

# LETTER HEALTH CONSULTATION

## REVIEW OF CANCER DATA FOR TOBYHANNA AREA MONROE COUNTY, PA

March 13, 2013

Prepared by:



Pennsylvania Department of Health  
Division of Environmental Health Epidemiology

## Health Consultation: A Disclaimer

The Pennsylvania Department of Health (PADOH) Health Assessment Program (HAP) collaborates with the Agency for Toxic Substances and Disease Registry (ATSDR), the lead federal public health agency, to prepare health consultation documents which determine if exposure to contaminants can harm people's health as well as prevent and reduce exposures and illnesses. A health consultation is a written response to a specific request for information about health risks related to a specific site, a chemical release, or the presence of hazardous material, and considers the levels of hazardous substances at a site, whether people might be exposed to contaminants, by what pathways, and what potential harm the substances might cause to them. In order to prevent or mitigate exposures, a consultation may lead to specific actions and recommendations, 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; conducting health studies; characterizing demographics; recommending changes/additions to related Commonwealth of Pennsylvania policies/regulations, improving quality of life; and/or providing health education for health care providers and community members.

ATSDR provides technical assistance and funding to PADOH to help identify and evaluate environmental health threats to communities using the best science, taking responsive public health actions, and providing trusted health information. While this health consultation was supported by funds from a cooperative agreement with the ATSDR, it has not been reviewed and cleared by ATSDR. More information about ATSDR is available online at [www.atsdr.cdc.gov](http://www.atsdr.cdc.gov).

The conclusions and recommendations presented in this health consultation document are based on an analysis of the environmental sampling data and information made available to the PADOH within a limited time frame. The availability of additional sampling data, new information and/or changes in site conditions could affect the conclusions and recommendations presented in this document. PADOH will consider reviewing additional future data related to the site, if made available and deemed appropriate.



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From: Farhad Ahmed, Epidemiologist/Program Manager Health Assessment Program  
Pennsylvania Department of Health (PADOH)

Subject: Review of Cancer Data for Tobyhanna area, Monroe County, PA

**Background and Statement of Issues:**

This letter health consultation (LHC) describes the occurrences of cancer (with a focus on bone and soft tissue cancer) among children and young adults living in the Tobyhanna area of Pennsylvania. ATSDR has been addressing public health concerns in the Tobyhanna area for many years, and in support of this work PADOH has conducted analyses of the cancer experience in this area. PADOH's analyses are done using data contained in the Pennsylvania Cancer Registry (PCR). The PCR is a registry of all cancers diagnosed in Pennsylvania residents. This letter health consultation documents PADOH's analysis of the cancer experience in young people in the Tobyhanna area over the period 1992-2008.

On March 11, 2011 a meeting was held with a group of citizens concerned about environmental exposures and cancer in the Tobyhanna area. Several government agencies were represented, including PADOH, ATSDR/CDC, the Pennsylvania Department of Environmental Protection (PADEP), U.S. Environmental Protection Agency (EPA), and the U.S. Army Corps of Engineers (USACE), Tobyhanna Army Depot. PADOH was present to respond to questions about cancer

risks in the Tobyhanna area. Several possible environmental contamination issues of public health concern were discussed by meeting attendees. A particular focus was radiation exposure via naturally occurring radionuclides in drinking water supplies in the area. Meeting attendees suggested that this pathway was a concern as a possible cause of the childhood cancers in the area, most notably malignant bone tumors. Ionizing radiation is an established risk factor for bone cancer.

To address community concerns and questions, PADOH has been evaluating and sharing cancer data from the area for the past several years with residents. In November 2008, PADOH prepared a summary of cancer registry data for major types of cancer for the period 1996-2005 for Tobyhanna (ZIP Code 18466) and included 15 additional nearby ZIP Code areas. In a follow up analysis to this report, PADOH particularly highlighted bone cancer cases diagnosed during the period 1996-2007. While the analysis found the number of bone and soft tissue cancers that occurred among young area residents over the time period was greater than expected, the elevation was not found to be statistically significant.

At the March 2011 community meeting, PADOH shared updated information on cancer rates for the Tobyhanna ZIP Code 18466 (Table 1). Community members believed the updated PCR information did not address their questions about cancer in young people because it combined adult and childhood cancers. Additionally, residents provided a list of 20 childhood cancer patients as documentation of the childhood cancer cases in the Tobyhanna area. Based on feedback provided by the citizen's group, PADOH committed to further evaluating childhood cancer rates in the area, and reporting back to meeting attendees.

