Health Consultation

CHILDHOOD CANCER INCIDENCE UPDATE:

A REVIEW AND ANALYSIS OF CANCER REGISTRY DATA, 2001-2005

FOR

TOWNSHIP OF TOMS RIVER, OCEAN COUNTY, NEW JERSEY

AUGUST 20, 2008

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
Atlanta, Georgia 30333

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Prepared By:
New Jersey Department of Health and Senior Services
Public Health Services
Consumer and Environmental health Services

Under Cooperative Agreement with the
The U.S. Department of Health and Human Services
Agency for Toxic Substances and Disease Registry

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Summary

In response to community concerns in the Township of Toms River (formerly named Dover Township), the New Jersey Department of Health and Senior Services (NJDHSS) and the federal Agency for Toxic Substances and Disease Registry (ATSDR) have investigated the incidence of childhood cancers. Following a series of incidence analyses and a case-control epidemiologic study of environmental risk factors, the NJDHSS and ATSDR recommended continued surveillance of childhood cancer in the community. The current report provides an update of childhood cancer incidence in Toms River (and in a smaller four census tract area) for the period 2001-2005, and examines the trend in childhood cancer incidence over the period 1979-2005.

In 2001-2005, there were 26 cases of cancer among children in the Township of Toms River, with about two-thirds of the cases occurring in the final two years. In the Township, the most frequently diagnosed cancers over this time were brain/CNS cancers (6), leukemias (4), and soft tissue sarcomas (4). Total cancer incidence in female children was higher than expected, although the difference was not statistically significant; total cancer incidence in male children was similar to expected. Total leukemia incidence was lower than expected for both males and females. Brain/CNS cancer incidence in males was higher than expected, although not statistically significant, while brain/CNS cancer incidence in Township females was similar to expected. Soft tissue sarcoma in females was the only statistically significant elevation (4 observed cases, 0.7 expected); there were no cases of soft tissue sarcoma diagnosed in Township males. The overall incidence of cancer in children under age five years in the Township was lower than expected for both males and females, including no cases of childhood leukemia. In the smaller sub-Township area, five cases were reported in the period 2001-2005, with all occurring in the final two years. Overall cancer incidence was similar to expected for both males and females. There were three cases of soft tissue sarcomas in females, which was statistically significantly higher than expected.

An analysis of time trends in the period 1979-2005 showed a pattern of higher childhood cancer rates from the middle 1980s through the early to middle 1990s for Township children, for total childhood cancer and for leukemia. Childhood brain/CNS cancer rates for the Township have been similar to state rates throughout the time period.

In contrast to the decreasing time trend seen for leukemia and brain/CNS cancer incidence, there was a rise in soft tissue sarcomas in females in 2004-2005, when four cases were diagnosed. Little is known about the causes of childhood soft tissue sarcoma. Preliminary childhood cancer incidence data for the years 2006 and 2007 show no new cases of soft tissue sarcoma in the Township.

The NJDHSS should continue surveillance of childhood cancers in the Township of Toms River. While the incidence of leukemias and brain/CNS cancers is no longer elevated, surveillance should confirm the preliminary incidence information from 2006 and 2007 regarding soft tissue sarcoma incidence. The NJDHSS should also consider outreach to families of children diagnosed with soft tissue sarcoma in 2004-2005, to explore potential risk factors in common.

Background and Statement of Issues

In 1995, the New Jersey Department of Health and Senior Services (NJDHSS), at the request of the federal Agency for Toxic Substances and Disease Registry (ATSDR), conducted a descriptive investigation of childhood cancer incidence (1979-1991) in the Township of Toms River (formerly named Dover Township), Ocean County, New Jersey. The investigation identified a higher than expected incidence of childhood cancers in the Township, including a statistically significant elevation in brain and central nervous system (CNS) cancers among young children in a four census tract section of the Township.

In response to community concerns about childhood cancer in Toms River, NJDHSS and ATSDR developed a Public Health Response Plan to follow-up on these findings. One element of the plan was to conduct a follow-up investigation of the incidence of reportable cancer among children in this community by including additional years of incidence. The report, *Childhood Cancer Incidence Health Consultation: A Review and Analysis of Cancer Registry Data, 1979-1995 for Dover Township (Ocean County), New Jersey*[1], found that all cancers combined and leukemia in female children were statistically significantly higher than average state rates for the Township, and that leukemia and brain/CNS cancers were statistically significantly higher in the four census tract section of the Township in comparison to the state. The report recommended that a case-control study of the elevated cancer groupings be conducted.

NJDHSS and ATSDR conducted a case-control study of leukemia and nervous system cancer in Township children, with a focus on specific environmental factors in the past. The study report was finalized in 2003, *Case-Control Study of Childhood Cancer in Dover Township (Ocean County), New Jersey*[2]. Among the findings of the study was an association between leukemia in female children and prenatal exposure to water from a contaminated community drinking water well field. The report recommended that as additional cancer data becomes available, updates of childhood cancer incidence in Toms River would be provided to the community.

In parallel with the release of the final case-control study report, the NJDHSS and ATSDR released an updated cancer incidence Health Consultation re-evaluating the cancer data from 1979-1995, adding an additional five years of cancer data (1996-2000), and evaluating time trends over the entire period[3]. The report found that the overall magnitude of cancer incidence in the Township for the period 1996-2000 was similar to previous years, though there was an apparent decrease in the incidence of cancer among younger children. The time trend analysis indicated higher rates of childhood cancer incidence during the mid to late 1980s, but found no clear evidence that the incidence was continuing to drop in the most recent time period. Consequently, the report recommended continued surveillance of childhood cancer in the Township as an additional five years of data became available. The current report provides an update of childhood cancer incidence in Toms River for the period 2001-2005.

Methods

Population

This evaluation of childhood cancer incidence included the entire childhood population (ages 0-19) residing in the Township of Toms River, Ocean County, in the period 2001 through 2005. Population estimates for the Township were determined by extrapolation of the 1990 and 2000 U.S. Census Bureau[4] data for the five year period. Similarly, population estimates were determined for a smaller area analysis using the U.S. Census Bureau census tract boundaries for the year 2000.

