Review of Cancer Registry Data (1985-2019) – Havertown, Pennsylvania

Bureau of Epidemiology

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Executive Summary

In response to community concerns regarding local cancer incidence, the Pennsylvania Department of Health (PADOH) reviewed the Pennsylvania (PA) Cancer Registry and prepared this report. The objective of a cancer registry data review is to determine if an increased risk for cancer incidence exists in a community, in relation to a larger comparison area population. Incidence is defined as the number of newly diagnosed people with a condition, while the prevalence of that condition includes newly diagnosed people and those who were diagnosed with that condition in the past. Cancer registries do not collect information to link observed cancer rates with environmental exposures or other risk factors, such as family or residential history, occupational exposures, lifestyle behaviors including alcohol consumption and smoking tobacco, and obesity and other underlying conditions.

The population of concern for this cancer data review is residents of Havertown, PA. To determine whether there is an excess of cancer cases in a particular study area, PADOH calculates standardized incidence ratios (SIRs). This entails a statistical comparison of observed number of cancer cases to expected number of cases based on data from the state's Cancer Registry. In this data review, PADOH compared the cancer incidence rates in Havertown with the rest of Delaware County for 1985-2019 (1985-1994, 1995-2004, 2005-2014, and 2015-2019). Community members were particularly concerned about brain cancers and cancers in children but were also interested in learning more about cancer rates in Havertown for all age groups.

No statistically significant increases or decreases in rates were observed for childhood cancers in Havertown relative to Delaware County for any of the time periods reviewed. Brain cancer rates in Havertown also did not show statistically significant increases or decreases compared to Delaware County, except a significantly lower rate among men during 1985-1994. Regarding additional cancer rates in adults in Havertown relative to Delaware County, the following was concluded:

- No statistically significant increases or decreases in rates were observed for myeloma, stomach cancer, or uterine cancer.
- Statistically significant increases in cancer incidence were reported for female breast cancer, Hodgkin's lymphoma, melanoma, non-Hodgkin's lymphoma (NHL), testicular cancer, and thyroid cancer during one or more time periods between 1985-2019.

- Statistically significant decreases in cancer incidence were noted for all cancers, bladder cancer, brain cancer, female breast cancer, cervical cancer, colon cancer, esophageal cancer, kidney cancer, laryngeal cancer, leukemia, liver cancer, lung cancer, oral cancer, ovarian cancer, pancreatic cancer, and prostate cancer during one or more time periods between 1985-2019.

Upon additional community inquiry, PADOH will analyze new cancer data for the Havertown community as it becomes available.

Purpose

PADOH developed this report to provide information about cancer incidence rates among residents of Havertown, located in Delaware County, PA, in comparison to the cancer incidence rates in Delaware County for the period 1985–2019.

Background

Havertown is a residential suburban unincorporated community in Haverford Township, Delaware County, Pennsylvania. Havertown's ZIP Code is 19083 and "Havertown" is a postal address. According to the 2020 U.S. Census American Community Survey 5-Year Estimates Data Profiles, the population of Havertown is estimated at 36,110, including 2,745 children younger than 5 years of age 11,292 people younger than 18 years of age, and 8,270 people age 65 and older. The population of Delaware County is estimated at 565,328, including 33,403 children younger than 5 years of age, 440,833 people younger than 18 years of age, and 93,043 people age 65 and older.

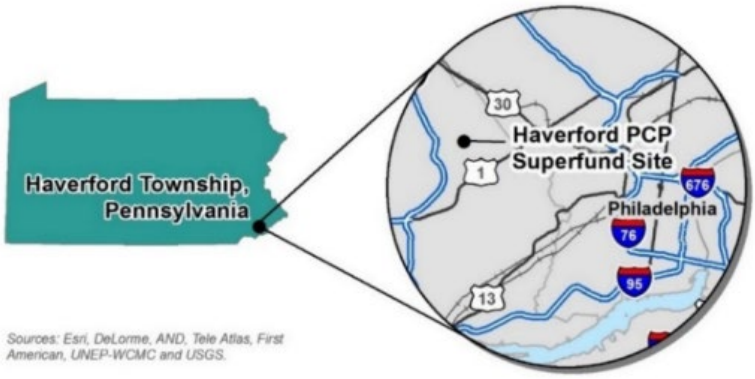
Table A: Age-Distribution in Havertown Township, PA and Delaware County, PA

