INVESTIGATION OF CANCER INCIDENCE IN THE BELLEVUE AREA,
TOWN OF CHEEKTOWAGA, ERIE COUNTY, NEW YORK, 1985-2001

Prepared by the:

Cancer Surveillance Program
Bureau of Chronic Disease Epidemiology and Surveillance
New York State Department of Health

with the assistance of
New York State Cancer Registry staff

For further information contact:
Aura L. Weinstein, M.P.H.
Director, Cancer Surveillance Program
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Background

In March of 2002, the Cancer Surveillance Program of the New York State Department of Health, Bureau of Chronic Disease Epidemiology and Surveillance, completed a screening study of the incidence of cancer in ZIP Code areas 14043 and 14227 in the Town of Cheektowaga, Erie County, New York during the time period 1994-1998. This study was requested by the Community Exposure Research Section of the Bureau of Environmental and Occupational Epidemiology of the Department's Center for Environmental Health, who were investigating various health outcomes in response to resident concerns related to the Buffalo Crushed Stone quarry and three landfills. These four sites are located in close proximity to each other on either side of the border between the two ZIP Code areas (see Figure 1).

The screening study found that the total numbers of males and females living in the two ZIP Codes who were newly diagnosed with cancer was similar to the numbers expected for areas of New York State, exclusive of New York City. When individual types of cancer were examined separately, the numbers of most types of cancer were similar to or less than the numbers expected. The only exception was cancer of the uterus (uterine corpus, excluding the cervix) in females, where a statistically significant excess number of cancer cases was found. This type of cancer, however, is not known to be associated with any environmental risk factors; rather, all known risk factors are personal. Further examination of available information on the women with uterine cancer did not identify any unusual features that could account for the excess, and showed that their residences were not concentrated in any particular areas of the two ZIP Codes.

Following the release of the findings from the screening study, some residents expressed concern over the lack of significant findings for cancers that may be sensitive to environmental contaminants. It was their opinion that the two ZIP Code areas included a large number of residents who did not live in the immediate area of the quarry and landfills and thus were unlikely to be affected by any contaminants from the sites; any health effects the residents living close to the sites may have experienced may have been concealed or diluted by studying the larger area. Health Department staff met with these residents and with interested staff from the State University of New York at Buffalo to determine the geographic areas that were of greatest concern to the residents, and jointly developed a plan for conducting a second study that focused on these areas. This report describes the methods and findings of that study.

Methods

Study Plan This investigation was designed to determine whether the number of cancer cases arising among people residing in the Bellevue study area was unusual. In order to do this, the number of cases actually diagnosed among residents of the study area was compared with the
number of cases one would expect to find, if cancer rates in the study area were the same as in similar areas of the state.

**Study Area and Time Period** The Bellevue study area consisted of block group 2 of Census Tract 98.00, block group 2 of Census Tract 108.03, and block group 4 of Census Tract 108.04 in Erie County (Figure 2). The time period for the investigation of cancer incidence was 1985 through 2001, the most recent year for which cancer reporting was considered complete for analysis within small geographic areas at the time work on the follow-up study was initiated.

**Identification of Observed Incident Cancers** To proceed with the investigation, it was necessary to identify all cases of cancer diagnosed among people residing in the study area during the time period of the study. The source for these data was the New York State Cancer Registry. The Cancer Registry contains information on all cases of cancer reported to the New York State Department of Health, as mandated by law. The computerized Cancer Registry files are continuously updated to reflect information gained from multiple reports on the same cancer. Cancer incidence data presented in this report represent cancer cases diagnosed from 1985 through 2001, with information on these cases updated as of August 2004.

Variation in cancer incidence among different geographic areas reflects not only true differences in cancer incidence, but also differences in how cancer is diagnosed, treated, and recorded in different areas of the state. The completeness and accuracy of the Cancer Registry depend upon reporting from hospitals, laboratories, managed care organizations and other sources. The Cancer Registry has been certified as more than 95% complete by the North American Association of Central Cancer Registries (1). In addition, the Cancer Registry has received gold certification from the Association for the past five years, the highest certification standard given to central cancer registries.

