	1.29	(0.27-3.77)
Lymphoma	8	9.496	0.84	(0.36-1.66)
Soft Tissue	1	1.661	0.60	NC

Note: Diagnosed/Expected ratios that have a 95% Confidence Interval that brackets the value 1.00 are not considered statistically high or low.

*Ratio is statistically significant at p=0.05 level. (** p=0.01 level)

NC=not calculated (see text)

Table A34 – Number of Cancer Diagnoses Compared to the Expected Number in Area 2, 1989-1996 – Males and Females				
	Cancers Diagnosed	Cancers Expected	Diagnosed / Expected	95% C.I. for Ratio
All Cancers	523	533.420	0.98	(0.90-1.07)
Salivary Gland	0	1.062	0.00	NC
Oral	5	5.930	0.84	(0.27-1.97)
Nasopharynx	0	0.590	0.00	NC
Other Pharynx	4	3.315	1.21	(0.33-3.09)
Esophagus	5	3.783	1.32	(0.43-3.09)
Stomach	13	8.744	1.49	(0.79-2.54)
Small Intestine	1	1.642	0.61	NC
Colorectal	47	56.303	0.83	(0.61-1.11)
Liver	0	4.073	0.00	NC
Other Biliary	4	3.130	1.28	(0.35-3.27)
Pancreas	15	10.569	1.42	(0.79-2.34)
Larynx	4	4.793	0.83	(0.23-2.14)
Lung	92	58.357	1.58**	(1.27-1.93)
Melanoma	11	22.498	0.49*	(0.24-0.87)
Bladder	22	22.470	0.98	(0.61-1.48)
Kidney	8	12.008	0.67	(0.29-1.31)
Thyroid	10	6.984	1.43	(0.69-2.63)
Other Endocrine	1	0.721	1.39	NC
Brain	11	8.076	1.36	(0.68-2.44)
Bone	2	0.919	2.18	NC
Leukemia	23	13.237	1.74*	(1.10-2.61)
Mult. Myeloma	5	5.534	0.90	(0.29-2.11)
Lymphoma	12	22.994	0.52*	(0.27-0.91)
Soft Tissue	3	3.236	0.93	(0.19-2.71)

Note: Diagnosed/Expected ratios that have a 95% Confidence Interval that brackets the value 1.00 are not considered statistically high or low.

* Ratio is statistically significant at p=0.05 level. (** p=0.01 level)

NC = not calculated due to less than 3 diagnoses (see text for explanation).

Table A35 – Number of Cancer Diagnoses Compared to the Expected Number in Area 2, 1989-1996 – Males				
	Cancers Diagnosed	Cancers Expected	Diagnosed / Expected	95% C.I. for Ratio
All Cancers	280	277.579	1.01	(0.89-1.13)
Salivary Gland	0	0.633	0.00	NC
Oral	3	3.636	0.83	(0.17-2.41)
Nasopharynx	0	0.382	0.00	NC
Other Pharynx	2	2.534	0.79	NC
Esophagus	3	2.869	1.05	(0.22-3.06)
Stomach	6	5.894	1.02	(0.37-2.22)
Small Intestine	1	0.989	1.01	NC
Colorectal	31	30.343	1.02	(0.69-1.45)
Liver	0	2.730	0.00	NC
Other Biliary	1	1.283	0.78	NC
Pancreas	7	5.291	1.32	(0.53-2.73)
Larynx	3	3.699	0.81	(0.17-2.37)
Lung	62	35.470	1.75**	(1.34-2.24)
Melanoma	7	11.999	0.58	(0.23-1.20)
Prostate	75	91.664	0.82	(0.64-1.03)
Testis	2	3.232	0.62	NC
Bladder	20	17.094	1.17	(0.71-1.81)
Kidney	5	7.421	0.67	(0.22-1.57)
Thyroid	3	1.664	1.80	(0.37-5.27)
Other Endocrine	0	0.363	0.00	NC
Brain	7	4.605	1.52	(0.61-3.13)
Bone	1	0.612	1.63	NC
Leukemia	12	7.716	1.56	(0.80-2.71)
Mult. Myeloma	5	2.963	1.69	(0.55-3.94)
Lymphoma	7	13.194	0.53	(0.21-1.09)
Soft Tissue	1	1.734	0.58	NC

Note: Diagnosed/Expected ratios that have a 95% Confidence Interval that brackets the value 1.00 are not considered statistically high or low.

