

Health Consultation

CANCER INCIDENCE RATES IN EAST OMAHA
1990-2001

OMAHA, DOUGLAS COUNTY, NEBRASKA

EPA FACILITY ID: NESFN0703481

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U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
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Health Consultation: A Note of Explanation

An ATSDR health consultation is a verbal or written response from ATSDR to a specific request for information about health risks related to a specific site, a chemical release, or the presence of hazardous material. In order to prevent or mitigate exposures, a consultation may lead to specific actions, such as restricting use of or replacing water supplies; intensifying environmental sampling; restricting site access; or removing the contaminated material.

In addition, consultations may recommend additional public health actions, such as conducting health surveillance activities to evaluate exposure or trends in adverse health outcomes; conducting biological indicators of exposure studies to assess exposure; and providing health education for health care providers and community members. This concludes the health consultation process for this site, unless additional information is obtained by ATSDR which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

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1990-2001

CITY OF OMAHA, DOUGLAS COUNTY, NEBRASKA

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Prepared by:

U.S. Department of Health and Human Services
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Introduction and Purpose

In May 2005, ATSDR released its final Public Health Assessment for the Omaha Lead Superfund Site (OLS), concluding that ongoing exposure to lead puts children 6 and younger living in or near the Omaha Lead site area at risk of lead-related health effects. In all public health assessments (PHAs), ATSDR is required by the Superfund law to consider the evaluation of mortality and morbidity data. The law indicates that a PHA should include relevant health outcome data reviews when exposure to site contaminants could have resulted in the development or worsening of health effects. These reviews may help to better define the need for and scope of public health interventions, when appropriate. Traditional health outcome data reviews of sites involving exposures to lead have examined childhood blood-lead surveillance data in the exposed communities. The correlation between blood-lead levels and learning difficulties and slightly impaired hearing and growth of children is well defined and used to establish the existence of a public health hazard

In the 11th Report on Carcinogens, the National Toxicology Program (NTP) of the U.S. National Institutes of Health concluded that “lead and lead compounds are reasonably anticipated to be human carcinogens”(4,5). In arriving at its conclusion, the NTP relied upon studies on laboratory animals and workers exposed to high levels of lead. The laboratory animals developed brain, kidney, and lung cancer. The workers inhaled high levels of lead fumes or accidentally ingested lead dust. The worker studies did not account for diet and smoking and exposure to other cancer-causing agents. The worker study showed weak evidence for increased risk for lung, stomach, or bladder cancer. The workers were exposed to lead at 50 to 5000 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) in air and had 40 to 100 micrograms lead per deciliter ($\mu\text{g}/\text{dl}$) in blood (6). These levels are much higher than the lead exposure among residents of East Omaha.

This recent determination by the NTP prompted ATSDR to conduct an exploratory analysis of site-specific cancer occurrence within the communities of East Omaha. Characteristics supporting this analysis include the findings of the May 2, 2005, public health assessment, a large population that may have been exposed to lead, and a cancer database suitable for comparing cancer incidence rates in the exposed and non-exposed communities. The purpose of this analysis was to look at existing information and determine if cancer rates may be influenced by environmental lead contamination. The findings from this analysis are used to identify possible follow-up activities.