To identify all cancer cases within the study area, a listing of all cancer cases diagnosed in the ZIP Codes serving the study area was obtained from the Cancer Registry. Each street address was then examined individually to determine whether that individual lived in the study area at the time of diagnosis. Street address information could not be found for six cases. Since the people living in the study area represent only a small portion of the total population of each ZIP Code area, these individuals were not included in the study. (Later analyses showed that including these individuals in the study would not have changed the study findings.) All cases with an address located within the study area were then grouped by age, sex and type of cancer. These are referred to as the "observed" cases.

**Calculation of Expected Incident Cancers** To determine whether the number of observed cases was unusual, it was necessary to calculate the number of cancer cases that would be expected in the study area. To do this, it was first necessary to estimate the size of the study area population by age and sex for each year of the study period. This was done using data from the 1980, 1990 and 2000 United States (US) Censuses and assuming a constant rate of population change within each
age and sex group between census years. The study area population for the post-census year 2001 was estimated by its population for 2000. The populations for each year of the time period were then summed to obtain the estimated total population of the study area for 1985-2001.

The expected number of cancer cases was calculated by applying cancer incidence rates by age and sex for the years 1985-2001 for a reference area to the estimated total population of the follow-up study area by age and sex. The reference area selected for this investigation was New York State, exclusive of New York City.

Types of Cancer (Anatomic Sites) Studied Seventeen of the most common types of cancer were examined among males, including lung, colorectal, prostate, and bladder cancers, and lymphomas and leukemias. Nineteen of the most common types were examined among females. In addition to the sites examined for males (except prostate), cancers of the breast and female reproductive organs were examined for females.

Statistical Testing The probability that chance alone could explain an increase or decrease in the observed number of cancer cases compared to the expected number was evaluated based on the Poisson distribution (2). (In statistics, the Poisson distribution describes a process where a rare event occurs in a large population.) If the probability of observing an excess or deficit was 0.025 or less for any cancer site, the result was considered to be statistically significant. Non-significant excesses or deficits were considered to represent random variations in observed patterns of disease.

Results

A total of 375 cancers (186 in males and 189 in females) were identified among all persons residing in the Bellevue study area between 1985 and 2001. For all anatomical sites combined, neither total was statistically significantly different from the 204 and 212 cases expected among males and females, respectively.

Table 1 shows results for total cancers and the individual cancer sites examined separately among males and females. Some related sites have been grouped in the table, although statistical testing was conducted for each site individually. The most frequently observed types of cancer among males were prostate cancer, with 40 cases observed (53 cases expected); lung cancer, with 37 cases observed (36 cases expected); and colorectal cancer, with 33 cases observed (27 cases expected). Fewer than six cases were observed for several types of cancer that are not shown in the table, including cancers of the esophagus, liver, pancreas, larynx, testis, brain, and thyroid and for multiple myeloma. (To protect patient confidentiality, for cancer sites with fewer than six observed cases, the specific numbers of observed cases have not been indicated.) No specific site of cancer among males, including those not shown in the table, showed a statistically significant difference in number of cases from the number expected.
The most frequently observed types of cancer among females included breast, with 57 cases observed (59 cases expected); lung, with 28 cases observed (28 cases expected); and colorectal, with 24 cases observed (30 cases expected). Unlike in the screening study, the number of women diagnosed with uterine cancer (12 women) was similar to the number expected (13 women). Fewer than six cases were observed for several other types of cancer that are not shown in the table, including cancers of the oral cavity, esophagus, stomach, liver, larynx, cervix, brain, and thyroid and for multiple myeloma and leukemia. No specific site of cancer among females, including those not shown in the table, showed a statistically significant difference in number of cases from the number expected.

Discussion

This study was done to examine cancer incidence among people living in the Bellevue area and in the immediate vicinity of the Buffalo Crushed Stone quarry and three landfills. Since the number of people living in the area covered by the second, more focused, study was only about a tenth the number living in the area covered by the previous screening study, the time period of the second study was extended to include cancers diagnosed from 1985 to 2001, the most recent year for which data were available at the time the study was begun. This 17-year study period provides a greater level of statistical power, that is, the ability to detect a difference from the expected cancer incidence if there was one, than if we had used a five-year study period as in the screening study.

Results showed that cancer incidence in the Bellevue study area was similar to that expected if study area residents developed cancer at the same rate as residents in all of New York State, exclusive of New York City. There were no individual cancers diagnosed in greater (or lesser) numbers than would be likely to occur purely due to random variation. In particular, the excess number of cases of uterine cancer observed among females in the screening study was not present in the smaller area.

