Investigating the Relationship between Modifiable Environmental Risk Factors and Incidence of Colorectal Cancer: A Community Based Study

by

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Abstract

Colorectal cancer is the third most diagnosed cancer and second leading cause of cancer related deaths in Canada. As Ontario has the largest population in Canada, it also has great disparities in colorectal cancer incidence. The region of Timiskaming has the highest incidence for colorectal cancer, while the region of Peel has the lowest incidence for colorectal cancer in Ontario. The purpose of this study is to identify the dominant non-nutritional modifiable environmental risk factors in the region of Timiskaming compared to the region of Peel that may be associated with diverging colorectal cancer incidence rates. The three objectives of the study included performing a systematic review on available published literature, creating an assessment questionnaire tool regarding environmental exposures, and utilizing the questionnaire assessment tool within a pilot study group while expanding it into the communities of interest. Findings indicate that there are dominant non-nutritional modifiable environmental risk factors in the regions of Timiskaming and Peel that may be associated with colorectal cancer. The dominant factors identified are tobacco/smoking, alcohol use, pesticides/organochlorines, and metal toxins. Following this study, it is imperative that recommendations are directed at a community level and relate to the assessment of potential non-nutritional modifiable environmental risk factors. Future research should accompany a larger sample size, multiple participant communities, and catering of the questionnaire tool towards the communities of interest.

Key words: colorectal cancer, environmental risk factors, community based research

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1.0 Introduction

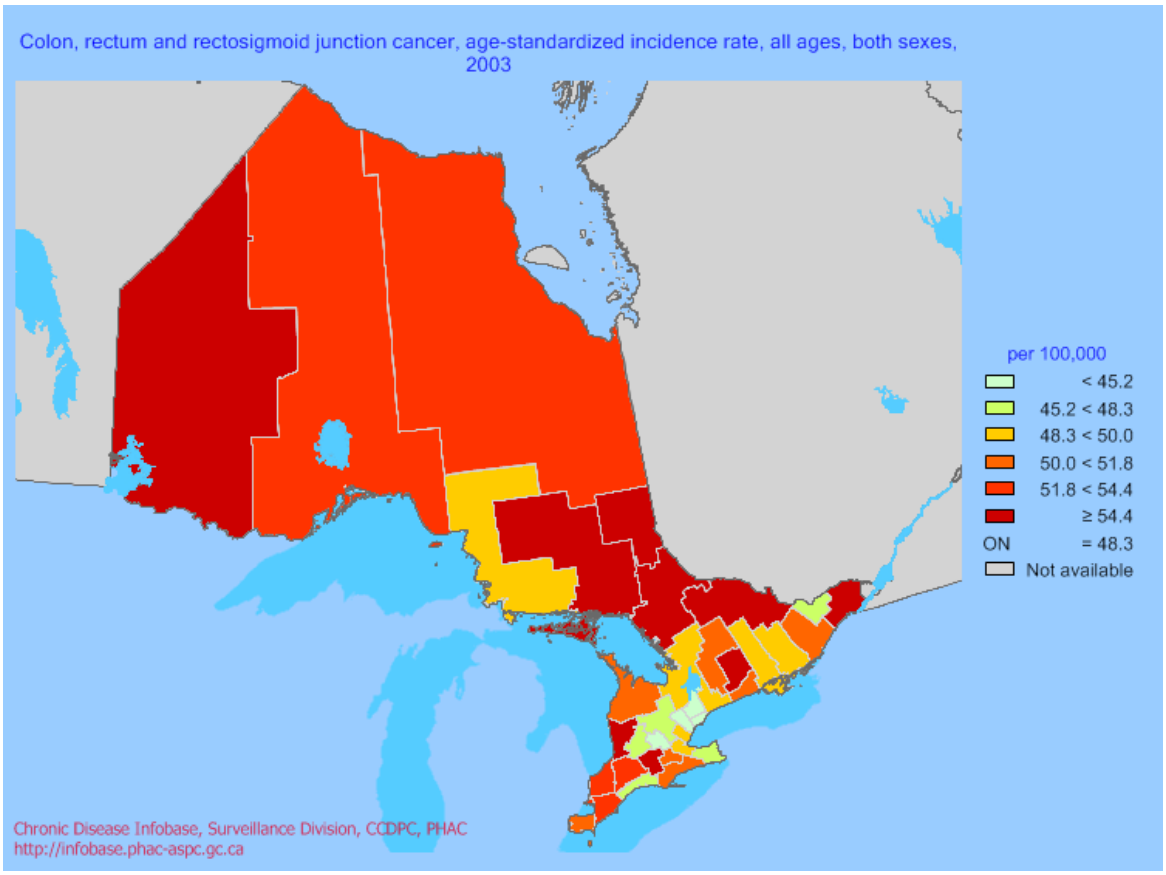
1.1 Worldwide, Population, and Community Level Disparities

The burden of cancer is a global issue that is greatly influencing the health and well-being of humans worldwide. It is the leading cause of death worldwide, accounting for 13% of all deaths in 2008 (World Health Organization, 2011). As there has been progress to ultimately reduce cancer rates, there are still prevalent geographical differences present internationally, nationally, and locally. As the global population gradually increases and continues to age, the adoption of cancer associated activities and lifestyle choices continue to enhance cancer incidence, mortality, and disparities.

Cancer of the colon and rectum is a major cause of mortality and morbidity, and accounts for over 9% of cancer incidence worldwide. The prevalence of colon and rectum cancer is rapidly rising in areas that are known to be historically of low risk and the cause of these emerging trends seems to be a combination of factors that affect lifestyle and environment (Jemal et al., 2011). Even as these forms of cancer have a great impact on individuals globally, they are quite preventable, making it undoubtedly possible to reduce its magnitude (Hagger & Boushey, 2009). Colorectal cancer rates are changing and following an unequal population distribution and burden around the world (Henry, Niu, & Boscoe, 2009). It is the third most diagnosed cancer in males and second in females worldwide. The worldwide geographical differences are so great that colorectal cancer incidence rates range by 20 fold, with the lowest incidence in India and the highest incidence in Japan (Adami, Hunter, & Trichopoulos, 2008). North America, Europe, Australia, and New Zealand present the high incidence rates, while South-Central Asia

and Africa present the lowest incidence rates (Jemal et al. 2011). These disparities are continuing to broaden as the human population continues to increase.

It has been distinguished that colorectal cancer is the third most common cancer diagnosis and the second leading cause of cancer related deaths in Canada and the United States (Centers for Disease Control and Prevention, 2011; Canadian Cancer Society, 2011). Reviewing Canada's provincial and territorial levels of colorectal cancer incidence have shown that in 2007, the territory of Nunavut (84.1 cases per 100,000) had the highest incidence among all of Canada, followed by the Northwest Territories (63.6 cases per 100,000). In 2007, the province of Ontario was ranked the 5th highest out of 13 provinces and territories for colorectal cancer incidence rates with 34.4 cases per 100,000 persons (Public Health Agency of Canada, 2011). Although Ontario does not have the highest incidence rate of colorectal cancer in Canada, it does hold the largest population in Canada with distinguishable disparities between Ontario community regions. Within the province of Ontario, colorectal cancer incidence rates vary prominently from the highest incidence in the North East region of Timiskaming in 2003 (70.4 cases per 100, 000) to the lowest incidence in the Southern region of Peel in 2003 (41.3 cases per 100, 000) (Figure 1) (PHAC, 2011).



Source & notes

1. Data sources: Statistics Canada, Canadian Cancer Registry (CCR) Database and Demography Division (population estimates). June 2007 CCR file.
2. WHO, International Classification of Diseases for Oncology, Third Edition (ICD-O-3) and the International Agency for Research on Cancer (IARC) rules for determining multiple primaries sites.
3. Cancer incidence refers to new primary sites of malignant neoplasms.
4. Cancer incidence rates are age-standardized using the direct method and the 1991 Canadian Census population structure. Rates in this table are based on three consecutive years of cancer incidence data which were summed and divided by three times the population estimate of the middle year of the three-year period. The confidence intervals for the age-standardized cancer incidence rates were produced using the Spiegelman method. Reference: Spiegelman M. "Introduction to Demography", Revised Edition. Cambridge, Massachusetts: Harvard University Press, 1968, page 113, Formula 4.29.
5. The health regions presented in this table are based on boundaries and names in effect as of June 2005. Each of the northern territories also represents a health region.

Figure 1. Colorectal cancer incidence rates for all ages and sexes per 100, 000 in Ontario, Canada in 2003 (PHAC, 2011).

Colorectal cancer disparities are not only viewed as on an international or national level, but more specifically are present at a community level. The disparities are only continuing to exist, affecting the economies and health status of communities. There are also visible gender differences when distinguishing between cancer of the colon and cancer of the rectum. Cancer of the rectum is generally seen to be twice as common in males as in females (Adami et al., 2008). For the purposes of this study, colon and rectum cancer will be analyzed together as colorectal cancer. The province of Ontario will be further assessed as it was a convenient location for the time frame available for the research.

1.2 Clinical Aspects of Colorectal Cancer

It is imperative to understand the clinical aspects of colorectal cancer and the manifestation among humans before indulging into specific attributes. Initially, a visible protrusion known as a polyp can be present in the colon or rectum regions of the body. The polyp can be classified as an adenomatous polyp, hyperplastic polyp, or a juvenile polyp. Most colorectal cancers arise from adenomatous polyps. These are premalignant and only a small portion of these lesions actually develop into cancer. The polyps tend to be clinically undetected and mostly do not produce symptoms. However, if symptoms do present themselves, they can be quite obstructive (Mayer, 2001). A lesion present in the colon or rectum can ultimately ulcerate leading to blood loss in the stool which can go undetected to the naked eye. This blood loss is one of the most common signs and can be accompanied with changes in bowel habits, cramping, anaemia, fatigue, anorexia, and weight loss. Identification of blood in the stool can be assessed through a non-invasive fecal occult blood test. This test involves the individual's stool samples being analysed in

a laboratory for the presence of blood that is not visible to the naked eye. Further diagnostic testing can involve a colonoscopy, sigmoidoscopy or digital rectal examination. A colonoscopy or sigmoidoscopy involves a tube that is inserted through the rectum to view the lining of the colon and rectum regions to take biopsies and remove any visible polyps. The digital rectum examination involves a physical examination of the rectum region by the physician, and biopsies can be performed with this test as well.

Once a polyp is detected, prognosis of having cancer of the colon or rectum is assessed using the TNM classification method. This method incorporates depth of tumor penetration (T), lymph node involvement (N), and distant metastases (M). Staging of colorectal cancer is dependent on this classification system. If the disease is superficial and does not involve regional lymph nodes then it is classified as a Stage A disease. If the tumor has penetrated more deeply but does not involve the regional lymph nodes then it is classified as a Stage B disease. If there is penetration of the regional lymph nodes then it is classified as a Stage C disease. If the disease involves metastatic spreading then it is classified as a Stage D disease (Mayer, 2001). Following diagnosis, the hallmark treatment is total resection of the tumor. Additional therapies are available depending on the tumor penetration and stage of diagnosis (Mayer, 2001). As colorectal cancer is preventable, it is important to assess all risk factors that could reduce the risk in humans. There are both non-modifiable and modifiable risk factors that can contribute to the risk of colorectal cancer.

1.3 Non-Modifiable Risk Factors

Common risk factors that have been associated with colorectal cancer risk are age, gender, family history, and inherited genetic predisposition (Figure 2) (Canadian

Cancer Society, 2011). The risk tends to be higher in males than females and increases after the age of 40 years and sharply after the age of 50 years. The risk among persons aged 60 to 79 years is more than 50 times the risk in those younger than age 40 years (Hagger & Boushey, 2009). Robb, Miles, & Wardle (2004) accounted for demographic characteristics in relation to the risk of developing colorectal cancer. They found that age differences were significant to perceived risk but still quite small. The development of colorectal cancer is persistent in only 20% of those with family history, leaving a majority of cases occurring without family history of the condition (Hagger & Boushey, 2009). The increased risk regarding family history is stronger for those with first-degree relatives with colorectal cancer. A genetic risk does exist for about 5 to 10% of colorectal cancers with the most common conditions being familial adenomatous polyposis (FAP) and hereditary non-polyposis colorectal cancer (HNPCC). FAP accounts for <1% and HNPCC accounts for 2 to 6% of colorectal cancer cases. This distribution regarding non-modifiable risk factors still does not account for the majority of colorectal cancer cases, leaving room to explore other factors of importance (Hagger & Boushey, 2009). Even though these pre-existing elements may play a role in the development of colorectal cancer, modifiable risk factors have emerged to contribute greatly to the impact of overall risk development.

1.4 Modifiable Risk Factors

Modifiable risk factors can include both nutritional and environmental aspects. Over time, research has focused more on factors pertaining to diet, body size, and physical activity. These factors are not only studied in relation to colon and rectum cancer but are frequently studied in relation to most types of cancer. They can work in a

combination affecting the lifestyle patterns of individuals and communities. Diet and nutrition are often viewed as being associated with colorectal cancer as the focus remains on fat or meat products, dairy, fiber, and vegetables. To understand the importance of these factors on colorectal cancer risk, it is necessary to examine the available published literature.

Animal fat or animal protein has been related to colorectal cancer in previous cohort and case control studies revealing inconsistent findings. A recently published meta-analysis by Alexander, Cushing, Lowe, Sceurman, & Roberts (2009) presented six cohort studies with careful inclusion of only animal fat sources. This study determined that there was no support for an independent association between animal fat or protein intake and risk of colorectal cancer (summary RR=1.04, CI=0.83, 1.31, p=0.221). Dairy foods and calcium studies were also explored to identify any relationship to colorectal cancer. Calcium is often seen as a protective agent for colonic carcinogenesis and is attributed to the intake of dairy products. Cho et al. (2004) performed a pooled analysis of 10 prospective studies and found that those with the high intake of milk and calcium were at a lower risk for colorectal cancer. They found a relative risk of 0.86 (CI=0.78-0.95, p=0.02) for dietary calcium and 0.78 (CI=0.69-0.88, p<0.001) for total calcium. Other dairy products such as cheese, butter, cream, and ice cream, produced a suggestive inverse relationship, implying that calcium may have a small protective role against colorectal cancer (cheese – RR=0.83, CI=0.72-0.96; yogurt – RR=0.91, CI=0.82-1.00). Another protective agent suggested for colorectal cancer is dietary fiber. It is suggested that fiber dilutes fecal carcinogens and reduces the travel time of feces in the bowel. Again this association has been quite inconsistent in the literature and has yet to be

demonstrated with robust evidence. Park et al. (2005) used a pooled analysis of 13 prospective studies to determine the strength of this association. The pooled analysis displayed a non-significant weak inverse relationship between dietary fiber and colorectal cancer risk (RR=0.94, CI=0.86-1.03, p=0.75). Even when other dietary risk factors were accounted for, this study did not find an association. The intake of folate also falls into the category of a possible protection agent for colorectal cancer. Folate can be acquired through different food sources, particularly from leafy vegetables and breakfast cereals. A meta-analysis performed on overall dietary folate intake and colorectal cancer risk by Sanjoaquin, Allen, Couto, Roddam, & Key (2005) deemed that folate had only a small protective effect on colorectal cancer (RR=0.95, CI=0.81-1.11, p=0.33). This relationship was studied once again by Kim et al. (2010) revealing that 13 prospective cohort studies demonstrated only a modest association between total folate intake and colorectal cancer protection (RR=0.87, CI=0.78-0.98, p=0.009). It is evident that the inconsistencies still persist in relation to these forms of modifiable risk factors and the risk of colorectal cancer.

Body size and level of physical activity are also often correlated with different forms of cancer, and the frequency of the evidence is abundant in the literature (Hagger & Boushey, 2009). The most recent meta-analyses on obesity and risk of colorectal cancer by Moghaddam, Woodward, & Huxley (2007), it was revealed that obesity has a strong and direct relationship with the risk of colorectal cancer. This study included 8 case control studies (RR=1.50, CI=1.31-1.72, p<0.001) and 23 cohort studies (RR=1.35, CI=1.24-1.46, p<0.001). It was also determined that among those in the obesity category, males had a higher risk for colorectal cancer in comparison to females (Moghaddam, et

al., 2007). On the other hand, physical activity is often promoted to reduce the risk for all forms of cancer. To investigate this relationship in colon cancer, Wolin, Yan, & Colditz (2011) performed a meta-analysis with 20 applicable studies that determined a pooled significant inverse association between physical activity and risk of colon polyps (RR=0.84, CI=0.77-0.92), p=0.005). They focused specifically on physical activity in relation to colon adenomas because there were fewer studies and no previous meta-analysis on this specific form. The significant association found through this meta-analysis helps to strengthen the association of physical activity to reducing colon cancer risk by possibly 15% (Wolin, Yan, & Colditz, 2011).

