



TOWN OF WAYLAND

41 COCHITUATE ROAD
WAYLAND, MASSACHUSETTS 01778

Julia Junghanns, R.S., C.H.O.
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PRESS RELEASE FROM THE WAYLAND BOARD OF HEALTH

March 23, 2016

The Board of Health would like to share with the public communication between the Board and the Massachusetts Department of Public Health (MDPH) regarding breast cancer incidence in Wayland. Based on a report issued by the MDPH in 2011 (Cancer Incidence in Massachusetts, 2004-2008), the Board of Health raised questions regarding a higher than expected incidence of breast cancer in the Town. Due to the higher than expected incidence of breast cancer in Wayland, In 2012 and 2013, the Board requested additional analysis be done by the MDPH, with regard to impact due to geographic significance, residential history and proximity to hazardous waste sites in town (the Dow site, the former dump at the Middle School location, and the former Watertown Dairy site). According to MDPH, these studies have been completed, and show no link between breast cancer incidence and hazardous waste sites. The most recent report received in November 2015 indicates that breast cancer incidence in Wayland is consistent with what would be expected based on population. For more information including official correspondence and reports please refer to the Wayland Health Department website: http://www.wayland.ma.us/Pages/waylandMA_Health/health and click on MDPH Breast Cancer Study correspondence and reports.



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TOWN OF WAYLAND
BOARD OF HEALTH

January 7, 2016

Julia Junghanns
Director of Public Health
41 Cochituate Road
Wayland, MA 01778

Subject: MDPH/BEH Follow-up on Breast Cancer Incidence in Wayland

Dear Ms. Junghanns:

Thank you for your letter to the Massachusetts Department of Public Health/Bureau of Environmental Health (MDPH/BEH) in which you requested analyses related to the incidence of breast cancer in Wayland. As you know, at your request, MDPH/BEH previously conducted reviews of breast cancer incidence data for Wayland that were reported to you in letters dated July 19, 2012, and December 4, 2012. In your follow-up letter of August 16, 2013, you requested additional analyses of the geographic distribution of women's residences diagnosed with breast cancer relative to the location of specific hazardous waste sites as well as a review of their residential history. This letter presents the findings of these additional analyses.¹

At the time of our initial analysis, the incidence of breast cancer for the years 2004-2008 was reviewed for Wayland and its two census tracts (CTs). In Wayland as a whole (combining CTs 3661 and 3662), breast cancer incidence in females was statistically significantly elevated. Upon closer examination, we saw that the incidence in CT 3662 was statistically significantly higher than the statewide experience, while the incidence in CT 3661 was not statistically significantly different than the statewide experience. We then focused our evaluation on CT 3662, and reported to you that the elevation appeared to be related to early screening for breast cancer and reproductive risk factors in Wayland women.

Hazardous Waste Site Reviews

Based on your correspondence of August 2013 and subsequent phone conversations with a Wayland resident following the release of MDPH/BEH's analyses, three sites were identified as areas of interest: the former Watertown Dairy at 6 Moore Road, Wayland Middle School at 201 Main Street, and the

¹ This work was supported in part by funds from a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR), U.S. Department of Health and Human Services. This document has not been reviewed or cleared by ATSDR.

former Dow Chemical site at 412 Commonwealth Road. A brief summary of the history of each property and the results of a review of the geographic distribution of breast cancer diagnoses near the sites are provided.

The Former Watertown Dairy and Dow Chemical Site have been regulated under the statewide hazardous waste site cleanup program administered by the Massachusetts Department of Environmental Protection (MassDEP). The Massachusetts Contingency Plan (MCP) was established in 1983 under Chapter 21E of Massachusetts General Laws (M.G.L. c21E, 310 CRM 40.0000) and authorizes MassDEP to enforce regulations governing the investigation and cleanup of oil and hazardous material release sites, known as "21E sites." Releases can vary widely with respect to the source, materials involved, amount released, and geographic extent of contamination.

Former Watertown Dairy Site (6 Moore Road)

The former Watertown Dairy is a 248-acre property located at 6 Moore Road in CT 3662. The site was used as an unlicensed dump in the 1970s for car batteries, rubber products, chemicals associated with rubber manufacturing, and medical and biological waste (Nangle 1991). The property was acquired in 1980 by the Farmers Home Administration, a former US government agency (Nangle 1991). In the early 1980s, the Town of Wayland explored developing a new municipal drinking water well nearby. In 1986, the town considered purchasing the property and discovered it to be an unlicensed landfill during a site assessment. Remediation activities were conducted at the property including waste and soil removal, redistribution of clean native soil, removal of underground fuel storage tanks, and the instillation of four groundwater monitoring wells. The groundwater initially contained petroleum hydrocarbon contamination and thus was routinely monitored for volatile organic compounds (VOCs), base/neutral extractables, total petroleum hydrocarbons, total lead and total nickel. No contaminants were detected at the completion of groundwater monitoring, which continued for two years after site closure. Site remediation was completed in 1989 (Nangle 1991).

MDPH/BEH reviewed the geographic distribution of addresses at the time of diagnosis for women diagnosed with breast cancer during 2004-2008 in Wayland in relation to the former Watertown Dairy site. No unusual spatial patterns were observed. The residences of women diagnosed during 2004-2008 followed population density patterns.