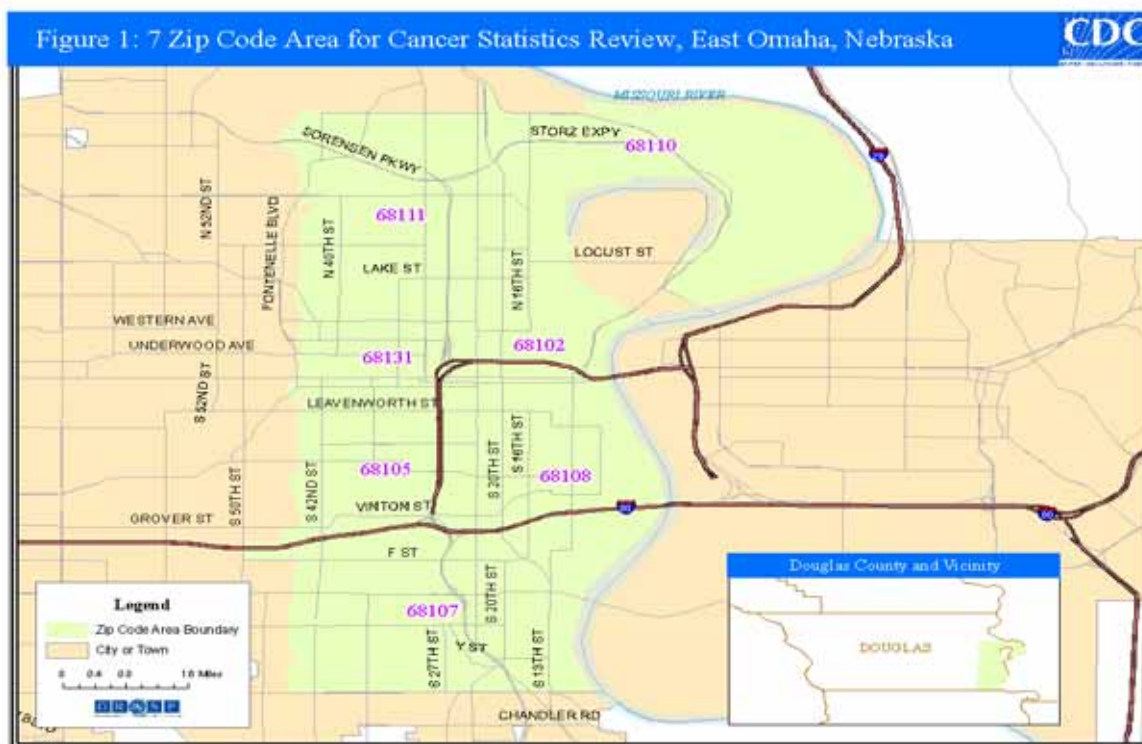
This analysis examined lead-related cancer rates by comparing the incidence rates of cancer in East Omaha residents to rates for people living in Douglas County and in the state of Nebraska as a whole. The comparison areas were selected because the cancer data quality would be similar, demographics are similar, and these areas would be expected to have lower lead exposures. ATSDR’s conclusions that a public health hazard exists at OLS are not affected by this analysis. The limitations inherent in the data review do not permit conclusions about whether lead exposure actually caused any cancers in Omaha and the other two areas.

Analysis

The Nebraska Cancer Registry (NCR) collects information on cancers diagnosed among Nebraska residents since 1987. Since NCR staff commented that data for the registry’s “start-up” years (1987–1989) may have been incomplete, data from these years were not used in this report. We evaluated the cancers associated with exposure to lead in the soil or air as listed in the National Toxicology Report.

For the purposes of this data review, we included in the analysis any new primary malignant cancer reported to the NCR from 1990 to 2001 that occurred in the lung or bronchus, stomach, urinary bladder, brain/central nervous system (CNS), or kidney and renal pelvis. At the time of diagnosis, a case must have lived in the East Omaha ZIP codes 68102, 68105, 68107, 68108, 68110, 68111, or 68131 (Figure 1), or in Douglas County (excluding East Omaha), or in the state of Nebraska (excluding Douglas County).

Cancer incidence rates were age-adjusted to the 2000 U.S. population to account for an increasing rate of cancer with increasing age. Differences in cancer incidence rates by area were assessed by the Byar method using cancer rates and 95% confidence intervals (7). The Byar method is a test statistic and is used to calculate confidence intervals for rate ratios. Information on personal risk factors such as smoking, diet, and lead exposure were not available.



Results

Lung cancer was the most frequent cancer in East Omaha, Douglas County, and the State of Nebraska (Table 1). Incidence rates of lung and stomach cancer were higher in East Omaha than Douglas County and Nebraska (Table 2). Incidence rates of kidney cancer were higher in East Omaha than Nebraska.

Whites living in East Omaha had higher incidence rates of lung cancer than whites in Douglas County and higher rates of kidney, lung and stomach cancer than whites living in Nebraska (Table 3). African Americans living in East Omaha had a higher incidence rate of lung cancer than African Americans in Nebraska (Table 4).

Table 1. Number of New Cancers Reported to the Nebraska Cancer Registry, 1990–2001

Primary Site of Cancer	East Omaha 7 zip code area	Douglas County (excluding East Omaha)	State of Nebraska (excluding Douglas County)
Bladder	217	711	3312
Brain/Other CNS*	73	258	1037
Kidney & Renal Pelvis	173	503	1734
Lung & Bronchus	1249	2509	8771
Stomach	114	217	867
TOTAL	1826	4198	15721

* Central nervous system.

Table 2. Age-Adjusted Average Annual Cancer Incidence Rates for East Omaha, Douglas County, and State of Nebraska, 1990–2001.

Primary Site of Cancer	Cancer Incidence Rate (per 100,000 people) for Total Population			Is the Cancer Incidence Rate in East Omaha Statistically Higher than the Comparison Group? (Range of Excess Cancer Rate)*	
	East Omaha	Douglas County	State of Nebraska	Compared with Douglas County	Compared with State of Nebraska
Bladder	17	21	20	No	No
Brain/Other CNS**	6	7	7	No	No
Kidney & Renal Pelvis	14	14	11	No	Yes (1.1–1.4)
Lung & Bronchus	100	74	56	Yes (1.3–1.5)	Yes (1.7–1.9)
Stomach	9	7	5	Yes (1.1–1.8)	Yes (1.4–2.0)

* Lower and upper bounds for 95% confidence interval for the comparison rate ratio. Statistical significance occurs when the range excludes 1.0; 1.0 is the baseline comparison rate.