Population	Havertown	Delaware County
Total	36,110	565,328
Under 5	2,745	33,403
Under 18	11,292	124,495
18 to 65	16,548	347,790
Over 65	8,270	93,043

Havertown's past included agriculture as well as gunpowder and textile manufacturing. From 1947 to 1990s, National Wood Preservers (NWP) operated in Havertown. Due to historical environmental contamination of pentachlorophenol

(PCP) from NWP, the site was added to the Environmental Protection Agency's (EPA) National Priority List (NPL), which identifies sites of known or potential hazardous exposure eligible for long-term remedial investigation and action. Long-term exposure to high levels of PCP can cause liver and thyroid damage and may cause cancer in humans. Other contaminants such as polycyclic aromatic hydrocarbons (PAHs), dioxins, furans, chromium, and arsenic compounds were also found at this site.

From 1985 to 1998, federal (Agency for Toxic Substances and Disease Registry, ATSDR) and state (PADOH) public health agencies reviewed environmental data and health information at various times to evaluate community health outcomes and provide public health recommendations related to the Havertown PCP Superfund site. In 1998, PADOH reviewed cancer mortality (1981 to 1996) and cancer incidence data (1985 to 1994) for 23 primary types of cancer for the residents within ¼ mile around the Havertown NPL Superfund site. Cancer deaths and cancer incidences were not found to be elevated. At the time, PADOH provided lifestyle recommendations to reduce community members' risk of developing some types of cancer.



(Environmental Protection Agency 2017)

Methodology

PADOH uses a cancer incidence analysis to investigate the possibility of excess cancers in a particular community. Incidence rates are calculated with information reported by hospitals and health care providers to the Pennsylvania Cancer Registry. Cancer incidence in the study area is compared to the incidence in a larger comparison area such as the zip code area, county, or the state by calculating standardized incidence ratios (SIRs). SIR calculation involves

comparing the observed number of cancer cases to a number that would be expected if the community were experiencing the same rate of cancer as a larger comparison area. While a cancer incidence analysis does not reveal whether past exposures to contaminants caused observed cancer cases, it serves to answer whether there is an excess of cancer in the population of concern. PADOH adheres to the cancer incidence analysis guidelines developed by the Centers for Disease Control and Prevention (CDC) and the Council of State and Territorial Epidemiologists (CSTE). For this community, PADOH evaluated the cancer incidences in four periods: 1985 to 1994, 1995 to 2004, 2005 to 2014, and 2015 to 2019 to see if there is any trend in cancer incidence rates in Havertown, PA.

Sex and age are two key factors that are taken into consideration for the calculation of the expected number of cancer cases. The observed number of cancer cases among different age groups of males and females in the study area was obtained from the Pennsylvania Cancer Registry. The expected number of cancer cases in the same age groups were determined by multiplying the age-specific rates for those cancers at the comparison area (in this case, the County minus Havertown) with the age-specific population of males and females in the study area (in this case Havertown). The SIR is obtained by dividing the total number of observed cases with the total number of expected cases for all age groups during the specific period.

In this analysis, PADOH calculated age-adjusted incidence rates for cancers of the bladder, brain, female breast, cervix, colon, esophagus, Hodgkin's lymphoma, kidney, larynx, leukemia, liver, lung, melanoma, myeloma, NHL, mouth (oral), ovaries, pancreas, prostate, stomach, testes, thyroid, uterus, childhood cancers, and the total of all cancers among adult males and females.

