



## St. Clair County Health Department

### Wilms Tumor Investigative Study Final Report February 2013

#### Introduction

St. Clair County, Michigan has seen a rise in the prevalence of Wilms tumor cases since 2001. This increase in prevalence of the Wilms tumor cases is concerning to the public and to community health officials. From the Michigan Cancer Registry the St. Clair County Health Department (SCCHD) identified eleven cases of Wilms tumors in St. Clair County between 1990 and 2009, seven of which were diagnosed in children younger than five years old (the most common age of presentation). Three cases occurred in the ten years from 1990-1999, and eight cases were reported from 2000-2009. These eight cases were the subjects of this report. Three of these cases occurred in Marine City, which according to the 2010 census had a population of 4,248. A complete summary of the evaluation of expected versus observed incidence of Wilms in St. Clair County can be found in the SCCHD's initial "*Investigation Summary Report*" released July, 2012.

Wilms tumor is a rare malignant cancer of the kidney that usually presents between the ages of three to five years of age. It is extremely rare in individuals over 15 years of age. The causes and main risk factors of Wilms tumor are still largely unknown. Recent studies have shown that there can be many genetic factors that could possibly be an etiology of Wilms tumor. Researchers know that certain syndromes such as WAGR and Denys-Drash are strongly associated with the development of Wilms tumor. They have also found there is an increased risk of a child developing Wilms tumor if they have overgrowth disorders, which may also be linked to a gene that is associated with Wilms tumor. There is an increased amount of research being done to gain a better understanding of a genetic origin of the disease but there is still a lot that is not understood about the potential genetic (or other) risk factors. (Chu, Heck, Ribeiro, Brennan, Boffetta, Buffler, & Hung, 2010).

In addition to genetic risk factors that may lead to the development of Wilms tumor, studies have found there may be environmental risk factors as well as parental medical problems.

Some studies have found that maternal hypertension during pregnancy increases the risk of Wilms tumor in their child. In addition, some studies have found an association of Wilms tumor development and increased maternal age at the time of their child's birth. In a few studies, paternal pesticide exposure prior to conception has been linked to an increase risk of Wilms; however, the findings are not consistent through all studies examining risk factors for Wilms. Also, it has been found there is an elevated risk of Wilms if there is a paternal exposure to hydrocarbons prior to conception. Finally, studies have found that high birth weight increases the risk of a child to develop Wilms tumor. Consequently, low birth weight was discovered to have no association (Chu et. al, 2010). This investigative study and subsequent report attempts to consider all of these potential risk factors.

Since the elevated incidence of Wilms tumor was established in 2012, there have been concerns from the community about the relationship between environmental pollutants and cancer, as well as specific assertions related to concerns about air and water quality. The SCCHD worked to address public concerns by looking more closely at the families affected by this cancer. This process began with an administration of a questionnaire to the Wilms tumor patient's families to see if there were common risk factors in demographic data, occupational exposures, intrauterine exposures, and environmental exposures. The data collected for this final report has been reviewed by an Epidemiologist at the Michigan Department of Community Health (MDCH) and is being shared with academic researchers at the University of Michigan as well as with the families of those affected by Wilms tumor.

## **Materials and Methods**

The initial information contained in the SCCHD's "*Investigation Summary Report*" analyzed the confirmed cases in St. Clair County relative to adjacent counties and the state's incidences. Only cases that had presented voluntarily were available to the SCCHD investigatory team. The initial investigation included review of maternal residency at the time of diagnosis and time of her child's birth and correlated this with any known environmentally contaminated area (landfill, brownfield sites, industries, etc.). None of the eight cases initially reviewed had consistent relationships with a water source or other notable environmental issue.

Graduate students from the Michigan State University Public Health Program (MSU PHP), under the direction of the SCCHD's Medical Health Officer, researched and developed an appropriate series of questions that captured various demographics and exposures relevant to this type of cancer. This questionnaire was developed using multiple cancer research survey models and previous epidemiological studies of Wilms tumor. Once the questionnaire was developed, SCCHD and MSU PHP partnered with Dr. Richard Lieberman, Assistant Professor of Pathology, from the University of Michigan Health Systems Obstetrics and Gynecology/ Pathology Department, Dr. Lieberman's research team, and Dr. Julie Wirth, an epidemiologist at the MDCH. The questionnaire was divided into four categories: demographic data, occupational exposures, intrauterine exposures, and residential and behavioral exposures.

The questions were aimed at obtaining a history of each patient, the mother, father and caregiver of the patient, as well as detecting common associations between cases. The MSU PHP team sent letters to the families of children that had a confirmed diagnosis of Wilms tumor asking for their voluntary participation in the investigation. The MSU PHP students interviewed a total of eight mothers, six fathers, and twelve caregivers. Each of the mothers and fathers interviewed in the investigation were biologically related to the child. All of the caregivers interviewed were biologically related grandparents or were step-parents.

No control cases were included, and as a result, only the relative frequency (%) of each response could be determined from the cases. Compiled data was numerically coded and analyzed through EpiInfo.

At the beginning of the investigation, University of Michigan researchers indicated an interest in reviewing the placental tissues from these eight Wilms tumor cases. The Parent/Guardian was asked to sign a Release of Information (ROI) Form of the placental tissue that Dr. Lieberman's research team could locate and obtain the patient's tissue for study. The standard protocol for most hospitals is to retain placental tissue only in cases of complicated or abnormal births. All births of these children were reported as normal and consequently, their placental tissue was not kept for evaluation by the delivering hospital and was not available for histological review by Dr. Lieberman.