The Wayland Middle School (201 Main Street)

The Wayland Middle School is adjacent to the Wayland Highway Department office and maintenance building on Main Street in Wayland. A former disposal area lies beneath the highway department building and along the access road to the Middle School (CDM 2000). The landfill operated from the early 1900's to 1958 and was used primarily for disposing of municipal waste, which was regularly burned during the landfill's operating years (Cygnus 1994). In 2000, site investigations were conducted to establish the size and location of the historic dump and to identify potential contaminants at the Wayland Highway Department building (Cygnus 1999). Although the landfill is unlined, site investigations using electromagnetic survey techniques indicated there has been no leaching or contamination of soil beneath the Wayland Highway Department and Wayland Middle School (CDM 2000, Cygnus 1994). The Wayland Middle School itself has reported no releases of chemicals or hazardous waste, based on a search of the MassDEP 21E site files. Around 1988, the eastern portion of

the landfill was covered by petroleum-contaminated soil, and then paved over with asphalt. The levels of petroleum constituents in the soil tested below MassDEP requirements for contaminant levels in final landfill cover (Cygnus 1994).

MDPH/BEH reviewed the geographic distribution of addresses at the time of diagnosis for individuals diagnosed with breast cancer during 2004-2008 in Wayland in relation to Wayland Middle School. No unusual spatial patterns were observed in the area around the Wayland Middle School or Highway Department. The residences of women diagnosed during 2004-2008 followed population density patterns.

The former Dow Chemical Site (412 Commonwealth Road)

The former Dow Chemical Site located at 412 Commonwealth Road in Wayland was a chemical factory primarily focused on research. Dow Chemical purchased the property in 1963 and operated it until 1988. In 1995, the property was sold and then purchased again by Dow Chemical due to evidence of contamination at the site. Remediation was coordinated by MassDEP and completed in 2000 (MDPH 2001). In response to a request by the Wayland Board of Health, MDPH issued a health consultation report in 2001 which evaluated potential pathways of exposure to chemical contamination on the property as well as the incidence of cancer in the area surrounding the site. The health consultation can be found at: <http://www.mass.gov/eohhs/docs/dph/environmental/investigations/wayland/wayland.pdf>.

MDPH/BEH reviewed the geographic distribution of addresses at the time of diagnosis for individuals diagnosed with breast cancer during 2004-2008 in Wayland in relation to the former Dow Chemical site. No unusual spatial patterns were observed. The residences of women diagnosed during 2004-2008 followed population density patterns.

Residential History:

As requested, MDPH/BEH reviewed the residential history of women diagnosed with breast cancer during 2004-2008 in census tract 3662, the census tract where breast cancer incidence was statistically significantly elevated during this time period. Residential history information was obtained from the available street listings maintained by the Town Clerk. Information on five individuals could not be found in the street listings and two individuals were reported with two diagnoses. Of the 50 individuals for whom residential history information could be obtained, 28% (n=14) were found to have lived at their residence for less than 10 years, with half of those being short-term residents (<4 years). This is important to keep in mind as cancer in general has a long period of development (latency period) that can range from 10 to 30 years, particularly for solid tumors (Bang 1996, Frumkin 1995).

Historical Information on Breast Cancer Incidence

MDPH/BEH also reviewed the incidence of breast cancer in Wayland from 1982-2003. Breast cancer occurred about as expected in the town as a whole and its two CTs during these time periods: 1982-1992, 1990-1995, 1994-1998, and 1999-2003. As reported earlier, there was a statistically significant elevation in breast cancer incidence in Wayland from 2004-2008 (84 observed vs. 58.2 expected, SIR = 144.3, CI = 115.1-178.6) The most recent available data from the Massachusetts Cancer Registry

City/Town Supplement show that breast cancer diagnoses were not statistically elevated in Wayland during the 2007- 2011 time period (77 observed vs. 61.5 expected, SIR = 125.1, CI = 98.7-156.4).

Conclusions

MDPH/BEH conducted additional analyses to address your questions on the possible role of residential history and proximity to three properties in Wayland in relation to the elevated incidence of breast cancer in Wayland, specifically in census tract 3662 during 2004-2008. No unusual spatial patterns of breast cancer diagnoses during 2004-2008 were observed in close proximity to the three sites identified as areas of interest. In addition, approximately one-quarter of the women diagnosed with breast cancer in CT 3662 during this time period lived in their homes for less than 10 years prior to their diagnosis. This is important to keep in mind as breast cancer has a long period of development (latency period) that can range from 10 to 30 years.

Consistent with the findings reported in our original letter, the information compiled suggests that socioeconomic status factors and early screening likely played a contributing role in the incidence of breast cancer in Wayland. Reproductive and lifestyle factors (age at first full-term birth, physical activity, diet, cultural practices, etc.) are suggested by research as possible contributors to increased lifetime risk of breast cancer. Maternal age at first birth was reviewed for women in Wayland using MassCHIP, an MDPH database. For census year 2000, 86% of women had their first full-term birth at 30 years or older compared to 43% for Massachusetts as a whole. MDPH also reviewed cancer staging information for women diagnosed with breast cancer in Wayland from 2004-2008. The staging data indicate that women in Wayland are being screened for breast cancer earlier and/or more regularly than women statewide. It is possible that reproductive and lifestyle factors such as age at first birth and early screening for breast cancer, at least in part, may be contributing to high breast cancer in the community.

We hope that this information is helpful. Please feel free to contact us if you have any questions.