An SIR over one indicates that more cases occurred than expected, and vice versa. As an example, a ratio of 1.5 is interpreted as one-and-a-half times as many cases as the expected number, and a ratio of 0.9 indicates nine-tenths as many cases as the expected number. An SIR is considered statistically significant if the 95% confidence interval for the SIR does not include one. Furthermore, the narrower the confidence interval, greater confidence exists in the precision of the SIR.

Due to small sample sizes of childhood cancers in the community, PADOH summed together cases of different cancer types in children aged 0-20. The cancer types analyzed were leukemia, myeloproliferative diseases and myelodysplastic diseases; lymphomas and reticuloendothelial neoplasms; central nervous system and miscellaneous intracranial and intra-spinal neoplasms; neuroblastoma and other peripheral nervous cell tumors; soft tissue and other

extra osseous sarcomas; retinoblastoma; renal tumors; hepatic tumors; malignant bone tumors; germ cell tumors, trophoblastic tumors and neoplasms of gonads; other malignant epithelial neoplasms and malignant melanomas; and other unspecified malignant neoplasms.

Results

Table 1 displays the SIRs for cancers of the bladder, brain, female breast, cervix, colon, esophagus, Hodgkin's lymphoma, kidney, larynx, leukemia, liver, lung, melanoma, myeloma, NHL, mouth (oral), ovaries, pancreas, prostate, stomach, testes, thyroid, uterus, childhood cancers, and the total of all cancers among adult males and females. Childhood cancers SIRs are presented in Table 2. Both tables present the number of observed (OBS) and expected (EXP) cases for males and females, the SIR, and the corresponding 95% confidence intervals. Blue highlight indicates statistically lower SIRs and orange highlight indicates statistically higher SIRs.

Table 1: Age-Adjusted Standardized Incidence Ratios (SIR) and 95% Confidence Intervals (CI) for Various Cancers Among Male and Female Adults in Havertown Compared Delaware County, Pennsylvania (1985-1994, 1995-2004, 2005-2014, and 2015-2019)

	PERIOD	1985-1994		1995-2004		2005-2014		2015-2019	
	SEX	Male	Female	Male	Female	Male	Female	Male	Female
All Cancers	EXP	1614	1592	1729	1693	1769	1848	728	756
	OBS	1256	1288	1571	1635	1647	1853	704	761
	SIR	0.78	0.81	0.91	0.97	0.93	1	0.97	1.01
	95% CI	0.74 - 0.82	0.77 - 0.85	0.86 - 0.95	0.92 - 1.01	0.89 - 0.98	0.96 - 1.05	0.90 - 1.04	0.94 - 1.08
Bladder	EXP	113	44	124	48	111	39	50	16
	OBS	85	41	115	43	118	49	46	24
	SIR	0.75	0.93	0.93	0.9	1.06	1.25	0.93	1.53
	95% CI	0.60 - 0.93	0.66 - 1.26	0.76 - 1.11	0.65 - 1.21	0.88 - 1.27	0.92 - 1.65	0.68 - 1.24	0.98 - 2.27
Brain	EXP	23	18	23	23	50	70	23	29
	OBS	13	15	23	23	48	66	19	24
	SIR	0.57	0.84	1	0.99	0.97	0.95	0.84	0.81
	95% CI	0.30 - 0.97	0.47 - 1.39	0.64 - 1.51	0.63 - 1.49	0.71 - 1.28	0.73 - 1.20	0.51 - 1.32	0.52 - 1.21