## Demographics

The percentages of income status, ethnicity, and level of education were diverse, yet consistent and proportional to county-wide demographics (Figure 1). Though there have been very few nationwide Wilms tumor studies to date, some studies have shown an increased prevalence of Wilms' with increased maternal age, but not with increased paternal age (Chu et. al, 2010). The average age for mothers in this cohort was 29.5, with a range of 18 to 39 years old at the time of delivery.

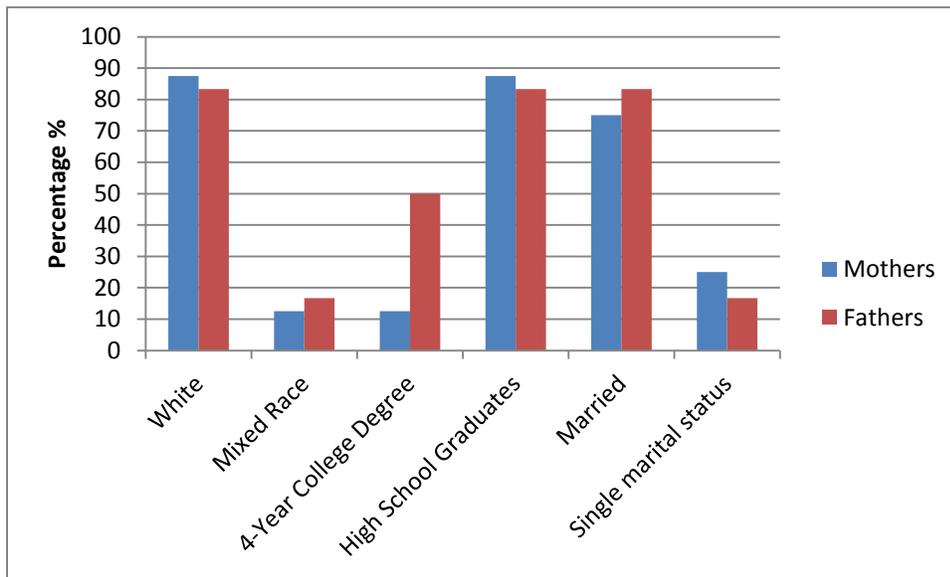
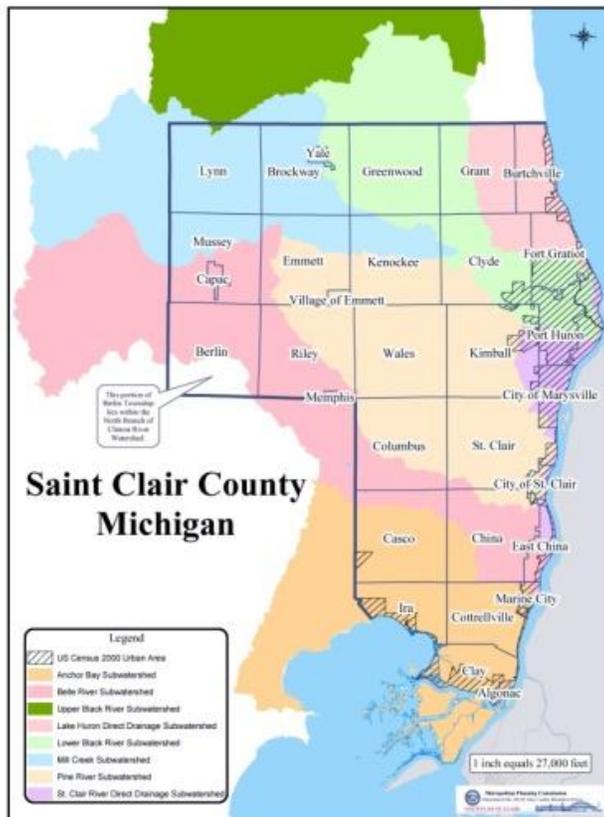


Figure 1. Mother and Father Demographics

Discussions with researchers and a review of the literature suggest exposures to the fetus in the uterus are most likely to result in genetic changes to developing kidney tissue that would lead to cancer after birth. The first and second trimesters are considered the most vulnerable to many genetic defects. The mother's place of residency for each trimester was asked through the questionnaire. Analysis revealed a wide divergence among residency during and after pregnancy for each case, including two cases that had no maternal residency in St. Clair County during their pregnancy. The investigation showed that five of the eight mothers spent their first and second trimesters in either Marine City or Port Huron, and three of the eight mothers spent their entire pregnancy in Marine City. Figure 2 illustrates the major municipalities of St Clair County, with the majority of the county's population living in the cities along the Eastern border. The largest

city is Port Huron, with a 2010 census of 30,184. The other cities along the St Clair River are Marysville (pop: 9,959), St Clair (pop: 4,585), Marine City (pop: 4,248), and Algonac (pop: 4,110).

