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Evaluation of Health Outcome Data in Northampton and Easthampton, MA and among Neighborhoods in Closest Proximity to the Northampton Regional Landfill

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QUESTIONS AND ANSWERS

Q1. Why was a study of cancer and other health outcomes conducted in Northampton and Easthampton?

A. The Massachusetts Department of Public Health/Bureau of Environmental Health (MDPH/BEH) was asked by the City of Northampton/Mayor's Office, its health director, and concerned residents to assess whether the health of residents living near the Northampton Regional Landfill was likely to have been or could be affected by their proximity to the landfill. Particular concern was expressed about the occurrence of cancer in the neighborhood.

Q2. What is the Bureau of Environmental Health (BEH)?

A. The Bureau of Environmental Health (BEH) is part of the Massachusetts Department of Public Health (MDPH). BEH works to protect public health by looking at how a community's environment might affect residents' health or whether unusual disease patterns suggest that the environment may have played a role in disease occurrence. The BEH's Community Assessment Program (CAP) conducted this evaluation.

Q3. What data were used to evaluate the incidence of cancer in Northampton and Easthampton?

A. To evaluate the incidence of cancer in the two communities, MDPH used data from the Massachusetts Cancer Registry (MCR), a division of the MDPH Bureau of Health Information, Statistics, Research, and Evaluation. Since 1982, the MCR has been collecting reports of new cancer diagnoses among Massachusetts residents. The 23-year period 1982-2004 is the period for which the most recent and complete statewide cancer incidence data were available to calculate incidence rates.

Q4. How does MDPH evaluate cancer patterns at the neighborhood level?

A. Cancer rates were first calculated for the communities of Northampton and Easthampton, as a whole, and then for the census tract in Northampton where the landfill is located as well as for the neighboring census tract in Easthampton that is closest to the landfill.

Q5. What is a census tract?

A. A census tract is a geographic subdivision of a city or town designated by the U.S. Census Bureau. Census tracts usually contain between 1,500 and 8,000 persons and are designed to be homogenous with respect to population characteristics.

Q6. How did MDPH calculate the cancer incidence rates for Northampton, Easthampton, and the two census tracts of interest?

A. Cancer incidence data were tabulated by gender according to 18 age groups to compare the *observed* number of cancer diagnoses to the number that would be *expected* based on the statewide cancer rate. A statistic called a Standardized Incidence Ratio (SIR) was calculated for four time periods: 1982-1986, 1987-1991, 1992-1996, and 1997-2004, in order to evaluate trends in cancer incidence in comparison to the statewide cancer experience.

Q7. Did the study review cancer patterns in the neighborhoods closest to the landfill?

A. Yes. In addition to census tract analyses, the pattern of all cancer diagnoses was qualitatively reviewed for an area that constitutes a one-mile radius around the landfill.

Q8. What are the boundaries of the one-mile radius area?

A. The one-mile radius evaluated consists of the area bordered to the east by Sovereign Way, to the south by Lexington Drive, to the west by Loudville Road, and to the north by Ryan Road. See the attached map showing the area within the one-mile radius.

Q9. How did MDPH evaluate cancer incidence occurring after 2004?

A. Because the MCR is a continuous surveillance system, it is possible to review cancer incidence reports for more recent years (2005 to the present) for defined geographic areas, even though complete statewide data are not available to allow for the calculation of actual cancer incidence rates. For the 28 streets, in part or whole, within a one-mile radius of the landfill, MDPH identified and reviewed all cancer diagnoses from 1982 to the present.

Q10. How does MDPH evaluate cancer patterns?

A. In addition to calculating actual cancer incidence rates, at the community level as well as census tract level, MDPH evaluates the geographic patterns of the cancer diagnoses, the temporal patterns of the dates of diagnosis, and, if the incidence of a particular type of cancer is elevated, age and gender patterns for the specific cancer type, information on cancer subtypes, and available risk factor information from the MCR (such as usual occupation and tobacco use history). All of this information is used to assess whether cancer rates are elevated, whether the patterns of specific cancer types appear unusual, and whether any

common factor (environmental or non-environmental) appears to be related to cancer in the community, census tract, or neighborhood.

Q11. What types of cancer were studied and why?