* Ratio is statistically significant at p=0.05 level. (** p=0.01 level)

NC = not calculated due to less than 3 diagnoses (see text for explanation).

Table A36 – Number of Cancer Diagnoses Compared to the Expected Number in Area 2, 1989-1996 – Females				
	Cancers Diagnosed	Cancers Expected	Diagnosed / Expected	95% C.I. for Ratio
All Cancers	243	255.841	0.95	(0.83-1.08)
Salivary Gland	0	0.429	0.00	NC
Oral	2	2.294	0.87	NC
Nasopharynx	0	0.208	0.00	NC
Other Pharynx	2	0.781	2.56	NC
Esophagus	2	0.914	2.19	NC
Stomach	7	2.850	2.46	(0.99-5.06)
Small Intestine	0	0.653	0.00	NC
Colorectal	16	25.960	0.62	(0.35-1.00)
Liver	0	1.343	0.00	NC
Other Biliary	3	1.847	1.62	(0.33-4.75)
Pancreas	8	5.278	1.52	(0.65-2.98)
Larynx	1	1.094	0.91	NC
Lung	30	22.887	1.31	(0.89-1.87)
Melanoma	4	10.499	0.38*	(0.10-0.97)
Female Breast	69	86.066	0.80	(0.63-1.02)
Cervix	25	17.560	1.42	(0.92-2.10)
Uterus	13	12.165	1.07	(0.57-1.83)
Ovary	11	10.165	1.08	(0.54-1.94)
Bladder	2	5.376	0.37	NC
Kidney	3	4.587	0.65	(0.13-1.91)
Thyroid	7	5.320	1.32	(0.53-2.71)
Other Endocrine	1	0.358	2.79	NC
Brain	4	3.471	1.15	(0.31-2.95)
Bone	1	0.307	3.26	NC
Leukemia	11	5.521	1.99*	(1.00-3.56)
Mult. Myeloma	0	2.571	0.00	NC
Lymphoma	5	9.800	0.51	(0.17-1.19)
Soft Tissue	2	1.502	1.33	NC

Note: Diagnosed/Expected ratios that have a 95% Confidence Interval that brackets the value 1.00 are not considered statistically high or low.
*Ratio is statistically significant at p=0.05 level. (** p=0.01 level)
NC=not calculated (see text)

Table A37 - Number of Cancer Diagnoses Compared to the Expected Number in Area 3, 1979-1996 – Males and Females				
	Cancers Diagnosed	Cancers Expected	Diagnosed / Expected	95% C.I. for Ratio
All Cancers	729	774.628	0.94	(0.87-1.01)
Salivary Gland	6	2.156	2.78*	(1.02-6.06)
Oral	10	8.470	1.18	(0.57-2.17)
Nasopharynx	1	1.559	0.64	NC
Other Pharynx	13	7.826	1.66	(0.88-2.84)
Esophagus	1	10.168	0.10	NC
Stomach	17	14.473	1.17	(0.68-1.88)
Small Intestine	4	3.207	1.25	(0.34-3.19)
Colorectal	78	74.254	1.05	(0.83-1.31)
Liver	7	5.723	1.22	(0.49-2.52)
Other Biliary	3	3.404	0.88	(0.18-2.58)
Pancreas	15	15.822	0.95	(0.53-1.56)
Larynx	6	10.473	0.57	(0.21-1.25)
Lung	80	89.186	0.90	(0.71-1.12)
Melanoma	13	21.661	0.60	(0.32-1.03)
Bladder	15	18.622	0.81	(0.45-1.33)
Kidney	18	18.949	0.95	(0.56-1.50)
Thyroid	18	13.985	1.29	(0.76-2.03)
Other Endocrine	0	1.455	0.00	NC
Brain	13	14.533	0.89	(0.48-1.53)
Bone	5	1.829	2.73	(0.88-6.39)
Leukemia	15	20.229	0.74	(0.41-1.22)
Mult. Myeloma	13	9.515	1.37	(0.73-2.34)
Lymphoma	45	36.582	1.23	(0.90-1.65)
Soft Tissue	8	7.325	1.09	(0.47-2.15)

Note: Diagnosed/Expected ratios that have a 95% Confidence Interval that brackets the value 1.00 are not considered statistically high or low.