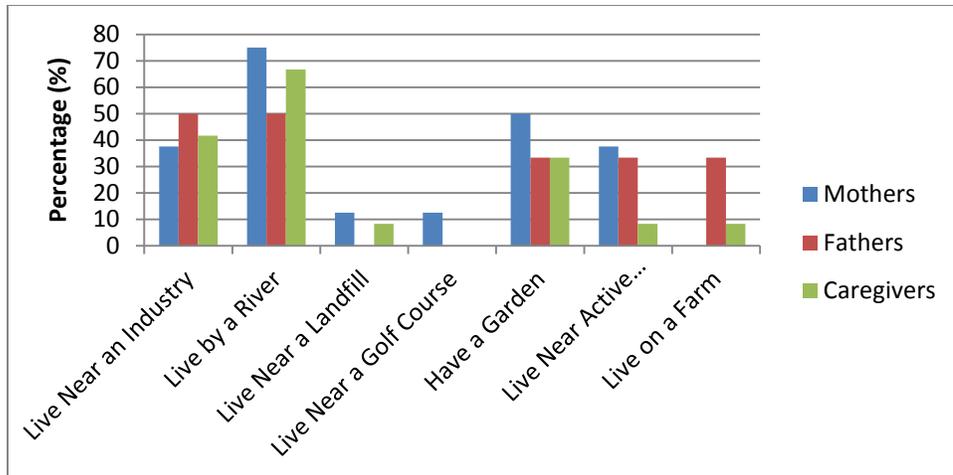


*Figure 2. Urbanized Areas of St. Clair County, 2000*

## Environmental Exposures

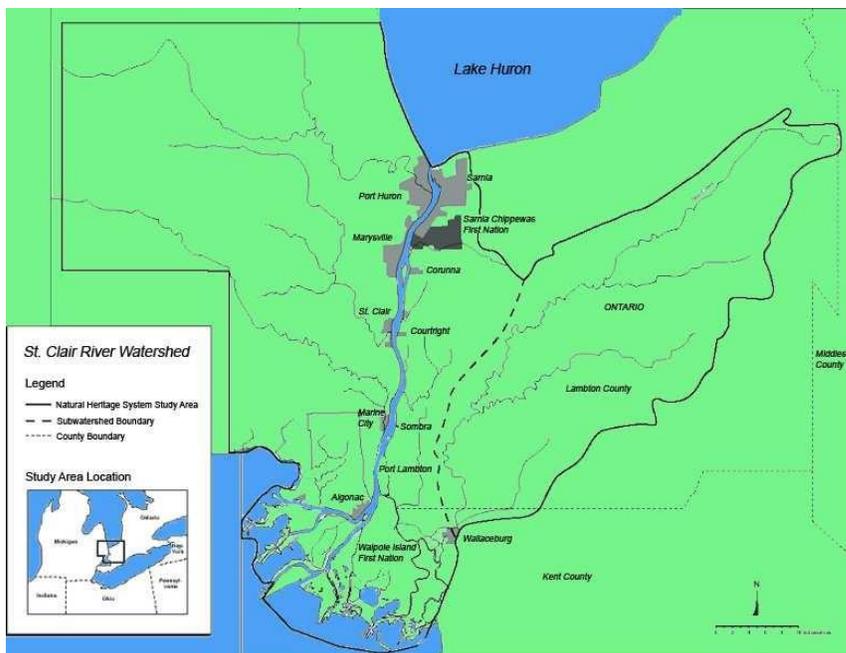
This section of the questionnaire took a look at the acquired and preventable residential and environmental exposures for the mother, father, and caregiver in each case (Figure 3). Some of the survey questions in this section were vague, such as inquiries about living near “industry” and “rivers”.

St. Clair County is bordered to the east by Ontario, Canada’s largest industrialized region, an area known as “Chemical Valley”, where oil refining, petrochemical production, and power plants are an integral part of the Canadian economy.



**Figure 3. Residential and Environmental Exposures**

The St. Clair River is the waterway that separates Michigan on the west from Ontario to the east. The St. Clair River begins at the southern end of Lake Huron and flows south for approximately 40 miles to the southern tip of St. Clair County. The St. Clair River is a vital fresh-water resource for shipping, drinking water supply, commercial and sport fishing, swimming, and recreational boating. Much of the shoreline along the St. Clair River is urbanized and industrialized (Figure 4), while the majority of the watershed further west from the river is predominately rural. Southeast Michigan Council of Government’s 2008 land use map shows almost 50% of St. Clair County’s acreage is agriculture and less than 2% is categorized as industrial.



**Figure 4. Tributary rivers and watersheds of St. Clair County, MI and Ontario, Canada**

Seventy-five percent of the mothers reported living near a river, which they indicated was either the St. Clair River or the Black River located in Port Huron. No mothers reported living near other in-land tributary rivers such as the Belle or Pine Rivers. Two-thirds of mother and father respondents said they lived near industry; however the specific industry or the actual proximity to the industries reported was not elicited. Studies have shown there is a significant association between maternal exposure to pesticides and Wilms (Chu et. al, 2010). A minority of the women knew of pesticide use either in their own garden or somewhere in their neighborhood (Table 1). Half the women gardened during their pregnancy, but only a small percentage of these women handled gardening chemicals, such as fertilizers or pesticides. Only one-third of father respondents identified handling garden chemicals.