Cancer Case Ascertainment

The New Jersey State Cancer Registry (NJSCR) was used to determine the number of childhood cancer cases occurring in the Toms River population. The cancer registry is a population-based cancer incidence registry covering the entire state of New Jersey. By law, all cases of newly diagnosed cancer are reportable to the registry, except for certain carcinomas of the skin and *in situ* cervical cancers diagnosed after 1994. In addition, the registry has reporting agreements with the states of New York, Pennsylvania, Delaware, Maryland, North Carolina, and Florida. Information on New Jersey residents who are diagnosed with cancer in those states is supplied to the New Jersey State Cancer Registry. The registry has been in operation since October 1, 1978.

The time period for this investigation was January 1, 2001, through December 31, 2005. A "case" was defined as a child (less than 20 years of age) who was diagnosed with a new reportable cancer during the study period while residing in Toms River. Residence at time of diagnosis was used to determine residential location. Pre-diagnosis residential information is not available for cancer cases in the Registry. Information on potential cancer risk factors, such as genetic risks, is also not available from the Registry.

Cancers to be Evaluated

All childhood cancers combined and groupings of selected childhood cancer types as defined by the International Classification of Childhood Cancer[5] were evaluated and include: total childhood cancer, brain and central nervous system (CNS) cancers, astrocytoma, sympathetic nervous system tumors, neuroblastoma, Wilms' tumor, malignant bone cancer, soft tissue sarcomas, leukemia, acute lymphocytic leukemia, lymphoma, Hodgkin disease, and non-Hodgkin lymphoma.

Data Analysis

Standardized incidence ratios (SIRs) were used for the quantitative analysis of childhood cancer incidence[6-7]. The SIR is calculated by dividing the observed number of cases (determined from the NJSCR) by an expected number for the surveyed population over the time period reviewed.

The expected number was derived by multiplying a comparison population's age-sex-specific cancer incidence rates and the study area age-sex-specific population figures. The comparison

rates used to derive the expected number of cases were the New Jersey average annual cancer incidence rates for 2001 to 2005. State rates were calculated using SEER*Stat software[8].

SIRs were calculated for the entire Township of Toms River and a four census tract section of the Township representing the oldest section of the town (see Figure 1). For purposes of analysis, this four census tract section was defined as the population residing within census tracts 228, 231, 232, and 236, the identical sub-Township area examined in the previous two Health Consultations.

In order to parallel the earlier Health Consultations, SIRs were calculated for each cancer grouping by all age groups combined (0-19) and the youngest age group (0-4) separately. In addition, SIRs were calculated for males, females, and the total childhood population.

The observed and expected numbers are evaluated by interpreting the ratio of these numbers. If the observed number of cases equals the expected number of cases, the SIR will equal 1.0. An SIR less than 1.0 indicates that fewer cases are observed than expected. An SIR greater than 1.0 indicates that more cases than expected are observed.

Random fluctuations may account for some SIRs being higher or lower than 1.0. The statistical significance of deviations from the SIR equal to 1.0 was evaluated using a 95% confidence interval (CI). The 95% CI was used to evaluate the probability that the SIR may be greater or less than 1.0 due to chance alone, and was based on the Poisson distribution[9]. If the confidence interval includes 1.0, then the estimated SIR is not considered to be statistically significantly different than 1.0.

Results

Table 1 presents the 5-year childhood person-time estimates for the Township and the sub-Township areas. The total childhood person-time for the Township was 117,780 years, a 4.6% increase from the 1996-2000 evaluation period. For the sub-Township area, the total childhood person-time was 23,692 years, a 5.2% increase from the earlier period.

Table 2 provides an enumeration of the total childhood cancer incidence by year, age-group and sex for the Township and the sub-Township area for the period 2001-2005. The total number of incident cancers reported to the NJSCR for the Township of Toms River was 26 (an average of 5.2 cases per year), with about two-thirds of the cases occurring in the final two years (2004-2005). For the sub-Township area, five cases were reported (an average of 1.0 case per year), with all occurring in the final two years.

Township of Toms River SIR Analyses

Table 3 presents the Toms River cases by cancer grouping. The most frequently diagnosed cancers over this time period include brain/CNS cancers (6), leukemias (4), and soft tissue sarcomas (4).

Table 4 presents the SIR results for children ages 0-19 in the Township. (SIRs are shown when the observed number is more than one case.) Total cancer in females was higher than expected (14 observed compared to 10.4 expected), although the difference was not statistically significant. Total cancer incidence in male children in the Township was similar to expected (12 observed vs. 12.4 expected.). Total leukemia incidence was lower than expected for both males and females; the observed numbers of acute lymphocytic leukemia were similar to expected for both males and females. Brain/CNS cancer incidence in males was higher than expected, although not statistically significant. Brain/CNS cancer incidence in Township females was similar to expected. Soft tissue sarcomas in females was the only statistically significant elevation (SIR=5.5; 95% CI=1.5, 14) with four cases in the Township. There were no cases of soft tissue sarcoma diagnosed in Township males. Bone cancer in females was also elevated (2 observed vs. 0.5 expected), but this difference was not statistically significant.

A total of five children under the age of five were diagnosed with cancer in the Township. The overall incidence of cancer in this age-group was lower than expected for both males and females (Table 5). Only one cancer grouping had more than one case, brain/CNS cancer in young males, and while this was higher than expected it was not statistically significant. No females were diagnosed with brain/CNS cancer during this time period. There were no leukemia cases diagnosed in children under the age of five.

Sub-Township Area SIR Analyses

Table 6 presents the sub-Township cases by cancer grouping. A total of five children were diagnosed with cancer in this area, three of which were soft tissue sarcomas in females.