Sincerely,

Jan Sullivan

Jan Sullivan, Acting Director
Bureau of Environmental Health

Cc: Linda Segal

① Life time risk higher for women with lower socioeconomic status
② age at birth
③ women screened earlier + at a greater rate than women in MA
in part contributing

References:

- Bang KM. 1996. Epidemiology of occupational cancer. *J Occup Med.* 11(3):467-85.
- Camp Dresser & McKee (CDM). 2000. Wayland Highway Department Environmental Investigation of Former Wayland Town Dump. Wayland, Massachusetts. February 2000.
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September 17, 2013

Julia Junghanns, R.S., C.H.O.
Director of Public Health
Board of Health
Town of Wayland
41 Cochituate Road
Wayland, MA 01778

Subject: Your letter to MDPH of August 16, 2013

Dear Ms. Junghanns:

Thank you for your letter of August 16, 2013 to the Massachusetts Department of Public Health /Bureau of Environmental Health (MDPH/BEH) in which you request analyses related to the incidence of breast cancer in Wayland.

As you know, MDPH/BEH recently analyzed breast cancer incidence data for Wayland and reported these analyses in a letter to you dated July 19, 2012. Following that analysis, you asked for additional work, which we conducted, and reported to you in a letter dated December 4, 2012. These letters included analysis of breast cancer data for the 5-year period of 2004 through 2008.

As you know, MDPH also issued a report in June 1997 in which cancer incidence data for the 11-year period of 1982-1992 were evaluated in relation to the former Dow Chemical site at 412 Commonwealth Road in Wayland. In this report, we concluded that cancer incidence (including breast cancer) in the area of the former Dow Chemical site generally occurred less often than expected. The report also evaluated cancer patterns in relation to 13 other disposal sites regulated by the Massachusetts Department of Environmental Protection at the time; no unusual patterns were seen.

After review of our two recent letters referred to above, our epidemiological analyses seemed to suggest that socio-economic factors and early screening likely played an important role in the elevated incidence of breast cancer in Wayland. However, in your most recent letter, you specifically ask if MDPH/BEH could consider the residential history and proximity to hazardous waste sites in Wayland of women diagnosed with breast cancer. You also request that we review

additional years of historical data. We can add this most recent request to our work plan, however, due to the backlog of other requests, it is unlikely that we will be able to begin the additional analyses for at least a year. Please feel free to call Jan Sullivan at (617) 624-5757 if you would like to modify this request for assistance or if you have any questions.

Sincerely,

A handwritten signature in black ink, appearing to read "Suzanne K. Condon", written over the typed name and title.

Suzanne K. Condon, Associate Commissioner
Director, BEH

Cc: Martha J. Steele, Deputy Director, BEH
Jan Sullivan, Director, Community Assessment Program, BEH



TOWN OF WAYLAND

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Julia Junghanns, R.S., C.H.O.
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August 16, 2013

The Commonwealth of Massachusetts
Executive Office of Health and Human Services
Department of Public Health
Bureau of Environmental Health
Attention: Jan Sullivan, Director, Community Assessment Program
250 Washington Street
Boston, Mass 02108-4619

Subject: Letter received dated December 4, 2012 regarding Breast Cancer incidence in Wayland

Dear Ms. Sullivan,

We received your letter in response to our letter dated September 27, 2012. We appreciate your follow-up and response by providing this information. After review of your letter by the Board of Health and Health Department staff we formally request that the Department of Public Health conduct additional analysis on breast cancer incidence in Wayland (as referenced in the last paragraph of your letter dated 12/4/12). We have concerns regarding breast cancer incidence and geographic significance/residential history and proximity to hazardous waste sites including the Dow site, and Watertown Dairy, among other things that could be looked into including prior years of the Cancer Registry.

Thank you in advance for your attention regarding these questions. We look forward to hearing back from you.

Sincerely,

Julia Junghanns, R.S., C.H.O.
Director of Public Health
Board of Health
Town of Wayland

Cc: Suzanne K. Condon, Associate Commissioner,
Director, Bureau of Environmental Health
Martha J. Steele, Deputy Director, BEH



The Commonwealth of Massachusetts
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DEC 06 2012

TOWN OF WAYLAND
BOARD OF HEALTH

December 4, 2012

Julia Junghanns
Director of Public Health
Town of Wayland
41 Cochituate Road
Wayland, MA 01778

Subject: Your Letter to MDPH of September 27, 2012

Dear Ms. Junghanns:

Your letter of September 27, 2012 to Associate Commissioner Suzanne K. Condon, Director of the Massachusetts Department of Public Health's Bureau of Environmental Health, (MDPH/BEH) was referred to the BEH Community Assessment Program (CAP) for follow-up. You requested additional information related to an analysis of breast cancer incidence data for the Town of Wayland conducted by the CAP and reported to you in a letter dated July 19, 2012.

In your most recent correspondence, you asked if we had considered the MDPH June 1997 study of cancer incidence in Wayland in our recent evaluation of breast cancer incidence data. The July 2012 letter was based on a review of the most recent five years of breast cancer incidence data (2004-2008) available through the Massachusetts Cancer Registry (MCR) while the June 1997 report covered the 11-year period of 1982-1992. As you may know, breast cancer incidence in Wayland and its two census tracts occurred about as expected during the 11-year period of 1982-1992. No statistically significant elevations in breast cancer in either the town as a whole or its census tracts occurred for the 1982-1992 period when compared to the statewide experience. When preparing an evaluation for a community it is standard practice for CAP staff to review any reports previously prepared; therefore, the information from the previous report was considered.