Exposures	Yes	No	Unsure or N/A
Pesticides Used in Home	25	62.5	12.5
Pesticides Used in Neighborhood	25	37.5	37.5
Handled Fertilizer	12.5	37.5	0
Public Water Company	75	25	0
Use of Water Filter	62.5	37.5	0
Use of Septic Tank	50	50	0
Decommissioned Septic Tank on Property	12.5	87.5	0
Radon Tested Home	0	75	25
Pets During Pregnancy	75	25	0
Clean up after the Pets	37.5	37.5	25
Pets Live inside the Home	50	25	25

**Table 1.** Exposures During Pregnancy for Mother, in Percentages (%)

Exposures	Yes	No	Unsure or N/A
Handled Fertilizer	16.67	83.33	66.67
Pesticides Used in Home	0	100	0
Pesticide Used in Neighborhood	50	16.67	33.33
Public Water Company	50	50	0
Use of Water Filter	50	50	0
Use of Septic Tank	50	50	0
Home Tested for Radon	16.67	83.33	0
Pets in the Home	100	0	0
Cleaned up After Pets	83.33	16.67	0
Pets Living Inside the Home	33.33	66.67	0
Use of Antibacterial Soap in the Home	100	0	0

**Table 2.** Exposures Before Conception for Father, in Percentages (%)

**Occupational Exposures**

Emerging research indicates possible concerns that trilosan, the chemical in antibacterial soaps, may disrupt endocrine functions, specifically the adrenal gland, in many different animals (Sifferlin, 2012). Due to this recent study, the fathers and caregivers were asked if they used antibacterial soap (mothers were not asked). All of the fathers reported using antibacterial soap (Table 2) and majority of the caregivers responded that they used antibacterial soap (Table 3). Although the chemical found in antibacterial soap has been found to disrupt endocrine function in animal studies, it has not been linked in any previous literature to increase the risk of the development of Wilms or even to carcinogenesis.

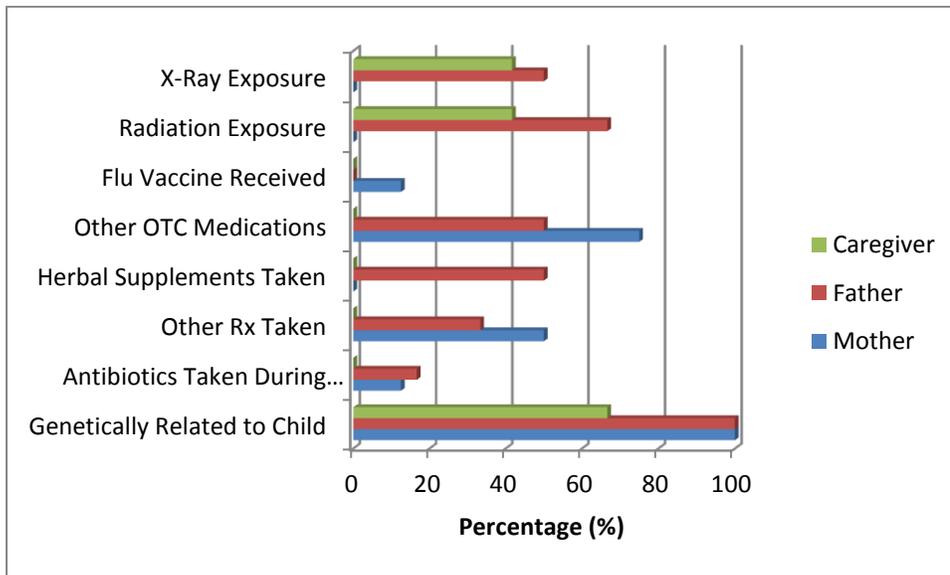
Occupational exposures may play a role in cancer formation. Exposures to chemicals or radiation at work (dyes, oils, dusts, chemicals, tars, etc.) may prove to have a carcinogenic affect upon the developing fetus by denaturing proteins or increasing cell division. Three mothers reported they did not have an occupation outside the home during their pregnancy. The women who stated they worked during their pregnancy had a wide range of jobs in various fields from agriculture, industry, a hairdresser, and unspecified trades. Twenty-five percent of the mothers reported using chemicals on the job, however, the specific type of chemical was unknown. On the other hand, all of the fathers held jobs outside of the home during the mothers' pregnancies. A minority of fathers reported being exposed to chemicals at their jobs, however, the specific chemicals were not identified.

Exposures	Yes	No	Unsure or NA
Handled Fertilizer	16.67	83.33	0
Pesticides Used in Home	33.33	66.67	0
Pesticide Used in Neighborhood	16.67	66.67	16.67
Public Water Company	25	75	0
Use of Water Filter	33.33	66.67	0
Use of Septic Tank	33.33	66.67	0
Home Tested for Radon	16.67	83.33	0
Pets in the Home	50	50	0
Cleaned up After Pets	41.67	8.33	50
Pets Living Inside the Home	33.33	16.67	50
Use of Antibacterial Soap in the Home	91.67	8.33	0