Table 7 presents the SIR results for children ages 0-19 in the sub-Township area. (SIRs are shown when the observed number is more than one case.) Overall cancer incidence was similar to expected for both males and females. There was one brain/CNS case (male) and no leukemia cases in the sub-Township area. The incidence of soft tissue sarcomas in female children in the sub-Township area was statistically significantly high (SIR=21; 95% CI=4.2, 62) with three cases in the sub-Township area. There were no cases of soft tissue sarcoma among males.

There were two children under the age of five diagnosed with cancer in the sub-Township area with an expectation of 1.3 cases during the 5-year period (Table 8). The two cases include one male with brain/CNS cancer and one female with soft tissue sarcoma.

Discussion

The 1997 and 2003 reports on childhood cancer found significantly higher incidence for all cancers[1,3] during the period 1979-1995 in Toms River. Much of the excess in total childhood cancer in the Township appeared to be in females, especially those under five years of age, and in the youngest females diagnosed while living in the sub-Township area, where the largest SIR (6.5) for total cancer was found. From 1996-2005, total childhood cancer incidence was similar to the state rates for both male and females in each age-group (0-19 and 0-4) in both the Township and sub-Township area, with no significant differences detected.

Figure 2 presents New Jersey annual childhood (ages 0-19) total cancer rates and Toms River Township 5-year running average childhood cancer rates for the period 1979-2005. A clear pattern of higher cancer rates is evident from the middle 1980s through the early to middle 1990s for Township children. Total childhood cancer since the middle 1990s shows Township incidence rates fluctuating near the state rate. This overall pattern was also found for the youngest (under age 5) Township children and for children living in the sub-Township area.

The increased total cancer incidence during the period 1979-1995 appeared to be driven by excess leukemia and brain/CNS cancers, particularly in all females and the youngest females, in both the Township and sub-Township area. Figure 3 presents New Jersey annual childhood (ages 0-19) leukemia rates and Toms River Township 5-year running average childhood leukemia rates for the period 1979-2005. Similar to total cancer incidence, a pattern of higher leukemia rates is evident from the middle 1980s through the early to middle 1990s for Township children. Leukemia incidence has decreased substantially since that time period, with fewer than expected cases in the most recent evaluation period (2001-2005) and no children diagnosed with leukemia under age five. Additionally, there has been only one child diagnosed with leukemia in the sub-Township area in the ten-year period 1996-2005, and no cases diagnosed under the age of five for this area.

Figure 4 presents New Jersey annual childhood (ages 0-19) brain/CNS cancer rates and Toms River Township 5-year running average childhood brain/CNS cancer rates for the period 1979-2005. Township childhood brain/CNS cancer rates tended to track state rate relatively closely throughout the time period. Excess brain/CNS cancer (including astrocytoma) was most notable in the sub-Township area during the 1979-1995 period (not shown on a graph). This excess was seen primarily among females under age five. Since 1996, there have been two children (both male) diagnosed with brain/CNS cancer in the sub-Township area, approximately what would be expected based on average state rates. Furthermore, there have been no astrocytoma cases in the sub-Township area in the ten-year period from 1996-2005.

In contrast to the decreasing time trend seen for leukemia and brain/CNS cancer incidence, soft tissue sarcomas in females showed a substantial rise in 2004-2005, when four cases were diagnosed. Soft tissue sarcoma in Township females was statistically significantly elevated and more than five times higher than expected. Three of the four female cases resided in the sub-Township area at the time of diagnosis. Soft tissue sarcoma in the sub-Township area females was statistically significantly elevated and approximately 21 times higher than expected. From 1979-1995, soft tissue sarcoma was found to be elevated, approximately 75% higher than expected for both males and females, though not statistically significant. The four female cases for the Township from 2004-2005 nearly equaled the number of cases (5) seen in females over the previous 25 years, 1979-2003.

Although the four soft tissue sarcoma cancer cases were grouped for analysis according to the International Classification of Childhood Cancer, it should be pointed out no two cases were identical on primary site in the body and histologic classification of the tumor cell type. In addition, the four children were born in three different years ranging from 1995 to 2002.

Pediatric soft tissue sarcomas are a mixed group of tumors that occur in connective tissue, such as muscles, tendons, and fat, and account for approximately 7% of all childhood tumors[10]. Rhabdomyosarcomas (tumors of the striated muscle), and undifferentiated sarcoma are the most common, comprising more than half of all soft tissue sarcomas. Nationally, pediatric soft tissue sarcoma incidence rates tend to be slightly higher in males than females[11].

Little is known about the causes of childhood soft tissue sarcoma. Certain congenital anomalies and genetic conditions are the strongest known risk factors, including Li-Fraumeni syndrome, neurofibromatosis, Gardner's syndrome, and hereditary retinoblastoma[11,12], but likely account for a small proportion of cases. Recent epidemiologic studies of children diagnosed with rhabdomyosarcoma have suggested that lower socioeconomic status, diagnostic X-rays during pregnancy, older maternal age, fewer previous pregnancies, maternal toxemia, and paternal use of cigarettes, marijuana and cocaine may increase risk[12]. In adults, risk factors for soft tissue sarcoma include exposure to radiation therapy, workplace exposure to certain chemicals (vinyl chloride, arsenic, herbicides, phenoxyacetic acids, dioxin, and wood preservatives containing chlorophenols), and chronic lymphedema[13-14].

According to the NJSCR, preliminary childhood cancer incidence data for the years 2006 and 2007 show no new cases of soft tissue sarcoma in the Township of Toms River (reported as of the end of February 2008).

Conclusions

Total childhood cancer incidence in Toms River and the sub-Township area was significantly elevated during the period 1979-1995, particularly in young females. Since the middle 1990s, total childhood cancer incidence appears to be similar to background state rates.

Leukemia incidence in Toms River and the sub-Township area was significantly elevated during the period 1979-1995, particularly in young females. Leukemia incidence since the middle 1990s has decreased considerably since with fewer than expected cases in the most recent evaluation period (2001-2005) and no children diagnosed with leukemia under age five.