As the described modifiable risk factors are important, they do not account for the geographic differences that are clearly present within the regions of different nations, like in Ontario. The included studies do not discuss the factors in relation to geographical differences. There are other modifiable risk factors that can be discussed and possibly contributing to the geographical differences recognized. These risk factors are considered environmental (chemical, physical, biological) and non-nutritional (Figure 2). The modifiable factors are a missing component of the present knowledge as there is a lack of evidence to demonstrate any strength of association. The non-nutritional modifiable environmental risk factors pertaining to colorectal cancer – generally all cancers - has been limited in research methodology and approach, resulting in clear gaps in the published literature. These risk factors can be categorized into specific forms such as smoking/tobacco, alcohol, toxic metals, occupational exposures, pesticides/organochlorines, air pollution, and ionizing radiation. These categories ultimately carry intermixable exposures that are present in the environments surrounding

individuals and communities, only further contributing to colorectal cancer risk. Of the seven risk factor categories, only five were related to colorectal cancer in the available published literature. These five factors were smoking/tobacco, alcohol, toxic metals, occupational exposures, and pesticides/organochlorines. Each of the modifiable five risk factors will be discussed in relation to colorectal cancer to understand the strength of association.

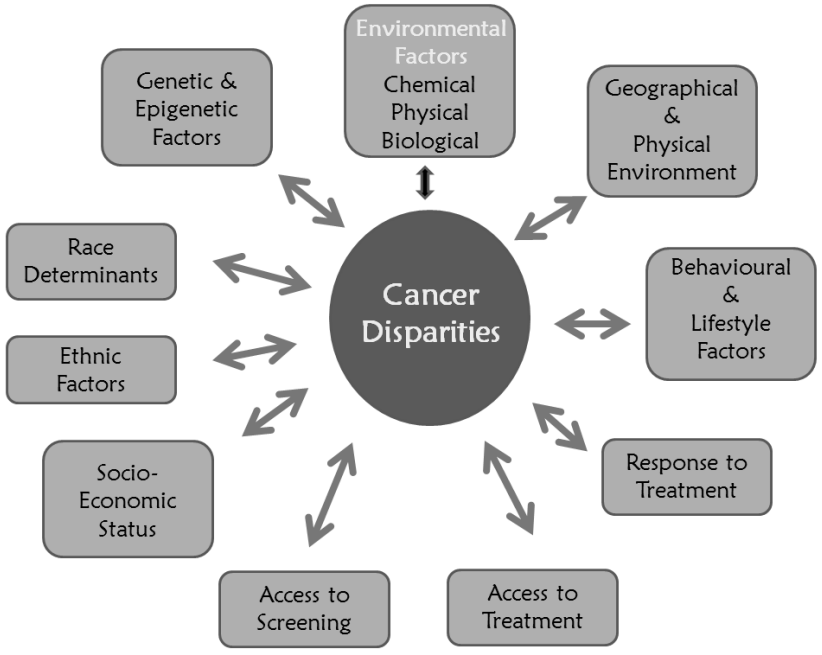


Figure 2. Non modifiable and modifiable factors that contribute to disparities in cancer incidence (Sanchez, 2011).

1.4.1 The Effects of Active and Passive Smoking on Colorectal Cancer Risk

Since the 1950s, tobacco has been the cause of mortality in almost half a million Ontarians, this being six times greater than the summation of all deaths in Ontario from motor vehicle accidents, drugs, alcohol, and AIDS over the same time period (Holowaty et al., 2002). While cigarettes have been the dominant factor, other forms of tobacco such

as smokeless tobacco, environmental tobacco smoke (ETS) or passive smoking, pipes, and cigars are also influential factors (Holowaty et al., 2002). The International Agency for Research on Cancer (IARC) currently classifies smokeless tobacco, second-hand tobacco smoke, and tobacco smoking as Group 1 carcinogens, meaning that they are in fact carcinogenic to humans (IARC, 2012). The influence of tobacco smoke on cancer can be due to the roughly 4000 carcinogenic chemicals present in the tobacco (Domagala-Kulawik, 2008). Tobacco smoke has been linked to specific forms of cancer, especially lung cancer; however the link to colorectal cancer is less determined. Cigarette smoke may be responsible for the formation and growth rate of adenomatous polyps that can lead to colorectal cancer, particularly with long term smoke exposure (Haggar & Boushey, 2009). There is evidence of the interaction among tobacco and alcohol exposure and colorectal cancer. The interaction is with mutations in DNA that may be induced by tobacco exposure and less repairable in the presence of alcohol (Haggar & Boushey, 2009). On the other hand, the association between tobacco exposure and colorectal cancer has been inconsistently reported due to differences in assessing long exposure times and latency periods of cancer onset (Peppone et al., 2009). Peppone et al. (2009) used a detailed questionnaire tool to assess smoking history in hospital cases and controls. The retrospective approach did not observe an association between smoking and colorectal cancer risk (OR=0.92, CI=0.72-1.19) however this study only examined lifetime smoking history. Examination of prolonged population exposure and specific forms of tobacco use may have accounted for different results. Peppone et al. (2008) also examined risk but in current, never, and past smokers to assess any differences. They found that current smokers had the youngest age of onset for colorectal cancer at age 57.4

($p<0.001$) in comparison to never smokers (64.2 years of age, $p<0.001$). This indicates that those who are currently smoking are at a higher risk and may need screening or risk factor prevention strategies earlier than those who never smoked. Paskett et al. (2007) observed the association regarding active and passive smoking and utilized participants from the recognized Women's Health Initiative study, which was made up of an observational and clinical approach. A significant association was shown between active smoking and rectal cancer (HR=1.95, CI=1.10-3.47, $p=0.05$), however not with colon cancer. There was no risk association determined between passive smoking and colorectal cancer. Once again, smoking status, age of initiation, and duration of smoking were important components for the risk of colorectal cancer (Paskett et al., 2007).

Previously, the only published meta-analysis on the association between cigarette smoking and colorectal cancer was by Chen et al. (2003), which found cigarette smoking to be a significant risk for colorectal cancer. This study only focused on case control studies published in China. To establish a more comprehensive and updated meta-analysis, Liang, Chen, & Giovannucci (2008) examined prospective studies worldwide and observed an increased risk in relation to smoking exposure. They found a significant association between variables of daily cigarette consumption, duration, pack-years, age of initiation, and colorectal incidence ($p<0.0001$). An increased risk in incidence and mortality was associated with increased daily cigarette consumption and a 20-year increase in duration of smoking. Former smokers had a higher risk (RR=1.25, CI=1.04-1.51), followed by current smokers (RR=1.15, CI=1.00-1.32). A 10-year delay in age of initiation of smoking was also significantly associated with a 4.4% reduction in relative risk. A stronger association was found for rectal cancer than colon cancer, but it is not

clear whether rectal cancer has a different pathogenic mechanism than colon cancer. Tsoi et al. (2009) performed a meta-analysis and also found a significant association between tobacco smoking and incidence of colorectal cancer. They used a prospective approach examining smoking history and follow-up periods (ranging from 4 to 30 years) of studies. They found a higher risk among male smokers (RR=1.38, CI=1.22-1.56, $p<0.00001$) than female smokers (RR=1.06, CI=0.95-1.19, $p=0.28$) and a higher risk for rectal cancer in both gender groups (RR=1.36, CI=1.15=1.61). There was only a modestly higher risk in current smokers (RR=1.20, CI=1.10-1.30, $p<0.0001$) than never smokers. A higher risk for rectal cancer in comparison to colon cancer was also reported.

Passive smoking or environmental tobacco smoke (ETS) exposure is another important component of exposures that can be present in the household, workplace, or public areas, contributing to exposure up to 50 times the concentration of smokers (Domagala-Kulawik, 2008). There is no consistent biological marker for ETS exposure, thus making this exposure difficult to measure and assess. Studies that do account for ETS rely on survey assessment tools or historical data (Taylor, Najafi, & Dobson, 2007). As previously mentioned, Paskett et al. (2007) found no association between passive smoking and colorectal cancer. However, the assessment of both active and passive smoking can overlap the exposures, making it difficult to differentiate between the two forms. Peppone et al. (2010) utilized the same participant group in their passive smoking studies as in their active smoking studies and found that the odds of colorectal cancer in smokers slightly decreased when accounting for ETS exposure (OR=1.34, CI=1.04-1.72). This finding was limited as the highest levels of ETS exposure and the absence of ETS exposure in participants revealed no apparent risk.

There is a significant association between active smoking and colorectal cancer however there is no conclusive association between passive smoking and colorectal cancer. Despite the association between active smoking and colorectal cancer, challenges in the discussed studies are present when using survey assessment tools. Peppone et al. (2009) describe potential discrepancies such as selection bias and the notion that controls may have had a higher smoking rate than average due to the hospital based approach. Examining a greater variety of the population may help to alleviate this bias. Tsoi et al. (2009) also mention selection bias in their included studies which may slightly distort results, though only prospective cohort studies were used to prevent other biases such as recall or interviewer bias.

1.4.2 The Interactive Effects of Alcohol Intake and the Risk of Colorectal Cancer

Alcoholic beverages are drinks containing ethanol commonly classified into beers, wines, and spirits. It is generally a lifestyle, social, and recreational substance that is widely popular around the world. Although it is a common product, IARC (2012) has classified alcohol as a Group 1 carcinogen, meaning that it is carcinogenic to humans.

The method in which alcohol contributes to cancer is not widely known but alcohol is seen as a contributing factor to the increase of cancer risk. It may increase the risk for cancer by increasing hormone levels, through metabolism, or by making cells more vulnerable to other carcinogens. It is suggested that metabolites (ex. acetaldehyde) of ethanol are genotoxic possibly compromising the genetic material of cells, which contributes to the carcinogenic effect on the human body (American Cancer Society, 2007). Alcohol has become an important factor in colorectal cancer risk due to its accompanying role with tobacco smoke exposure. Alcohol and tobacco tend to be

observed together because it is believed that these two act synergistically thus increasing the risk for cancer even more so than each exposure individually. As tobacco exposure is usually observed through survey tools, alcohol is also assessed in the same method to determine non-drinkers vs. drinkers, and light, moderate, or heavy drinkers.

The evidence linking alcohol to colorectal cancer risk is varying among studies (Bongaerts, van den Brandt, Goldbohm, de Geoij, & Wejenberg, 2008). Alcohol has been a key focus in Asian studies due to the marked increase in colorectal cancer in Japan, Singapore, and parts of China. Singapore was a nation with relatively low risk for colorectal cancer however, since the 1960s the incidence rate has doubled in males and females (Tsong et al., 2007). Tsong et al. (2007) performed a population based study using a structured questionnaire to assess Singaporeans by following the participants for over 11 years. They found that participants who drank seven or more drinks per week in comparison to non-drinkers were at significant risk for colorectal cancer development (HR=1.84, CI=1.31-2.58, p=0.0004). Since the study also examined tobacco exposure, they found a significant association between heavy smokers and rectal cancer (HR=2.64, CI=1.77-3.96, $p<0.0001$) and light smokers and rectal cancer (HR=1.43, CI=1.10-1.87, $p<0.0001$) in comparison to non-smokers. When observing the interaction between tobacco and alcohol exposure, they determined that heavy smokers (those who smoked at least 13 cigarettes a day) who consumed seven or more drinks per week had an HR of 4.7 (CI=2.15-10.34) for rectal cancer only when compared to non-smokers and non-drinkers. Overall, tobacco and alcohol exposure were determined to be independent risk factors for rectal cancer, and alcohol exposure a risk factor for colon cancer (Tsong et al., 2007). Another population based study performed in the United Kingdom found a non-

significant association between alcohol consumption and colorectal cancer risk. They also examined the synergistic carcinogenic effect of alcohol and tobacco smoking and found a non-significant association. The alcohol intake was only assessed at baseline, and excessive alcohol consumption was not investigated due to low statistical power (Park et al., 2009). Assessing drinking habits over a longer period of time may be more reflective of the alcohol exposure in individuals than using baseline drinking habits. Bongaerts et al. (2008) attempted to assess long term patterns of drinking habits using the Netherlands Cohort Study. They found that 30g/day or more alcohol consumption was associated with colorectal cancer risk (HR=1.32, CI=1.06-1.65, p=0.017). However, this association was weakened when the heavy drinkers were compared with non-drinkers.

As there were inconsistent findings among the mentioned studies, the association between alcohol and colorectal cancer was further examined through the available published meta-analyses. Moskal et al. (2006) performed a meta-analysis and found that high alcohol intake was associated with risk of colon cancer (RR=1.50, CI=1.25-1.79, p=0.03) when comparing the highest and lowest categories of alcohol intake. They did not however examine type of alcoholic beverage or drinking pattern. This evidence does suggest that alcohol is a contributing risk factor for colorectal cancer. As previously mentioned, colorectal cancer incidence is increasing in Japan stimulating research in this area. The second meta-analysis retrieved was by Mizoue et al. (2008) who observed five Japanese cohort studies to determine if a relationship was present with alcohol intake to understand the strong occurrence of colorectal cancer in Japanese populations. They ultimately found a clear dose response relationship between alcohol consumption and colorectal cancer risk in males ($p<0.001$). Moreover, alcohol consumption of 23g/day or

more was significantly associated with the risk of colorectal cancer in women when compared to non-drinkers. They only observed baseline alcohol consumption, but if lifetime alcohol consumption and follow-up were examined, then further patterns may have been observed (Mizoue et al., 2008).

1.4.3 Toxic Metals Environments and the Risk for Colorectal Cancer

Among agents harmful to humans, the concern over metal toxins has grown as the prevalence of metals in daily resources and environments is more apparent. Products that individuals use on a daily basis can contain metals and this may be unknown or unrecognizable to individuals. Metals such as arsenic, cadmium, lead, and mercury can have a wide range of toxic effects on bodily systems and functions. These four particular metals are prevalent in Canada and are classified as confirmed or probable carcinogens (arsenic, cadmium – Group 1 carcinogenic to humans; lead – Group 2A probable carcinogen; mercury – Group 3 not classifiable as per IARC, 2012). Arsenic, cadmium, lead, and mercury are naturally occurring elements and have been associated with toxicity in populations due to present day higher levels than historically in air, food, water, soil, and products.

Arsenic is prevalent in groundwater and is utilized for gold or silver extraction in specific mining techniques. Through inhalation, arsenic can lead to lung cancer, and may potentially increase risk for liver, kidney, colon, and bladder cancer. The mechanism of action is currently unknown but it is believed that arsenic has a variety of effects on the human body, such as genotoxicity, promoting oxidative stress or DNA damage, inhibition of DNA repair, and tumor promotion (Stevens, Graham, Walker, Tscounwou, & Rogers, 2010). Currently, there are no known community studies examining the relationship

between arsenic and colorectal cancer, however the effects of arsenic trioxide were examined with regards to DNA synthesis and genotoxicity in human colon cells. Stevens et al. (2010) performed a laboratory study using arsenic trioxide, found in arsenic contaminated water, to determine its effects on human colon cells. They found that arsenic trioxide did in fact cause DNA damage and exhibited genotoxic effects on the human colon cells at high exposure levels that may be replicated in real environments. The implications of this study are important as more research needs to explore arsenic in relation to colorectal cancer risk in humans at a community level.

The metal cadmium is also important in Canada as it is frequently released in water sources – the highest amount released in Quebec (25%), British Columbia (24%), and Ontario (23%) in comparison to the national total (Environment Canada, 2011a). Cadmium can accumulate in the food chains and is present in tobacco smoke, making smoking a large exposure route for this metal toxin. We did not find any studies that examined the relationship specifically between cadmium and colorectal cancer in humans at a community level through the available published literature. Along with cadmium, lead is also present in tobacco smoke. Lead existed in many paint products, gasoline fuel products, and water service lines in the early 1900s and even in some toy products. Lead was a commonly utilized metal in many different products that can have lasting effects on human health and the environment. If residential homes or water line sources have not been renovated or updated, this metal may still be persistent in smaller quantities that can affect human health in the coming years. Lead is also present in metal ore mining facilities and may be a contributing factor for Ontario as this province has the largest release of lead to water in Canada, accounting for 42% of the total nationwide. The

concern with lead is that it can persist in the environment and bio-accumulate in the body's tissues and bones for years (Environment Canada, 2011a). As much of the focus thoroughly examines lead and lung cancer, there are no current studies in the published literature indicative of examining the relationship between lead and colorectal cancer in humans at a community level.