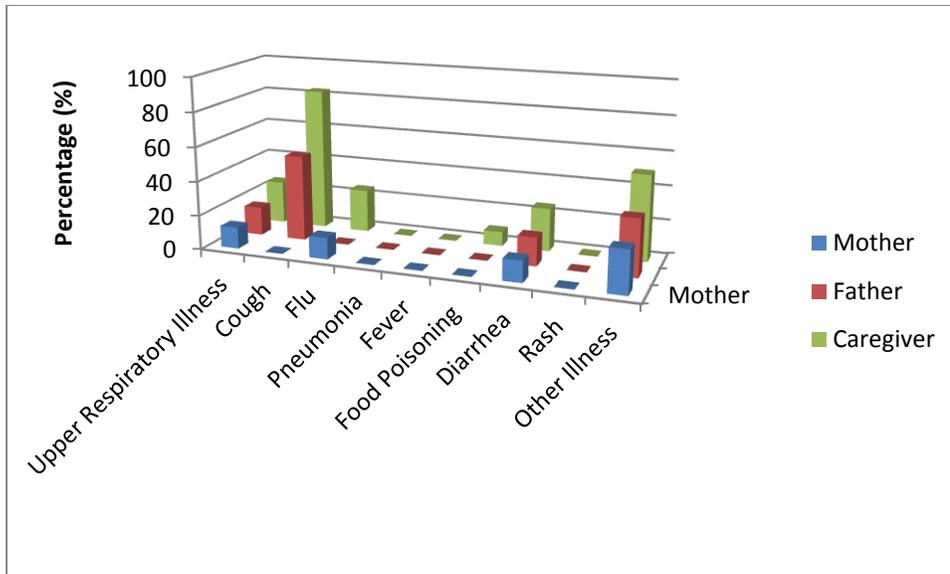
**Table 3.** *Exposures During Care for Caregivers, in Percentages (%)*

## Medical History of Parents

In terms of medical history of parental or caregiver respondents, there was no clear indication of common illnesses or medical conditions (Figures 5 and 6). Few of the mothers had an illness such as influenza, an upper respiratory disease, or diarrhea and the most common health complaint among fathers was a cough. Only a minority of the mothers took antibiotics during their pregnancies, but half of the mothers took prescription medication during pregnancy. None of the mothers consumed any herbal supplements and a minority used Over-The-Counter (OTC) medications. During pregnancy, vitamin use was sporadic (Figure 7). Virtually none of the mothers received a flu vaccine which is contrary to public health recommendations (U.S. Centers for Disease Control and Prevention, 2012). Many studies have found an association between maternal hypertension and Wilms tumor, but no such association was found in the SCCHD investigation because none of the mothers reported hypertension.

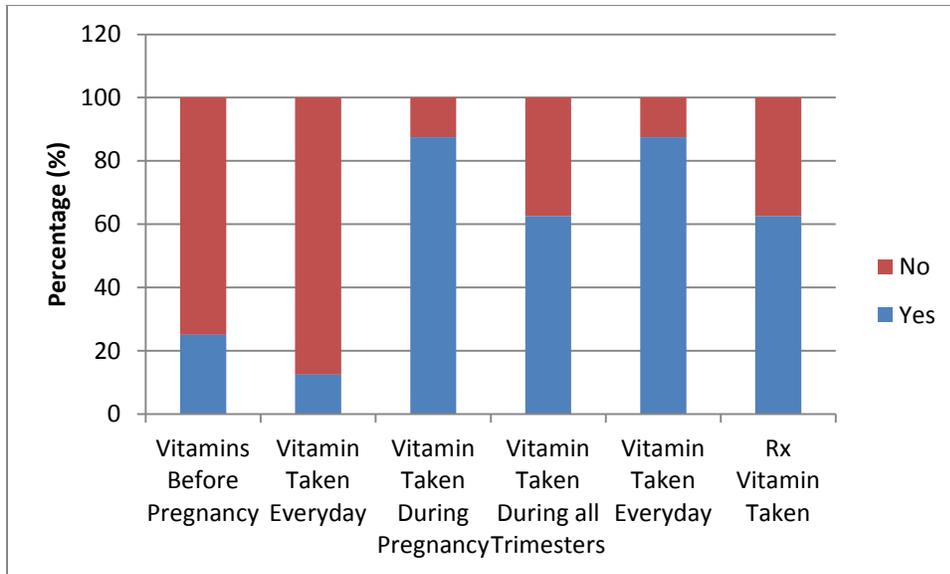


**Figure 5.** Medical History Before and During Pregnancy for Mother and Father; Post-Birth Medical History for Caregivers



**Figure 6.** *Illnesses for Mother, Father, and Caregivers*

Even though the embryo is protected in the uterus (any radiation dose to a fetus tends to be lower than the dose to its mother), the embryo and fetus are particularly sensitive to ionizing radiation. The health consequences for the developing fetus may be severe, even at radiation doses too low to immediately affect the mother. Such consequences of ionizing radiation include: growth retardation, malformations, impaired brain function, cancer, and other congenital defects. Though the fetus is particularly vulnerable to ionizing radiation, most radiation exposures will not expose the fetus to levels that may cause health consequences. Regular doctors' exams and occupational exposures within regulatory limits will most likely not cause ill health effects for the developing fetus or embryo (U. S. Centers for Disease Control and Prevention, 2011). For this study there was a high rate of x-ray and radiation exposure reported by fathers and caregivers, though no reasoning or responses were given for the high amount of radiation exposure. In this investigation, none of the mothers reported any radiation exposure during their pregnancy. A comprehensive medical charts review could clarify many medication issues if pursued.