Brain/CNS cancer incidence was significantly elevated during the period 1979-1995 in young females residing in the sub-Township area. Brain/CNS cancer incidence since the middle 1990s has decreased and is similar to average state rates.

Soft tissue sarcoma in females diagnosed in 2004-2005 was significantly higher than expected for both the Township (SIR=5.5) and sub-Township area (SIR=21).

Recommendations

The NJDHSS should continue surveillance of childhood cancers in the Township of Toms River. While the incidence of leukemias and brain/CNS cancers is no longer elevated, the incidence of soft tissue sarcomas in the two-year period 2004-2005 was unusually high. Preliminary incidence information from 2006 and 2007 do not indicate that this increase has continued, but this should be confirmed when NJSCR data for these years is considered complete.

Additionally, the NJDHSS should consider outreach to families of children diagnosed with soft tissue sarcoma in 2004-2005. The purpose of the outreach would be to explore whether there were potential risk factors in common, including residential history, family medical history, parental occupation or other relevant information.

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Certification

This health consultation was prepared by the New Jersey Department of Health and Senior Services under a cooperative agreement with the Agency for Toxic Substances and Disease Registry. This health consultation was conducted in accordance with approved methodology and procedures existing at the time it was initiated.

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The Division of Health Assessment and Consultation (DHAC), ATSDR, has reviewed this health consultation and concurs with its findings.

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Figures

Figure 1 Township of Toms River and the sub-Township area

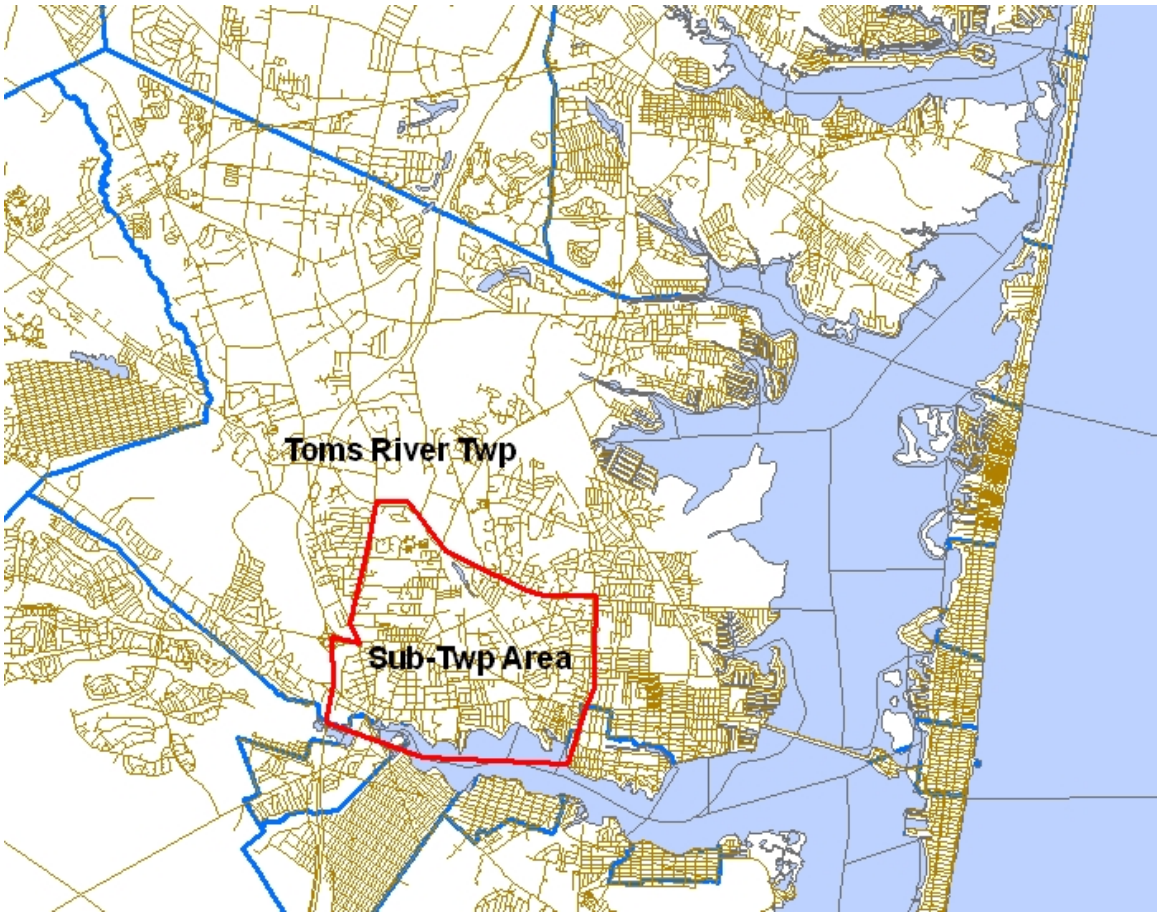


Figure 2. NJ Annual Childhood Cancer Rates and Toms River 5-Year Running Average Childhood Cancer Rates