* Ratio is statistically significant at p=0.05 level. (** p=0.01 level)

NC = not calculated due to less than 3 diagnoses (see text for explanation).

Table A38 – Number of Cancer Diagnoses Compared to the Expected Number in Area 3, 1979-1996 – Males

	Cancers Diagnosed	Cancers Expected	Diagnosed / Expected	95% C.I. for Ratio
All Cancers	349	386.205	0.90	(0.81-1.00)
Salivary Gland	2	1.286	1.56	NC
Oral	5	6.051	0.83	(0.27-1.93)
Nasopharynx	1	1.345	0.74	NC
Other Pharynx	10	6.118	1.63	(0.79-3.01)
Esophagus	1	7.966	0.13	NC
Stomach	13	9.902	1.31	(0.70-2.24)
Small Intestine	4	1.780	2.25	(0.61-5.75)
Colorectal	40	40.782	0.98	(0.70-1.34)
Liver	5	4.116	1.21	(0.39-2.84)
Other Biliary	0	1.911	0.00	NC
Pancreas	10	10.048	1.00	(0.48-1.83)
Larynx	3	8.470	0.35	(0.07-1.04)
Lung	55	60.260	0.91	(0.69-1.19)
Melanoma	3	10.832	0.28*	(0.06-0.81)
Prostate	76	92.808	0.82	(0.65-1.03)
Testis	6	8.259	0.73	(0.27-1.58)
Bladder	10	14.136	0.71	(0.34-1.30)
Kidney	12	13.142	0.91	(0.47-1.59)
Thyroid	7	3.622	1.93	(0.78-3.99)
Other Endocrine	0	0.882	0.00	NC
Brain	10	7.930	1.26	(0.61-2.32)
Bone	3	1.038	2.89	(0.60-8.45)
Leukemia	9	12.772	0.70	(0.32-1.34)
Mult. Myeloma	5	5.517	0.91	(0.29-2.12)
Lymphoma	29	23.295	1.24	(0.84-1.79)
Soft Tissue	6	3.462	1.73	(0.63-3.78)

Note: Diagnosed/Expected ratios that have a 95% Confidence Interval that brackets the value 1.00 are not considered statistically high or low.

* Ratio is statistically significant at p=0.05 level. (** p=0.01 level)

NC = not calculated due to less than 3 diagnoses (see text for explanation).

Table A39 – Number of Cancer Diagnoses Compared to the Expected Number in Area 3, 1979-1996 – Females				
	Cancers Diagnosed	Cancers Expected	Diagnosed / Expected	95% C.I. for Ratio
All Cancers	380	388.423	0.98	(0.88-1.08)
Salivary Gland	4	0.870	4.60*	(1.25-11.76)
Oral	5	2.419	2.07	(0.67-4.83)
Nasopharynx	0	0.214	0.00	NC
Other Pharynx	3	1.708	1.76	(0.36-5.13)
Esophagus	0	2.202	0.00	NC
Stomach	4	4.571	0.88	(0.24-2.24)
Small Intestine	0	1.427	0.00	NC
Colorectal	38	33.472	1.14	(0.80-1.56)
Liver	2	1.607	1.24	NC
Other Biliary	3	1.493	2.01	(0.41-5.87)
Pancreas	5	5.774	0.87	(0.28-2.02)
Larynx	3	2.003	1.50	(0.31-4.38)
Lung	25	28.926	0.86	(0.56-1.27)
Melanoma	10	10.829	0.92	(0.44-1.70)
Female Breast	105	127.701	0.82	(0.67-1.00)
Cervix	65	56.762	1.15	(0.88-1.46)
Uterus	11	13.245	0.83	(0.42-1.49)
Ovary	10	14.251	0.70	(0.34-1.29)
Bladder	5	4.486	1.11	(0.36-2.61)
Kidney	6	5.807	1.03	(0.38-2.25)
Thyroid	11	10.363	1.06	(0.53-1.90)
Other Endocrine	0	0.573	0.00	NC
Brain	3	6.603	0.45	(0.09-1.33)
Bone	2	0.791	2.53	NC
Leukemia	6	7.457	0.80	(0.29-1.75)
Mult. Myeloma	8	3.998	2.00	(0.86-3.94)
Lymphoma	16	13.287	1.20	(0.69-1.95)
Soft Tissue	2	3.863	0.52	NC