To address childhood cancer risks questions, several data analysis steps were carried out:

1. Information from the list of 20 childhood cancers submitted by residents was provided to the PCR for cancer patient record matching, and tabulated by ZIP Code area, year of diagnosis, and cancer site group.
2. Figure 1 shows the 13 Zip Codes areas included in the study for cancer.
3. For the combined 13 ZIP Code areas, all childhood cancers for the 17 year time period (1992 -2008) were tabulated by ZIP Code area, year of diagnosis, and cancer site group.

4. Numerous runs of childhood cancer rate tables were produced for the 1992-2008 time period, including the 13 aggregate ZIP Code areas, each of the 13 ZIP Code areas individually, and Lackawanna, Monroe, and Wayne Counties.

### *Analytical Notes*

The PCR is a comprehensive database of all cancers diagnosed in Pennsylvania residents. Since 1985, the PCR has collected patient-specific cancer data that include geographic location, data of diagnosis, and cancer type. PADOH selected the time analysis interval of 1992-2008 as being most representative for bracketing the available 2000 population census data. At this time, the most recent data available in the PCR for analysis is from 2008.

### **Discussion**

Childhood cancer is a rare disease having a low probability of occurrence. In Pennsylvania over the 17 year time period chosen for this analysis (1992-2008), there were 9,732 childhood cancers out of 1,213,351 cancer cases. This accounted for 0.80 percent of all reported cancers in Pennsylvania over that time period.

### *Description of Cases*

Several observations are apparent from the data analysis results. First, while the list of 20 childhood cancers cases among 13 different ZIP Code areas provided by the Tobyhanna citizens had a 100 percent matching rate to PCR records, these cases accounted for only approximately 20 percent of the 95 childhood cancer cases occurring in this group of ZIP Code areas for the 17 year time period, 1992-2008. For both the childhood cancers self reported by the residents and the childhood cancers reported to PCR, Childhood Cancer Group I (leukemia) was the most prevalent cancer type.

The greatest number of childhood cancer cases in the 13 aggregate ZIP Code areas reported to PCR in any one year were the 12 cases in children reported in 2008.

An issue of particular concern for the Tobyhanna residents is bone tumors in children. The citizen case list identified 5 out of 20 childhood cancer cases from the area as being bone tumors, while the PCR case list identified 7 out of 95 childhood cancer cases from the area as being malignant bone tumors. This indicates a high ascertainment of malignant bone tumors by the residents.

### *Statistical Evaluation of Cases (Rate Analysis)*

After tabulating and comparing the childhood cancer cases available in the resident and PCR list, the next step is statistical evaluation of the data. This involves the calculation of rates for the geographic area of concern, and comparing this information to statewide rates.

PADOH estimated the childhood cancer rates for the 13 aggregate ZIP Code area of concern, as well as for each of the 13 ZIP Code areas individually, and for Lackawanna, Monroe, and Wayne Counties. ***No statistically significantly higher childhood cancers were found for any of the geographic areas evaluated.***

In addition, PADOH calculated the cancer rates for all ages of cases combined (adults and children) diagnosed in ZIP Code Tobyhanna 18466 for all types of reportable cancers from 1992-2008. No cancer types were found to be statistically elevated in this ZIP code when compared to the statewide rates. ***Therefore, the results of this analysis do not support the concern of a childhood cancer cluster, or an increased risk of childhood cancer in the Tobyhanna area, or a cancer cluster in other age groups.***

Interpretation of cross-sectional study results is limited because it is not known what percent of the families in the ZIP Code areas were evaluated or if families from Lackawanna, Monroe, and Wayne Counties may have relocated into or out of the study area during the 17 year (1992-2008) time period. Also, ZIP Code area analysis is sensitive to local population estimates. For example, the greatest number of childhood cancer cases among the group of 13 ZIP code areas occurred in 2008, the last year of the study period. It is not known if this is the beginning of a trend, or an increase in the number of children living in the area. Additional years of cases counts and updated ZIP Code area population estimates could be helpful in answering this question.

### **Results:**

The results of our analysis can be seen in two tables enclosed in this LHC. Table 2 shows the observed and expected number of cancers, the overall SIR and the SIR for each cancer type, and whether any differences in occurrence are found to be different than expected using statistical calculations. For malignant bone tumors, the SIR is 1.49 (Table 2), and this is ***not*** statistically significant for the 13 Tobyhanna study zip codes. For soft tissue & for other extraosseous

sarcomas, the SIR is 1.17 (Table 2), which is also *not* statistically significant. While the numbers are small for the above mentioned cancers, it shows the number of observed cases are very close to the number of expected cases.