	PERIOD	1985-1994		1995-2004		2005-2014		2015-2019	
	SEX	Male	Female	Male	Female	Male	Female	Male	Female
Female Breast	OBS	-	423	-	593	-	594	-	254
	SIR	-	0.86	-	1.11	-	1.09	-	1.13
	95% CI	-	0.78 - 0.94	-	1.02 - 1.20	-	1.01 - 1.18	-	0.99 - 1.27
Cervical	EXP	-	82	-	30	-	23	-	8
	OBS	-	50	-	22	-	17	-	8
	SIR	-	0.61	-	0.73	-	0.73	-	0.99
	95% CI	-	0.45 - 0.80	-	0.46 - 1.10	-	0.43 - 1.18	-	0.43 - 1.96
Colon	EXP	240	222	222	220	166	164	67	59
	OBS	188	226	214	184	130	140	72	38
	SIR	0.78	1.02	0.96	0.84	0.78	0.85	1.08	0.64
	95% CI	0.68 - 0.9	0.89 - 1.16	0.84 - 1.10	0.72 - 0.97	0.65 - 0.93	0.72 - 1.01	0.85 - 1.36	0.45 - 0.88
Esophageal	EXP	22	9	25	10	24	9	11	3
	OBS	12	5	20	3	25	5	8	3
	SIR	0.54	0.54	0.79	0.29	1.03	0.58	0.75	0.89
	95% CI	0.28 - 0.94	0.17 - 1.25	0.48 - 1.21	0.06 - 0.84	0.67 - 1.52	0.19 - 1.34	0.33 - 1.48	0.18 - 2.61
Hodgkin's	EXP	10	8	9	6	9	8	3	3
	OBS	9	7	14	10	6	11	10	6
	SIR	0.92	0.85	1.64	1.6	0.65	1.46	3.76	1.92
	95% CI	0.42 - 1.75	0.34 - 1.74	0.90 - 2.75	0.77 - 2.94	0.24 - 1.42	0.73 - 2.61	1.80 - 6.91	0.71 - 4.18
Kidney	EXP	39	26	53	34	72	42	29	14
	OBS	52	13	59	27	62	36	33	13
	SIR	1.33	0.5	1.11	0.79	0.86	0.86	1.15	0.91
	95% CI	0.99 - 1.75	0.27 - 0.85	0.85 - 1.44	0.52 - 1.15	0.66 - 1.10	0.60 - 1.19	0.79 - 1.62	0.48 - 1.55
Laryngeal	EXP	34	10	29	8	21	6	9	2
	OBS	17	7	22	5	12	2	5	2
	SIR	0.5	0.71	0.75	0.64	0.56	0.34	0.59	0.89
	95% CI	0.29 - 0.80	0.29 - 1.47	0.47 - 1.14	0.21 - 1.50	0.29 - 0.98	0.04 - 1.24	0.19 - 1.37	0.11 - 3.20

	PERIOD	1985-1994		1995-2004		2005-2014		2015-2019	
	SEX	Male	Female	Male	Female	Male	Female	Male	Female
Leukemia	EXP	34	29	40	33	46	33	20	15
	OBS	33	12	46	35	39	36	23	11
	SIR	0.98	0.41	1.15	1.05	0.85	1.08	1.17	0.73
	95% CI	0.68 - 1.38	0.21 - 0.71	0.84 - 1.54	0.73 - 1.46	0.61 - 1.17	0.76 - 1.50	0.74 - 1.75	0.36 - 1.31
Liver	EXP	11	7	24	10	39	16	23	6
	OBS	11	3	13	6	23	10	15	3
	SIR	0.98	0.43	0.54	0.6	0.58	0.64	0.66	0.49
	95% CI	0.49 - 1.76	0.09 - 1.26	0.29 - 0.93	0.22 - 1.31	0.37 - 0.87	0.31 - 1.18	0.37 - 1.08	0.1 - 1.43
Lung	EXP	277	185	269	216	229	228	88	93
	OBS	205	127	179	156	174	175	76	69
	SIR	0.74	0.69	0.67	0.72	0.76	0.77	0.87	0.74
	95% CI	0.64 - 0.85	0.57 - 0.82	0.57 - 0.77	0.61 - 0.84	0.65 - 0.88	0.66 - 0.89	0.68 - 1.08	0.58 - 0.94
Melanoma	EXP	39	25	87	69	164	134	75	51
	OBS	45	35	94	89	200	169	95	74
	SIR	1.15	1.4	1.08	1.29	1.22	1.26	1.27	1.46
	95% CI	0.84 - 1.54	0.98 - 1.95	0.87 - 1.32	1.04 - 1.59	1.05 - 1.40	1.08 - 1.47	1.03 - 1.55	1.14 - 1.83
Myeloma	EXP	14	14	17	18	20	18	10	8
	OBS	8	11	20	14	19	16	4	10
	SIR	0.59	0.78	1.16	0.77	0.94	0.88	0.39	1.28
	95% CI	0.25 - 1.16	0.39 - 1.40	0.71 - 1.79	0.42 - 1.29	0.56 - 1.47	0.5 - 1.42	0.11 - 1.01	0.61 - 2.35
Non-Hodgkin's Lymphoma	EXP	50	47	63	57	68	56	30	24
	OBS	44	52	66	62	69	74	29	28
	SIR	0.88	1.1	1.05	1.09	1.01	1.32	0.96	1.18
	95% CI	0.64 - 1.18	0.82 - 1.44	0.81 - 1.33	0.84 - 1.4	0.79 - 1.28	1.04 - 1.66	0.64 - 1.38	0.78 - 1.70
Oral	EXP	46	23	43	21	50	22	23	8
	OBS	22	21	48	16	50	20	15	10
	SIR	0.48	0.9	1.12	0.75	1	0.92	0.65	1.28
	95% CI	0.30 - 0.72	0.56 - 1.38	0.83 - 1.49	0.43 - 1.22	0.74 - 1.32	0.56 - 1.42	0.37 - 1.08	0.62 - 2.36