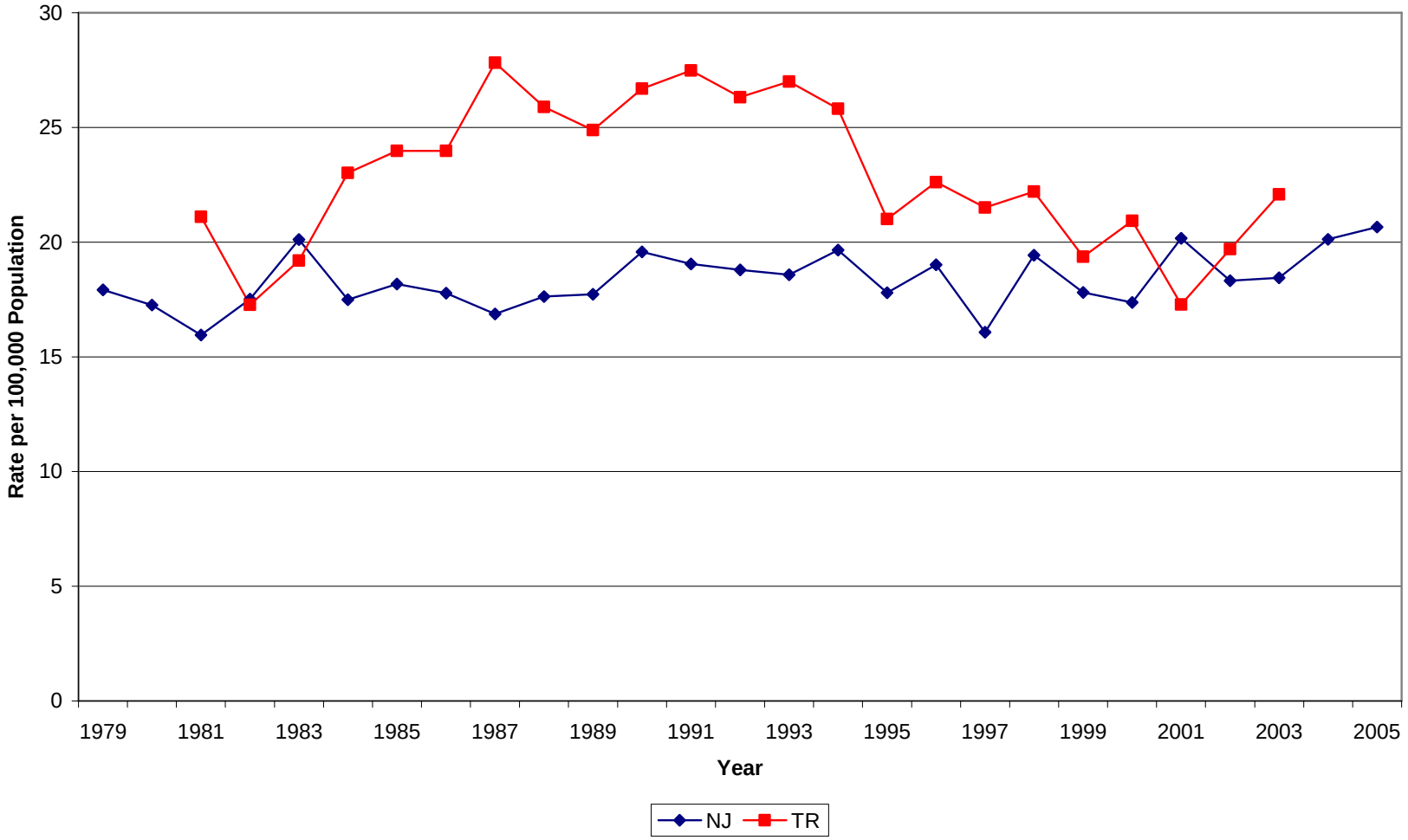


Figure 3. NJ Annual Childhood Leukemia Rates and Toms River 5-Year Running Average Childhood Leukemia Rates