Table 3 shows the proportions and distributions of the major cancer types comparing cancer percentages in Tobyhanna area with that of Pennsylvania for the childhood cancers.

### **Next Steps**

PADOH will continue to periodically evaluate PCR data to determine if the number of cases of childhood cancer in this area significantly changes over time. In addition, if residents have further information that they believe should be evaluated, PADOH will continue to provide assistance to the community.

The findings indicate that the cancer rate and pattern in this area is not different from other parts of the state.

When new validated and finalized data from beyond the 17 year time period of 1992 to 2008 become available from the PCR, PADOH will review the data and make the results available to the community members in a timely manner.

Sincerely,

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Pennsylvania Department of Health

**Table 1**  
**CANCER INCIDENCE 1992-2008 FOR PENNSYLVANIA ZIP CODE AREA = 18466 Tobyhanna**

	POP	CASES	EXPECTED	SIR	ST RATE	CR RATE	ADJ RATE	Z-SCORE
All CANCER SITES								
MALE	7490	466	679.21	.69	907.28	518.47	622.48	-11.86 -
FEMALE	7669	460	600.54	.77	850.67	499.85	651.60	-8.54 -
TOTAL	15159	926	1279.75	.72	878.01	509.05	635.31	-14.51 -
BUCCAL CAVITY AND PHARYNX								
MALE	7490	15	18.99	.79	23.63	16.69	18.67	-1.15
FEMALE	7669	8	7.46	1.07	10.50	8.69	11.27	.25
TOTAL	15159	23	26.44	.87	16.84	12.64	14.65	-.83
ESOPHAGUS								
MALE	7490	5	10.87	.46	14.28	5.56	6.57	-3.10 -
FEMALE	7669	2	2.53	.79	4.08	2.17	3.22	-.56
TOTAL	15159	7	13.40	.52	9.00	3.85	4.70	-2.96 -
STOMACH								
MALE	7490	8	11.75	.68	16.43	8.90	11.19	-1.67
FEMALE	7669	8	5.35	1.50	9.47	8.69	14.17	1.53
TOTAL	15159	16	17.10	.94	12.83	8.80	12.01	-.37
COLON AND RECTUM								
MALE	7490	61	80.68	.76	111.78	67.87	84.51	-3.14 -
FEMALE	7669	44	62.29	.71	103.99	47.81	73.45	-4.24 -
TOTAL	15159	105	142.98	.73	107.75	57.72	79.13	-5.08 -
LIVER/INTRAHEPATIC BILE DUCT								
MALE	7490	8	8.94	.90	11.46	8.90	10.26	-.38
FEMALE	7669	1	2.99	.33	4.71	1.09	1.57	-2.89 -
TOTAL	15159	9	11.93	.75	7.97	4.95	6.01	-1.19
PANCREAS								
MALE	7490	9	13.75	.65	18.82	10.01	12.32	-1.95
FEMALE	7669	8	11.08	.72	18.65	8.69	13.47	-1.69
TOTAL	15159	17	24.83	.68	18.73	9.35	12.83	-2.61 -

LARYNX								
MALE	7490	6	10.78	.56	13.71	6.68	7.63	-2.23 -
FEMALE	7669	4	2.49	1.60	3.32	4.35	5.32	.92
TOTAL	15159	10	13.27	.75	8.34	5.50	6.28	-1.18
BRONCHUS AND LUNG								
MALE	7490	76	101.54	.75	136.69	84.56	102.31	-3.54 -
FEMALE	7669	65	63.66	1.02	94.88	70.63	96.87	.23
TOTAL	15159	141	165.20	.85	115.06	77.51	98.21	-2.58 -
MELANOMA OF THE SKIN								
MALE	7490	8	27.83	.29	36.03	8.90	10.36	-8.16 -
FEMALE	7669	8	20.78	.39	26.33	8.69	10.14	-5.27 -
TOTAL	15159	16	48.60	.33	31.01	8.80	10.21	-9.46 -
BREAST								
MALE	7490	1	1.81	.55	2.42	1.11	1.34	-.97
FEMALE	7669	138	197.59	.70	263.16	149.95	183.79	-6.22 -
TOTAL	15159	139	199.40	.70	137.26	76.41	95.69	-6.42 -
CERVIX UTERI								
FEMALE	7669	20	22.67	.88	25.71	21.73	22.68	-.62
CORPUS/UTERUS, NOS								
FEMALE	7669	24	38.71	.62	51.67	26.08	32.04	-3.69 -
OVARY								
FEMALE	7669	8	18.41	.43	25.22	8.69	10.96	-4.64 -
PROSTATE								
MALE	7490	128	194.20	.66	257.18	142.41	169.51	-6.97 -
TESTIS								
MALE	7490	6	6.90	.87	8.36	6.68	7.27	-.40
URINARY BLADDER								
MALE	7490	33	45.26	.73	64.10	36.72	46.73	-2.72 -
FEMALE	7669	11	13.16	.84	21.54	11.95	18.00	-.98
TOTAL	15159	44	58.42	.75	42.09	24.19	31.70	-2.85 -