Your next question asked about comparisons to other communities. To analyze breast cancer incidence in Wayland, the CAP used the breast cancer experience of the state as a whole for comparison. The Standardized Incidence Ratio (SIR) is used routinely by MDPH to evaluate a community's cancer experience in relation to that of the state. The SIR is the most appropriate statistic for conducting small-area analyses. Because of how an SIR is calculated, it is not

appropriate to compare SIRs among communities; the SIR does not account for differences in the age distribution of the communities and age is an important risk factor for cancer. Attached is a detailed explanation of an SIR.

With respect to how Wayland may compare with other communities of similar socioeconomic status, as stated in our July 2012 letter, the lifetime risk of breast cancer is increased in women of higher socioeconomic status. Research suggests that this may be due to reproductive and lifestyle factors (age at first full-term birth, physical activity, diet, cultural practices, etc.). In your recent letter, you ask if there are other communities in the Commonwealth with similarly elevated breast cancer incidence. Other communities of higher SES in the metro west area of Boston – Acton, Ashland, Newton, Needham, and Concord for example – also have breast cancer incidence rates that are statistically significantly higher than would be expected based on the statewide experience.

Finally, you wanted to know about whether we researched the residential history of the women in Wayland who have been diagnosed with breast cancer and whether we investigated hazardous waste sites in Wayland in relation to breast cancer incidence. While we did not assess the role of residential history or proximity to hazardous waste sites in our assessment of breast cancer incidence, we believe that the information compiled to date suggests that SES factors and early screening more likely played a role. However, if you still would like us to conduct additional analyses, we would be happy to discuss this further.

Please feel free to contact us at (617) 624-5757.

Sincerely,



Jan Sullivan, Director
Community Assessment Program

Cc: Suzanne K. Condon, Associate Commissioner
Director, Bureau of Environmental Health
Martha J. Steele, Deputy Director, BEH

Explanation of a Standardized Incidence Ratio (SIR) And 95% Confidence Interval

To determine whether an elevation is occurring among individuals diagnosed with cancer in a community or census tract (CT), cancer incidence data are tabulated by gender according to eighteen age groups to compare the observed number of cancer diagnoses to the number that would be expected based on the statewide cancer rate.

Specifically, an SIR is the ratio of the observed number of cancer diagnoses in an area to the expected number of diagnoses multiplied by 100. Age-specific statewide incidence rates are applied to the population distribution of a community to calculate the number of expected cancer diagnoses. The SIR is a comparison of the number of diagnoses in the specific area (i.e., community or census tract) to the number of expected diagnoses based on the statewide rate. Comparison of SIRs between communities or census tracts is not possible because each of these areas has different population characteristics.

To calculate an SIR, it is necessary to obtain accurate population information. Population is interpolated based on U.S. census data for the community of interest. Midpoint population estimates are calculated for each time period evaluated. To estimate the population between census years, an assumption is made that the change in population occurs at a constant rate throughout the ten-year interval between each census.¹

A CT is a geographic subdivision of a city or town designated by the United States Census Bureau. Because age group and gender-specific population information is necessary to calculate incidence rates, the CT is the smallest geographic area for which cancer rates can be accurately calculated. Specifically, a CT is a smaller statistical subdivision of a county as defined by the U.S. Census Bureau. CTs usually contain between 1,500 and 8,000 persons and are designed to be homogenous with respect to population characteristics (U.S. DOC 2000).

An SIR of 100 indicates that the number of cancer diagnoses observed in the population evaluated is equal to the number of cancer diagnoses expected in the comparison or "normal" population. An SIR greater than 100 indicates that more cancer diagnoses occurred than expected and an SIR less than 100 indicates that fewer cancer diagnoses occurred than expected. Accordingly, an SIR of 150 is interpreted as 50% more diagnoses than the expected number; an SIR of 90 indicates 10% fewer diagnoses than expected.

Caution should be exercised, however, when interpreting an SIR. The interpretation of an SIR depends on both the size and the stability of the SIR. Two SIRs can have the same size but not the same stability. For example, an SIR of 150 based on four expected diagnoses and six observed diagnoses indicates a 50% excess in cancer, but the excess is actually only two diagnoses. Conversely, an SIR of 150 based on 400 expected diagnoses and 600 observed diagnoses represents the same 50% excess in cancer, but because the SIR is based upon a greater number of diagnoses, the estimate is more stable. It is very unlikely that 200 excess diagnoses of

¹ Using slightly different population estimates or statistical methodologies, such as grouping ages differently or rounding off numbers at different points during calculations, may produce slightly different results.

cancer would occur by chance alone. As a result of the instability of incidence rates based on small numbers of diagnoses, SIRs are not calculated when fewer than five diagnoses are observed for a particular cancer type.

To help interpret or measure the stability of an SIR, the statistical significance of an SIR can be assessed by calculating a 95% confidence interval (95% CI) to determine if the observed number of diagnoses is "statistically significantly different" from the expected number or if the difference may be due solely to chance (Rothman and Boice 1982). Specifically, a 95% CI is the range of estimated SIR values that has a 95% probability of including the true SIR for the population. If the 95% CI range does not include the value 100, then the study population is significantly different from the comparison or "normal" population. "Significantly different" means there is less than 5% percent chance that the observed difference (either increase or decrease) in the rate is the result of random fluctuation in the number of observed cancer diagnoses.