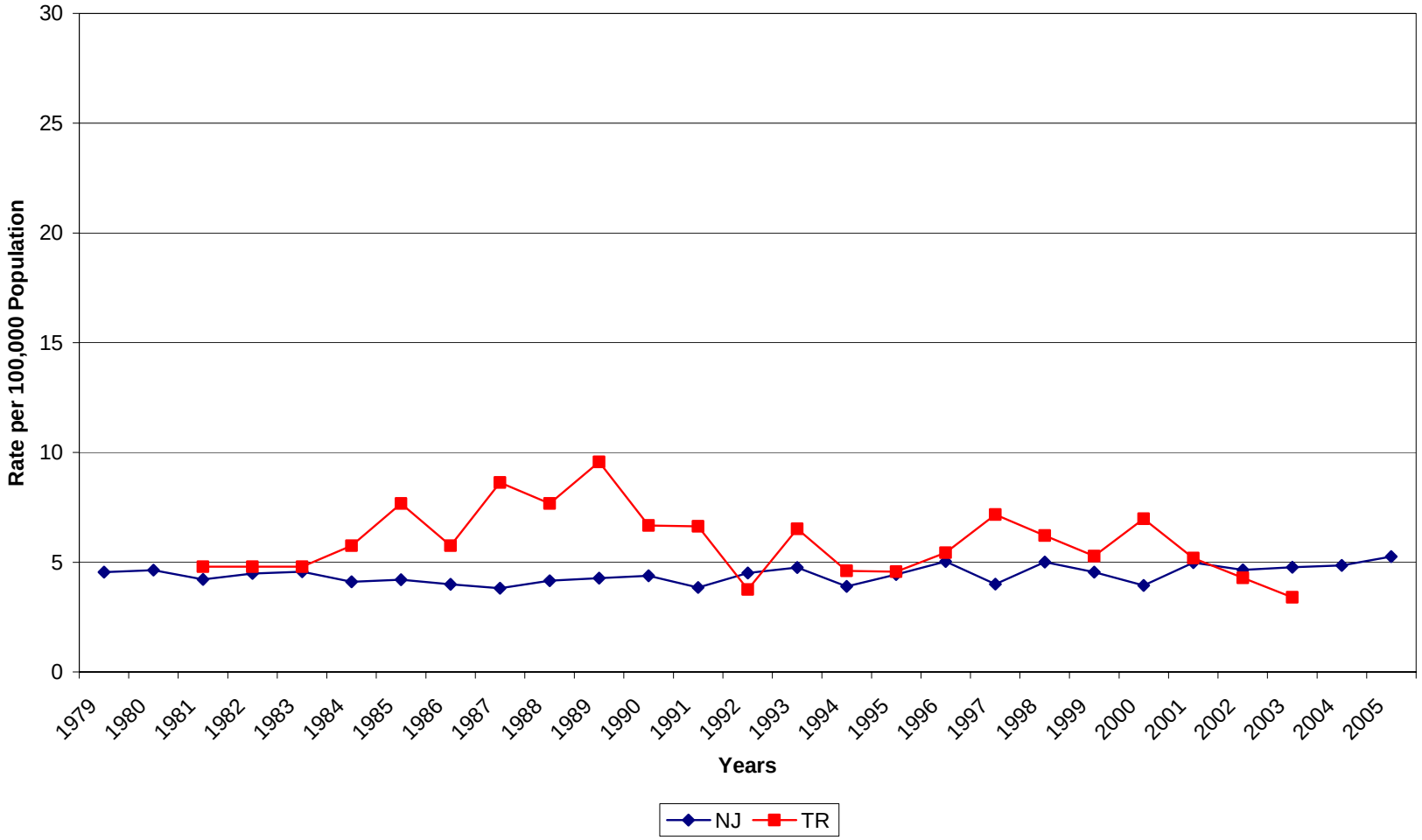
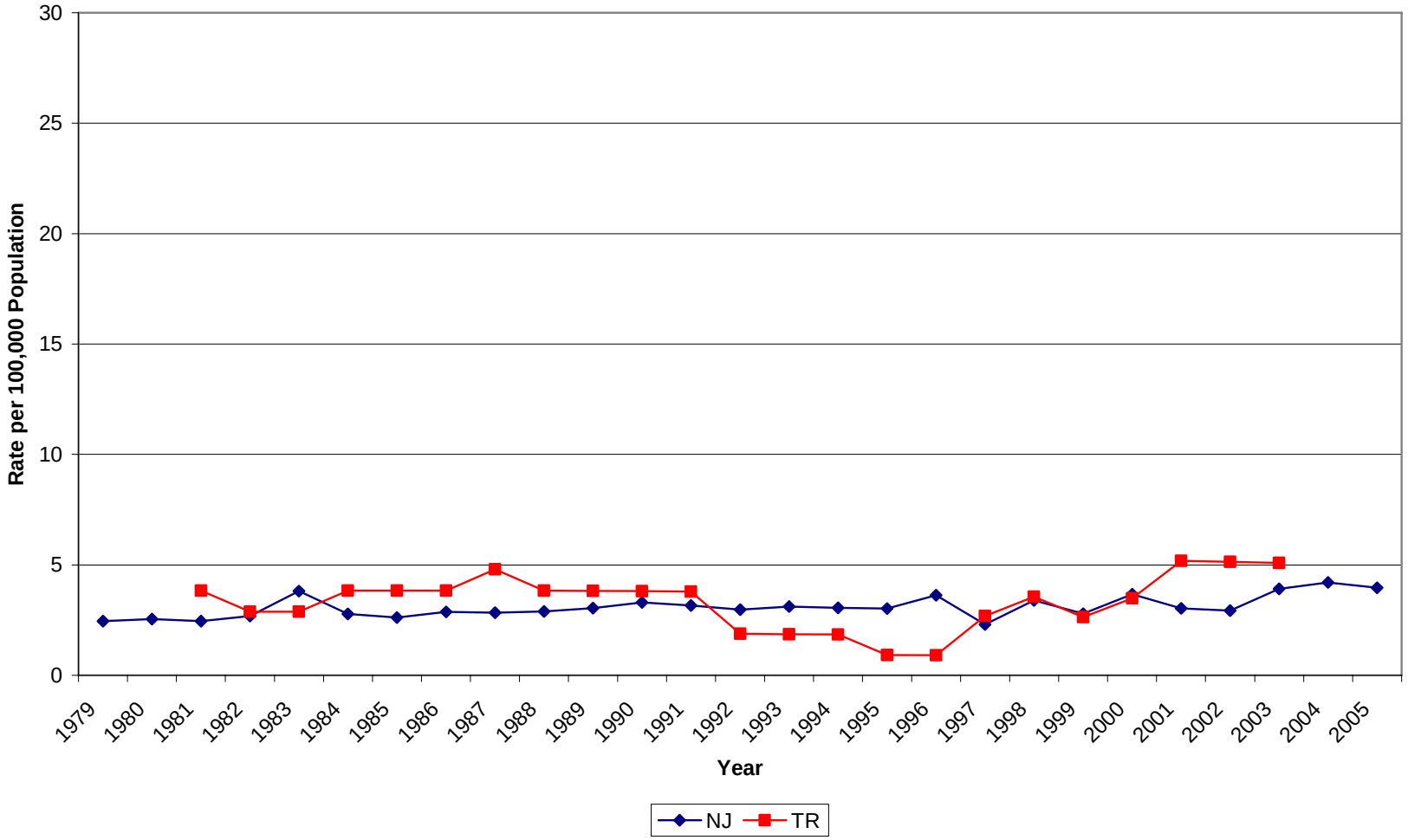


Figure 4. NJ Annual Childhood Brain/CNS Rates and Toms River 5-Year Running Average Childhood Brain/CNS Rates



Tables

Table 1 Person-Years for the Time Period 2001-2005 for the Township of Toms River and the Sub-Township Area (Census Tracts 228, 231, 232, and 236) Using the 1990 and 2000 U.S. Census Bureau Data

	Age-Group	Male	Female
Toms River	0-4	13,247	11,797
	5-9	15,261	14,541
	10-14	17,195	15,734
	15-19	15,364	14,641
	Total	61,067	56,713
Sub-Township Area	0-4	2,717	2,419
	5-9	3,062	2,949
	10-14	3,528	2,820
	15-19	3,279	2,918
	Total	12,586	11,106

Table 2 Childhood Cancer Incidence (0 to 19 Years) Township of Toms River and the Sub-Township Area (Census Tracts 228, 231, 232, and 236) Diagnosis Year, Age Group, and Sex

	Number of Cases Toms River	Sub-Township
Diagnosis Year		
2001	2	0
2002	4	0
2003	3	0
2004	8	2
2005	9	3
Total	26	5
Age-Group		
0-4	5	2
5-9	6	1
10-14	8	2
15-19	7	0
Sex		
Male	12	2
Female	14	3