The fourth metal, mercury, is often recognized as a neurotoxin but very rarely recognized as a carcinogen. It is often associated with industrial occupations such as metal smelting, iron production, waste incineration, and mining techniques. Saskatchewan and Ontario emit the highest levels of mercury accounting for 20% of the nation's total emission (Environment Canada, 2011a). Mercury exposure can occur through drinking water, air, food, and dental amalgams. Mercury is also commonly found in many household items such as fluorescent light bulbs and thermometers. These products can expose individuals to mercury if these items are damaged or inappropriately disposed. It was also used in dental amalgams and can orally expose individuals to this metal over their lifetime (Sears, Kerr, & Bray, 2011). There is no consistent evidence demonstrating mercury exposure through dental amalgams contributing to health conditions (Ucar & Brantley, 2011). Additionally, it is quite difficult to assess whether the low level household exposures of mercury can contribute to cancer, as these types of exposures are difficult to quantify and explore. There are no current studies in the observed published literature exploring the relationship between non-nutritional mercury and colorectal cancer in humans at a community level.

The mechanism connecting metal toxins and cancer has not been accurately understood but there is speculation that the toxins act as genotoxic or epigenetic

carcinogens when exposure is high or over a long term. The metallic elements and their many different forms may interact with biological molecules in the body by activating or inhibiting the biological processes that promote cellular damage and tumor progression (Sears et al., 2011).

1.4.4 Occupational Exposures and Colorectal Cancer Risk

Exposures associated with occupation can vary extensively as these are made up of carcinogenic agents containing different chemicals and metals. Specific occupations such as industrial or mining work can allow for greater exposure to agents than the general population, enhancing the risk for cancer. On the other hand, daily occupational conditions can allow for long term low level daily exposures that can be quite detrimental to individual health, making it challenging to pinpoint exposure specificity. As there are different variables present in occupations, it can be difficult to individualize occupational exposures as they generally overlap. One specific exposure that shows a strong relationship with cancer is asbestos. Although asbestos is frequently related to lung cancer, Aliyu et al. (2005) studied its risk association with colorectal cancer. The study found a dose response relationship with males who demonstrated radiographic evidence of asbestos exposure. Individuals with 21 to 30 years of exposure had a 74% increase in risk for colorectal cancer in comparison to those who had less than 10 years of exposure. The risk also increased significantly with asbestos exposed males who were classified as heavy smokers (RR=3.92, CI=0.54, 28.2, p=0.03). Another occupation exposure assessed was the metalworking fluids in the automobile manufacturing industry. Malloy et al. (2006) explored the re-examination of metalworking fluids in relation to rectal and colon cancer as two distinct forms of cancer. Metalworking fluids encompass a number of

carcinogens that include sulphur, polycyclic aromatic hydrocarbons, and chlorinated products. The hazard ratio for rectal cancer increased as the exposure to metalworking fluids increased. However, this relationship was not apparent for colon cancer (Malloy, Miller, & Eisen, 2006).

The use of pesticides is important not only inside and outside of the home or environment, but is also important at an occupation level. Pesticide applicators are often exposed to higher levels of chemical pesticides than the general population due to occupational exposure. Using a self-administered questionnaire, exposure to 50 different pesticides was assessed among applicators by Lee et al. (2007). This study only found a significant association between rectal cancer and lifetime exposure to the pesticide chlorpyrifos (2.7 fold risk, CI=1.2-6.4, p=0.008) and a significant association between colon cancer and the highest exposure category of pesticide aldicarb (4.1 fold risk, CI=1.3-12.8, p=0.001). Even though there were plausible associations with two types of pesticides, overall there was no strong significant correlation between pesticides and colorectal cancer when looking at the large number of pesticides explored. As there are many different exposures combined in occupational settings that overlap with other environmental exposures, it is challenging to address the individual effects of specific exposures. Certain occupations demonstrate specific exposures, however not all can be accounted for.

1.4.5 The Use of Organochlorines and Colorectal Cancer Risk

Organochlorines (OCs) have a wide range of uses and encompass many chemical agents. This group remains to be one of the most persistent pollutants with exposure to humans. The use of these chemicals can be occupational or non-occupational and the

concern with them is that they are not easily metabolized in the human body resulting in accumulation in the adipose tissue. The main route of exposure is through dietary intake, where the OCs that are not easily metabolised by the body will accumulate in the adipose tissue, re-circulate in the blood, and eventually be excreted in the feces. The concern is that through this pathway, the gastrointestinal tract will be exposed to the OCs, with residence in the colon and rectum regions. Even though the OCs may be excreted with feces, the long duration of the OCs in the colon and rectum provide opportunity for contamination of the colon and rectum epithelium (Howsam et al., 2004). Industrial or occupational organochlorine compounds can include hexachlorobenzene (HCB), polychlorinated biphenyls (PCBs), and pesticide dichlorodiphenyltrichloroethane (DDT). These specific forms of organochlorines are classified as Group 2A probable or Group 2B possible carcinogens to humans as per IARC (Howsam et al., 2004). Risk was examined by Howsam et al. (2004) assessing participants through interviews and blood samples in hospital case and control patients. They examined specific forms of OCs and found that mono-*ortho* PCBs were associated with an elevated risk for colorectal cancer possibly indicating a causal relationship (OR=2.94, CI=1.39-6.20, p=0.047). The main routes of exposure can be through ingestion, dermal contact, and inhalation, and the risk of daily low level exposure is often undermined. Everyday low level exposures may be linked to the onset of cancer later on in life, however this relationship is difficult to assess with limited evidence. This warrants further research to examine the specific types of OCs and the potential risk for colorectal cancer.

The seven environmental risk factors are difficult to quantify individually, but they may in fact work together synergistically. For example, the occupation of a pesticide applicator will account for occupational, pesticide, and air pollution exposures. It is important to assess the numerous risk factors together as communities or individuals may be exposed in different ways to these factors throughout their lifetime.

1.5 Objectives of the Study

There were three components that this study aimed to achieve. The first objective was to systematically review the available and accessible published literature to assess all non-nutritional modifiable environmental risk factors in relation to colorectal cancer incidence. The second objective was to create an appropriate questionnaire assessment tool encompassing non-nutritional modifiable environmental exposures by combining other exposure assessing validated and standardized tools from the published literature. The third objective was to pilot test the questionnaire assessment tool and utilize it at a community level. These objectives are necessary steps that will help to answer the research question of our study.

1.6 Research Question

Is it possible to identify the dominant non-nutritional modifiable environmental risk factors when comparing two communities that have diverging cancer incidence rates?

1.7 Colorectal Cancer in the District of Timiskaming

As colorectal cancer incidence is the highest in Timiskaming (70.4 per 100,000) in comparison to Ontario (48.3 per 100,000), it is also important to identify the colorectal

cancer mortality rates and historical trends in Timiskaming (PHAC, 2011). In 2011, the colorectal cancer mortality rate in Timiskaming was 18.1 per 100,000 persons, in comparison to Ontario's rate of 17.0 per 100,000. For all cancer deaths in 2011, Timiskaming demonstrated 194.3 deaths per 100,000 persons, whereas Ontario was much lower with 159.1 deaths per 100,000 persons. Looking at the historical trends of colorectal cancer incidence in Timiskaming, it can be observed that the rates have been fairly consistent with a slight increase over the years. Between 1992 and 1996, the colorectal cancer incidence rates for the North East area of Ontario (inclusive of Timiskaming) were 73.7 per 100,000 persons for males and 45.8 per 100,000 persons for females. At the time, the North East area had the highest incidence for colorectal cancer in males (Holowaty et al., 1998). In 2000, the region of Timiskaming had a colorectal cancer incidence rate of 56.9 per 100,000 persons, which is relatively lower than the most recent reported colorectal cancer incidence rate of 70.4 per 100,000 persons in Timiskaming in 2003 (PHAC, 2011). Corresponding with the cancer rates are the health systems available for the community in terms of physician and resource accessibility. This information is crucial to understanding the dynamics of the health services available in Timiskaming. The community generally has 95 general/family physicians per 100,000 persons and 20 specialist physicians per 100,000 persons. This compares to Ontario, which has as an average of 90 general/family physicians per 100,000 persons and 97 specialist physicians per 100,000 persons, outlining the significant difference of specialist physicians available (Statistics Canada, 2011c). There are three hospitals present in the district of Timiskaming – Temiskaming Hospital, Englehart & District Hospital, and the Kirkland & District Hospital. The Temiskaming Hospital accounts for 16 family

physicians, 2 surgeons, 3 GP anaesthetists, 1 geriatric practitioner, 1 internist, 1 visiting pathologist, and visiting radiologists. There are roughly 20 visiting specialists in outpatient clinics (Temiskaming Hospital, 2011). The Englehart & District Hospital has 6 family physicians, and Kirkland & District Hospital has 5 family physicians, 2 general surgeons, and 1 internist along with visiting specialists (Englehart & District, 2011; Kirkland & District Hospital, 2011). The North East LHIN, which includes the Timiskaming district, shows a 21.2% of fecal occult blood test participation in men and women aged 50-74 years in 2006-07 (Cancer Care Ontario, 2009a). However, this percentage accounts for a large area of the North East, possibly masking the effect of the Timiskaming region on its own.

1.8 Timiskaming Community Profile

The Timiskaming district is a part of the North Eastern district of Ontario (Figure 3) and there has been no prior research performed within this region regarding cancer incidence and environmental risk factors. The population size is 33, 283, but is divided into the city of Temiskaming Shores (Hailebury, New Liskeard, and North Cobalt) and the towns of Cobalt, Englehart, Kirkland Lake, and Latchford. Since 1912, this region has had numerous mining, agricultural, and industrial industries. These industries may have impacts that contribute to long term environmental exposures to residing families. The most significant mining industry would be from the Cobalt's silver rush in the 1900s, which declared this region as one of the largest silver producing areas of the world. This silver rush period allowed the region of Timiskaming to be among extensive historical text. However, over time the mining decreased and economic growth declined with an ensuing population decline, eventually leading to the closing of the silver mining. In the

early 21st century, the cancer incidence rates in this region began to unravel, leaving the region with the highest incidence rates for all primary cancer sites in all of Ontario (PHAC, 2011). These alarming rates have not been a focus in published literature or in other knowledge based outlets. Although the silver mining industry is closed in Timiskaming, miners and their families continue to live in the house dwellings that were built directly above the mines that run deep below the community. It has been stated that an environmental risk from mining are the tons of mine waste rock and tailings that end up dumped on land and in lakes. Much of this contamination is composed of the metal arsenic, which was used for silver mining during the 1900s (Dumaresq, 2009). The Town of Kirkland Lake was also a mining region in the 1900s specifically for gold. The mining of gold allowed Kirkland Lake's economy to grow, but as the mines began to close down over the century, the population and economy regressed as well. Gold mining is still active in this region, however not to the extent that it had been previously. Additionally, Kirkland Lake has innovatively enhanced their lumber mill industry to promote economic growth and employment.

The major industry that spans across each city and town of the Timiskaming district is the Ontario Northland Railway which not only initiated the discovery of the mining industry but also implemented many job opportunities and allowed for community growth (Town of Kirkland Lake, 2010). Another growing concern is the decline of the overall population in Timiskaming. There was a 3.4% decline from 2001 to 2006, whereas the overall Ontario population increased by 6.6% during the same time frame (Statistics Canada, 2006). Due to the declining population, there have been initiatives to promote residence in Timiskaming by restarting mining processes,

providing student community jobs, and promoting a healthy lifestyle approach. Furthermore, the border of Quebec from Timiskaming is only separated by Lake Timiskaming, allowing for much French-English integration regarding language and sharing of services.

Timiskaming is comprised of very little diversity in terms of ethnic background. As there is minimal immigration and emigration (0.7%) in Timiskaming, the community has the lowest number of visible minorities in Canada (Public Health Agency of Canada, 2011). Over 90% of the population is Caucasian and it is estimated that 5.6% of the population is of Aboriginal descent. Moreover, 88.1% of the population has resided at the same address in Timiskaming in the past five years, demonstrating little mobility in and out of Timiskaming (Statistics Canada, 2011c).

1.9 Colorectal Cancer in the District of Peel

Colorectal cancer incidence is lower in the region of Peel (41.3 per 100,000) compared to that of the Ontario average of 48.3 per 100,000 persons (PHAC, 2011). The colorectal cancer mortality rate in 2011 demonstrates a similar ratio with Peel at 14.8 per 100,000 compared to Ontario with 17.0 per 100,000 persons. The overall cancer death rate in 2011 in Peel was 133.3 per 100,000 persons which again is much lower than the Ontario rate which was 159.1 per 100,000 persons. The rates of colorectal cancer incidence have dropped over time in Peel. From 1992 to 1996, the Southern region of Ontario (inclusive of Peel) reported incidence rates of 57.4 per 100,000 persons for males and 40.2 per 100,000 persons for females making the Southern region have the lowest colorectal cancer incidence rates for males and the second lowest for females at that time (Holowaty et al., 1998). In 2000, the incidence rate was 41.9 per 100,000 persons further

identifying Peel as the region with the lowest colorectal cancer incidence rates in Ontario (PHAC, 2011).

Peel's health services differ from that of Timiskaming in terms of physician availability and resource accessibility. Peel has 65 general/family physicians per 100,000 persons and 50 specialist physicians per 100,000 persons in comparison to Ontario's average of 90 general/family physicians per 100,000 persons and 97 specialist physicians per 100,000 (Statistics Canada, 2011b). Peel has much lower physician availability than Ontario as a whole; however the region has a much higher availability of specialist physicians than Timiskaming. Peel is home to Credit Valley Hospital, Peel Memorial Hospital, Brampton Memorial Hospital Campus, and Brampton Civic Hospital. The Credit Valley Hospital has its own endoscopy clinic with up to date information and access to colonoscopies. Peel Memorial Hospital has over 350 physicians and is currently being redeveloped, thus the Brampton Memorial campus location is a current satellite addition (Region of Peel, 2011). The Central West LHIN (including Brampton and Mississauga) shows a 24.7% of fecal occult blood test participation in men and women aged 50-74 years in 2006-07 (Cancer Care Ontario, 2009b).

1.10 Peel Community Profile

The district of Peel is located in Southern Ontario and consists of the cities of Brampton, Mississauga, and the town of Caledon (Figure 3). The total population is around 1,159,405 making Peel the second largest municipality in Ontario after Toronto. This region focuses its services and infrastructure on water delivery, wastewater treatment, waste collection/disposal, public health, long term care centres, and social services. Peel has extensive public health resources, tools, accessibility, and up to date

information for the public. Specifically, Peel has widespread accessible information on colorectal cancer and the methods to maintain a healthy lifestyle, along with preventative methods for cancer. Additionally, the regional health website provides reports and understanding on alcohol, air pollution, tobacco use, pesticides, and lead metal (Peel Public Health, 2011).

The population of Peel has been increasing rapidly over the years, with a population change of 17.2% from 2001 to 2006, in comparison to the Ontario population increase by only 6.6% from 2001 to 2006 (Statistics Canada, 2006). The Peel community has the highest ethnic diversity in all of Ontario, accounting for 50% of the population (Public Health Agency of Canada, 2011). This is consistent with the large population size in Peel, allowing for rapid immigration and emigration in the community. Only 0.5% of the Peel population is of Aboriginal descent, whereas about 47% of the population is of South Asian descent. It is estimated that 85.7% of the population resided at the same address in the past five years in Peel (Statistics Canada, 2011b).