KIDNEY AND RENAL PELVIS								
MALE	7490	20	22.56	.89	28.86	22.25	25.58	-.66
FEMALE	7669	10	12.27	.81	17.61	10.87	14.35	-.95
TOTAL	15159	30	34.84	.86	23.04	16.49	19.85	-1.06
BRAIN/OTHER NERVOUS SYSTEM								
MALE	7490	7	9.75	.72	11.82	7.79	8.49	-1.13
FEMALE	7669	4	7.55	.53	9.67	4.35	5.12	-2.09 -
TOTAL	15159	11	17.30	.64	10.71	6.05	6.81	-2.14 -
THYROID								
MALE	7490	2	6.33	.32	7.61	2.23	2.40	-3.31 -
FEMALE	7669	15	20.02	.75	22.96	16.30	17.21	-1.37
TOTAL	15159	17	26.35	.65	15.55	9.35	10.03	-2.43 -
NON-HODGKIN LYMPHOMA								
MALE	7490	21	26.14	.80	34.59	23.36	27.79	-1.33
FEMALE	7669	23	20.03	1.15	30.22	24.99	34.70	.86
TOTAL	15159	44	46.17	.95	32.33	24.19	30.81	-.42
HODGKIN LYMPHOMA								
MALE	7490	6	4.45	1.35	5.39	6.68	7.26	.69
FEMALE	7669	1	3.62	.28	4.26	1.09	1.17	-2.84 -
TOTAL	15159	7	8.08	.87	4.80	3.85	4.16	-.44
MULTIPLE MYELOMA								
MALE	7490	7	7.13	.98	9.75	7.79	9.58	-.06
FEMALE	7669	3	5.38	.56	8.61	3.26	4.80	-2.02 -
TOTAL	15159	10	12.51	.80	9.16	5.50	7.32	-1.06
LEUKEMIAS								
MALE	7490	10	17.72	.56	23.49	11.13	13.26	-2.91 -
FEMALE	7669	15	11.78	1.27	17.31	16.30	22.05	1.12
TOTAL	15159	25	29.50	.85	20.30	13.74	17.20	-1.13
MESOTHELIOMIA								
MALE	7490	2	2.68	.75	3.91	2.23	2.92	-.63
FEMALE	7669	1	.54	1.85	.88	1.09	1.62	.69
TOTAL	15159	3	3.22	.93	2.34	1.65	2.18	-.17
CARCINOID TUMOR								

MALE	7490	2	3.13	.64	2.78	1.57	1.78	-.91
FEMALE	7669	3	3.70	.81	3.50	2.30	2.83	-.50
TOTAL	15159	5	6.83	.73	3.15	1.94	2.31	-.98
ALL OTHER SITES								
MALE	7490	25	41.98	.60	57.81	27.81	34.43	-4.20 -
FEMALE	7669	34	44.34	.77	67.80	36.95	51.99	-2.49 -
TOTAL	15159	59	86.31	.68	62.98	32.43	43.05	-4.72 -

CANCER INCIDENCE 2001-2008 FOR PENNSYLVANIA ZIP CODE AREA = 18466 Tobyhanna

	POP	CASES	EXPECTED	SIR	ST RATE	CR RATE	ADJ RATE	Z-SCORE
POLYCYTHEMIA VERA								
MALE	7490	0	.97	.00	2.15	.00	.00	-1.06
FEMALE	7669	2	.56	3.57	1.56	3.73	5.58	1.52
TOTAL	15159	2	1.53	1.31	1.85	1.88	2.42	.43
CHRONIC MYELOPROLIFERATIVE DISEASE								
MALE	7490	0	.25	.00	.62	.00	.00	-.57
FEMALE	7669	0	.16	.00	.49	.00	.00	-.51
TOTAL	15159	0	.40	.00	.55	.00	.00	-.77

- + Screened Higher Rate (Z-SCORE greater than or equal to 1.96)
- Screened Lower Rate (Z-SCORE less than or equal to -1.96)