Note: Diagnosed/Expected ratios that have a 95% Confidence Interval that brackets the value 1.00 are not considered statistically high or low.
*Ratio is statistically significant at p=0.05 level. (** p=0.01 level)
NC=not calculated (see text)

Table A40 – Number of Cancer Diagnoses Compared to the Expected Number in Area 3, 1979-1988 – Males and Females				
	Cancers Diagnosed	Cancers Expected	Diagnosed / Expected	95% C.I. for Ratio
All Cancers	300	299.054	1.00	(0.89-1.12)
Salivary Gland	1	1.100	0.91	NC
Oral	5	3.481	1.44	(0.46-3.36)
Nasopharynx	0	0.675	0.00	NC
Other Pharynx	4	3.612	1.11	(0.30-2.83)
Esophagus	1	3.527	0.28	NC
Stomach	8	5.032	1.59	(0.69-3.13)
Small Intestine	0	1.135	0.00	NC
Colorectal	36	30.753	1.17	(0.82-1.62)
Liver	0	2.034	0.00	NC
Other Biliary	0	1.737	0.00	NC
Pancreas	6	6.681	0.90	(0.33-1.96)
Larynx	1	3.764	0.27	NC
Lung	34	35.293	0.96	(0.67-1.35)
Melanoma	7	8.201	0.85	(0.34-1.76)
Bladder	5	7.523	0.66	(0.22-1.55)
Kidney	11	7.091	1.55	(0.78-2.77)
Thyroid	8	5.505	1.45	(0.63-2.86)
Other Endocrine	0	0.617	0.00	NC
Brain	3	5.689	0.53	(0.11-1.54)
Bone	3	1.110	2.70	(0.56-7.90)
Leukemia	7	8.962	0.78	(0.31-1.61)
Mult. Myeloma	7	2.968	2.36	(0.95-4.86)
Lymphoma	15	12.229	1.23	(0.69-2.02)
Soft Tissue	3	3.268	0.92	(0.19-2.68)

Note: Diagnosed/Expected ratios that have a 95% Confidence Interval that brackets the value 1.00 are not considered statistically high or low.

* Ratio is statistically significant at p=0.05 level. (** p=0.01 level)

NC = not calculated due to less than 3 diagnoses (see text for explanation).

Table A41 – Number of Cancer Diagnoses Compared to the Expected Number in Area 3, 1979-1988 – Males				
	Cancers Diagnosed	Cancers Expected	Diagnosed / Expected	95% C.I. for Ratio
All Cancers	132	137.758	0.96	(0.80-1.14)
Salivary Gland	1	0.736	1.36	NC
Oral	3	2.366	1.27	(0.26-3.71)
Nasopharynx	0	0.581	0.00	NC
Other Pharynx	3	3.009	1.00	(0.21-2.92)
Esophagus	1	2.726	0.37	NC
Stomach	8	3.470	2.31	(0.99-4.54)
Small Intestine	0	0.444	0.00	NC
Colorectal	20	16.080	1.24	(0.76-1.92)
Liver	0	1.463	0.00	NC
Other Biliary	0	1.112	0.00	NC
Pancreas	3	4.071	0.74	(0.15-2.15)
Larynx	1	3.044	0.33	NC
Lung	24	25.229	0.95	(0.61-1.42)
Melanoma	2	4.041	0.49	NC
Prostate	20	22.676	0.88	(0.54-1.36)
Testis	2	3.771	0.53	NC
Bladder	4	5.805	0.69	(0.19-1.76)
Kidney	7	5.016	1.40	(0.56-2.88)
Thyroid	3	1.505	1.99	(0.41-5.83)
Other Endocrine	0	0.456	0.00	NC
Brain	3	3.024	0.99	(0.20-2.90)
Bone	2	0.551	3.63	NC
Leukemia	4	6.038	0.66	(0.18-1.69)
Mult. Myeloma	2	1.648	1.21	NC
Lymphoma	9	7.729	1.16	(0.53-2.21)
Soft Tissue	2	1.802	1.11	NC