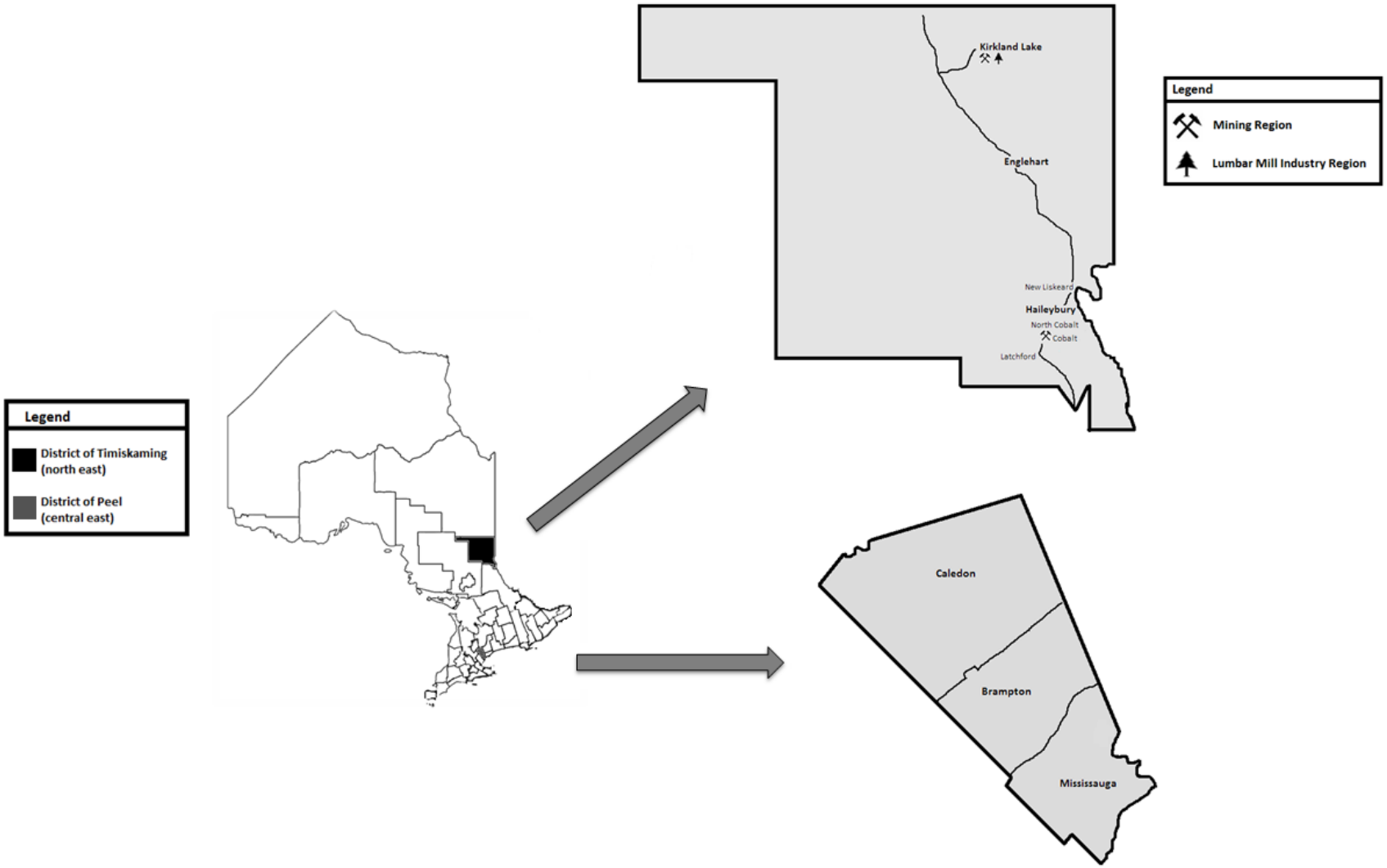


Figure 3. The district of Timiskaming and the district of Peel in the province of Ontario.

2.0 Methodology

2.1 Ethical Considerations

This study was developed and approved regarding the Research Ethics Board (REB) at the University Ontario Institute of Technology (REB # 10-091 for the Ethics Approval Letter, see Appendix A). Ethical considerations were necessary as the study involved human participants in community settings. Letters of permission to conduct research were also granted by the program directors at the Mississauga Centre Ontario Early Years Centre and the Timiskaming Ontario Early Years Centre (Appendix C).

2.2 Systematic Review Determining Risk Factor Categories

The first objective of our study was to perform a concise systematic review on the available published literature to identify all primary studies that examined non-nutritional modifiable environmental risk factors and colorectal cancer. In order to do so, we collaborated with an information specialist to help search and synthesize the available published literature. We hypothesized that the non-nutritional modifiable environmental risk factors were partially responsible for regional colorectal cancer incidence disparities. An inclusion criteria tool was created in order to identify the articles that would be included in the systematic review. Only studies that were original, in English, examining human participants, discussing any non-nutritional modifiable environmental risk factor with the measurable outcome of colorectal cancer were eligible for inclusion. Studies that examined non-human participants, cell line or molecular mechanisms, languages other than English, nutritional components, and examined other outcomes other than colorectal cancer were excluded. A comprehensive search of the PubMed database

between 1960 and April 12, 2011 was performed using the key words "colorectal neoplasms", "ethanol", "alcoholism", "alcoholic beverages", "alcoholic drinking", "smoking", "tobacco", "air pollution", "adverse effects ionizing radiation". "metals", "heavy/adverse effects", "light/adverse effects", and "occupational exposure", "pesticides", and "organochlorine products". The initial search yielded 534 citations which were reviewed by the primary investigator utilizing the inclusion criteria tool. The articles included were then transferred to a data extraction spreadsheet where they were categorized further into sub categories. These sub categories developed the seven risk factors, based on type of study and specific risk factor studied. The risk factors of air pollution and ionizing radiation in relation to colorectal cancer deemed no current published literature in the past 10 years. The five remaining categories were found to be the most common non-nutritional modifiable environmental risk factors associated with colorectal cancer in the reviewed literature. These categories, as previously mentioned, were smoking/tobacco, alcohol, metal toxins, occupational exposures, and pesticides/organochlorines. Characteristics of research methodology, risk factor, and measured outcomes were assessed to extrapolate the strongest evidence.

2.3 Questionnaire Tool Development

Following the systematic review, the development of a survey tool was necessary to assess the non-nutritional modifiable environmental risk factors which can ultimately examine the determinants or risk factors leading to colorectal cancer. A questionnaire assessment tool (Appendix B) was developed combining questions that assess or measure the seven risk factors. Questions were selected for the questionnaire assessment tool based on frequency of use among the five survey tools and relevance in terms of question

necessity and comprehension. The questionnaire assessment tool was to be administered to the communities of interest, by ensuring accessibility to participation and providing clarification to any unclear questions for participants. Utilizing a questionnaire tool also would allow for versatility as the questionnaires could ultimately be accessed at any point in the data collection process by participants.

The questionnaire tool was created using five other survey tools which were standardized, published, and utilized tools in communities in Canada, United States, and Singapore. The survey tools selected were comprised of categorical questions with few open ended questions. They encompassed different aspects of the seven environmental risk factors assessing community and population exposure. The survey tools used for our study were the National Health and Nutritional Examination Study (NHANES) (2009-10), Joint Canada/US Survey of Health (JCUSH) (2004), Cape Cod Breast Cancer Study (1999), Canadian Community Health Study (CCHS) (2010), and Genes and Environment in Lung Cancer Study (2005).

The National Health and Nutritional Examination Study (NHANES) program has numerous tools that assess the health status of adults and children in the United States. NHANES is a program under the National Center for Health Statistics and is part of the Centers for Disease Control and Prevention (CDC). The health surveys under this program sample about 5,000 people across the United States annually. These surveys can determine the prevalence of diseases and dominant risk factors. The importance of determining non-nutritional modifiable environmental risk factors in our research makes the NHANES survey tools to be essential to address these factors (Centers for Disease Control and Prevention, 2010). The Joint Canada/US Survey of Health (JCUSH) works to

increase knowledge, validity, comparability, and integration on health data between Canada and the United States. The target population of this survey are household residents aged 18 years and older. The tool was designed by specialists from Statistics Canada to associate logical flow of questions for the general public and provides reliable estimates for three age groups of 18-44 years, 45-64 years, and 65 years and older. Generally, sample sizes are 3,500 respondents in Canada, and 5,000 from the United States. This tool was utilized to address non-nutritional modifiable environmental risk factors in relation to health (Statistics Canada, 2004). The Cape Cod breast cancer study by the Silent Spring Institute is a well-known study developed for research on breast cancer and tetrachloroethylene (PCE) in drinking water. The household exposure and pesticide questions were utilized from this study (Silent Spring Institute, 1999). The Canadian Community Health Study (CCHS) is a cross sectional study that examines health status, health care uses, and health determinants. This survey is flexible to ensure rapid responses on emerging issues of importance to Canada's population and was developed in collaboration with Statistics Canada specialists and other federal/provincial sectors. Field testing was performed on this tool in order to test questions, examine response rates, time estimates, and feedback information. This standard tool examines similar questions as the JCUSH and NHANES do and allows for consistency (Statistics Canada, 2010). The Genes and Environment in Lung Cancer study utilized a survey to address risk factors for different forms of cancer, and was designed by researchers at the National University of Singapore. The occupational exposure component from this survey was used, as it was direct and easily applicable to participants (Tsong et al., 2007).

As the questionnaire assessment tool combined questions from the five survey tools mentioned, it was also important to ensure that the questionnaire assessment tool was comprehensive and suitable for community participants. Once the selected questions were formatted into a questionnaire format and reviewed by the primary investigator and faculty advisor, the tool was then divided into nine different sections. The nine sections were: *Section A. General & Health Status, Section B. Tobacco Smoke & Cigarettes, Section C. Alcohol Use, Section D. Housing Characteristics, Section E. Volatile Chemicals/Fumes/Pesticide Use, Section F. Metal Toxins, Section G. Occupational Exposures, Section H. Ionizing Radiation, and Section I. Socio-Demographic Characteristics*. These nine sections would allow participants to flow through the questionnaire with intended breaks to prevent the questionnaire from being overwhelming for participants. The divided sections would also allow for ease of completing the questionnaire as participants could ultimately either skip or complete each section based on which exposures were applicable to them.

2.4 Pilot Study

The third objective of the study was to pilot the questionnaire tool prior to use in communities. The tool was first reviewed by the advisory committee and then piloted among 11 individuals. The purpose of the pilot group was essentially to determine if the tool was consistent, comprehensible, and time efficient. Recruitment for the pilot study was based on interest, and a range of individuals participated. The participants were placed in a community setting that replicated that of what would be expected in the communities. Each pilot study participant was given a sample consent form and numbered questionnaire on paper. The participants were also given the option of

selecting a mock individual where they could randomly select an individual scenario out of a box and then they would answer the questionnaire as the individual they selected. For example, if a participant selected the mock individual "silver miner" then he or she would adhere to that role and answer the questionnaire portraying a silver miner. This was merely for the primary investigator to recognize if the questionnaire answers could ultimately differentiate between different types of individuals. The pilot group was given an hour to complete the questionnaire with a break whenever necessary and refreshments were provided. The group was asked to provide any feedback about the tool after completing it. Relevant feedback was provided to revise certain aspects of the tool regarding questions that seemed complex or required accompanying explanations. There were also suggestions regarding the format of the questions, and the format and presentation of the questionnaire itself. Specific questions in each section were altered to be more concise and easily understood by participants. The questionnaire font sizes were also changed to be more legible for participants and the questionnaire was split further into three major sections to allow for comprehension. The tool was then reviewed once again by the primary investigator and faculty advisor to include final changes.

2.5 Community Participation

All Ontario health units were examined through the Public Health Agency of Canada's Chronic Disease Infobase system to determine cancer incidence disparities in Ontario. This system identified regions with varying overall cancer incidence rates and specific cancer site incidence rates. It was recognized that the region of Timiskaming has the highest incidence rate for all invasive primary cancer sites in Ontario, whereas the region of Peel has the lowest incidence rate for all invasive primary cancer sites in

Ontario in 2003. Moreover, this disparity was present specifically for colorectal cancer incidence in Ontario. The purpose of this study was to assess the colorectal cancer disparities among that of the community with the highest incidence in comparison to the community with the lowest incidence. The target populations were Timiskaming and Peel, where Peel would act as a reference community to Timiskaming since the former holds the lowest incidence rates for all cancers in Ontario.

In order to examine a portion of the populations in Timiskaming and Peel, a common community centre that was present in both communities was sought out. Due to the low density population of Timiskaming, there were only few large community centres present and thus this region had to be explored thoroughly. The inclusion criteria for participants was that they would need to be 18 years of age and older, in order to have the level of understanding for the risk factors being assessed. To fit these criteria, the Ontario Early Years Centres under the Ontario Ministry of Children and Youth Services were approached. These centres provide a range of programs and activities for parents and children aged 0-6 years, while providing information on services and health to the community involved (Ministry of Children and Youth Services, 2010). As parents are the most frequent visitors of these centres and are recognized as the key holders of health for his or her family, it was imperative to involve them in the research. There are over a 100 Early Years Centres across Ontario, with frequent sites in areas with denser populations like Peel. The two target centres used in this research were the Timiskaming Ontario Early Years Centre and the Mississauga Centre Ontario Early Years Centre. The Timiskaming Ontario Early Years Centre is located in the city of Temiskaming Shores with satellite locations in Englehart and Kirkland Lake. As this is the largest community

centre branching across Timiskaming, participants were recruited from all three locations. The region of Peel had seven available Early Years Centres due to its population size. However, the centre in Mississauga Centre was chosen based on voluntary participation and accessibility. The chosen community centres were based on size, availability, and community involvement.

The number of participants expected from each community centre ranged from 40 to 60 individuals as per program directors. Throughout the day, the centres had a different number of users depending on the program being provided. It was estimated that at full capacity, the community centers could each fit 40 to 60 individuals. We expected at least 40 individuals per center to participate in this study.

2.6 Community Based – Ecological Approach

A community based approach was undertaken in order to assess community level risk factors for colorectal cancer risk by involving the communities of interest. The study topic of colorectal cancer incidence and non-nutritional modifiable environmental risk factors was seen to be of importance to the communities of interest, specifically to that of the community of Timiskaming. The impact of cancer in general is quite important in all of Ontario; however more so in Timiskaming do to the high incidence rates described previously. Our approach aimed to improve the health outcomes and reduce health disparities within the communities by allowing the community to participate in aspects of decision making (Wallerstein & Duran, 2011). This approach was also recognized as being least invasive while contributing to the health of the community individuals. Our study was to be as inclusive as possible by selecting the largest community centre in Timiskaming and choosing the same community centre located in Peel for consistency.

Throughout the research process, both communities were consulted and involved regarding study objectives, methods of data collection, and feedback distribution/dissemination. This was to initiate a more mutually driven agenda involving the participant communities. Due to the limited time frame for the project, the communities were only involved in the mentioned aspects. Further involvement can be achieved in the future if the project time frame is longer given more funding and access to resources. In this study, the main priority of the communities was for our research to provide feedback to the participants after the completion of the study. In order to accomplish this, we have opted to present our research findings in the participant communities after completion. We will also be inviting the public health units and LHINs of the participant communities to the community presentations to engage a greater audience. The translational feedback will aim to allow both communities to understand the non-nutritional modifiable environmental risk factors in relation to colorectal cancer risk, while steering recommendations for research concerning public health units and the LHINs. Incorporating community involvement in the research process may advance community research further by ultimately reducing cancer disparities and increasing health research in the communities of interest.

Our study aimed to utilize an ecological design to identify any relationships between non-nutritional modifiable environmental risk factors and incidence of colorectal cancer. The ecological approach is hypothesis generating but may not necessarily indicate causal inference (Margel & Fleshner, 2011). As two non-random communities were being examined, the sample groups selected in these communities were chosen based on availability. As our research topic was never previously explored in Timiskaming, it was

relevant to use an ecological approach at the aggregate level which can further enable follow-up studies.

2.7 Data Collection Process

The third objective was to not only pilot the questionnaire tool, but to primarily use the questionnaire tool in the participant communities to assess the discussed environmental non nutritional modifiable risk factors. In order to ensure a high response rate and complete understanding of the questionnaire, a group administered method was selected for administering the questionnaire at community centres.

By collaborating with the program directors from each of the chosen community centre, three dates were selected for each centre to administer the questionnaire on these dates. The questionnaire was to be administered by the primary investigator. As soon as the data collection dates were selected, invitation letters (Appendix D) were provided to the community centres a few months prior to data collection in order to hand out to interested community members. On the selected dates for data collection, a brief information session was provided where participants would sign the consent form (Appendix E) containing all the appropriate information about the study, followed by the completion of the questionnaire. Refreshments were provided throughout the data collection process on the selected dates to create a casual and comfortable environment for participants. A feedback letter (Appendix F) was also provided to each participant to inform them of when the study results would be presented to the community after the completion of the project.

Following this method of data collection, the program directors requested more methods of data collection aside from group administration, as many of the parents that

use the centres preferred an online printable version or pickup/take home idea. This would also help to increase response rate and accessibility. By collaborating with the community centres, these methods were achieved. The online printable version was created as a Google web page (Appendix G) with an information prompt (Appendix H) explaining the study, the questionnaire tool, and the consent form that was required to be signed and completed. The participants who opted for the printable version would print the necessary material and return it to the participating community centre. This ensured that only participants from Timiskaming and Peel were applicable to participate.

The pickup/take home method was effective as well, as the primary investigator dropped off questionnaires at each centre and then the community centre provided the questionnaires to parents. The community centre program directors maintained a log sheet provided by the primary investigator in order to record the questionnaire number, phone number, and first name of participant. Only the program directors had access to the contact information to maintain anonymity with the study investigators. All questionnaires were numbered and additional numbers were provided on the log sheet (Appendix I) for any online printed questionnaires that may be handed in since online versions would not be numbered. This was to prevent duplicate questionnaire numbers.

For both the on-site group administration and pick-up/take home method, a total of 72 questionnaires were provided to each community centre. The online version was accessible for two months and 10-20 additional questionnaire numbers were provided on the log sheet. The Peel location completed a total of 65 questionnaires, four of which were not applicable due to incompletion or not being returned, totalling to 61 completed questionnaires. Questionnaires deemed as incomplete were questionnaires with two or

more sections incomplete and thus were excluded from the study as they could not be effectively included in the analysis. The Timiskaming location provided 53 completed questionnaires which were all included in the study.