	PERIOD	1985-1994		1995-2004		2005-2014		2015-2019	
	SEX	Male	Female	Male	Female	Male	Female	Male	Female
Ovarian	EXP	-	57	-	50	-	46	-	16
	OBS	-	39	-	45	-	41	-	19
	SIR	-	0.69	-	0.9	-	0.89	-	1.15
	95% CI	-	0.49 - 0.94	-	0.66 - 1.21	-	0.64 - 1.21	-	0.69 - 1.80
Pancreatic	EXP	29	33	36	34	42	42	20	20
	OBS	17	26	27	39	30	47	20	11
	SIR	0.6	0.8	0.76	1.15	0.71	1.12	1.02	0.55
	95% CI	0.35 - 0.95	0.52 - 1.17	0.50 - 1.11	0.82 - 1.57	0.48 - 1.01	0.82 - 1.48	0.62 - 1.57	0.28 - 0.99
Prostate	EXP	434	-	481	-	441	-	163	-
	OBS	329	-	466	-	402	-	144	-
	SIR	0.76	-	0.97	-	0.91	-	0.88	-
	95% CI	0.68 - 0.85	-	0.88 - 1.06	-	0.82 – 1.01	-	0.74 - 1.04	-
Stomach	EXP	37	23	33	20	28	15	11	7
	OBS	31	16	23	19	19	13	13	5
	SIR	0.84	0.7	0.7	0.96	0.67	0.85	1.21	0.69
	95% CI	0.57 - 1.19	0.40 - 1.14	0.44 - 1.04	0.58 - 1.5	0.41 - 1.05	0.45 - 1.45	0.65 - 2.07	0.22 - 1.60
Testicular	EXP	13	-	13	-	12	-	5	-
	OBS	15	-	20	-	33	-	10	-
	SIR	1.15	-	1.58	-	2.82	-	1.97	-
	95% CI	0.64 - 1.89	-	0.96 - 2.44	-	1.94 - 3.97	-	0.95 - 3.63	-
Thyroid	EXP	7	21	13	35	22	67	11	33
	OBS	7	14	15	38	44	92	8	36
	SIR	0.95	0.66	1.14	1.08	2.01	1.37	0.74	1.1
	95% CI	0.38 - 1.95	0.36 - 1.10	0.64 - 1.88	0.76 - 1.48	1.46 - 2.70	1.11 - 1.68	0.32 - 1.46	0.77 - 1.52
Uterine	EXP	-	77	-	88	-	100	-	49
	OBS	-	62	-	86	-	93	-	47
	SIR	-	0.81	-	0.98	-	0.93	-	0.96
	95% CI	-	0.62 - 1.04	-	0.78 - 1.21	-	0.75 - 1.14	-	0.70 - 1.28