**Figure 7.** *Vitamin Intake During Pregnancy for Mothers*

## Behavioral Risks

In general, a large proportion of carcinogenesis is believed to be related to behavioral factors. Nearly 50% of cancers are thought to be related to personal lifestyle choices, however, not necessarily related to the development of a Wilms tumor. Another area of interest to the MSU PHP students was food and caffeine consumption. All of the mothers bought their meats and produce from local grocery stores; none of the mothers reported being vegetarians. Half of the mothers consumed seafood during their pregnancy, and of these four mothers, a small percentage caught their own fish. Bisphenol-A (BPA) is an inorganic compound used in some plastics and has been linked to endocrine disruption and the developing fetus is especially vulnerable to this toxin (Nishikawa, Iwano, Yanagisawa, Koike, & Inoue, 2010). A few of the mothers reported using bottled water during their pregnancies; however, they did not know if the plastic water bottles were BPA-free. Two-thirds of the mothers reported using microwaveable plastic products, but these mothers did not know if the plastics were BPA-free. In terms of caffeine consumption, a majority of the mothers consumed pop, coffee, or tea everyday while no one reported consuming energy drinks. Fathers reported the same numbers when questioned

about BPA and plastics, but they reported 100% use of caffeine products. There have been no studies that have shown an association of caffeine consumption with Wilms.

Alcohol and nicotine are well-known teratogens, a chemical, infectious agent, physical condition, or deficiency that, on fetal exposure, can alter fetal morphology or subsequent function. Both alcohol and nicotine can impede intranatal and postnatal growth, as well as induce other malformations. Though 100% of the mothers reported consuming alcohol before their pregnancy, 50% of the mothers reported consuming alcohol during their pregnancy. Of the mothers that stated they consumed alcohol during their pregnancy, some women drank less than one alcoholic beverage per week; some drank two to three beverages per week; and some consumed over six alcoholic beverages per week. Two of the mothers reported they were smokers before their pregnancy; one quit smoking at the onset of her pregnancy. A minority of fathers and mothers reported narcotic use during the pregnancy. All of the fathers reported alcohol consumption before and after the mother's conception. Half of the fathers considered themselves smokers and smoking did not cease once the mother became pregnant.

## **Research Summary**

The relative frequencies from the questionnaire data have been completed by the MSU Public Health Program, but it is difficult to draw concrete conclusions or associations from the sample size from this study. Even though the St. Clair County Wilms tumor cases were statistically greater than expected, it is challenging to draw conclusive information from small sample sizes. The results of this survey suggest that there are few similarities in the Wilms cases in relation to exposures from environmental teratogens; however, there were relatively high associations in the following categories: hand-washing with antibacterial soap, living near unspecified water, and caffeine consumption. There were no similarities reported relative to environmental exposures that were previously reported in the literature, i.e. increased maternal age, birth order, high birth weight, pesticide exposure, chemical exposure, preterm birth, maternal hypertension, caffeine consumption, alcohol consumption, and nicotine use (Chu et al, 2010). The geographical location of the mothers during their pregnancies is disproportionate in relation to Marine City, but as a group there was wide variation in where they lived, particularly during pregnancy, and for how long.

It is important to note that although this investigative study was comprehensive within the SCCHD's scope and capabilities, there were some limitations of this particular study design. First, the questionnaire asked straightforward questions without more in-depth background data applied. For instance, two-thirds of the men reported radiation exposure, but there is no data showing if this relates to radiation exposure from an x-ray or radiation by other means. Another limitation of this study design was that it was based upon self-reporting, and generally, people may downgrade unpleasant answers. Self-reporting may also be degraded by lapses in memory. Since many of these mothers were interviewed anywhere from three to fifteen years after their pregnancy, recalling certain seasonal illnesses and OTC medications after that amount of time can be difficult. The questionnaire also only reported upon the pre-natal period and did not delve into the post-partum period because it is believed that intrauterine exposures are more relevant than postpartum exposures. It is crucial to note that one of the cases stems from a genetic abnormality, so the questionnaire contributions may not correlate with the other seven cases and may skew data frequencies.

The SCCHD continues to work with and communicate with Dr. Lieberman and University of Michigan researchers who remain interested in further studies related to St Clair County. The survey also allowed for ongoing dialogue and support from MDCH and the CDC who continue to give support and guidance for these difficult issues.

The SCCHD acknowledges that there are gaps in data and more research is needed. Since there is no clear environmental exposure linked to Wilms tumors, either in the literature or locally, ongoing attention to new or emerging changes is important. Although industrial toxins remain an ongoing concern, the SCCHD cautions the community that many other factors may be useful to consider. While the ability to pinpoint an exact cause of this event may seem elusive, it remains valid to improve the quality of our environment in a comprehensive manner, even without evidence to suggest a direct problem. The SCCHD is working closely with St. Clair County Emergency Management to establish better communications about industrial spills and other chemical releases into the air and water and will compile them in a systematic way. The SCCHD will continue to be advocates for the drinking water monitoring system, as well as the improvement of the watersheds, tributary systems, and beaches of the county.

## **Environmental Toxins Summary**

Exposure to all harmful chemicals, whether in the air, soil or water, cannot completely be eliminated. Risks to exposed individuals, as it relates to carcinogens, vary according to the intensity, potency, and duration of the exposure, as well as genetic susceptibility. Children respond differently to carcinogens, and things that may not be a health detriment to adults may have a negative impact on immature bodies (Barton, Hughes, A., Environmental Health Perspectives, Volume 113, Number 9, September 2005). Carcinogen testing data are not available for most industrial and commercial chemicals and, ideally, such testing should be performed before products are introduced, rather than after there is widespread human exposure. This is an area of growing interest referred to as “green chemistry” which the Environmental Protection Agency (EPA) has published materials about at <http://www.epa.gov/greenchemistry/pubs/aboutgc.html>.