2.8 Incentive for Participants

A $50.00 gift card draw was provided as an incentive for each community centre in order to increase participation. Each community centre draw was done separately after all questionnaires were returned to the primary investigator. The program directors for each community were notified of the winning questionnaire number and the program directors then informed the winning participants. Since the community centres maintained a log sheet, the participants were easily accessible to the program directors. However, the study investigators were not provided with the participant contact information in order to maintain anonymity.

2.9 Data Analysis

In order to thoroughly analyze the data collected the statistical analysis tool SPSS (Statistics Version 19) was utilized with the assistance of a Faculty of Business and IT Instructor. The 53 questionnaires from Timiskaming and the 61 questionnaires from Peel were all included in the analysis. Data input was organized per section of the questionnaire, per community. Utilizing Microsoft Excel, the data for each section from Timiskaming participants was inputted, followed by the data for each section from Peel participants. Along with the question responses, the questionnaire number pertaining to each individual was also inputted to maintain which responses belonged to which questionnaire number. The data was verified by the primary investigator by randomly

selecting 4 to 8 questions per section of each questionnaire and confirming if the correct response were inputted from the questionnaire to the excel file.

Once all the sections were verified, the data was copied and pasted onto data sheets in SPSS. The questionnaire data was maintained by section and per community in SPSS as well. The SPSS data sets included the questionnaire number, each individual question, the actual values, and measure (ex. scale, ordinal, nominal). The data was first normalized to ensure all values were standardized across both community data sets and the data was coded to simplify the datasets. Normalizing and coding the data sets prepared the data for manipulation. The data was then checked by random data verification to ensure the accuracy of the data entry for all datasets. This was performed by the primary investigator and the instructor by randomly selecting a handful of questionnaire numbers and confirming if the data entered matched the actual responses in the questionnaires. The selected questionnaires were assessed on 4 to 8 questions per section at random. Each question was also labelled, allowing verification of the data once again by the primary investigator and instructor.

The corresponding sections from each community group were examined to ensure comparability among sections. Each section was assessed using descriptive statistics to observe the frequencies, mean, median, mode, standard error, kurtosis, and skewness. We then used the descriptive statistics to plot the frequencies as histograms to identify normalization. Responses that were ‘don’t know’ or deemed as a ‘missing value’ were not included in most response values within each category. However, there were cases where the missing values were deemed as ‘not applicable’ and were usable as a response set. For example, a reported non-smoker would not select any responses related to self-

smoking patterns but would still be applicable as a non-smoker resulting in valid missing values.

As the study examines two independent groups in relation to different variables (risk factors), it was essential to identify how significantly different the risk factors were when comparing the two groups. For the bivariate analysis, parametric tests were initially used, followed by non-parametric tests to observe the mean distribution of the samples. Parametric tests such as the independent sample t-test and one way ANOVA were utilized. The independent sample t-test was the first test used for the analysis. This is the most commonly utilized method to assess the differences in means between two samples, as it essentially measures the significance of the differences (Goodman, 2009). The t-test was used to examine categorical variables with only up to two categories within the questions. The second test performed was the one way ANOVA (analysis of variance) to observe the variance of the means of the two samples. This test takes into account all sources of variation when looking at samples of relatively the same size (Goodman, 2009). The one way ANOVA is useful when examining categorical or continuous variables with three or more categories and was used for all questions that fit these criteria (Hill & Lewicki, 2007). As the one-way ANOVA takes into account equal variation, the equality of means Welch test assesses unequal variances and was the third test performed. The equality of means Welch test is similar to that of the t-test but is further robust and can aid to confirm the t-test findings. It was simply used to confirm and strengthen the t-test findings. Portions of the Welch test findings were significantly different from the t-test findings and thus normality needed to be examined in order to

ensure that the most appropriate test was being used. In order to examine normality, it was necessary to incorporate non-parametric tests.

Normality was observed using the Kolmogorov-Smirnov (KS) non-parametric test. This would ensure that the correct tests had been utilized for the categorical and continuous data. In addition to using the KS test, the questions that demonstrated a difference in the t-test and Welch test findings were also plotted and compared for non-uniform or uniform distribution among both community groups. If both communities appeared similar then the distribution was recognized as uniform and the parametric value from the t-test was used. If the distributions were not similar in the compared communities, then it was declared non-uniform and a non parametric test was required. The non-parametric Mann-Whitney U test was the test of choice to evaluate the distribution of the variables with non-uniform normality, as it is a reliable and widely used test.

Additionally, bivariate correlations were examined using Pearson's correlation coefficient to identify correlations between responses to questions within each section and across all sections. Correlations were observed between questions of the same section, and for each section in comparison to all other sections. Significant correlations were maintained at $p<0.05$.

3.0 Results

The results from the participant communities were systematically analysed by section of the questionnaire and by community. Following this, the complementary sections of the questionnaire from each community were combined and compared.

3.1 Sections A & I. General Health & Socio-Demographic Characteristics

The first and last sections (Section A & I) of the questionnaire assessed general health and socio-demographic characteristics and were analysed together. Section A explored the gender, age group, and health status of the participants. Section I explored the marital status, education level, birth place, aboriginal background, ethnicity, language preference, and total household income of participants. These factors are neither modifiable nor environmental however they are important indicators of the community characteristics. Table 1 illustrates the comparative results of these factors for Timiskaming and Peel.

Table 1. General Health and Socio-Demographic Characteristics

		Timiskaming n=53	Peel n=61	P value (p<0.05)
Age				0.972
	18-24	4 (7.5%)	2 (3.3%)	
	25-45	38 (71.7%)	49 (80.3%)	
	46-59	10 (18.9%)	9 (14.8%)	
	60-75	1 (1.9%)	1 (1.6%)	
	76+	0 (0%)	0 (0%)	
Health Status				0.002
	Excellent	4 (7.5%)	10 (16.4%)	
	Very Good	16 (30.2%)	29 (47.5%)	
	Good	24 (45.3%)	19 (31.1%)	
	Fair	7 (13.2%)	3 (4.9%)	
	Poor	2 (3.8%)	0 (0%)	
Gender				0.798
	Female	47 (88.7%)	55 (90.2%)	
	Male	6 (11.3%)	6 (9.8%)	
Relationship				0.623
	Married	31 (58.5%)	44 (72.1%)	
	Living Common Law	12 (22.6%)	2 (3.3%)	
	Living with a partner	2 (3.7%)	1 (1.6%)	
	Widowed	1 (1.9%)	2 (3.3%)	
	Separated	1 (1.9%)	2 (3.3%)	
	Divorced	3 (5.7%)	2 (3.3%)	
	Single	3 (5.7%)	8 (13.1%)	
Education				0.000
	Less than High School	2 (3.8%)	0 (0%)	
	High School	8 (15.1%)	4 (6.6%)	
	Trades certificate/diploma	4 (7.5%)	3 (4.9%)	
	Non-university/college certificate or diploma	16 (30.2%)	11 (18.0%)	
	University or college certificate	11 (20.8%)	9 (14.8%)	
	Bachelor degree	9 (17.0%)	21 (34.4%)	
	Professional School degree	3 (5.7%)	13 (21.3%)	

Table 1 continued. General Health and Socio-Demographic Characteristics

		Timiskaming n=53	Peel n=61	P value (p<0.05)
Birthplace				0.000
	Asia	2 (3.8%)	22 (36.7%)	
	Europe	2 (3.8%)	10 (16.7%)	
	Middle East	0 (0%)	3 (5.0%)	
	North America	49 (92.5%)	23 (38.3%)	
	South America	0 (0%)	2 (3.3%)	
Aboriginal Ethnic Background				0.007
	Yes	6 (11.3%)	0 (0%)	
	No	47 (88.7%)	61 (100%)	
Ethnic Background				0.000
	Caucasian	51 (96.2%)	21 (34.4%)	
	Hispanic or Latino	0 (0%)	2 (3.3%)	
	Black or African American	0 (0%)	5 (8.2%)	
	South Asian	2 (3.8%)	16 (26.2%)	
	East Asian	0 (0%)	14 (23.0%)	
	West Asian or Middle Eastern	0 (0%)	2 (3.3%)	
	More than one	0 (0%)	1 (1.6%)	
Language				0.153
	English	40 (75.5%)	39 (63.9%)	
	French	6 (11.3%)	1 (1.6%)	
	Other	1 (1.9%)	17 (27.9%)	
	More than one	6 (11.3%)	4 (6.6%)	
Total Household Income				0.122
	< 25,000	6 (12.2%)	1 (1.8%)	
	25,000 < 50,000	14 (28.6%)	9 (16.1%)	
	50,000 < 80,000	9 (18.4%)	17 (30.4%)	
	80,000 < 100,000	7 (14.3%)	18 (32.1%)	
	100,000 +	13 (26.5%)	11 (19.6%)	

Timiskaming participants reported having a statistically significant overall lower health status than of those participants from Peel ($p<0.01$). Timiskaming participants ranged across ‘poor’ (3.8%), ‘fair’ (13.2%), ‘good’ (45.3%), ‘very good’ (30.2%), and ‘excellent’ health (7.5%). Peel participants reported a higher level of health status

ranging from ‘fair’ (4.9%), ‘good’ (31.1%), ‘very good’ (47.5%), to ‘excellent’ health (16.4%).

Education was also significantly different as Timiskaming participants were assessed having overall lower level of education than Peel participants ($p<0.001$). Timiskaming participants ranged across ‘less than high school’ (3.8%), ‘high school’ (15.1%), ‘diploma’ (7.5%), ‘non university/college certificate’ (30.2%), ‘university/college certificate below bachelor’s’ (20.8%), ‘bachelor’s degree’ (17.0%), and ‘professional degree’ (5.7%). Peel participants ranged from ‘high school’ (6.6%), ‘diploma’ (4.9%), ‘non university/college certificate’ (18.0%), ‘university/college certificate’ (14.8%), ‘bachelor’s degree’ (34.4%), and ‘professional degree’ (21.3%).

Birth place was significantly different among the two participant communities ($p<0.001$) as Timiskaming participants were primarily comprised of those born in North America (92.5%), with only 3.8% indicating being born in Europe and 3.8% being born in Asia. Peel participants were distributed among different regions such as North America (38.3%), Asia (36.7%), Europe (16.7%), Middle East (5.0%), and South America (3.3%). Aboriginal background was also assessed and demonstrated a statistical significant difference ($p<0.01$) as 11.3% of Timiskaming participants declared being of Aboriginal background in comparison to 0% in Peel. Ethnic background corresponded with birth place and demonstrated statistically significant differences ($p<0.001$). Timiskaming participants were primarily Caucasian (96.2%) with few individuals as South Asian (3.8%), whereas Peel ranged among Caucasians (34.4%), South Asians (26.2%), East Asians (23.0%), Black or African American (8.2%), West Asian/Middle

Eastern (3.3%), Hispanic or Latino (3.3%), and there were 1.6% of individuals who identified with more than one of the listed ethnic backgrounds.

No statistical significant differences ($p>0.05$) were observed regarding age, gender, relationship status, language preference, and total household income.

3.2 Section B. Tobacco Smoke & Cigarettes

The second section of the questionnaire assessed active and passive smoking, cessation of smoking, and other tobacco products. Table 2 demonstrates the distribution regarding this section among the two communities.

Table 2. Smoking and Tobacco Exposure

		Timiskaming n=53	Peel n=61	P-value (p<0.05)
Smoked a whole cigarette in lifetime				0.000
	No	18 (34%)	42 (68.9%)	
	Yes	35 (66%)	19 (31.1%)	
Age of first whole cigarette smoked				0.003
	10-13	7 (33.3%)	0 (0%)	
	14-17	11 (52.4%)	9 (56.2%)	
	18-21	3 (14.3%)	5 (31.2%)	
	22-25	0 (0%)	1 (6.3%)	
	26-29	0 (0%)	1 (6.3%)	
Smoked 100 cigarettes in lifetime				0.317
	No	10 (30.3%)	8 (44.4%)	
	Yes	23 (69.7%)	10 (55.6%)	
Current smoking pattern				0.010
	Every day	8 (23.5%)	3 (50.0%)	
	Some days	1 (3.0%)	3 (50.0%)	
	Not at all	25 (73.5%)	0 (0%)	
Age of when first started to smoke cigarettes daily				0.000
	10-13	2 (25.0%)	0 (0%)	
	14-17	4 (50.0%)	0 (0%)	
	18-21	2 (25.0%)	0 (0%)	
	22-25	0 (0%)	0 (0%)	
	26-29	0 (0%)	0 (0%)	
	30-33	0 (0%)	1 (33.3%)	
	34-37	0 (0%)	1 (33.3%)	
	38-41	0 (0%)	1 (33.3%)	
Age when last smoked cigarettes				0.000
	10-13	2 (25.0%)	0 (0%)	
	14-17	3 (37.5%)	0 (0%)	
	18-21	3 (37.5%)	0 (0%)	
	22-25	0 (0%)	0 (0%)	
	26-29	0 (0%)	0 (0%)	
	30-33	0 (0%)	2 (50.0%)	
	34-37	0 (0%)	1 (25.0%)	
	38-41	0 (0%)	1 (25.0%)	

Table 2 continued. Smoking and Tobacco Exposure

		Timiskaming n=53	Peel n=61	P-value (p<0.05)
Current number of cigarettes smoked daily				0.012
	1	0 (0%)	6 (100.0%)	
	3	1 (14.3%)	0 (0%)	
	5	2 (28.6%)	0 (0%)	
	10	2 (28.6%)	0 (0%)	
	15	1 (14.3%)	0 (0%)	
	25	1 (14.3%)	0 (0%)	
Days in the past month having smoked 1 or more cigarettes				0.006
	0	0 (0%)	6 (54.5%)	
	2	1 (12.5%)	1 (9.1%)	
	4	0 (0%)	1 (9.1%)	
	29	1 (12.5%)	0 (0%)	
	30	5 (62.5%)	3 (27.3%)	
	31	1 (12.5%)	0 (0%)	
Number of cigarettes smoked each day in the past month				0.007
	0	1 (8.3%)	0 (0%)	
	1	0 (0%)	6 (66.7%)	
	2	0 (0%)	2 (22.2%)	
	3	1 (8.3%)	0 (0%)	
	4	1 (8.3%)	0 (0%)	
	5	3 (25.1%)	1 (11.1%)	
	10	4 (33.4%)	0 (0%)	
	15	1 (8.3%)	0 (0%)	
	25	1 (8.3%)	0 (0%)	
Smoked cigarettes daily for more than 3 months				0.936
	No	2 (9.1%)	1 (10.0%)	
	Yes	20 (90.9%)	9 (90.0%)	
Age of initiation of smoking daily				0.458
	10-13	2 (11.8%)	0 (0%)	
	14-17	8 (47.0%)	4 (44.4%)	
	18-21	5 (29.4%)	4 (44.4%)	
	22-25	2 (11.8%)	1 (11.1%)	

Table 2 continued. Smoking and Tobacco Exposure

		Timiskaming n=53	Peel n=61	P-value (p<0.05)
Most number of cigarettes smoked daily				0.000
	1	0 (0%)	3 (27.3%)	
	2	0 (0%)	4 (36.3%)	
	3	1 (4.8%)	2 (18.2%)	
	4	0 (0%)	1 (9.1%)	
	5	2 (9.5%)	1 (9.1%)	
	6	2 (9.5%)	0 (0%)	
	7	1 (4.8%)	0 (0%)	
	10	1 (4.8%)	0 (0%)	
	15	3 (14.2%)	0 (0%)	
	16	1 (4.8%)	0 (0%)	
	20	4 (19.0%)	0 (0%)	
	25	3 (14.2%)	0 (0%)	
	35	1 (4.8%)	0 (0%)	
	36	1 (4.8%)	0 (0%)	
	40	1 (4.8%)	0 (0%)	
Cessation of daily smoking				0.352
	Never smoked every day	1 (6.25%)	0 (0%)	
	Less than 1 year ago	1 (6.25%)	0 (0%)	
	1 year to less than 2 years ago	1 (6.25%)	0 (0%)	
	2 years to less than 3 years ago	0 (0%)	1 (12.5%)	
	3 or more years ago	13 (81.3%)	7 (87.5%)	
Complete cessation of smoking				0.630
	Less than 1 year ago	1 (6.25%)	0 (0%)	
	1 year to less than 2 years ago	1 (6.25%)	0 (0%)	
	2 years to less than 3 years ago	0 (0%)	1 (14.3%)	
	3 or more years ago	14 (87.5%)	6 (85.7%)	
Considering quitting within the next 6 months				1.000
	No	2 (33.3%)	1 (33.3%)	
	Yes	4 (66.7%)	2 (66.7%)	