Table 2: Age-Adjusted Standardized Incidence Ratios (SIR) and 95% Confidence Intervals (CI) for Childhood Cancers in Havertown Compared to Delaware County, Pennsylvania (1985-1994, 1995-2004, 2005-2014, and 2015-2019)

	PERIOD	1985-1994		1995-2004		2005-2014		2015-2019	
	SEX	Male	Female	Male	Female	Male	Female	Male	Female
Childhood Cancers	EXP	13	13	11	12	14	14	7	7
	OBS	10	8	14	10	16	20	9	8
	SIR	0.78	0.61	1.3	0.81	1.16	1.42	1.34	1.18
	95% CI	0.37 - 1.43	0.27 - 1.21	0.71 - 2.18	0.39 - 1.49	0.67 - 1.89	0.87 - 2.19	0.61 - 2.54	0.51 - 2.32

For brevity, the reported results are limited to significant SIRs as presented below. Statistically significant increases in cancer incidence were reported for female breast cancer, Hodgkin's lymphoma, melanoma, non-Hodgkin's lymphoma (NHL), testicular cancer, and thyroid cancer during one or more time periods between 1985-2019.

- The incidence rate of **female breast cancer** among women was 11% and 9% higher during 1995-2004 and 2005-2014, respectively, among females in Havertown when compared to the rest of Delaware County.
- The incidence rate for **Hodgkin's lymphoma** among men was 276% higher during 2015-2019 in Havertown compared to the rest of Delaware County.
- The incidence rate for **melanoma** was 22% higher during 2005-2014 and 27% higher during 2015-2019 among males in Havertown compared to the rest of Delaware County. The incidence rate for melanoma was 29% higher during 1995-2004, 26% higher during 2005-2014, and 46% higher during 2015-2019 among females in Havertown compared to the rest of Delaware County.
- The incidence rate of **non-Hodgkin's lymphoma** was 32% higher among females during 2005-2014 compared to the rest of Delaware County.
- The incidence rate for **testicular cancer** was 182% higher during 2005-2014 among males in Havertown compared to the rest of Delaware County.
- During 2005-2014, the incidence rate of **thyroid cancer** was 101% higher among males and 37% higher among females in Havertown compared to the rest of Delaware County.

Statistically significant decreases in cancer incidence were noted for all cancers, bladder cancer, brain cancer, female breast cancer, cervical cancer, colon cancer, esophageal cancer, kidney cancer, laryngeal cancer, leukemia, liver cancer, lung

cancer, oral cancer, ovarian cancer, pancreatic cancer, and prostate cancer during one or more time periods between 1985-2019.

- The incidence rate of **all cancers** among males was 22% lower in Havertown compared to the rest of Delaware County during 1985-1994. For the same period, the incidence rate of all cancers among females was 19% lower compared to the rest of Delaware County. From 1995-2004, the incidence of all cancers among men was 9% lower in Havertown compared to the rest of the state. Lastly, from 2005-2014, the incidence rate of all cancers among males was 7% lower in Havertown compared to the rest of Delaware County.
- From 1985-2004, males in Havertown had 25% lower **bladder cancer** incidence rates compared to the rest of Delaware County.
- From 1985-2004, males in Havertown had 43% lower **brain cancer** incidence rates compared to the rest of Delaware County.
- The incidence rate for **female breast cancer** was 14% lower among females in Havertown compared to the rest of Delaware County during 1985-1994.
- The incidence rate for **cervical cancer** was 39% lower among females in Havertown during 1985-1994 compared to the rest of Delaware County.
- The incidence of **colon cancer** was 22% lower among males in Havertown compared to Delaware County during both 1985-1994 and 2005-2014. Among females in Havertown, the incidence rate of colon cancer was 16% and 36% lower compared to the rest of Delaware County during 1995-2004 and 2015-2019, respectively.
- The incidence rate of **esophageal cancer** was 46% lower among males in Havertown compared to the rest of Delaware County during 1985-1994. The incidence rate was 71% lower among females in Havertown compared to the rest of Delaware County during 1995-2004.
- During 1985-1994, the incidence rate for **kidney cancer** was 50% lower among females in Havertown compared to the rest of Delaware County.
- The incidence rate for **laryngeal cancer** was 50% and 44% lower among males in Havertown compared to the rest of Delaware County during 1985-1994 and 2005-2014, respectively.
- The incidence rate for **leukemia** was 59% lower among females in Havertown compared to the rest of Delaware County during 1985-1994.
- The incidence rate for **liver cancer** was 46% and 42% lower among females in Havertown compared to the rest of Delaware County during 1995-2004 and 2005-2014, respectively.
- The incidence rate for **lung cancer** among males in Havertown was 26% lower during 1985-1994, 33% lower during 1995-2004, and 24% lower during