Note: Diagnosed/Expected ratios that have a 95% Confidence Interval that brackets the value 1.00 are not considered statistically high or low.

* Ratio is statistically significant at p=0.05 level. (** p=0.01 level)

NC = not calculated due to less than 3 diagnoses (see text for explanation).

Table A42 – Number of Cancer Diagnoses Compared to the Expected Number in Area 3, 1979-1988 – Females				
	Cancers Diagnosed	Cancers Expected	Diagnosed / Expected	95% C.I. for Ratio
All Cancers	168	161.296	1.04	(0.89-1.22)
Salivary Gland	0	0.364	0.00	NC
Oral	2	1.115	1.79	NC
Nasopharynx	0	0.094	0.00	NC
Other Pharynx	1	0.603	1.66	NC
Esophagus	0	0.801	0.00	NC
Stomach	0	1.562	0.00	NC
Small Intestine	0	0.691	0.00	NC
Colorectal	16	14.673	1.09	(0.62-1.77)
Liver	0	0.571	0.00	NC
Other Biliary	0	0.625	0.00	NC
Pancreas	3	2.610	1.15	(0.24-3.36)
Larynx	0	0.720	0.00	NC
Lung	10	10.064	0.99	(0.48-1.83)
Melanoma	5	4.160	1.20	(0.39-2.81)
Female Breast	44	47.407	0.93	(0.67-1.25)
Cervix	41	32.704	1.25	(0.90-1.70)
Uterus	5	5.892	0.85	(0.27-1.98)
Ovary	4	5.649	0.71	(0.19-1.81)
Bladder	1	1.718	0.58	NC
Kidney	4	2.075	1.93	(0.53-4.93)
Thyroid	5	4.000	1.25	(0.40-2.92)
Other Endocrine	0	0.161	0.00	NC
Brain	0	2.665	0.00	NC
Bone	1	0.559	1.79	NC
Leukemia	3	2.924	1.03	(0.21-3.00)
Mult. Myeloma	5	1.320	3.79*	(1.23-8.85)
Lymphoma	6	4.500	1.33	(0.49-2.90)
Soft Tissue	1	1.466	0.68	NC

Note: Diagnosed/Expected ratios that have a 95% Confidence Interval that brackets the value 1.00 are not considered statistically high or low.
*Ratio is statistically significant at p=0.05 level. (** p=0.01 level)
NC=not calculated (see text)

Table A43 – Number of Cancer Diagnoses Compared to the Expected Number in Area 3, 1989-1996 – Males and Females				
	Cancers Diagnosed	Cancers Expected	Diagnosed / Expected	95% C.I. for Ratio
All Cancers	429	475.574	0.90*	(0.82-0.99)
Salivary Gland	5	1.056	4.73**	(1.53-11.06)
Oral	5	4.989	1.00	(0.32-2.34)
Nasopharynx	1	0.884	1.13	NC
Other Pharynx	9	4.214	2.14	(0.98-4.05)
Esophagus	0	6.641	0.00	NC
Stomach	9	9.441	0.95	(0.44-1.81)
Small Intestine	4	2.072	1.93	(0.53-4.94)
Colorectal	42	43.501	0.97	(0.70-1.31)
Liver	7	3.689	1.90	(0.76-3.91)
Other Biliary	3	1.667	1.80	(0.37-5.26)
Pancreas	9	9.141	0.98	(0.45-1.87)
Larynx	5	6.709	0.75	(0.24-1.74)
Lung	46	53.893	0.85	(0.63-1.14)
Melanoma	6	13.460	0.45*	(0.16-0.97)
Bladder	10	11.099	0.90	(0.43-1.66)
Kidney	7	11.858	0.59	(0.24-1.22)
Thyroid	10	8.480	1.18	(0.57-2.17)
Other Endocrine	0	0.838	0.00	NC
Brain	10	8.844	1.13	(0.54-2.08)
Bone	2	0.719	2.78	NC
Leukemia	8	11.267	0.71	(0.31-1.40)
Mult. Myeloma	6	6.547	0.92	(0.34-2.00)
Lymphoma	30	24.353	1.23	(0.83-1.76)
Soft Tissue	5	4.057	1.23	(0.40-2.88)