The health of our local waterways, soil and air has been a considerable source of concern for many people in the community; however these are complex fields to analyze. Premature environmental testing is not recommended by the Center for Disease Control as results may be difficult to explain or understand in terms of meaning or significance, causing unanticipated harm to the community and economy. For a complete review of the CDC’s recommendations on cancer cluster investigations see <http://www.cdc.gov/mmwr/preview/mmwrhtml/00001797.htm>. Other readings related to cancer clusters can be found at: <http://www.cdc.gov/nceh/clusters/pubs.htm>

The speed, direction, flow and temperature of water and air are in constant motion, as well as the pollutants they are carrying, making it difficult to ascertain all risks. The environmental enforcement and compliance of industrial facilities, which are perceived to be the single largest threat to our local environment, is outside the SCCHD’s jurisdiction. There are, however, some encouraging signs from the environment that indicate improvement from previous levels of pollution.

The St. Clair River is the fresh water source from which all residents in St. Clair County receive their municipal water supply. In 1985, the U.S. and Canadian governments identified the St. Clair River as one of forty-three Areas of Concern (AOCs) across the Great Lakes because all

AOC's have the most significant pollution problems and greatest loss of beneficial uses for the public. All Great Lakes and their connecting waterways have fourteen public Beneficial Uses that are protected by both the US and Canadian governments. By 1992, the St. Clair River Binational Public Advisory Council (BPAC) had determined that there were ten Beneficial Uses that were impaired on the St. Clair River. These Beneficial Use Impairments (BUI's) were deemed significant for a number of reasons including, but not limited to, municipal and industrial discharges, combined sewer overflows, contaminated sediments, destruction of fish/ wildlife habitat, and polluted storm water runoff.

1. Restrictions on Fish and Wildlife Consumption
2. Bird or Animal Deformities or Reproductive Problems
3. Degradation of Benthos
4. Beach Closings
5. Loss of Fish and Wildlife Habitat
6. Restrictions on Drinking Water Consumption or Taste and Odor Problems
7. Tainting of Fish and Wildlife Flavor
8. Restrictions on Dredging Activities
9. Added Costs to Agriculture or Industry
10. Degradation of Aesthetics

Through two decades of collaborative efforts by BPAC, the government - including the SCCHD - industry, the public, and environmental groups in the US and Canada, BPAC is currently reporting that the conditions of the St. Clair River have dramatically improved. The St. Clair River has removed more beneficial use impairments than any other AOC in Michigan. The following provides a short list documenting some of the most recent improvements to the St. Clair River:

- Four Beneficial Use Impairments Re-Designated to Unimpaired
  - In 2011 and 2012, after thorough study and analysis, four Beneficial Use Impairments were re-designated as Unimpaired. These were: Tainting of Fish and Wildlife Flavor, Restrictions on Dredging Activities, Added Costs to Agriculture or Industry, and Degradation of Aesthetics.

- Industrial Discharge Reductions
  - From 1978 – 2009, 17 Canadian facilities that have industrial discharges to the St. Clair River, decreased their pollutant loadings (19 parameters) by 76%. (Sarnia-Lampton Environmental Association)
  - By 2005 Canadian spills to the St. Clair River had improved over 600% from 1986. (Sarnia-Lampton Environmental Association)
- Sediment Quality Recovery
  - In the 1990s, Canadian industry spent millions of dollars to clean up riverbed sediments previously contaminated by industrial discharges. A study by the Sarnia-Lampton Environmental Association analyzed sediment quality from 1957– 1990 in three areas along the Canadian shoreline considered to be the most toxic. The data analysis demonstrates that sediment quality in the study areas has recovered to healthy levels.
- Sewage Reductions
  - By the end of 2012, the City of Port Huron will have separated 91% of its combined sewer system which will result in the elimination of approximately 290 million gallons of pollution to our waterways annually as compared to before 1990. (City of Port Huron)
  - In 2012, the City of Marysville completed a \$20 million dollar project to improve its waste water infrastructure and eliminate sanitary sewer overflows. This improvement increased its waste water treatment plant capacity from 6.0 to 10.2 million gallons/ day.
  - From 1978 – 2009, Canadian municipal discharges to the St. Clair River decreased 84%. (Sarnia-Lampton Environmental Association)
  - In 2002, the SCCHD spearheaded a new storm water program that identified and corrected hundreds of failing septic systems across the county. This effort has currently reduced the amount of sewage being discharged into waterways by approximately 50 million gallons per year.
  - In 2010, the MDEQ completed an extensive assessment of *Ecoli* levels in the St. Clair River. They found 99% of samples taken over the entire summer were in compliance with safe swimming levels.

- Beach Closings
  - From 1992 – 2012, Chrysler Beach in Marysville was the only beach that closed due to high *E. coli* counts along the US side of the St. Clair River. The public beach in Marine City was never closed.
  - In 2010, the SCCHD applied for and received grant funds to improve management of Chrysler Beach and locate sources of pollution.
  - In 2012, the SCCHD assisted the City of Marysville to receive grant funding of \$500,000 to continue reducing pollutant sources for Chrysler Beach.
  