Table 3 Township of Toms River Childhood Cancer Incidence (0 to 19 Years), 2001-2005

Disease Grouping	Male	Female	Total
Malignant Bone Tumors	1	2	3
Brain/Central Nervous System	4	2	6
(Astrocytoma)	(1)	(0)	(1)
Retinoblastoma	0	0	0
Sympathetic Nervous System	1	0	1
(Neuroblastoma)	(1)	(0)	(1)
Hodgkin Disease	1	0	1
Non-Hodgkin Lymphoma	0	0	0
Other Lymphoma	0	1	1
Leukemia	3	1	4
(Acute Lymphocytic Leukemia)	(3)	(1)	(4)
Melanoma	0	1	1
Skin	0	0	0
Hepatic Tumors	0	0	0
Renal Tumors	0	0	0
(Wilms' Tumor)	(0)	(0)	(0)
Thyroid	0	3	3
Nasopharyngeal Carcinoma	0	0	0
Soft Tissue Sarcomas	0	4	4
Germ Cell/Trophoblastic	1	0	1
Other Carcinomas	1	0	1
Other Benign/Borderline	0	0	0
In Situ Cancers	0	0	0
Other/Unspecified	0	0	0
Total:	**12**	**14**	**26**

Note: The parenthetical numbers are a subset of the rows directly above them.

Table 4 Township of Toms River Childhood Cancer (0 to 19 Years) 2001-2005 Standardized Incidence Ratios (SIRs)

Cancer Type	Sex	Number Observed	Number Expected	SIR	95% C. I. Lower	Upper
All Cancer	**Total**	26	22.8	1.1	0.75	1.7
	Male	12	12.4	1.0	0.50	1.7
	Female	14	10.4	1.3	0.73	2.3
Bone	**Total**	3	1.3	2.4	0.48	6.9
	Male	1	0.8	-	-	-
	Female	2	0.5	4.0	0.45	14
Brain/CNS	**Total**	6	4.2	1.4	0.53	3.1
	Male	4	2.2	1.8	0.49	4.7
	Female	2	1.9	1.0	0.12	3.7
Astrocytoma	**Total**	1	1.9	-	-	-
	Male	1	1.0	-	-	-
	Female	0	0.9	-	-	-
Leukemia	**Total**	4	5.6	0.7	0.19	1.8
	Male	3	3.3	0.9	0.18	2.6
	Female	1	2.3	-	-	-
Acute	**Total**	4	3.8	1.0	0.28	2.7
Lymphocytic	**Male**	3	2.3	1.3	0.27	3.9
Leukemia	**Female**	1	1.6	-	-	-
All Lymphoma	**Total**	2	3.4	0.6	0.07	2.1
	Male	1	2.1	-	-	-
	Female	1	1.3	-	-	-
Hodgkin	**Total**	1	1.6	-	-	-
	Male	1	0.9	-	-	-
	Female	0	0.8	-	-	-
Non-Hodgkin	**Total**	0	1.4	-	-	-
Lymphoma	**Male**	0	1.0	-	-	-
	Female	0	0.4	-	-	-
Soft Tissue Sarcomas	**Total**	4	1.7	2.4	0.64	6.0
	Male	0	1.0	-	-	-
	Female	4	0.7	5.5*	1.5	14
Sympathetic Nervous	**Total**	1	1.0	-	-	-
System	**Male**	1	0.5	-	-	-
	Female	0	0.5	-	-	-
Neuroblastoma	**Total**	1	1.0	-	-	-
	Male	1	0.5	-	-	-
	Female	0	0.5	-	-	-
Wilms' Tumor	**Total**	0	0.7	-	-	-
	Male	0	0.4	-	-	-
	Female	0	0.4	-	-	-

*** Significantly elevated, p<0.05**

Table 5 Township of Toms River Childhood Cancer (0 to 4 Years) 2001-2005 Standardized Incidence Ratios (SIRs)

Cancer Type	Sex	Number Observed	Number Expected	SIR	95% C. I. Lower	Upper
All Cancer	**Total**	5	6.0	0.8	0.27	1.9
	Male	3	3.5	0.9	0.17	2.5
	Female	2	2.6	0.8	0.09	2.8
Bone	**Total**	0	0.1	-	-	-
	Male	0	0.0	-	-	-
	Female	0	0.0	-	-	-
Brain/CNS	**Total**	2	1.2	1.7	0.19	6.0
	Male	2	0.7	3.0	0.33	11
	Female	0	0.5	-	-	-
Astrocytoma	**Total**	0	0.6	-	-	-
	Male	0	0.3	-	-	-
	Female	0	0.3	-	-	-
Leukemia	**Total**	0	2.1	-	-	-
	Male	0	1.3	-	-	-
	Female	0	0.8	-	-	-
Acute	**Total**	0	1.5	-	-	-
Lymphocytic	**Male**	0	0.8	-	-	-
Leukemia	**Female**	0	0.6	-	-	-
All Lymphoma	**Total**	1	0.2	-	-	-
	Male	0	0.1	-	-	-
	Female	1	0.1	-	-	-
Hodgkin	**Total**	0	0.0	-	-	-
	Male	0	0.0	-	-	-
	Female	0	0.0	-	-	-
Non-Hodgkin	**Total**	0	0.1	-	-	-
Lymphoma	**Male**	0	0.1	-	-	-
	Female	0	0.0	-	-	-
Soft Tissue Sarcomas	**Total**	1	0.4	-	-	-
	Male	0	0.3	-	-	-
	Female	1	0.2	-	-	-
Sympathetic Nervous	**Total**	1	0.8	-	-	-
System	**Male**	1	0.4	-	-	-
	Female	0	0.4	-	-	-
Neuroblastoma	**Total**	1	0.8	-	-	-
	Male	1	0.4	-	-	-
	Female	0	0.4	-	-	-
Wilms' Tumor	**Total**	0	0.5	-	-	-
	Male	0	0.3	-	-	-
	Female	0	0.3	-	-	-