For example, if a confidence interval does not include 100 and the interval is above 100 (e.g., 105-130), then there is a statistically significant excess in the number of cancer diagnoses. Similarly, if the confidence interval does not include 100 and the interval is below 100 (e.g., 45-96), then the number of cancer diagnoses is statistically significantly lower than expected. If the confidence interval range includes 100, then the true SIR may be 100. In this case, it cannot be determined with certainty that the difference between the observed and expected number of diagnoses reflects a real cancer increase or decrease or is the result of chance. It is important to note that statistical significance alone does not necessarily imply public health significance. Determination of statistical significance is just one tool used to interpret cancer patterns in a community.

In addition to the range of the estimates contained in the confidence interval, the width of the confidence interval also reflects the stability of the SIR estimate. For example, a narrow confidence interval, such as 103-115, allows a fair level of certainty that the calculated SIR is close to the true SIR for the population. A wide interval, for instance 85-450, leaves considerable doubt about the true SIR, which could be much lower than or much higher than the calculated SIR. This would indicate an unstable statistic. Again, due to the instability of incidence rates based on small numbers of diagnoses, statistical significance is not assessed when fewer than five diagnoses are observed.

References

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TOWN OF WAYLAND

Board of Health

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September 27, 2012

The Commonwealth of Massachusetts
Executive Office of Health and Human Services
Department of Public Health
Bureau of Environmental Health
Attention: Suzanne K. Condon, Associate Commissioner, Director BEH
250 Washington Street
Boston, Mass 02108-4619

Subject: Letter received dated July 19, 2012 regarding Breast Cancer incidence in Wayland

Dear Ms. Condon,

We received your letter regarding breast cancer incidence in Wayland including your review of geographic distribution of breast cancer diagnoses in each census tract to assess if the spatial distribution appeared unusual based on residence at diagnosis. We appreciate your follow-up and response by providing this information.

As you outlined in your letter, this was requested by our office staff during a telephone conversation when the cancer incidence report dated December 28, 2011 was discussed (covering years 2004-2008). This discussion was initiated due to the report reflecting breast cancer incidence in females being statistically significantly elevated with 85 diagnoses observed when approximately 59 diagnoses were expected based on the statewide breast cancer data experience during that time.

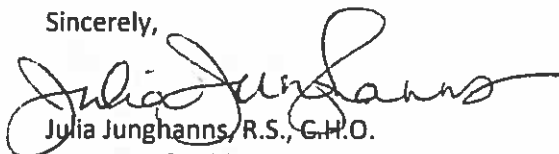
After review of your letter and study by the Board of Health and Health Department staff we request additional information and we have outlined our questions below.

- Upon review of our files it has come to our attention that the Massachusetts Department of Public Health conducted a study on cancer incidence in Wayland in June 1997. Was this prior assessment and data taken into consideration to complete the current study?

- We would like to know what communities were used to compare with Wayland and if these communities are similar to Wayland. If communities similar to Wayland were not used we request that a comparison of like communities be performed.
- When the current study was conducted was the length of time of residency taken into consideration? For example; on average how long have women lived in Wayland at the time of their breast cancer diagnosis? Are they residents who lived in town for 20 years or more?
- Are there other towns in the Commonwealth that are finding similar elevated incidences of breast cancer?
- We request that you provide a finer resolution and level of detail than the explanation referenced by socioeconomic status as the contributor to statistically significant breast cancer incidence in Wayland.
- When the study was performed were areas of hazardous waste sites in Wayland referenced in relation to the incidence of breast cancer, and were areas reviewed as potential cancer clusters?

Thank you in advance for your prompt attention regarding these questions. We look forward to hearing back from you.

Sincerely,



Julia Junghanns, R.S., C.H.O.
Director of Public Health
Board of Health
Town of Wayland

Cc: Martha J. Steele, Deputy Director, BEH
Jan Sullivan, Director, Community Assessment Program, BEH



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July 19, 2012

Julia Junghanns, Director
Wayland Health Department
41 Cochituate Rd.
Wayland, MA 01778

BOARD OF HEALTH
TOWN OF WAYLAND

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Dear Ms. Junghanns:

As you may recall, staff in the Community Assessment Program (CAP) within the Massachusetts Department of Public Health/Bureau of Environmental Health (MDPH/BEH) discussed breast cancer incidence data with you in a phone conversation on November 9, 2011. At that time, the incidence of breast cancer in Wayland for the years 2004-2008 was reviewed, the most recent 5-year time period available from the Massachusetts Cancer Registry (MCR). During the conversation, you asked that we provide you with a summary of our discussion related to the review of the breast cancer data.

BEH reviewed breast cancer incidence in Wayland and its two census tracts for the years 2004-2008. CT 3661 comprises approximately the lower quarter of Wayland which borders Framingham and Natick. CT 3662 comprises the northern three quarters of Wayland which borders Sudbury and Weston. Table 1 summarizes breast cancer incidence in the two CTs and in Wayland as a whole. No diagnoses occurred in males during this time period. In Wayland as a whole, breast cancer incidence in females was statistically significantly elevated with 85 diagnoses observed when approximately 59 diagnoses were expected, based on the statewide breast cancer experience during this time. In CT3662, there were 57 breast cancer diagnoses during this time when approximately 36 diagnoses were expected; this finding is statistically significantly different from the statewide experience. The number of breast cancer diagnoses in CT3661, the southern portion of Wayland, was elevated but not statistically significantly so. In CT 3661, 27 women were diagnosed with breast cancer when approximately 23 diagnoses would be expected.