Study limitations

In drawing conclusions from these data, several aspects of the methodology need to be addressed. First, since there were 38 individual tests of significance, (17 among males, 19 among females and one each among males and females overall), it was anticipated that one or two results might appear statistically significant even though the differences between observed and expected events were due entirely to random fluctuations in the data. In this particular investigation, however, no statistically significant differences were found.

The second aspect is the power of the statistical test, that is, the probability that a true departure from the expected number can be detected by significance testing. The power of a significance test varies with the number of expected cases. For example, using the statistical test described above, the probability of detecting a true doubling in cancer incidence over the expected value will be 80% or higher when the expected number is at least 12. For this investigation, the power of detecting a doubling, if one were present, was high for the total number of cancer cases for each sex and for the most frequently diagnosed individual cancers.
An additional limitation is that migration, that is, movement of people in or out of the study area, could not be taken into account. Cancer cases were identified among persons who both resided in the study area and were diagnosed with cancer during the period 1985 through 2001. Former residents of the study area who moved away prior to being diagnosed with cancer could not be included, while persons who developed cancer shortly after moving in to the area were included.

**General cancer information** Cancer may result from either genetic or environmental influences or an interaction of both genetics and environment. Examples of possible environmental influences include diet, smoking, and other lifestyle factors and occupation, as well as natural and man-made cancer-causing substances in the air, food or water. The development of cancer is usually a lengthy process. For many types of cancer, symptoms do not occur until 10 to 30 years after exposure to cancer-causing agents. An agent that promotes the uncontrolled growth of cancer cells may cause cancer symptoms to be recognized in less time.

Cancer, unfortunately, is a common disease. One of every two men and one of every three women will develop cancer during his/her lifetime (3). The number of people with cancer is increasing in most communities because more people are living to older ages, where cancer is more common.

Much more research is necessary before the causes of cancer are well understood. Current knowledge, however, suggests that the leading preventable cause of cancer is cigarette smoking. Dietary practices such as excessive alcohol consumption and the eating of high fat foods, as well as physical inactivity, are also believed to be important. In fact, tobacco use has been estimated to account for about 30% of all cancer deaths (4), and recent evidence suggests that unhealthy diet and insufficient physical activity may account for one third (5). Other avoidable risk factors include excessive exposure to sunlight, ionizing radiation, and various occupational exposures to cancer-causing agents.

It is important to realize that many cancers can be effectively treated if they are diagnosed at an early stage. Screening for cancers of the breast, cervix, colon and rectum, for example, helps to identify these diseases before the onset of symptoms and at a time when they are usually the most curable. Many persons could reduce their chances of developing or dying from cancer by adopting a healthier lifestyle and by visiting their physician for a cancer-related checkup.

**Interpretation**

This study provides no evidence of any unusual patterns of cancer incidence among people living in the Bellevue area, in close proximity to the Buffalo Crushed Stone quarry and three landfills. Although certain cancers were diagnosed more or less frequently than expected, the differences that did occur were within the range that can frequently occur due to random fluctuation. These results do not indicate the need for further investigation.
References

1. Schymura, MJ. Director, New York State Cancer Registry, personal communication.


FIGURE 1.

ZIP CODE SCREENING STUDY AREA AND FOLLOW-UP STUDY AREA
BELLEVUE, TOWN OF CHEEKTOWAGA
ERIE COUNTY, NEW YORK
FIGURE 2.

FOLLOW-UP STUDY AREA
BELLEVUE, TOWN OF CHEEKTOWAGA
ERIE COUNTY, NEW YORK
# Observed and Expected Numbers of Incident Cancer Cases,
Census Tracts 98.00 (Block Group 2 only), 108.03 (Block Group 2 only)
and 108.04 (Block Group 4 only),
Erie County, New York, 1985-2001
New York State exclusive of New York City Standard 1985-2001

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<th>FEMALES</th>
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<tbody>
<tr>
<td></td>
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<td>Expected</td>
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*Classification of site is based on the International Classification of Disease for Oncology, 3rd Edition.
*Data were obtained from the New York State Cancer Registry (database as of March 2005).
*Expected numbers are based on standard cancer incidence rates by age and sex for New York State, exclusive of New York City. Standard rates are applied to the total 1985-2001 study population (31,976 males, 35,237 females) to obtain expected numbers of cases.
*Includes observed and expected numbers of cases at sites of cancer not listed below.
*The number of cases is not shown to protect patient confidentiality.