Note: Diagnosed/Expected ratios that have a 95% Confidence Interval that brackets the value 1.00 are not considered statistically high or low.

* Ratio is statistically significant at p=0.05 level. (** p=0.01 level)

NC = not calculated due to less than 3 diagnoses (see text for explanation).

Table A44 – Number of Cancer Diagnoses Compared to the Expected Number in Area 3, 1989-1996 – Males				
	Cancers Diagnosed	Cancers Expected	Diagnosed / Expected	95% C.I. for Ratio
All Cancers	217	248.447	0.87	(0.76-1.00)
Salivary Gland	1	0.550	1.82	NC
Oral	2	3.685	0.54	NC
Nasopharynx	1	0.764	1.31	NC
Other Pharynx	7	3.109	2.25	(0.90-4.64)
Esophagus	0	5.240	0.00	NC
Stomach	5	6.432	0.78	(0.25-1.82)
Small Intestine	4	1.336	2.99	(0.82-7.66)
Colorectal	20	24.702	0.81	(0.49-1.25)
Liver	5	2.653	1.88	(0.61-4.40)
Other Biliary	0	0.799	0.00	NC
Pancreas	7	5.977	1.17	(0.47-2.41)
Larynx	2	5.426	0.37	NC
Lung	31	35.031	0.88	(0.60-1.26)
Melanoma	1	6.791	0.15	NC
Prostate	56	70.132	0.80	(0.60-1.04)
Testis	4	4.488	0.89	(0.24-2.28)
Bladder	6	8.331	0.72	(0.26-1.57)
Kidney	5	8.126	0.62	(0.20-1.44)
Thyroid	4	2.117	1.89	(0.51-4.83)
Other Endocrine	0	0.426	0.00	NC
Brain	7	4.906	1.43	(0.57-2.94)
Bone	1	0.487	2.05	NC
Leukemia	5	6.734	0.74	(0.24-1.74)
Mult. Myeloma	3	3.869	0.78	(0.16-2.27)
Lymphoma	20	15.566	1.28	(0.78-1.99)
Soft Tissue	4	1.660	2.41	(0.66-6.16)

Note: Diagnosed/Expected ratios that have a 95% Confidence Interval that brackets the value 1.00 are not considered statistically high or low.

* Ratio is statistically significant at p=0.05 level. (** p=0.01 level)

NC = not calculated due to less than 3 diagnoses (see text for explanation).

Table A45 – Number of Cancer Diagnoses Compared to the Expected Number in Area 3, 1989-1996 – Females				
	Cancers Diagnosed	Cancers Expected	Diagnosed / Expected	95% C.I. for Ratio
All Cancers	212	227.127	0.93	(0.81-1.07)
Salivary Gland	4	0.506	7.91**	(2.15-20.22)
Oral	3	1.304	2.30	(0.47-6.73)
Nasopharynx	0	0.120	0.00	NC
Other Pharynx	2	1.105	1.81	NC
Esophagus	0	1.401	0.00	NC
Stomach	4	3.009	1.33	(0.36-3.40)
Small Intestine	0	0.736	0.00	NC
Colorectal	22	18.799	1.17	(0.73-1.77)
Liver	2	1.036	1.93	NC
Other Biliary	3	0.868	3.46	(0.71-10.11)
Pancreas	2	3.164	0.63	NC
Larynx	3	1.283	2.34	(0.48-6.84)
Lung	15	18.862	0.80	(0.44-1.31)
Melanoma	5	6.669	0.75	(0.24-1.75)
Female Breast	61	80.294	0.76*	(0.58-0.98)
Cervix	24	24.058	1.00	(0.64-1.49)
Uterus	6	7.353	0.82	(0.30-1.78)
Ovary	6	8.602	0.70	(0.26-1.52)
Bladder	4	2.768	1.45	(0.39-3.70)
Kidney	2	3.732	0.54	NC
Thyroid	6	6.363	0.94	(0.35-2.05)
Other Endocrine	0	0.412	0.00	NC
Brain	3	3.938	0.76	(0.16-2.23)
Bone	1	0.232	4.31	NC
Leukemia	3	4.533	0.66	(0.14-1.94)
Mult. Myeloma	3	2.678	1.12	(0.23-3.27)
Lymphoma	10	8.787	1.14	(0.55-2.09)
Soft Tissue	1	2.397	0.42	NC