We also reviewed the geographic distribution of breast cancer diagnoses in each census tract, to assess if the spatial distribution appeared unusual based on residence at diagnosis. Because Wayland is not densely populated but has close neighborhoods interspersed among undeveloped tracts of land, some women with breast cancer in a few neighborhoods across

Wayland appear to reside in close proximity to one another. In general, however, breast cancer diagnoses in both census tracts followed population density patterns.

Breast cancer is the most common cancer among women, comprising 28% of all new cancer diagnoses in Massachusetts women. The chance of developing invasive breast cancer at some time in a woman's life is about 1 in 8 (12%). A woman's risk of developing breast cancer increases with age, with age being the strongest risk factor for breast cancer. About 1 out of 8 invasive breast cancers are found in women younger than 45, while about 2 out of 3 invasive breast cancers are found in women age 55 or older. Attachment A contains a more detailed discussion of risk factors associated with the development of breast cancer.

In Massachusetts women diagnosed with breast cancer between 2004 and 2008, the average age at diagnosis was 62.1 years. In Wayland women diagnosed during this same period, the average age at diagnosis was 62.8 years while in CTs 3661 and 3662, the average ages at diagnosis were 62.9 and 62.7 years, respectively. Therefore, the average age at diagnosis among Wayland women with breast cancer appears to be consistent with what would be expected based upon the statewide pattern among women with breast cancer.

Lifetime risk of breast cancer is increased in women of higher socioeconomic status (SES) (e.g. income, education, etc.). Research suggests that this may be due to reproductive and lifestyle factors (age at first full-term birth, physical activity, diet, cultural practices, etc.). MDPH reviewed data on maternal age at first birth, available through MassCHIP, for Wayland. For the census year 2000, the percentage of women in Wayland who had their first child at age 30 or older was 86% while, for Massachusetts as a whole, the percentage was 43%. According to the 2000 U.S. Census data available on MassCHIP, approximately 32% of Wayland women age 25 or older have a graduate or professional degree compared to 12% statewide.

MDPH reviewed cancer staging information for women diagnosed with breast cancer in Wayland during 2004-2008. Staging describes the extent of spread of an individual's cancer. From a public health perspective, earlier breast cancer staging reflects to some extent that women are being screened early and regularly for breast cancer whereas distant staging may reflect a lack of access to early screening. In Wayland, 81% of women were diagnosed at the local stage of breast cancer compared to 66% statewide. The same percentages of women (81%) in both CTs were also diagnosed at the local stage. These findings may indicate that women in Wayland are being screened for breast cancer earlier and/or more regularly than women statewide.

Based on staging data available through the MCR, it appears that women in Wayland are being screened earlier and at a greater rate than women in Massachusetts as a whole. In addition, based on socioeconomic data for Wayland, it is possible that reproductive factors such as age at first birth may be playing a role in incidence of breast cancer in the community. These factors, at least in part, may be contributing to higher rates of breast cancer in the community.

You may want to view our Environmental Public Health Tracking (EPHT) portal at <http://matracking.ehs.state.ma.us> to view the Standardized Incidence Ratios (SIRs) for various cancer types by census tract. The data presented on the portal cover the 2000 through 2006 time period; over the next year we will be updating the portal with additional years of cancer incidence data.

We hope that this information is helpful. Also, enclosed is a risk factor summary for breast cancer prepared by the CAP that may be helpful. Please feel free to call us at (617) 624-5757 if you have any questions.

Sincerely,

A handwritten signature in black ink, appearing to read "Suzanne K. Condon". The signature is fluid and cursive, with a large initial "S" and a long horizontal flourish at the end.

Suzanne K. Condon, Associate Commissioner
Director, BEH

Cc: Martha J. Steele, Deputy Director, BEH
Jan Sullivan, Director, Community Assessment Program, BEH

TABLE 1
Breast Cancer Incidence
Wayland, Massachusetts
2004-2008

Census Tract	Total				Males				Females			
	Obs	Exp	SIR	95% CI	Obs	Exp	SIR	95% CI	Obs	Exp	SIR	95% CI
3661	27	22.9	119	78 -- 173	0	0.2	NC	NC -- NC	27	22.8	119	78 -- 173
3662	57	36.5	157	* 119 -- 204	0	0.3	NC	NC -- NC	57	36.2	157	* 119 -- 204
City Total ¹	85	59.5	143	* 114 -- 177	0	0.5	NC	NC -- NC	85	59.0	144	* 115 -- 178

¹ Cases for which census tract designation was not possible are included in the town total.

Note: SIRs are calculated based on the exact number of expected diagnoses.

Expected number of diagnoses presented are rounded to the nearest tenth.

SIRs and 95% CIs are not calculated when the observed number is < 5.

Obs = Observed number of diagnoses

Exp = Expected number of diagnoses

SIR = Standardized Incidence Ratio

95% CI = 95% Confidence Interval

NC = Not calculated

* = Statistical significance

Data Source: Massachusetts Cancer Registry, Bureau of Health Information, Statistics, Research and Evaluation, Massachusetts Department of Public Health.