Table 2 continued. Smoking and Tobacco Exposure

	Timiskaming n=53	Peel n=61	P-value (p<0.05)
Seriously considering quitting within the next 30 days			0.633
No	1 (25.0%)	1 (50.0%)	
Yes	3 (75.0%)	1 (50/0%)	
Attempted to stop smoking for at least 24 hours in the past 12 months			0.175
No	4 (66.7%)	3 (100.0%)	
Yes	2 (33.3%)	0 (0%)	
Number of attempts to stop smoking for at least 24 hours in the past 12 months			*
3	1 (50.0%)	0 (0%)	
10	1 (50.0%)	0 (0%)	
Have a regular general practitioner			*
No	1 (25.0%)	0 (0%)	
Yes	3 (75.0%)	1 (100.0%)	
Saw medical practitioner in the past 12 months			*
No	3 (75.0%)	0 (0%)	
Yes	1 (25.0%)	1 (100.0%)	
Medical practitioner aware of smoking habit			*
No	1 (33.3%)	0 (0%)	
Yes	2 (66.7%)	1 (100.0%)	
In the past 12 months, medical practitioner advising cessation of smoking			*
No	3 (75.0%)	0 (0%)	
Yes	1 (25.0%)	1 (100.0%)	
In the past 12 months, medical practitioner providing specific help for cessation of smoking			*
No	4 (100.0%)	1 (100.0%)	
Yes	0 (0%)	0 (0%)	
Forms of help provided by the medical practitioner			*
None	2 (100.0%)	0 (0%)	
Provided self-help information	0 (0%)	1 (100.0%)	
Currently living with others in household			0.980
No	6 (11.3%)	7 (11.5%)	
Yes	47 (88.7%)	54 (88.5%)	

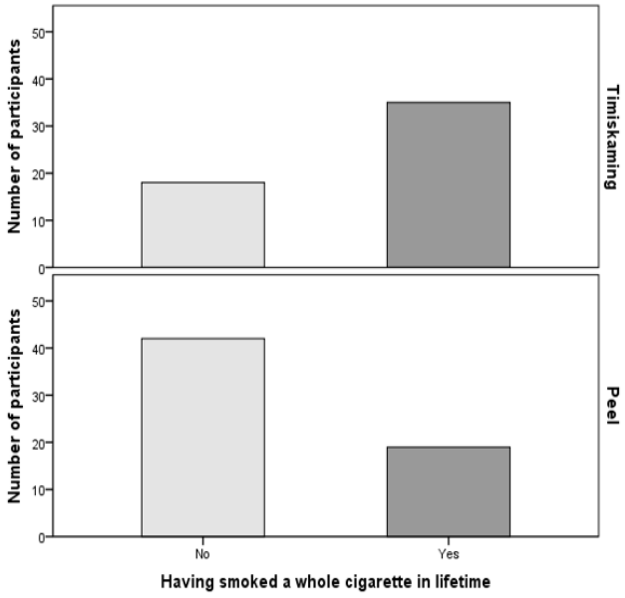
*Not applicable due to zero variance or the group having the sum of case weights less than or equal to 1

Table 2 continued. Smoking and Tobacco Exposure

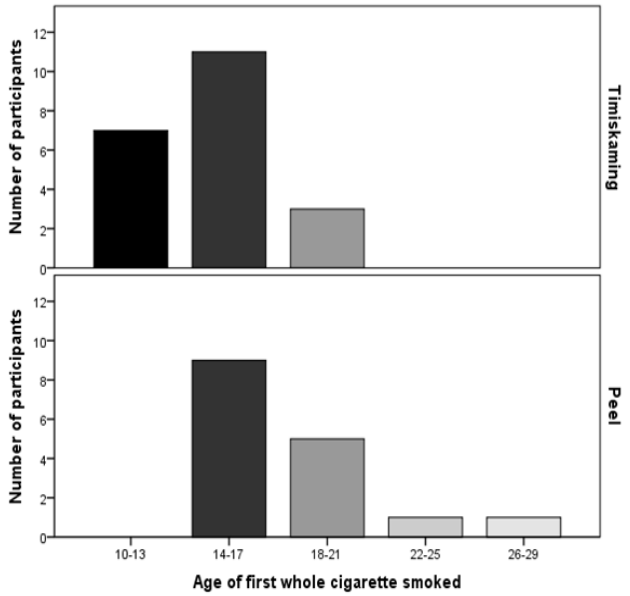
		Timiskaming n=53	Peel n=61	P-value (p<0.05)
Others smoking cigarettes, cigars, or pipes in the household				0.558
	No	42	51	
	Yes	7	6	
Others smoking every day or almost every day in the household				0.011
	No	3 (25.0%)	11 (73.3%)	
	Yes	9 (75.0%)	4 (26.7%)	
Exposure to second hand smoke every day or almost every day in car or vehicle in the past month				0.552
	No	46 (88.5%)	56 (91.8%)	
	Yes	6 (11.5%)	5 (8.2%)	
Exposure to second hand smoke every day or almost every day in public places in the past month				0.763
	No	45 (84.9%)	53 (86.9%)	
	Yes	8 (15.1%)	8 (13.1%)	
Smoking allowance in the household				0.599
	No	50 (94.3%)	56 (91.8%)	
	Yes	3 (5.7%)	5 (8.2%)	
Smoking restrictions in household				0.241
	No	2 (66.7%)	2 (25.0%)	
	Yes	1 (33.3%)	6 (75.0%)	
Methods of smoking restriction in household				0.497
	Allowed in certain rooms only	0 (0%)	1 (16.7%)	
	Restricted in presence of children	0 (0%)	1 (16.7%)	
	Allowed only if windows are open or with ventilation	0 (0%)	1 (16.7%)	
	Other restrictions	1 (100.0%)	3 (50.0%)	
Cigar smoking in the past month				0.159
	No	51 (96.2%)	61 (100.0%)	
	Yes	2 (3.8%)	0 (0%)	

Table 2 continued. Smoking and Tobacco Exposure

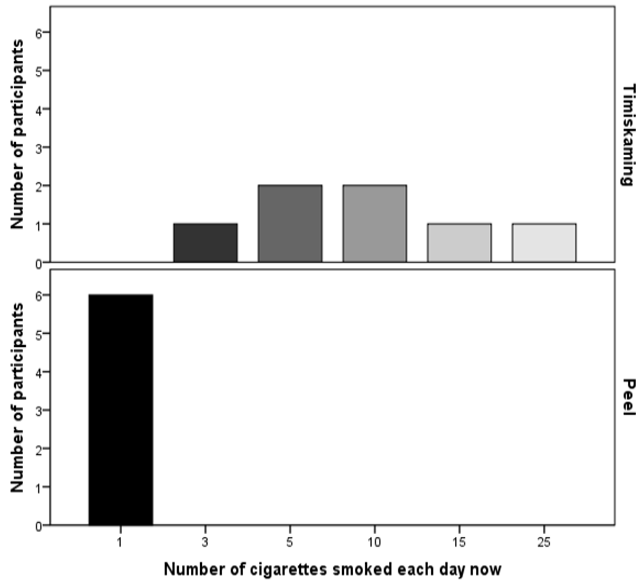
		Timiskaming n=53	Peel n=61	P-value (p<0.05)
Pipe smoking in the past month				0.322
	No	52 (98.1%)	61 (100.0%)	
	Yes	1 (1.9%)	0 (0%)	
Smokeless tobacco in the past month				0.321
	No	53 (100.0%)	59 (98.3%)	
	Yes	0 (0%)	1 (1.7%)	



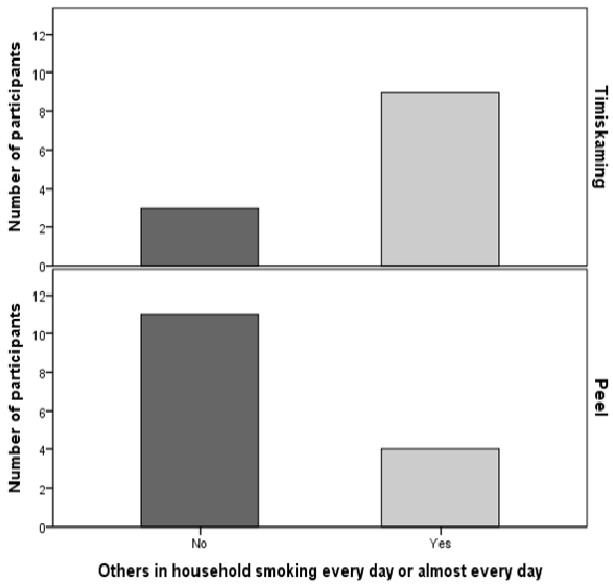
Panel A



Panel B



Panel C



Panel D

Figure 4. The significant differences in participant distribution regarding tobacco and smoke exposure in the communities of Timiskaming and Peel.

When participants were asked if ever having smoked a whole cigarette in his or her lifetime, there was a statistically significant difference ($p<0.001$), as 66% of Timiskaming participants and 31.1% of Peel participants indicated having done so (Figure 4, Panel A). Age of first whole cigarette smoked was also significantly different ($p<0.01$) as Timiskaming was distributed among ages ’10-13 years’ (33.3%), ’14-17 years’ (52.4%), ’18-21 years’ (14.3%), and Peel was distributed among ’14-17 years’ (56.2%), ’18-21 years’ (31.2%), ’22-25 years’ (6.3%), and ’26-29 years’ (6.3%) (Figure 4, Panel B). The current smoking pattern varied significantly ($p<0.05$) as Timiskaming smokers identified smoking ‘every day’ (23.5%), ‘some days’ (3.0%), or ‘not at all’ (73.5%), and Peel smokers only identified smoking ‘every day’ (50.0%) and ‘some days’ (50.0%). The age of when individuals first started to smoke cigarettes was also significantly different ($p<0.001$) as Timiskaming smokers was distributed among ages ’10-13 years’ (25.0%), ’14-17 years’ (50.0%), ’18-21 years’ (25.0%). Peel smokers ranged at higher age groups from ’30-33 years’ (33.3%), ’34-37 years’ (33.3%), and ’38-41 years’ (33.3%). Moreover, the age of when smokers last smoked cigarettes was also significantly different ($p<0.001$) among the communities as Timiskaming ranged once again from ’10-13 years’ (25.0%), ’14-17 years’ (37.5%), and ’18-21 years’ (37.5%), and Peel ranged from ’30-33 years’ (50.0%), ’34-37 years’ (25.0%), and ’38-41 years’ (25.0%).

When asked about the current number of cigarettes smoked daily ($p<0.05$), all smokers in Peel reported only smoking ‘1 cigarette’ daily whereas smokers in Timiskaming ranged from smoking ‘3 cigarettes’ (14.3%), ’5 cigarettes’ (28.6%), ’10 cigarettes’ (28.6%), ’15 cigarettes’ (14.3%), to ’25 cigarettes’ (14.3%) (Figure 4, Panel

C). The number of days in the past month having smoked 1 or more cigarettes significantly varied ($p<0.01$) as well. Smokers in Timiskaming ranged from '2 days' (12.5%), '29 days' (12.5%), '30 days' (62.5%), to '31 days' (12.5%). Smokers in Peel ranged from '0 days' (54.5%), '2 days' (9.1%), '4 days' (9.1%), to '30 days' (27.3%). The number of cigarettes smoked each in the past month was significantly different ($p<0.01$) with Timiskaming smokers ranging from '0 cigarettes' (8.3%), '3 cigarettes' (8.3%), '4 cigarettes' (8.3%), '5 cigarettes' (25.1%), '10 cigarettes' (33.4%), '15 cigarettes' (8.3%), to '25 cigarettes' (8.3%) and Peel smokers ranging from '1 cigarettes' (66.7%), '2 cigarettes' (22.2%), to '5 cigarettes' (11.1%). When asked about the highest number of cigarettes smoked daily by smokers, both communities varied significantly ($p<0.001$). Timiskaming ranged from '3 cigarettes' (4.8%), '5 cigarettes' (9.5%), '6 cigarettes' (9.5%), '7 cigarettes' (4.8%), '10 cigarettes' (4.8%), '15 cigarettes' (14.2%), '16 cigarettes' (4.8%), '20 cigarettes' (19.0%), '25 cigarettes' (14.2%), '35 cigarettes' (4.8%), '36 cigarettes' (4.8%), to '40 cigarettes' (4.8%). Peel ranged with fewer categories, from '1 cigarette' (27.3%), '2 cigarettes' (36.3%), '3 cigarettes' (18.2), '4 cigarettes' (9.1%), to '5 cigarettes' (9.1%). A significant difference was apparent for the other household members smoking every day or almost every day within the household that the participant resides in ($p<0.05$) as 75% of participants in Timiskaming and 26.7% of participants in Peel identified this exposure (Figure 4, Panel D).

No statistically significant differences ($p>0.05$) were found for smoking 100 cigarettes in one's lifetime, age of initiation of smoking daily, cessation of smoking, and for any second-hand smoke exposure in the household, public, or vehicle environments.

There were also no significant findings for differences regarding use of other tobacco products such as cigars, pipes, or smokeless tobacco.

3.3 Section C. Alcohol Use

This section addressed the alcohol beverage consumption patterns of individuals from both communities as presented in Table 3.

Table 3. Alcohol Exposure

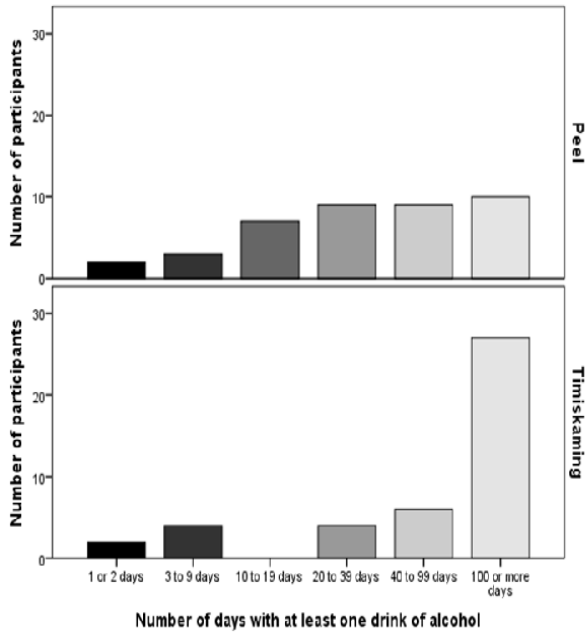
		Timiskaming n=53	Peel n=61	P-value (p<0.05)
Age at first drink of alcohol				0.340
	Never had a drink	2 (3.9%)	15 (25.9%)	
	8 years or younger	1 (2.0%)	0 (0%)	
	9 or 10 years old	1 (2.0%)	0 (0%)	
	11 or 12 years old	4 (7.8%)	0 (0%)	
	13 or 14 years old	17 (33.3%)	4 (6.9%)	
	15 or 16 years old	12 (23.5%)	14 (24.1%)	
	17 years old or older	14 (27.5%)	25 (43.1%)	
Number of days during lifetime with at least one drink of alcohol				0.015
	1 or 2 days	2 (4.6%)	2 (5.0%)	
	3 to 9 days	4 (9.3%)	3 (7.5%)	
	10 to 19 days	0 (0%)	7 (17.5%)	
	20 to 39 days	4 (9.3%)	9 (22.5%)	
	40 to 99 days	6 (14.0%)	9 (22.5%)	
	100 or more days	27 (62.8%)	10 (25.0%)	
Alcohol beverages in the past 12 months				0.079
	No	8 (15.7%)	14 (31.1%)	
	Yes	43 (84.3%)	31 (68.9%)	
Number of drinks in the past 12 months				0.004
	Less than once a month	15 (35.7%)	18 (58.1%)	
	Once a month	3 (7.1%)	6 (19.3%)	
	2 or 3 times a month	9 (21.4%)	4 (12.9%)	
	Once a week	4 (9.5%)	1 (3.2%)	
	2 to 3 times a week	10 (23.8%)	2 (6.5%)	
	4 to 6 times a week	1 (2.4%)	0 (0%)	
	Every day	0 (0%)	0 (0%)	
5 or more drinks of alcohol in one occasion in the past 12 months				0.000
	Never	17 (40.5%)	24 (75.0%)	
	Less than once a month	13 (31.0%)	8 (25.0%)	
	Once a month	4 (9.5%)	0 (0%)	
	2 to 3 times a month	4 (9.5%)	0 (0%)	
	Once a week	3 (7.1%)	0 (0%)	
	More than once a week	1 (2.4%)	0 (0%)	