Note: Diagnosed/Expected ratios that have a 95% Confidence Interval that brackets the value 1.00 are not considered statistically high or low.

*Ratio is statistically significant at p=0.05 level. (** p=0.01 level)

NC=not calculated (see text)

Table A46 – Number of Bladder Cancer Diagnoses by Race/Ethnicity and by Age Compared to the Expected Number in Area 1, 1979-1996 – Males and Females				
Race/ Ethnicity	Cancers Diagnosed	Cancers Expected	Ratio of Diagnosed to Expected	95% C.I. for Ratio
White Non-Hispanic	33	20.279	1.63*	(1.12-2.29)
Hispanic	3	2.756	1.09	(0.22-3.18)
Black	0	0.107	0.00	NC
Age				
35-44	2	0.701	2.85	NC
45-54	7	2.437	2.87*	(1.15-5.92)
55-64	11	6.303	1.75	(0.87-3.12)
65-74	12	8.366	1.43	(0.74-2.50)
75+	4	5.369	0.75	(0.20-1.91)
Total	36	23.486	1.53*	(1.07-2.12)

Note: Diagnosed/Expected ratios that have a 95% Confidence Interval that brackets the value 1.00 are not considered statistically high or low.

* Ratio is statistically significant at p=0.05 level. (** p=0.01 level)

NC = not calculated due to less than 3 diagnoses (see text for explanation).

Table A47 – Number of Stomach Cancer Diagnoses by Race/Ethnicity and by Age Compared to the Expected Number in Area 1, 1979-1996 – Males

Race/ Ethnicity	Cancers Diagnosed	Cancers Expected	Ratio of Diagnosed to Expected	95% C.I. for Ratio
White Non-Hispanic	10	4.062	2.46*	(1.18-4.53)
Hispanic	2	1.742	1.15	NC
Black	0	0.117	0.00	NC
Age				
35-44	1	0.287	3.48	NC
45-54	4	0.626	6.39**	(1.74-16.34
55-64	3	1.847	1.62	(0.33-4.75)
65-74	3	1.984	1.51	(0.31-4.42)
75+	2	1.570	1.27	NC
Total	13	6.412	2.03*	(1.08-3.46)

Note: Diagnosed/Expected ratios that have a 95% Confidence Interval that brackets the value 1.00 are not considered statistically high or low.

* Ratio is statistically significant at p=0.05 level. (** p=0.01 level)

NC = not calculated due to less than 3 diagnoses (see text for explanation).

Table A48 – Number of Larynx Cancer Diagnoses by Race/Ethnicity and by Age Compared to the Expected Number in Area 2, 1979-1988 – Males and Females

Race/ Ethnicity	Cancers Diagnosed	Cancers Expected	Ratio of Diagnosed to Expected	95% C.I. for Ratio
White Non-Hispanic	12	5.096	2.36*	(1.21-4.11)
Hispanic	1	1.324	0.76	NC
Black	0	0.114	0.00	NC
Age				
45-54	3	1.034	2.90	(0.60-8.48)
55-64	7	2.445	2.86*	(1.15-5.90)
65-74	1	2.141	0.47	NC
75+	2	0.730	2.74	NC
Total	13	6.584	1.99*	(1.06-3.39)

Note: Diagnosed/Expected ratios that have a 95% Confidence Interval that brackets the value 1.00 are not considered statistically high or low.