Table 6 Sub-Township Area (Census Tracts 228, 231, 232, and 236)
Childhood Cancer Incidence (0 to 19 Years), 2001-2005

Disease Grouping	Male	Female	Total
Malignant Bone Tumors	0	0	0
Brain/Central Nervous System	1	0	1
(Astrocytoma)	(0)	(0)	(0)
Retinoblastoma	0	0	0
Sympathetic Nervous System	0	0	0
(Neuroblastoma)	(0)	(0)	(0)
Hodgkin Disease	0	0	0
Non-Hodgkin Lymphoma	0	0	0
Other Lymphoma	0	0	0
Leukemia	0	0	0
(Acute Lymphocytic Leukemia)	(0)	(0)	(0)
Melanoma	0	0	0
Skin	0	0	0
Hepatic Tumors	0	0	0
Renal Tumors	0	0	0
(Wilms' Tumor)	(0)	(0)	(0)
Thyroid	0	0	0
Nasopharyngeal Carcinoma	0	0	0
Soft Tissue Sarcomas	0	3	3
Germ Cell/Trophoblastic	0	0	0
Other Carcinomas	1	0	1
Other Benign/Borderline	0	0	0
In Situ Cancers	0	0	0
Other/Unspecified	0	0	0
Total:	**2**	**3**	**5**

Note: The parenthetical numbers are a subset of the rows directly above them.

Table 7 Sub-Township Area (Census Tracts 228, 231, 232, and 236) Childhood Cancer (0 to 19 Years) 2001-2005 Standardized Incidence Ratios (SIRs)

Cancer Type	Sex	Number Observed	Number Expected	SIR	95% C. I. Lower	Upper
All Cancer	**Total**	5	4.6	1.1	0.35	2.5
	Male	2	2.6	0.8	0.09	2.8
	Female	3	2.0	1.5	0.30	4.3
Bone	**Total**	0	0.3	-	-	-
	Male	0	0.2	-	-	-
	Female	0	0.1	-	-	-
Brain/CNS	**Total**	1	0.8	-	-	-
	Male	1	0.5	-	-	-
	Female	0	0.4	-	-	-
Astrocytoma	**Total**	0	0.4	-	-	-
	Male	0	0.2	-	-	-
	Female	0	0.2	-	-	-
Leukemia	**Total**	0	1.1	-	-	-
	Male	0	0.7	-	-	-
	Female	0	0.4	-	-	-
Acute	**Total**	0	0.8	-	-	-
Lymphocytic	**Male**	0	0.5	-	-	-
Leukemia	**Female**	0	0.3	-	-	-
All Lymphoma	**Total**	0	0.7	-	-	-
	Male	0	0.4	-	-	-
	Female	0	0.3	-	-	-
Hodgkin	**Total**	0	0.3	-	-	-
	Male	0	0.2	-	-	-
	Female	0	0.2	-	-	-
Non-Hodgkin	**Total**	0	0.3	-	-	-
Lymphoma	**Male**	0	0.2	-	-	-
	Female	0	0.1	-	-	-
Soft Tissue Sarcomas	**Total**	3	0.3	8.9*	1.8	26
	Male	0	0.2	-	-	-
	Female	3	0.1	21*	4.2	62
Sympathetic Nervous	**Total**	0	0.2	-	-	-
System	**Male**	0	0.1	-	-	-
	Female	0	0.1	-	-	-
Neuroblastoma	**Total**	0	0.2	-	-	-
	Male	0	0.1	-	-	-
	Female	0	0.1	-	-	-
Wilms' Tumor	**Total**	0	0.1	-	-	-
	Male	0	0.1	-	-	-
	Female	0	0.1	-	-	-

*** Significantly elevated, p<0.05**

Table 8 Sub-Township Area (Census Tracts 228, 231, 232, and 236) Childhood Cancer (0 to 4 Years) 2001-2005 Standardized Incidence Ratios (SIRs)

Cancer Type	Sex	Number Observed	Number Expected	SIR	95% C. I. Lower	Upper
All Cancer	**Total**	2	1.3	1.6	0.18	5.8
	Male	1	0.7	-	-	-
	Female	1	0.5	-	-	-
Bone	**Total**	0	0.0	-	-	-
	Male	0	0.0	-	-	-
	Female	0	0.0	-	-	-
Brain/CNS	**Total**	1	0.2	-	-	-
	Male	1	0.1	-	-	-
	Female	0	0.1	-	-	-
Astrocytoma	**Total**	0	0.1	-	-	-
	Male	0	0.1	-	-	-
	Female	0	0.1	-	-	-
Leukemia	**Total**	0	0.4	-	-	-
	Male	0	0.3	-	-	-
	Female	0	0.2	-	-	-
Acute	**Total**	0	0.3	-	-	-
Lymphocytic	**Male**	0	0.2	-	-	-
Leukemia	**Female**	0	0.1	-	-	-
All Lymphoma	**Total**	0	0.0	-	-	-
	Male	0	0.0	-	-	-
	Female	0	0.0	-	-	-
Hodgkin	**Total**	0	0.0	-	-	-
	Male	0	0.0	-	-	-
	Female	0	0.0	-	-	-
Non-Hodgkin	**Total**	0	0.0	-	-	-
Lymphoma	**Male**	0	0.0	-	-	-
	Female	0	0.0	-	-	-
Soft Tissue Sarcomas	**Total**	1	0.1	-	-	-
	Male	0	0.1	-	-	-
	Female	1	0.0	-	-	-
Sympathetic Nervous	**Total**	0	0.2	-	-	-
System	**Male**	0	0.1	-	-	-
	Female	0	0.1	-	-	-
Neuroblastoma	**Total**	0	0.2	-	-	-
	Male	0	0.1	-	-	-
	Female	0	0.1	-	-	-
Wilms' Tumor	**Total**	0	0.1	-	-	-
	Male	0	0.1	-	-	-
	Female	0	0.1	-	-	-