A. The nine types of cancer selected for this study were cancers of the bladder, brain and central nervous system, breast, kidney, liver, and lung and bronchus as well as leukemia, Hodgkin lymphoma, and non-Hodgkin lymphoma. These cancer types were selected based on contaminants of concern at the Northampton Regional Landfill and/or resident concerns over suspected elevations of some cancer types. Incidence rates were calculated for all nine cancer types. In addition, for the one-mile radius around the landfill, all cancer diagnoses were identified and reviewed for individuals diagnosed while living on any of the 28 streets within the one-mile radius.

Q12. How did MDPH review the temporal and geographic distribution of cancer incidence in these communities?

A. Year of diagnosis was reviewed among individuals diagnosed with particular types of cancer in Northampton and Easthampton, to assess if any temporal patterns or clustering in time existed. In addition, the address at the time of diagnosis for individuals diagnosed with cancer in these communities was mapped using a computerized geographic information system (GIS). This allowed for an evaluation of the spatial distribution of where individuals lived at diagnosis, to assess any possible concentrations of diagnoses in any one neighborhood and in relation to the landfill. This evaluation also included consideration of the population density variability of each community through the use of GIS-generated population density overlays.

Q13. What did the study find regarding the incidence of cancer in Northampton and Easthampton?

A. In general, cancer incidence rates for the communities of Northampton and Easthampton as a whole and the two census tracts surrounding the landfill were approximately near or below the rates expected based on cancer incidence in the state of Massachusetts as a whole for the 23-year time period, 1982-2004. While some elevations occurred in certain cancer types in each community during certain time periods, the elevations did not persist over time and when examined closely, no unusual patterns emerged with respect to their spatial or temporal distribution or available risk factor information.

Q14. Were there any statistically significant elevations in cancer incidence during any time periods?

A. Yes. Statistically significant elevations were noted for three cancer types in Northampton females – leukemia in Northampton's census tract 8222.00 during 1992-1996 and breast and kidney cancers during 1997-2004. However, closer examination of risk factor information for each cancer type as well as spatial and temporal patterns did not reveal any unusual patterns or suggest that a common environmental factor played a primary role in these cancer diagnoses.

Q15. Upon closer examination, did the incidence of breast cancer in Northampton appear unusual?

A. Breast cancer incidence was elevated in Northampton during 1997-2004. Upon closer examination, MDPH learned that a higher percentage of women in Northampton were diagnosed with in-situ (non-invasive) breast cancer (33%), the earliest stage of breast cancer, during this time period compared to 24% of women statewide. For the Northampton census tract where the landfill is located, 43% of the women diagnosed with breast cancer were diagnosed with in-situ cancer. Therefore, it appears that Northampton women are being screened regularly and diagnosed earlier than women across Massachusetts. The

epidemiological literature on risk factors for breast cancer suggests that higher educational level and maternal age at first birth are both associated with an increased risk of breast cancer. For 1990, 45% of the women in Northampton had their first child at age 30 or older compared to 28% statewide. Similarly, for 2006, 54% of the women in Northampton had their first child at age 30 or older compared to 39% statewide. According to the 2000 U.S. Census, approximately 49% of Northampton women age 25 or older have at least a Bachelor's or graduate-level degree compared to 31% statewide.

Q16. Does the elevation in kidney cancer in Northampton females appear to be a long-term trend?

A. While kidney cancer incidence in Northampton females was either as expected or lower than expected in the first three time periods evaluated, it was higher than expected during 1997-2004, with 23 diagnoses reported when 13 would be expected. A review of risk factor information for these 23 females showed that their ages at diagnosis and kidney cancer subtypes were consistent with what would be expected based on the medical literature. In Northampton, the average age of the women diagnosed with kidney cancer between 1997 and 2004 was 64, compared to the national average of 65 as reported by the American Cancer Society. Between 80 and 90% of all kidney cancers are renal cell carcinomas. In Northampton, 16 of the 19 (84%) women for whom subtype information was available were diagnosed with renal cell carcinomas. Wilm's tumor, which represents 5% of all kidney cancers, is most common in children. Two of the 23 females were under age 19 at diagnosis and both were diagnosed with Wilm's tumors.