* Ratio is statistically significant at p=0.05 level. (** p=0.01 level)

NC = not calculated due to less than 3 diagnoses (see text for explanation).

Table A49 – Number of Lung Cancer Diagnoses by Race/Ethnicity and by Age Compared to the Expected Number in Areas 1 and 2, 1979-1996 – Males and Females

Race/ Ethnicity	Cancers Diagnosed	Cancers Expected	Ratio of Diagnosed to Expected	95% C.I. for Ratio
White Non-Hispanic	237	150.533	1.57**	(1.38-1.79)
Hispanic	30	26.753	1.12	(0.76-1.60)
Black	4	3.694	1.08	(0.30-2.77)
Age				
25-34	2	0.733	2.73	NC
35-44	6	3.284	1.83	(0.67-3.98)
45-54	35	16.503	2.12**	(1.47-2.95)
55-64	86	53.552	1.61**	(1.29-1.98)
65-74	99	72.522	1.37**	(1.11-1.66)
75+	44	36.566	1.20	(0.87-1.62)
Total	272	183.321	1.48**	(1.31-1.67)

Note: Diagnosed/Expected ratios that have a 95% Confidence Interval that brackets the value 1.00 are not considered statistically high or low.

* Ratio is statistically significant at p=0.05 level. (** p=0.01 level)

NC = not calculated due to less than 3 diagnoses (see text for explanation).

Table A50 – Number of Leukemia Diagnoses by Race/Ethnicity and by Age Compared to the Expected Number in Area 2, 1989-1996 – Males and Females

Race/ Ethnicity	Cancers Diagnosed	Cancers Expected	Ratio of Diagnosed to Expected	95% C.I. for Ratio
White Non-Hispanic	17	9.689	1.76*	(1.02-2.61)
Hispanic	4	3.195	1.25	(0.34-3.20)
Black	0	0.208	0.00	NC
Age				
0- 4	3	0.862	3.48	(0.72-10.18
5- 9	3	0.401	7.48*	(1.54-21.87
10-14	0	0.359	0.00	NC
15-19	0	0.334	0.00	NC
20-24	0	0.215	0.00	NC
25-34	1	0.526	1.90	NC
35-44	1	0.734	1.36	NC
45-54	1	0.923	1.08	NC
55-64	3	2.421	1.24	(0.26-3.62)
65-74	6	3.097	1.94	(0.71-4.22)
75+	5	3.365	1.49	(0.48-3.47)
Total	23	13.237	1.74*	(1.10-2.61)

Note: Diagnosed/Expected ratios that have a 95% Confidence Interval that brackets the value 1.00 are not considered statistically high or low.

* Ratio is statistically significant at p=0.05 level. (** p=0.01 level)

NC = not calculated due to less than 3 diagnoses (see text for explanation).

Table A51– Number of Cervix Cancer Cases by Race/Ethnicity and by Age Compared to the Expected Number in Area 2, 1979-1996 – Females

Race/ Ethnicity	Cancers Diagnosed	Cancers Expected	Ratio of Diagnosed to Expected	95% C.I. for Ratio
White Non-Hispanic	70	29.365	2.38**	(1.86-3.01)
Hispanic	15	15.772	0.95	(0.53-1.57)
Black	0	0.830	0.00	NC
Age				
15-19	1	0.452	2.21	NC
20-24	10	4.797	2.09*	(1.00-3.83)
25-34	31	18.524	1.67*	(1.14-2.38)
35-44	22	10.384	2.12**	1.32-3.21)
45-54	4	4.599	0.87	(0.24-2.23)
55-64	9	3.818	2.36*	(1.08-4.47)
65-74	5	2.690	1.86	(0.60-4.34)
75+	3	1.342	2.24	(0.46-6.54)
Total	85	46.605	1.82**	(1.46-2.26)

Note: Diagnosed/Expected ratios that have a 95% Confidence Interval that brackets the value 1.00 are not considered statistically high or low.

* Ratio is statistically significant at p=0.05 level. (** p=0.01 level)

NC = not calculated due to less than 3 diagnoses (see text for explanation).