2005-2014 compared to the rest of Delaware County. The incidence rate for lung cancer among females in Havertown was 31% lower during 1985-1994, 28% lower during 1995-2004, 23% lower during 2005-2014, and 25% lower during 2015-2019 compared to the rest of Delaware County.

- The incidence rate of **oral cancer** was 52% lower among males in Havertown during 1985-1994 compared to the rest of Delaware County.
- The incidence rate for **ovarian cancer** was 31% lower among females in Havertown during 1985-1994 compared to the rest of Delaware County.
- The incidence rate for **pancreatic cancer** was 40% lower among males in Havertown during 1885 to 1994, and 45% lower among females in Havertown during 2015-2019, compared to the rest of Delaware County.
- The incidence rate for **prostate cancer** was 24% lower during 1985-1994 among males in Havertown compared to the rest of Delaware County.

No statistically significant results were reported for myeloma, stomach cancer, uterine cancer, or all childhood cancers combined.

Discussion

Many factors contribute to the development of cancer. Pennsylvania's Cancer Registry does not collect information on most of the risk factors, such as family or residential history, occupational exposures, lifestyle behaviors including alcohol consumption and smoking tobacco, and underlying conditions. Female breast cancer, Hodgkin's, melanoma, non-Hodgkin's lymphoma, testicular cancer, and thyroid cancer reported significantly elevated SIRs. However, the observed increases in cancer rates could be associated with one or more of those risk factors which were not considered in these analyses. Additionally, there was a lack of consistency with cancer incidence data across all periods and among both sexes. No cancer type displayed statistically significant increases or decreases in incidence among both males and females for every period.

However, melanoma rates were higher among both sexes in more than one period. The incidence rate for melanoma was 22% higher during 2005-2014 and 27% higher during 2015-2019 among males in Havertown compared to the rest of Delaware County. For females in Havertown, the incidence rate for melanoma was 29% higher during 1995-2004, 26% higher during 2005-2014, and 46% higher during 2015-2019 compared to the rest of Delaware County. Melanoma is the most serious type of skin cancer that occurs when the pigment-producing cells (melanocytes) that produce melanin (the pigment that gives skin color) become cancerous. Anyone can get melanoma, but there are certain characteristics that

increase risk such as a lighter natural skin color, skin that burns or freckles easily, people with blue or green eyes, people with blonde or red hair, older age, and a family history of skin cancer. Reducing your exposure to ultraviolet rays can help minimize your chance of developing melanoma (Centers for Disease Control and Prevention 2021a).

The female breast cancer rates did not indicate a consistent pattern across different time periods. Although the incidence rate for female breast cancer was 14% lower in Havertown compared to the rest of Delaware County during 1985-1994, it was 11% and 9% higher during 1995-2004 and 2005-2014, respectively, and non-significant during the period 2015-2019. In 2016, female breast cancer was the most diagnosed cancer among Pennsylvanian women (Pennsylvania Department of Health 2019). Female breast cancer is most diagnosed among women older than 50 years of age. Previous radiation therapy to the chest or breasts can induce an increased risk of getting breast cancer (Centers for Disease Control and Prevention 2021b). The SIR for female breast cancer does not reveal statistically significant increases for all periods.