Table 3 continued. Alcohol Exposure

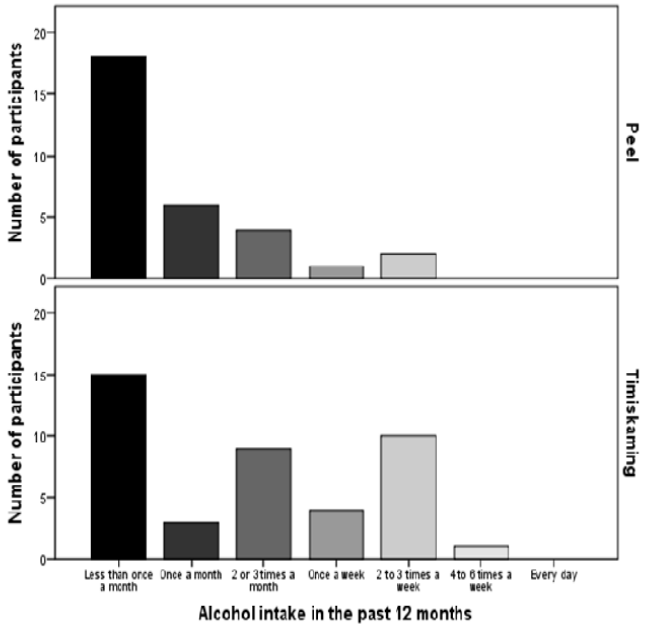
		Timiskaming n=53	Peel n=61	P-value (p<0.05)
Number of days in the past month with a drink of alcohol				0.090
	None	13 (31.0%)	8 (25.8%)	
	1 or 2 days	10 (23.8%)	16 (51.6%)	
	3 to 5 days	9 (21.4%)	5 (16.1%)	
	6 to 9 days	5 (11.9%)	2 (6.5%)	
	10 to 19 days	4 (9.5%)	0 (0%)	
	20 to 29 days	1(2.4%)	0 (0%)	
	All 30 days	0 (0%)	0 (0%)	
5 or more drinks in a row or in two hours in the past month				0.032
	None	32 (74.4%)	28 (87.5%)	
	1 day	3 (7.0%)	4 (12.5%)	
	2 days	2 (4.7%)	0 (0%)	
	3 to 5 days	5 (11.6%)	0 (0%)	
	6 to 9 days	0 (0%)	0 (0%)	
	10 to 19 days	0 (0%)	0 (0%)	
	20 or more days	1 (2.3%)	0 (0%)	
Alcohol beverages in the past week				0.257
	No	24 (55.8%)	22 (68.7%)	
	Yes	19 (44.2%)	10 (31.3%)	
Number of drinks yesterday (day 1)				0.543
	0	13 (68.4%)	6 (60.0%)	
	1	1 (5.3%)	2 (20.0%)	
	2	3 (15.8%)	2 (20.0%)	
	5	1 (5.3%)	0 (0%)	
	7	1 (5.3%)	0 (0%)	
Number of drinks two days ago (day 2)				0.100
	0	10 (52.6%)	9 (90.0%)	
	1	6 (31.6%)	1 (10.0%)	
	2	1 (5.3%)	0 (0%)	
	5	2 (10.5%)	0 (0%)	

Table 3 continued. Alcohol Exposure

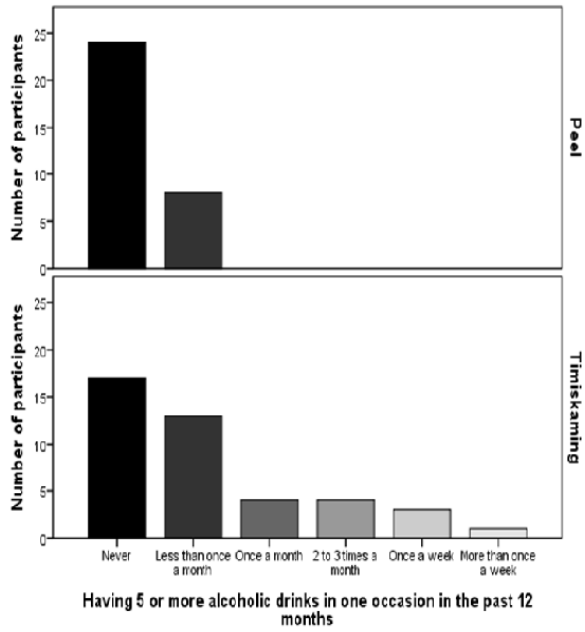
	Timiskaming n=53	Peel n=61	P-value (p<0.05)
Number of drinks three days ago (day 3)			0.413
0	12 (63.1%)	7 (70.0%)	
1	4 (21.0%)	2 (20.0%)	
2	1 (5.3%)	1 (10.0%)	
4	1 (5.3%)	0 (0%)	
12	1 (5.3%)	0 (0%)	
Number of drinks four days ago (day 4)			0.459
0	13 (68.4%)	7 (70.0%)	
1	2 (10.5%)	2 (20.0%)	
2	2 (10.5%)	1 (10.0%)	
3	1 (5.3%)	0 (0%)	
6	1 (5.3%)	0 (0%)	
Number of drinks five days ago (day 5)			0.289
0	10 (52.6%)	8 (80.0%)	
1	5 (26.3%)	1 (10.0%)	
2	2 (10.5%)	0 (0%)	
3	0 (0%)	1 (10.0%)	
4	1 (5.3%)	0 (0%)	
5	1 (5.3%)	0 (0%)	
Number of drinks six days ago (day 6)			0.732
0	13 (68.4%)	5 (50.0%)	
1	3 (15.8%)	4 (40.0%)	
2	2 (10.5%)	0 (0%)	
4	0 (0%)	1 (10.0%)	
5	1 (5.3%)	0 (0%)	
Number of drinks seven days ago (day 7)			0.478
0	18 (94.7%)	10 (100.0%)	
1	1 (5.3%)	0 (0%)	



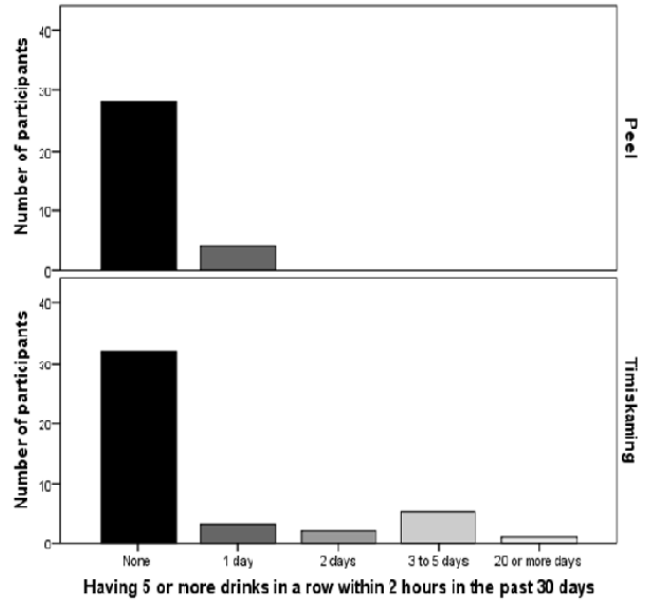
Panel A



Panel B



Panel C



Panel D

Figure 5. The significant differences in participant distribution regarding alcohol intake in the communities of Timiskaming and Peel.

The number of days during lifetime with at least one drink of alcohol significantly varied when the communities were compared ($p<0.05$). Timiskaming alcohol drinkers were observed to be distributed among '1 or 2 days' (4.6%), '3 to 9 days' (9.3%), '20 to 39 days' (9.3%), '40 to 99 days' (14.0%), and '100 or more days' (62.8%). Peel participants were observed to be distributed among '1 or 2 days' (5.0%), '3 to 9 days' (7.5%), '10 to 19 days' (17.5%), '20 to 39 days' (22.5%), '40 to 99 days' (22.5%), and '100 or more days' (25.0%) (Figure 5, Panel A). There was a significant difference examined regarding the number of drinks in the past 12 months ($p<0.01$) as Timiskaming participants reported among 'less than once a month' (35.7%), 'once a month' (7.1%), '2 to 3 times a month' (21.4%), 'once a week' (9.5%), '2 to 3 times a week' (23.8%), and '4 to 6 times a week' (2.4%). Peel varied with 'less than once a month' (58.1%), 'once a month' (19.3%), '2 to 3 times a month' (12.9%), 'once a week' (3.2%), and '2 to 3 times a week' (6.5%) (Figure 5, Panel B). Having five or more drinks of alcohol in one occasion in the past 12 months also presented a significant difference ($p<0.001$). Timiskaming participants reported among 'never' (40.5%), 'less than once a month' (31.0%), 'once a month' (9.5%), '2 to 3 times a month' (9.5%), 'once a week' (7.1%), and 'more than once a week' (2.4%), whereas Peel participants were only distributed among 'never' (75.0%) and 'less than once a month' (25.0%) (Figure 5, Panel C). Further assessing drinking habits also found a significant difference for having five or more drinks in a row or in two hours in the past month ($p<0.05$). Timiskaming ranged from 'none' (74.4%), '1 day' (7.0%), '2 days' (4.7%), '3 to 5 days' (11.6%), '20 or more days' (2.3%), whereas Peel ranged from 'none' (87.5%) to '1 day' (12.5%) (Figure 5, Panel D).

No statistically significant differences ($p>0.05$) were present for the age of first drink of alcohol, having a drink of alcohol in the past 12 months, number of days in the past month having a drink of alcohol, having a drink of alcohol in the past week, and for the number of drinks consumed each day in the past week.

3.4 Section D. Housing Characteristics

Housing characteristics as shown in Table 4 encompassed the year the most recent home/residence was built and length of time living at the most recent home/residence, home/residence water sources, and residing mining industries.

Table 4. Housing Characteristics

		Timiskaming n=53	Peel n=61	P-value (p<0.05)
The year current home/residence was built				0.000
	1990 or present	6 (13.6%)	36 (64.3%)	
	1978-1989	15 (34.1%)	15 (26.8%)	
	1960-1977	6 (13.6%)	4 (7.1%)	
	1950-1959	3 (6.9%)	1 (1.8%)	
	1940-1949	6 (13.6%)	0 (0%)	
	Before 1940	8 (18.2%)	0 (0%)	
Length of time living at current home/residence				0.085
	Less than one month	2 (3.8%)	1 (1.7%)	
	6 months	8 (15.1%)	4 (6.7%)	
	1 to 5 years	16 (30.2%)	20 (33.3%)	
	5 to 10 years	15 (28.3%)	12 (20.0%)	
	More than 10 years	12 (22.6%)	23 (38.3%)	
Source of tap water				0.000
	Private/public water company	32 (60.4%)	49 (98.0%)	
	Private/public well	17 (32.1%)	0 (0%)	
	Other	4 (7.5%)	1 (2.0%)	
Present water treatment devices in current home				0.030
	No	40 (75.5%)	30 (55.6%)	
	Yes	13 (24.5%)	24 (44.4%)	
Present or abandoned mining industries near the home/residence				0.000
	No	23 (47.9%)	51 (100.0%)	
	Yes	25 (52.1%)	0 (0%)	
Listed mining industries near home/residence				*
	Silver	9 (37.5%)	0 (0%)	
	Gold	13 (54.2%)	0 (0%)	
	Silver and Gold	2 (8.3%)	0 (0%)	

*Not applicable due to 0 variance or a group having the sum of case weights less than or equal to 1

The year that the current home/residence was built was examined to be significantly different when both communities were compared ($p<0.001$). The year the home/residence was built ranged from '1990 to present' (13.6%), '1978-1989' (34.1%), '1960-1977' (13.6%), '1950-1959' (6.9%), '1940-1949' (13.6%), to 'before 1940' (18.2%) in Timiskaming participants. Peel participants reported a different range across '1990 to present' (64.3%), '1978-1989' (26.8%), '1960-1977' (7.1%), and '1950-1959' (1.8%). The source of tap water ($p<0.001$) and use of water treatment devices ($p<0.05$) also presented significant differences. In Timiskaming, 60.4% reported using a 'private/public water company', 32.1% reported using a 'private/public well', and 7.5% reported 'other'. On the other hand, 98% of Peel reported using a 'private/public waste company' and 2% reported 'other'. Additionally, 24.5% of Timiskaming participants and 44.4% of Peel participants reported using a water treatment device in his/her household. The presence of present or abandoned mining industries near the home/residence was reported by 52.1% of Timiskaming participants and 0% of participants in Peel. Among the 52.1% of Timiskaming participants, 96% of them identified the type of mining industry near his/her household as silver, gold, or both.

There was no statistically significant difference ($p>0.05$) when examining the length of time the participants were living at the current home/residence.

3.5 Section E. Volatile Chemicals/Fumes/Pesticide Use

This section as shown in Table 5 was quite extensive and covered the different types of chemical use within and outside of the participant's home.

Table 5. Pesticides & Organochlorines

		Timiskaming n=53	Peel n=61	P-value (p<0.05)
Use of insecticides at current home/residence				0.008
	No	33 (67.3%)	49 (89.1%)	
	Yes	16 (32.7%)	6 (10.9%)	
First time using insecticides at home/residence				0.123
	1996-1999	3 (18.8%)	0 (0%)	
	2000-2003	1 (6.3%)	1 (16.7%)	
	2004-2007	7 (43.7%)	0 (0%)	
	2008-2011	5 (31.2%)	5 (83.3%)	
Most recent time using insecticides at home/residence				0.079
	1996-1999	1 (6.3%)	0 (0%)	
	2000-2003	1 (6.3%)	1 (16.7%)	
	2004-2007	11 (68.7%)	0 (0%)	
	2008-2011	3 (18.7%)	5 (83.3%)	
Number of times insecticides were used at current home/residence				0.772
	Never	0 (0%)	1 (14.3%)	
	Once or twice	11 (78.6%)	4 (57.1%)	
	3 to 10 times	3 (21.4%)	2 (28.6%)	
	More than 10 times	0 (0%)	0 (0%)	
Number of times residents left the home/residence due to fumigation				0.238
	Never	10 (62.5%)	6 (85.7%)	
	Once or twice	4 (25.0%)	1 (14.3%)	
	3 to 10 times	2 (12.5%)	0 (0%)	
	More than 10 times	0 (0%)	0 (0%)	
Home/residence treated for termites or carpenter ants				0.508
	No	14 (93.3%)	7 (100.0%)	
	Yes	1 (6.7%)	0 (0%)	
Home/residence treated for mosquitoes				0.160
	No	45 (95.7%)	57 (100.0%)	
	Yes	2 (4.3%)	0 (0%)	

Table 5 continued. Pesticides & Organochlorines

		Timiskaming n=53	Peel n=61	P-value (p<0.05)
Number of times home/residence treated for mosquitoes				*
	Once or twice	1 (50.0%)	0 (0%)	
	3 to 10 times	0 (0%)	0 (0%)	
	More than 10 times	1 (50.0%)	0 (0%)	
First time home/residence treated for mosquitoes				*
	2008-2011	2 (100.0%)	0 (0%)	
Most recent time home/residence treated for mosquitoes				*
	2008-2011	2 (100.0%)	0 (0%)	
Lawn at current home/residence				0.000
	No	2 (4.0%)	20 (33.3%)	
	Yes	48 (96.0%)	40 (66.7%)	
Use of chemicals on lawn at current home/residence				0.879
	No	21 (52.5%)	19 (54.3%)	
	Yes	19 (47.5%)	16 (45.7%)	
Total number of times lawn was treated with chemicals				0.354
	Once or twice	17 (89.5%)	13 (81.3%)	
	3 to 20 times	2 (10.5%)	2 (12.5%)	
	More than 20 times	0 (0%)	1 (6.2%)	
First time lawn was treated with chemicals				0.988
	1996-1999	1 (5.3%)	0 (0%)	
	2000-2003	1 (5.3%)	3 (27.3%)	
	2004-2007	7 (36.8%)	1 (9.1%)	
	2008-2011	10 (52.6%)	7 (63.6%)	
Most recent time lawn was treated with chemicals				0.822
	1996-1999	1 (5.3%)	0 (0%)	
	2000-2003	1 (5.3%)	2 (18.2%)	
	2004-2007	5 (26.3%)	1 (9.1%)	
	2008-2011	12 (63.1%)	8 (72.7%)	
Professional lawn service for pesticides/insecticides/ weed killers at current home/residence				0.971
	No	33 (73.3%)	27 (73.0%)	
	Yes	12 (26.7%)	10 (27.0%)	

*Not applicable due to 0 variance or a group having the sum of case weights less than or equal to 1