JUL 23 2012

TOWN OF WAYLAND
BOARD OF HEALTH**How to Use this Factsheet**

This risk factor summary was developed to serve as a general fact sheet. It is an overview and should not be considered exhaustive. For more information on other possible risk factors and health effects being researched, please see the References section.

A risk factor is anything that increases a person's chance of developing cancer. Some risk factors can be controlled while others cannot. Risk factors can include *hereditary conditions, medical conditions or treatments, infections, lifestyle factors, or environmental exposures*. Although risk factors can influence the development of cancer, most do not directly cause cancer. An individual's risk for developing cancer may change over time due to many factors and it is likely that multiple risk factors influence the development of most cancers. Knowing the risk factors that apply to specific concerns and discussing them with your health care provider can help to make more informed lifestyle and health-care decisions.

For cancer types with environmentally-related risk factors, an important factor in evaluating cancer risk is the route of exposure. This is particularly relevant when considering exposures to chemicals in the environment. For example, a particular chemical may have the potential to cause cancer if an individual inhales the chemical but that same chemical may not increase the risk of cancer if an individual has skin contact with the chemical. In addition, the dose and duration of time one might be exposed to an environmental agent is important in considering whether an adverse health effect might be expected.

Gene-environment interactions are another important area of cancer research. An individual's risk of developing cancer may depend on a complex interaction between their genetic make-up and exposure to an environmental agent (for example, a virus or a chemical contaminant). This may explain why some individuals have a fairly low risk of developing cancer as a result of an environmental factor or exposure, while others may be more vulnerable.

Key Statistics

Breast cancer is the most frequently diagnosed cancer among women in the United States, except for skin cancers. The American Cancer Society estimates that in 2012, approximately 226,870 women in the U.S. and 5,480 women in Massachusetts will be diagnosed with breast cancer and the disease will account for approximately 29% of all new cancer diagnoses in females. Between 2004 and 2008, invasive breast cancer accounted for 28.5% of cancer diagnoses in females in Massachusetts.

In the United States, breast cancer rates stabilized in the early 1990s, increased in the latter half of the 1990s, and dropped sharply between 2002 and 2003. The sharp drop has been attributed to decreased use of menopausal hormones following the 2002 publication of the Women's Health Initiative study results. This study linked the use of hormone

therapy to an increased risk of breast cancer. In Massachusetts, the incidence of invasive breast cancer in females remained stable over the years 2004-2008.

The chance of developing invasive breast cancer at some time in a woman's life is about 1 in 8. Women are 100 times more likely than men to develop this disease and risk increases with age. Men can also develop breast cancer, but male breast cancer is rare, accounting for less than 1% of all breast cancer cases. For more information on breast cancer in men, visit the American Cancer Society website at www.cancer.org.

A woman's risk of developing breast cancer increases with age. About 12-13% invasive breast cancers are found in women younger than 45, while about 66% are found in women age 55 or older. White women are slightly more likely to develop breast cancer than women of other races and ethnicities.

Types of Breast Cancer

The term "cancer" is used to describe a variety of diseases associated with abnormal cell and tissue growth. Cancers are classified by the location in the body where the disease originated (the primary site) and the tissue or cell type of the cancer (histology).

There are several types of breast cancer, although some of them are quite rare. In some cases a single breast tumor can have a combination of these types or have a mixture of invasive and *in situ* cancer.

In situ breast cancers are considered the earliest stage of cancer, when it is confined to the layer of cells where it began. They have not invaded into deeper tissues in the breast or spread to other organs in the body, and are sometimes referred to as non-invasive breast cancers. The remainder of this risk factor summary pertains to invasive breast cancers. Additional information on *in situ* breast cancers and other benign breast conditions can be found at www.cancer.org (American Cancer Society).

An invasive, or infiltrating, cancer is one that has already grown beyond the layer of cells where it started (as opposed to carcinoma *in situ*). Most breast cancers are invasive carcinomas -- either invasive ductal carcinoma or invasive lobular carcinoma.

Invasive ductal carcinoma (IDC) is the most common type of breast cancer and accounts for 75%–80% of all breast cancers. IDCs begin in the cells lining the milk duct of the breast, break through the wall of the duct, and grow into the fatty tissue of the breast. Once this occurs, IDCs may spread (metastasize) to other parts of the body through the lymphatic system and bloodstream.

Invasive lobular carcinoma (ILC) starts in the milk-producing glands (lobules) and account for approximately 10% of invasive breast cancers. Like IDC, it can metastasize to other parts of the body. Invasive lobular carcinoma may be harder to detect by a mammogram than invasive ductal carcinoma.

Other less common types of invasive breast cancer include:

- inflammatory breast cancer
- triple-negative breast cancer
- medullary carcinoma
- metaplastic carcinoma
- mucinous carcinoma
- Paget's disease
- tubular carcinoma
- papillary carcinoma
- adenoid cystic carcinoma or adenocystic carcinoma
- Phyllodes tumor
- angiosarcoma

Established Risk Factors

Hereditary Conditions

Having a family history of breast cancer increases a woman's risk of developing the disease. Women who have a first-degree relative (e.g. mother, sister) with breast cancer have about twice the risk of developing breast cancer themselves. Having two first-degree relatives with this disease increases a woman's risk by five-fold. Overall, about 20-30% of women with breast cancer have a family member with the same disease. Therefore, 70-80% of women who have breast cancer have no familial link to the disease.