Note: East Omaha area is a seven ZIP code geographic area; Douglas County excludes the seven ZIP code area; State of Nebraska excludes Douglas County.

** Central nervous system.

Table 3. Comparison of Age-Adjusted Average Annual Cancer Incidence Rates Among “Whites” in East Omaha, Douglas County, and State of Nebraska, 1990–2001.

Primary Site of Cancer	Cancer Incidence Rate (per 100,000 people) for Whites			Is the Cancer Incidence Rate in East Omaha Statistically Higher than the Comparison Group? (Range of Excess Cancer Rate)*	
	East Omaha	Douglas County	State of Nebraska	Compared with Douglas County	Compared with State of Nebraska
Bladder	20	21	21	No	No
Brain/Other CNS**	6	7	7	No	No
Kidney & Renal Pelvis	15	15	11	No	Yes (1.1–1.6)
Lung & Bronchus	102	73	56	Yes (1.3–1.5)	Yes (1.7–1.9)
Stomach	8	6	5	No	Yes (1.1–1.8)

* Lower and upper bounds for 95% confidence interval for the comparison rate ratio. Statistical significance occurs when the range excludes 1.0; 1.0 is the baseline comparison rate.

Note: East Omaha area is a seven ZIP code geographic area; Douglas County excludes the seven ZIP code area; State of Nebraska excludes Douglas County.

** Central nervous system.

Table 4. Comparison of Age-Adjusted Average Annual Cancer Incidence Rates Among “African Americans” in East Omaha, Douglas County, and State of Nebraska, 1990–2001.

Primary Site of Cancer	Cancer Incidence Rate (per 100,000 people)* for African Americans			Statistically Higher than Comparison Group (Range of Excess Cancer Rate)**	
	East Omaha	Douglas County	State of Nebraska	Compared with Douglas County	Compared with State of Nebraska
Bladder	9	12	7	No	No
Brain/Other CNS**	4	3	7	No	No
Kidney & Renal Pelvis	10	15	16	No	No
Lung & Bronchus	105	86	69	No	Yes (1.1–2.2)
Stomach	15	10	8	No	No

*Lower and upper bounds for 95% confidence interval for the comparison rate ratio. Statistical significance occurs when the range excludes 1.0; 1.0 is the baseline comparison rate.

Note: East Omaha is a seven ZIP code geographic area; Douglas County excludes the seven ZIP code area; State of Nebraska excludes Douglas County.

** Central nervous system.

Limitations

The following limitations should be recognized when evaluating the results of this analysis:

1. Data on other factors related to cancer (i.e., smoking, nutrition, and occupation) were not available on each individual diagnosed with cancer and included in this analysis. These factors have been identified as risk factors for cancer and may explain the differences in cancer rates between East Omaha, Douglas County, and Nebraska. In particular, the modest increase in lung cancers may be due to smoking and tobacco use which account for 85% of all lung cancers (8). It is, therefore, impossible to determine whether these factors or exposure to lead may be responsible for the modest increase in certain types of cancer found in this analysis.
2. There was no information on blood-lead levels or lead exposure for the individuals included in this analysis so no association at the individual level can be made with lead exposure and increased cancer rates.
3. There was no information on how long the individuals included in this analysis had lived in East Omaha, Douglas County, or Nebraska. Consequently, these people could have been exposed to other cancer-causing agents in other areas of the country before moving to the East Omaha area.
4. The East Omaha area was an industrial area, and long-time residents could have been exposed to other cancer-causing agents from past industrial activities through both occupation and residency which were not related to lead exposure.

Conclusion

Ongoing exposure to lead at the OLS puts children 6 and younger living in or near the Omaha Lead Site area at risk of lead-related health effects; specifically, increased blood lead levels, and learning difficulties and slightly impaired hearing and growth.

East Omaha residents had a modest increased rate for lung, kidney, and stomach cancer compared with residents of Douglas County or Nebraska. Bladder and brain cancer rates were not increased, and there was no consistent increased rate of kidney cancer. Because of the limitations in the methods of the data review, these results should be interpreted cautiously. The findings from this analysis are insufficient to conclude that lead contamination has caused cancer in residents of East Omaha. It is very possible that the other risk factors of smoking, nutrition, occupation, or exposure to other cancer-causing substances led to the modest increases in lung and stomach cancers.

Additional studies are required to further test the hypothesis that environmental contamination of lead may be associated with increased rates of lung, kidney, or stomach cancer. ATSDR will further evaluate this association by conducting similar cancer-statistic reviews at other sites where environmental lead contamination has resulted in a public health hazard to significantly large populations and adequate cancer databases are available for analyses.

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