According to the epidemiological literature, smoking and exposure to certain industrial chemicals increase the risk of developing kidney cancer. Of the 16 adult females diagnosed with kidney cancer for whom their smoking history was reported to the MCR, 10 reported being current or former smokers at the time of their diagnosis. Review of occupational information reported to the MCR for the 21 adult women diagnosed with kidney cancer showed that 5 of the 21 reported occupations where exposure to chemicals associated with kidney cancer may have occurred. MDPH also evaluated the geographic distribution of residence at diagnosis for those 23 females with kidney cancer as well as for the non-smokers and those with no reported possible exposures via their usual occupation, and found no unusual patterns citywide or near the landfill. MDPH accessed the MCR database for the years 2005 to the present and reported, based on a preliminary estimate, that the incidence of kidney cancer appears to be about as expected for these more current years in both genders, relying upon a crude estimation of the number of diagnoses expected.

Q17. What did a closer examination of the pattern of leukemia incidence in Northampton females reveal?

A. Leukemia was elevated during 1992-1996 in the Northampton census tract where the landfill is located, with six diagnoses reported when one would be expected. However, the incidence of leukemia in this census tract in the other three time periods evaluated was less than or as expected, compared to the statewide experience. The majority of the women were diagnosed with the most common subtype of adult leukemia. Careful evaluation of the risk factor data revealed that smoking and a previous cancer diagnosis may have played a role in 3 of the 6 diagnoses. The geographic distribution of the women diagnosed with leukemia in the census tract closely followed the patterns of population density in the census tract.

Q18. Was the geographic distribution of cancer incidence unusual in Northampton or Easthampton?

A. The analysis of the geographic distribution of residence at diagnosis for individuals diagnosed with the nine cancer types evaluated in Northampton or Easthampton did not reveal any unusual spatial

patterns that would suggest a common factor (environmental or non-environmental) played a primary role in cancer diagnoses among these individuals. In addition, no unusual geographic concentrations of individuals with cancer were observed in the one-mile radius around the Northampton Regional Landfill.

Q19. What did the study reveal about cancer patterns in the one-mile radius around the Northampton Regional Landfill?

A. No unusual patterns were noted in cancer diagnoses from 1982 to the present among individuals living within the one-mile radius of the landfill. This was true when examining the types of cancers diagnosed, the dates of diagnoses, the spatial distribution of residence at diagnosis, and the age and gender patterns for the various types of cancer.

Q20. What health outcomes other than cancer did MDPH evaluate?

A. MDPH reviewed other readily-available data for asthma, autism, reproductive outcomes, specifically birth defects and low birthweight births, and childhood lead poisoning. Asthma data for this investigation were drawn from two sources - the BEH school-based pediatric asthma surveillance program and asthma-related hospitalization data collected by the Massachusetts Division of Health Care Finance and Policy. Low birthweight data are collected by the MDPH Bureau of Health Information, Statistics, Research and Evaluation. Birth defects data were obtained from the Massachusetts Center for Birth Defects Research and Prevention within MDPH's Bureau of Family Health and Nutrition. Data on childhood blood lead levels are collected by the BEH Childhood Lead Poisoning Prevention Program. Finally, MDPH produced a report in 2005 on autism rates in Massachusetts communities, based on information collected from special education departments in schools across the state.

Q21. What are the results of the MDPH analysis of these health outcomes?

A. While some exceptions were noted in the report, overall, a review of readily-available health outcome data, specifically for reproductive outcomes, asthma, childhood blood level levels, and autism did not show any unusual patterns that persisted over time when the experiences of Northampton and Easthampton were compared to those of the state as a whole.

Q22. If the overall pattern of cancer near the Northampton Regional Landfill is not unusual, does that mean there are no environmental concerns associated with the landfill?

A. No. Although, overall, no unusual patterns emerged with respect to cancer incidence and the other health outcome data presented in the report, there may be future environmental concerns related to the landfill that need to be addressed. MDPH will continue to evaluate environmental sampling data that are collected for the landfill, to assess the significance of the data with respect to the health of nearby residents in the communities of Northampton and Easthampton.

Q23. Does MDPH recommend any follow-up?

A. The MDPH/BEH will continue to monitor the incidence of cancer in the city of Northampton and town of Easthampton through the Massachusetts Cancer Registry. In addition, as discussed above, MDPH will review and evaluate environmental sampling data to assess potential public health impacts.

Q24. Where can I obtain a copy of the report *Evaluation of Health Outcome Data in Northampton and Easthampton, MA and among Neighborhoods in Closest Proximity to the Northampton Regional Landfill*?

A. The full report is available on the MDPH website at http://www.mass.gov/dph/ceh.

Q25. Who should I contact for more information?