About 5-10% of breast cancer diagnoses are thought to be due to an inherited genetic mutation. Most of these mutations occur in the *BRCA1* and *BRCA2* genes. Other genes that may lead to an increased risk for developing breast cancer include *ATM*, *CHEK2*, *p53* and *PTEN*. Women who inherit these gene mutations have up to an 80% chance of developing breast cancer during their lifetime.

Medical Conditions and Treatments

Certain benign breast conditions may increase one's risk for breast cancer. Women with proliferative lesions without atypia (i.e., abnormal or unusual cells), which have excessive growth of cells in the ducts or lobules of breast tissue have a slight increased risk of developing breast cancer. Proliferative lesions with atypia, when the cells are excessively growing and no longer appear normal, raise one's risk by 4 to 5 times. Women with denser breast tissue (as seen on a mammogram) have more glandular tissue and less fatty tissue, and have a higher risk of breast cancer.

A woman with cancer in one breast is 3 to 4 times more likely to develop a new cancer in the other breast or in another part of the same breast. In addition, a previous diagnosis of an *in situ* breast cancer puts a woman at increased risk for an invasive breast cancer.

Cumulative exposure of the breast tissue to estrogen is associated with breast cancer risk. Several factors can influence estrogen levels. Women who started menstruating at an early age (before age 12) and/or went through menopause at a later age (after age 55) have a slightly higher risk of breast cancer. Also, women who have had no children or those whose first pregnancy occurred when they were over the age of 30 have an increased risk

for developing breast cancer. Women who have had more children and those who have breast-fed seem to be at lower risk.

Use of hormone replacement therapy is another factor that may affect breast cancer risk. Long-term use (several years or more) of combined post-menopausal hormone therapy (PHT) increases the risk of breast cancer. The increased risk from combined PHT appears to apply only to current and recent users. A woman's breast cancer risk seems to return to that of the general population within 5 years of stopping combined PHT. The use of estrogen-only replacement therapy (ERT) does not appear to increase the risk of breast cancer significantly but when used long term (for more than 10 years), ERT has been found to increase the risk of both ovarian and breast cancer in some studies.

Women who had radiation therapy to the chest area as treatment for another cancer are at significantly increased risk for breast cancer. This risk appears to be highest if the radiation is given during adolescence or puberty, when the individual's breasts are developing.

From the 1940s through the 1960s some pregnant women were given the drug diethylstilbestrol (DES) because it was thought to lower their chances of miscarriage. These women have a slightly increased risk of developing breast cancer. A woman whose mother took DES while pregnant may also have a slightly higher risk of breast cancer.

Lifestyle Factors

Alcohol consumption has also been associated with increased risk for breast cancer. Compared with non-drinkers, women who consume one alcoholic drink a day have a very small increase in risk whereas those who have 2 to 5 drinks daily have about 1½ times the risk of women who drink no alcohol.

Possible Risk Factors

Environmental Exposures

A great deal of research has been reported and more is being done to understand possible environmental influences on breast cancer risk. Of special interest are compounds in the environment that have been found in animal studies to have estrogen-like properties, which could in theory affect breast cancer risk. For example, substances found in some plastics, certain cosmetics and personal care products, pesticides (such as DDE), and PCBs (polychlorinated biphenyls) seem to have such properties. To date, however, there is not a clear link between breast cancer risk and exposure to these substances.

Lifestyle Factors

Recent studies have indicated that being overweight or obese may put a woman at increased risk of breast cancer, especially after menopause. Similarly, women who are

physically inactive throughout life may have an increased risk of breast cancer. Being active may help reduce risk by preventing weight gain and obesity.

Studies have found that women using oral contraceptives (birth control pills) have a slightly greater risk of breast cancer than women who have never used them, but this risk seems to decline once their use is stopped. Women who stopped using oral contraceptives for more than 10 years do not appear to have any increased breast cancer risk. When thinking about using oral contraceptives, women should discuss their other risk factors for breast cancer with their physician.

Lifetime risk of breast cancer is increased in women of higher socioeconomic status (SES) (e.g. income, education, etc.). Research suggests that this may be due to reproductive and lifestyle factors (age at first full-term birth, physical activity, diet, cultural practices, etc.).

Other Risk Factors That Have Been Investigated

Lifestyle Factors

Though links have been suggested, antiperspirants, bras, and breast implants have all been investigated as possible risk factors for breast cancer but no associations have been found.

The role of cigarette smoking in the development of breast cancer is unclear. Overall, data do not provide strong evidence for an association between active cigarette smoking and breast cancer risk. Some studies suggest a relationship between passive smoking and increased risk for breast cancer; however, confirming this relationship has been difficult due to the lack of consistent results from studies investigating first-hand smoke exposure.

Dietary fat intake is another factor that has been suggested to increase a woman's risk for breast cancer. Though studies have found decreased breast cancer rates in countries with a diet typically lower in fat, studies in the U.S. have not shown an association between the amount of fat in the diet and increased risk of breast cancer.

References/For More Information

Much of the information contained in this summary has been taken directly from the following sources. This material is provided for informational purposes only and should not be considered as medical advice. Persons with questions regarding a specific medical problem or condition should consult their physician.

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