During the period 2015-2019, the incidence rate for Hodgkin's lymphoma was 276% higher among males in Havertown compared to the rest of Delaware County. However, this SIR is based on 3 expected and 10 observed cases only. The SIR for Hodgkin's lymphoma was only statistically significant during one period and among one sex.

From 2005 to 2014, the incidence rate of non-Hodgkin's lymphoma (NHL) was 32% higher among females in Havertown compared to the rest of Delaware County. Like many cancers, increasing age and family history are strong risk factors for NHL (American Cancer Society 2020).

During 2005-2014, the incidence rate for testicular cancer was 182% higher in Havertown compared to the rest of Delaware County. Unlike most urologic cancers, testicular cancer is more common among younger men. Testicular cancer commonly begins in the cells that make sperm. An undescended testicle is a major risk factor associated with testis cancer (American Cancer Society 2018). Moreover, during 2005-2014, the incidence rate of thyroid cancer was 101% higher among males and 37% higher among females in Havertown compared to the rest of Delaware County. While there is no conclusive cause of thyroid cancer, exposure to radiation and genetic conditions can increase the likelihood of getting thyroid cancer (CDC 2021c). As previously mentioned, long-term exposure to high levels of PCP can cause thyroid damage and may lead to cancer. However, an elevated SIR

for thyroid cancer was only observed for one out of four periods, and any constant environmental exposure would expect to result in continued increases over time.

The cancer incidence analysis revealed findings of statistically significant decreases in incidence for cancers of the bladder, brain, female breast (1985-1994), cervix, colon, esophagus, kidney (females: 1985-1994), larynx, leukemia, liver, lung, mouth (oral), ovaries, pancreas, and prostate. Additionally, the analyses for myeloma, stomach cancer, uterine cancer, and childhood cancers did not reveal any statistically significant increases or decreases in incidence. Due to the complexity and abundance of cancer risks and the limitations of the Cancer Registry to analyze such risks, all statistically significant and insignificant cancer incidence rates cannot be viewed conclusively.

Conclusion

This cancer incidence analysis provides a summary of cancer rates and risk for the residents of Havertown, PA in comparison to Delaware County. Although there are numerous instances of statistically significant increases and decreases in cancer incidence, there lacked consistency among time periods and sex. Descriptive cancer registry data reviews cannot connect the observed changes in cancer rates to any source of potential environmental contamination.

PADOH is committed to evaluating new data for this community as it becomes available. Updating or conducting a further study of the cancer incidence information will be examined if additional information and data emerge.

Limitations

- This is a descriptive analysis only. The cancer registry does not collect information on a person's residential and/or occupational exposure history or other relevant cancer risk factors.
- Many cancers have a long latency period and take decades to develop and be diagnosed. It is difficult to determine the source of exposure that may have caused a particular cancer because people move to different states or counties. The PA Cancer Registry only reports cancers diagnosed in PA, and only records the person's residence at the time of their cancer diagnosis. If an individual moved out of the state before receiving their cancer diagnosis, their case may not be included in the PA Cancer Registry. Similarly, if an individual from another state or country moves to PA and is then diagnosed with cancer, their case will be included in the PA Cancer Registry.

- Another difficulty in many cancer cluster analyses is that the study population is usually a small community. Due to the small population size, there are typically few reported cancer cases. Likewise, there are some types of cancers that are less common than others and report few cases. Small cases yield wide confidence intervals, imprecise SIR values, and unstable incidence rates. For example, if there were 3 cases of a type of cancer for one year, but only 2 expected cases, the SIR would be a 50% increase. However, this is just based on one additional cancer case, which is very likely to have happened by chance. On the other hand, if there were 300 cases of a type of cancer for one year, but only 200 expected cases, the SIR would still be a 50% increase, but this time, it is based 100 additional cases, which is unlikely to have happened by chance. This limitation is often minimized by investigating data from multiple years.

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