A. Massachusetts Department of Public Health
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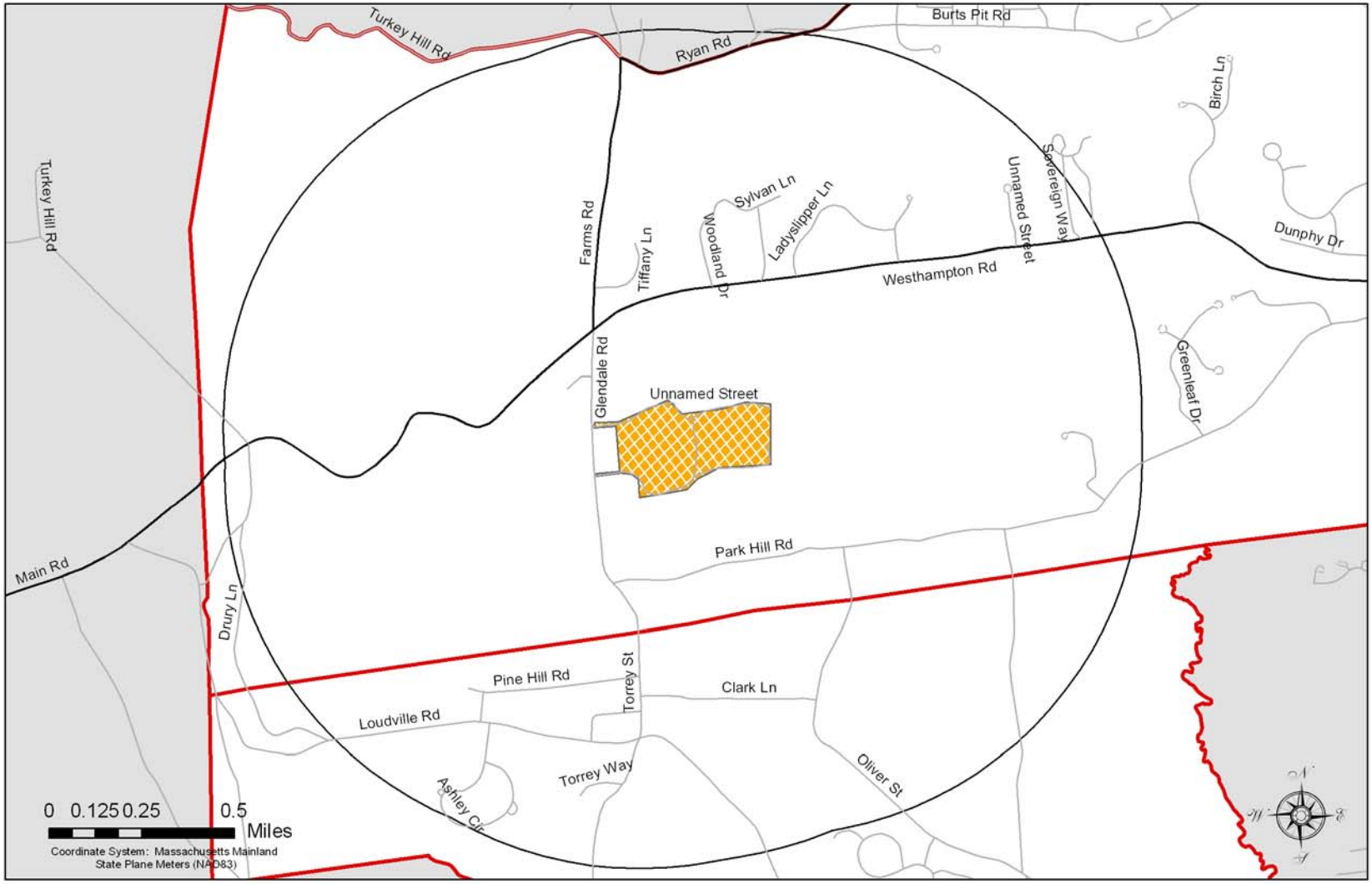
http://www.mass.gov/dph/ceh

Streets within one-mile of the Northampton Regional Landfill



Bureau of BEH Environmental Health

<cg>, <9/19/2007>

Geographic data supplied by: Massachusetts Executive Office of Environmental Affairs, MassGIS; Geographic Data Technology, Inc.

One-mile Radius
Northampton Regional Landfill
Census Tracts