- Fish and Wildlife Habitat
  - In 2010, over \$6 million in federal funds was received by local municipalities along the US side of the St. Clair River to acquire shoreline property and restore these properties for wildlife habitat.
  - In 2013, the St. Clair River is slated to receive an additional \$6 million to complete habitat projects that will allow it to redesignate the Fish and Wildlife Habitat BUI.
  
- Storm Water Runoff
  - From 2002 - present, the SCCHD has led efforts to reduce pollutants in storm water runoff. Currently, watershed planning partnerships have resulted in the implementation of new storm water education, illicit discharge elimination, and pollution prevention and good housekeeping programs across the county.

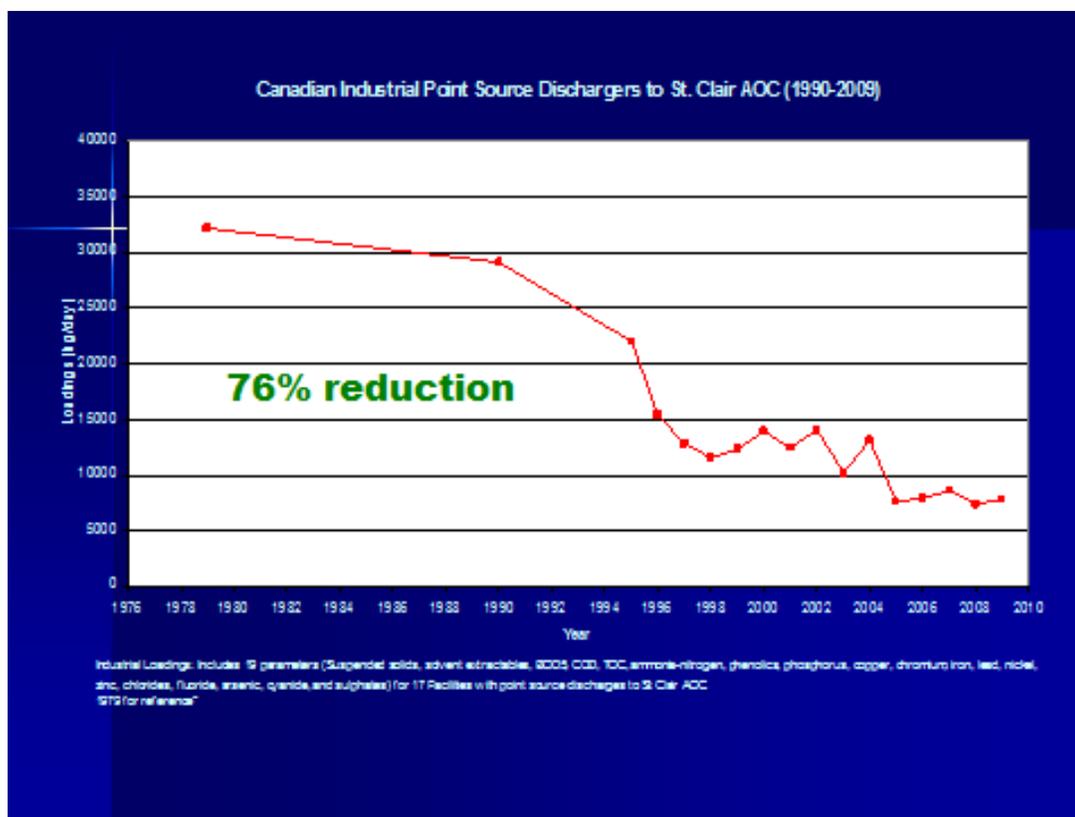


Figure 8. Canadian Municipal Point Source Discharges to St. Clair River, 1990 – 2009, Sarnia-Lambton Environmental Association

In 2007, in response to increased concerns from residents and pressure from elected officials, the St. Clair River-Lake St. Clair Drinking Water Monitoring Protection System was installed at St. Clair County water treatment plants to protect the public from exposure to chemicals. The goal of the project is to detect hydrocarbons, organic compounds and physical properties of the drinking water along the St. Clair River corridor. Implementation of this real-time monitoring project has led to quicker identification of pollutants, and more prompt notification regarding the presence and identity of water contaminants (Great Lakes Commission).

Air quality is tracked hourly at a monitoring station in Port Huron and can be viewed on the Michigan Department of Environmental Quality Air Quality Division’s (MDEQ) website, MiAir (<http://www.deqmiair.org>). The MDEQ is responsible for ensuring that air pollution sources in Michigan are regulated to minimize adverse impacts on human health and the

environment. The Air Quality Index (AQI) is an index calculated by the EPA for reporting daily air quality and is based on data from monitors used to demonstrate attainment with the National Ambient Air Quality Standards. Ozone Action Days, monitored April through September, are called when the AQI climbs into the unhealthy ranges. On Ozone Action Days the MDEQ encourages residents to make voluntary choices that reduce air pollution emissions that can lead to poor air quality and protect their health by reducing exposure to unhealthy air.

This study has provided the SCCHD the capacity to offer ongoing support for the families affected by Wilms tumor in St. Clair County, as well as develop a more robust involvement in the health of the environment and cancer concerns of the entire community. The SCCHD is committed to, now and in the future, supporting any continued actions that will reduce industrial, occupational, and residential risks from chemical exposure to all St. Clair County residents, and is committed to responding to any condition or event that threatens the health of the community.

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