VARIABLE CODES:

- POP = 2000 Census Population.
- CASES = Number of newly diagnosed cases during the reporting period.
- EXPECTED = Number of expected cases if study area had experienced average PA state rates during reporting period.
- SIR = Standard Incidence Ratio (observed/expected cases).
- ST RATE = Average annual state rate per 100,000 population during reporting period.
- CR RATE = Average annual crude rate per 100,000 population for study area during reporting period.
- ADJ RATE = Average annual age-adjusted per 100,000 population for study area during reporting period.
- Z-SCORE = Statistical significance of study area compared to state during reporting period (a z-score of 1.96 equates to a 95 % level of statistical significance or a 1 in 20 chance that the results are due to random variation).

**Table 2**  
**Observed and Expected Childhood Cancer Cases Based on**  
**Pennsylvania Incidence Rates for Children Ages 0 to 19,**  
**Thirteen Tobyhanna Study Zip Codes, 1992-2008**

<u>ICCC</u> <u>Group*</u>	<u>Type</u>	<u>Cases</u> <u>Observed</u>	<u>Cases</u> <u>Expected</u>	<u>SIR**</u>	
I	<b>Leukemia &amp; myeloproliferative diseases</b>	26	22.90	<b>1.14</b>	<i>ns</i>
II	<b>Lymphomas &amp; reticuloendothelial neoplasms</b>	17	14.50	<b>1.18</b>	<i>ns</i>
III	<b>CNS and miscellaneous intracranial and intraspinal neoplasms</b>	18	17.69	<b>1.02</b>	<i>ns</i>
IV	<b>Neuroblastoma &amp; other peripheral nervous cell tumors</b>	3	4.81	<b>0.62</b>	<i>ns</i>
V	<b>Retinoblastoma</b>	2	1.48	<b>1.35</b>	<i>ns</i>
VI	<b>Renal tumors</b>	1	3.55	<b>0.28</b>	<i>ns</i>
VII	<b>Hepatic tumors</b>	0	0.85	<b>0.00</b>	<i>ns</i>
VIII	<b>Malignant bone tumors</b>	7	4.69	<b>1.49</b>	<i>ns</i>
IX	<b>Soft tissue &amp; other extraosseous sarcomas</b>	7	6.00	<b>1.17</b>	<i>ns</i>
X	<b>Germ cell tumors</b>	4	6.11	<b>0.65</b>	<i>ns</i>
XI	<b>Other malignant epithelial neoplasms</b>	9	11.89	<b>0.76</b>	<i>ns</i>
XII	<b>Other &amp; unspecified malignant neoplasms</b>	1	0.40	<b>2.51</b>	<i>ns</i>
	<b>Total Childhood Cancers</b>	<b>95</b>	<b>94.78</b>	<b>1.00</b>	<i>ns</i>

\* WHO *International Classification for Childhood Cancers - Groups*

\*\* Ratio of Cases observed to Cases Expected; Risk Ratio.

*ns*; Not statistically significant.

**Table 3**  
**Distribution of Childhood Cancer Cases Based on Incidence**  
**in the Tobyhanna Study Area from 1992 to 2008, and PA from 1985-2008**

<u>ICCC</u> <u>Group*</u>	<u>Type</u>	<u>Tobyhanna</u>		<u>Pennsylvania</u>	
		<u>Cases</u>	<u>Percent</u>	<u>Cases</u>	<u>Percent</u>
I	Leukemia & myeloproliferative diseases	26	27.4	3,212	23.6
II	Lymphomas & reticuloendothelial neoplasms	17	17.9	2,115	15.5
III	CNS and miscellaneous intracranial and intraspinal neoplasms	18	18.9	2,425	17.8
IV	Neuroblastoma & other peripheral nervous cell tumors	3	3.2	744	5.5
V	Retinoblastoma	2	2.1	248	1.8
VI	Renal tumors	1	1.1	537	3.9
VII	Hepatic tumors	0	0.0	128	0.9
VIII	Malignant bone tumors	7	7.4	657	4.8
IX	Soft tissue & other extraosseous sarcomas	7	7.4	863	6.3
X	Germ cell tumors	4	4.2	902	6.6
XI	Other malignant epithelial neoplasms	9	9.5	1,739	12.8
XII	Other & unspecified malignant neoplasms	<u>1</u>	<u>1.1</u>	<u>57</u>	<u>0.4</u>
	<b>Total Childhood Cancers</b>	95	100.0	13,627	100.0

\* WHO International Classification for Childhood Cancers - Groups; I - XI