Table 5 continued. Pesticides & Organochlorines

	Timiskaming n=53	Peel n=61	P-value (p<0.05)
Number of times of use of professional lawn service for pesticides/insecticides/weed killers			0.224
Once or twice	9 (81.8%)	6 (66.7%)	
3 to 20 times	2 (18.2%)	1 (11.1%)	
More than 20 times	0 (0%)	2 (22.2%)	
First time of use of professional lawn service using pesticides/insecticides/weed killers			0.210
1996-1999	1 (9.1%)	0 (0%)	
2000-2003	2 (18.2%)	2 (22.2%)	
2004-2007	5 (45.4%)	1 (11.1%)	
2008-2011	3 (27.3%)	6 (66.7%)	
Most recent time of use of professional lawn service using pesticides/insecticides/weed killers			0.002
1996-1999	2 (18.2%)	0 (0%)	
2000-2003	4 (36.3%)	1 (10.0%)	
2004-2007	3 (27.3%)	0 (0%)	
2008-2011	2 (18.2%)	9 (90.0%)	
Use of chemicals like pesticides/insecticides/ herbicides/weed killers household members			0.082
No	33 (75.0%)	48 (88.9%)	
Yes	11 (25.0%)	6 (11.1%)	
Number of times pesticides/insecticides/ herbicides/weed killers used at current home/residence by household members			0.505
Once or twice	7 (63.6%)	3 (60.0%)	
3 to 20 times	4 (36.4%)	1 (20.0%)	
More than 20 times	0 (0%)	1 (20.0%)	
First year treated with pesticides/insecticides/ herbicides/weed killers by household members			0.199
1996-1999	2 (18.2%)	0 (0%)	
2000-2003	3 (27.3%)	1 (25.0%)	
2004-2007	3 (27.3%)	0 (0%)	
2008-2011	3 (27.3%)	3 (75.0%)	

Table 5 continued. Pesticides & Organochlorines

		Timiskaming n=53	Peel n=61	P-value (p<0.05)
Most recent time treated with pesticides/insecticides/ herbicides/weed killers by household members				0.073
	1996-1999	8 (72.7%)	0 (0%)	
	2000-2003	0 (0%)	2 (40.0%)	
	2004-2007	0 (0%)	0 (0%)	
	2008-2011	3 (27.3%)	3 (60.0%)	
Live or lived with a dog, cat, or family pet with flea collar				0.000
	No	38 (74.5%)	60 (98.4%)	
	Yes	13 (25.5%)	1 (1.6%)	
Number of years lived or living with a pet with a flea collar				0.053
	0	1 (9.1%)	0 (0%)	
	1	5 (45.4%)	0 (0%)	
	2	2 (18.2%)	0 (0%)	
	3	1 (9.1%)	0 (0%)	
	4	1 (9.1%)	0 (0%)	
	8	0 (0%)	1 (100.0%)	
	9	1 (9.1%)	0 (0%)	
Use of other tick or flea products				0.770
	No	1 (10.0%)	0 (0%)	
	Yes	9 (90.0%)	1 (100.0%)	
Number of times using these tick or flea products				0.821
	Once or twice	4 (36.4%)	0 (0%)	
	3 to 10 times	5 (45.4%)	1 (100.0%)	
	More than 10 times	2 (18.2%)	0 (0%)	
First time of use of tick/flea products				0.276
	1996-1999	1 (9.1%)	0 (0%)	
	2000-2003	1 (9.1%)	1 (100.0%)	
	2004-2007	4 (36.4%)	0 (0%)	
	2008-2011	5 (45.4%)	0 (0%)	

Table 5 continued. Pesticides & Organochlorines

		Timiskaming n=53	Peel n=61	P-value (p<0.05)
Most recent time of use of tick/flea products				0.206
	1996-1999	1 (8.3%)	0 (0%)	
	2000-2003	2 (16.7%)	0 (0%)	
	2004-2007	7 (58.3%)	0 (0%)	
	2008-2011	2 (16.7%)	1 (100.0%)	
Use of chemical products regularly to control mould or mildew				0.003
	No	33 (62.3%)	52 (86.7%)	
	Yes	20 (37.7%)	8 (13.3%)	
First time using chemical products to control mould or mildew				0.871
	1996-1999	1 (5.0%)	0 (0%)	
	2000-2003	1 (5.0%)	2 (22.2%)	
	2004-2007	5 (25.0%)	0 (0%)	
	2008-2011	13 (65.0%)	7 (77.8%)	
Most recent time using chemical products to control mould or mildew				0.139
	2000-2003	0 (0%)	1 (11.1%)	
	2004-2007	0 (0%)	0 (0%)	
	2008-2011	20 (100.0%)	8 (88.9%)	
Use of chlorine bleach for mould or mildew				0.081
	No	5 (26.3%)	5 (62.5%)	
	Yes	14 (73.7%)	3 (37.5%)	
General use of chlorine bleach for mould or mildew				0.571
	Daily	0 (0%)	0 (0%)	
	Weekly	5 (35.7%)	1 (20.0%)	
	Monthly	3 (21.4%)	2 (40.0%)	
	Less than once a month	6 (42.9%)	2 (40.0%)	
Use of any other products for mould or mildew				0.569
	No	12 (63.2%)	6 (75.0%)	
	Yes	7 (36.8%)	2 (25.0%)	

Table 5 continued. Pesticides & Organochlorines

		Timiskaming n=53	Peel n=61	P-value (p<0.05)
Identification of products used for mould or mildew				0.793
	Listed item	9 (52.9%)	3 (60.0%)	
	Unlisted	8 (47.1%)	2 (40.0%)	
Use of surface cleaners				0.177
	No	7 (13.2%)	14 (23.0%)	
	Yes	46 (86.8%)	47 (77.0%)	
General use of surface cleaners				0.294
	Daily	5 (11.4%)	5 (10.9%)	
	Weekly	21 (47.7%)	29 (63.0%)	
	Monthly	8 (18.2%)	5 (10.9%)	
	Less than once a month	10 (22.7%)	7 (15.2%)	
Use of paint thinner or paint stripper at current home/residence				0.015
	No	33(64.7%)	51 (85.0%)	
	Yes	18 (35.3%)	9 (15.0%)	
Number of times using paint thinner or paint stripper				0.056
	1 to 2 times	8 (44.4%)	6 (85.7%)	
	3 to 6 times	4 (22.2%)	1 (14.3%)	
	7 to 15 times	3 (16.7%)	0 (0%)	
	More than 15 times	3 (16.7%)	0 (0%)	
Breathing in fumes from degreasing cleaners in the last 3 days				0.096
	No	44 (83.0%)	56 (93.3%)	
	Yes	9 (17.0%)	4 (6.7%)	
Breathing in fumes from diesel fuel or kerosene in the last 3 days				0.188
	No	43 (81.1%)	54 (90.0%)	
	Yes	10 (18.9%)	6 (10.0%)	

Table 5 continued. Pesticides & Organochlorines

		Timiskaming n=53	Peel n=61	P-value (p<0.05)
Breathing in fumes from paint thinner, brush cleaner, or furniture stripper in the last 3 days				0.860
	No	50 (94.3%)	58 (95.1%)	
	Yes	3 (5.7%)	3 (4.9%)	
Breathing in fumes from dry-cleaning fluid or spot remover in the last 3 days				0.109
	No	47 (88.7%)	59 (96.7%)	
	Yes	6 (11.3%)	2 (3.3%)	

There was a significant difference regarding the use of insecticides at the home/residence of participants in both communities ($p<0.01$), as 32.7% of Timiskaming participants and 10.9% of Peel participants reported using insecticides. Having a lawn at the current home/residence was also significantly different ($p<0.001$) as 96% of Timiskaming participants and 66.7% of Peel participants indicated having one. The most recent time of use of professional lawn service using pesticides/insecticides/weed killers was observed to be significantly different among the communities ($p<0.01$). Timiskaming participants ranged from '1996-1999' (18.2%), '2000-2003' (36.3%), '2004-2007' (27.3%), to '2008-2011' (18.2%). Peel participants ranged from '2000-2003' (10.0%) to '2008-2011' (90.0%). Living or having lived with a pet with a flea collar was also observed to be significantly different ($p<0.001$) as 25.5% of Timiskaming participants and only 1.6% of Peel participants indicated this. The use of chemical products to regularly control mould or mildew was examined to be significantly different ($p<0.01$) as 37.7% of Timiskaming participants and 13.3% of Peel participants reported using chemical products to control mould/mildew. The use of paint thinner/stripper at the

home/residence was significantly different among the communities ($p<0.05$) as 35.3% of Timiskaming participants and 15.0% of Peel participants reported using paint thinner/stripper.

Due to a very small number of individuals identifying the use of chemicals to treat and control mosquitoes, the portion regarding mosquito control could not be computed for significance or variance. There were no statistically significant differences ($p>0.05$) for the time frame and number of times using insecticides, the use of various chemicals on the lawn, the use of professional pesticide lawn services, the use of pesticides/insecticides/herbicides by the participant or other household members, the use of tick/flea products, the use of surface cleaners, and exposure to fumes in the past few days.

3.6 Section F. Metal Toxins

The potential metal toxin products that the participants may be using or be exposed to inside and outside the home were assessed and are presented in Table 6.

Table 6. Metal Toxin Exposures

		Timiskaming n=53	Peel n=61	P-value (p<0.05)
Aware of gold mining taking place near or within community				0.000
	No	24 (48.0%)	55 (100.0%)	
	Yes	26 (52.0%)	0 (0%)	
Aware of silver mining taking place near or within community				0.000
	No	35 (76.1%)	55 (100.0%)	
	Yes	11 (23.9%)	0 (0%)	
Use of Copper Chromated Arsenic in house renovations or woodwork				0.323
	No	38 (100.0%)	39 (100.0%)	
	Yes	0 (0%)	0 (0%)	
Use of nickel cadmium batteries within the household				0.498
	No	7 (17.9%)	9 (24.3%)	
	Yes	32 (82.1%)	28 (75.7%)	
Recycling of batteries				0.398
	No	31 (64.6%)	31 (56.4%)	
	Yes	17 (35.4%)	24 (43.6%)	
House/residence built before 1978				0.000
	No	19 (46.3%)	49 (87.5%)	
	Yes	22 (53.7%)	7 (12.5%)	
House/residence painted at the time it was built before 1978				0.693
	No	4 (44.4%)	2 (33.3%)	
	Yes	5 (55.6%)	4 (66.7%)	
Use of lead red rust proof paint on a vehicle or barn				0.083
	No	40 (93.0%)	52 (100.0%)	
	Yes	3 (7.0%)	0 (0%)	
Lead containing drinking water pipes or brass fixtures within or around the home				0.160
	No	33 (94.3%)	31 (100.0%)	
	Yes	2 (5.7%)	0 (0%)	

Table 6 continued. Metal Toxin Exposures

		Timiskaming n=53	Peel n=61	P-value (p<0.05)
Mercury filled thermometers or thermostats within the household				0.584
	No	30 (68.2%)	41 (73.2%)	
	Yes	14 (31.8%)	15 (26.8%)	
Utilizing fluorescent light bulbs				0.094
	No	12 (23.5%)	22 (38.6%)	
	Yes	39 (76.5%)	35 (61.4%)	
Have or had a dental amalgam				0.001
	No	13 (32.5%)	36 (67.9%)	
	Yes	27 (67.5%)	17 (32.1%)	
Time frame of having a dental amalgam				0.015
	Had a dental amalgam, no longer do	5 (23.8%)	7 (70.0%)	
	Continue to have a dental amalgam	16 (76.2%)	3 (30.0%)	

Knowledge of gold mining taking place near or within the community ($p<0.001$) and knowledge of silver mining taking place near or within the community ($p<0.001$) were observed to be significantly different when comparing the two communities. In Timiskaming, 52% reported being aware of gold mining and 23.9% reported being aware of silver mining. In Peel, no participants indicated knowledge of either type of mining near or within his or her community. A significant difference also appeared for if the participant's home/residence was built prior to 1978 ($p<0.001$) as 53.7% of Timiskaming participants and 12.5% of Peel participants reported this. Examining if participants had or have a dental amalgam ($p<0.01$) and the time frame of having the dental amalgam ($p<0.05$) demonstrated significant differences. Among the Timiskaming participants,

67.5% indicated currently having or previously having a dental amalgam, whereas only 32.1% of Peel participants indicated this. When asked about the time frame of having the dental amalgams, 76.2% of Timiskaming participants and 30.0% of Peel participants reported still continuing to have the dental amalgams, whereas 23.8% of Timiskaming participants and 70.0% of Peel participants had a dental amalgam in the past.

There were no statistically significant differences ($p>0.05$) with regards to the use of copper chromated arsenic in house renovations or wood work, use of nickel cadmium batteries, if the home/residence built before 1978 was also painted at the time it was built, use of lead water pipes or brass fixtures, mercury filled thermometers/thermostats, and utilizing fluorescent light bulbs.

3.7 Section G. Occupational Exposures

Occupational exposures were distributed slightly differently between the two communities as shown in Table 7.

Table 7. Occupational Exposures

		Timiskaming n=53	Peel n=61
Cooking or kitchen	Yes	29	19
Contact with exhaust fumes from cars/vehicles	Yes	17	9
Industrial food processing/heating/cooking food	Yes	10	2
Textiles (production, sewing, packing)	Yes	3	4
Contact with glass wool, slag wool, or other mineral fibers	Yes	1	0
Processing or packing of fine grit or powder from mineral sand	Yes	2	0
Metal smelting	Yes	1	0
Burning of coal/wood/kerosene or oil	Yes	5	0
Radiation (work with X ray machines, radiation labs)	Yes	1	6
Waste incineration	Yes	1	0
Recycling of electronics, cable, scrap metal	Yes	0	1
Chemical and plastics production/processing	Yes	1	1
Firefighting and emergency response	Yes	1	0
Battery Manufacturing	Yes	0	0

* Statistical tests could not be computed in this section due to the small sample sizes

When examining all occupations held by participants over their lifetime, it was observed that 31% of Timiskaming participants were in the social science/education/government-service sector, 26% in sales/services, 16% in business/finance/administration, 7% in health occupations, and 7% in the trades/transport/equipment operations field. The remaining participant population demonstrated 6% in processing/manufacturing/utilities, 4% in management, 2% did not list an occupation, 1% in natural/applied sciences, and no participants identified working in the sector of art/culture/recreation/sports. When looking at the most recent occupation

held by participants, it was found that 38% were in the social science/education/government-service sector, 28% in sales/services, 9% in business/finance/administration, 6% in trades/transport/equipment operations, 5% in management, 4% in each of the sectors of processing/manufacturing/utilities and health. Another 4% did not list an occupation, 2% in natural/applied sciences, and none identified working in the sector of art/culture/recreation/sports.

The Peel participants also presented a mix of occupations held over a lifetime and as the most recent occupation held. When looking at all occupations held by participants, it was observed that 21% worked in the field of business/finance/administration and another 21% in sales/services. 18% worked in social science/education/government-service, while 10% worked in health related occupations, 9% worked in trades/transport/equipment operating, 7% in natural/applied science, 6% did not list any occupations, 5% in management, 2% in processing, manufacturing, and utility related occupations, and 1% in arts/culture/recreation/sports. When examining the most recent occupation held by participants, it was found that 23% were in the social science/education/government-service, 18% were in business/finance/administration, 18% were in sales/services, 10% were in health occupations, 8% were in natural/applied sciences, 8% did not list an occupation, 7% in trades/transport/equipment operations, 6% in management, and 2% in art/culture/recreation/sports. No participants reported recently working in the processing, manufacturing, or utilities related fields.

Specific occupational exposures were also examined which deemed toxic elements that may be present in occupational settings. However, the differences between Timiskaming and Peel could not be assessed due to a small sample size and zero variance

present in the provided categories. There are notable differences and similarities in the distribution count with particular exposures even though statistical testing could not be used. Six specific exposures were prevalent among a small portion of participants in both communities. These were cooking/kitchen (n=29, Timiskaming, n=19, Peel), contact with exhaust fumes from cars and vehicles (n=17, T, n=9, P), industrial food processing/heating/cooking (n=10, T, n=2, P), textile production/sewing/packing (n=3, T, n=4), burning of coal/wood/kerosene or oil (n=5, T, n=0, P), and radiation work with x-ray machines or radiation labs (n=1, T, n=6, P).

3.8 Section H. Ionizing Radiation

This section encompassed exposure to ionizing radiation through a single question as presented in Table 8.

Table 8. Ionizing Radiation Exposure

	Timiskaming n=53	Peel n=61	P-value (p<0.05)
Total number of X-rays in lifetime			0.930
None	1 (2.0%)	1 (1.9%)	
1 to 2	5 (9.8%)	7 (13.2%)	
3 to 5	10 (19.6%)	9 (17.0%)	
6 to 10	16 (31.4%)	15 (28.3%)	
11 to 20	11 (21.5%)	12 (22.6%)	
21 to 40	5 (9.8%)	7 (13.2%)	
41 or more	3 (5.9%)	2 (3.8%)	

The distribution of both communities among the categories of ‘none’, ‘1 to 2’, ‘3 to 5’, ‘6 to 10’, ‘11 to 20’, ‘21 to 40’, ‘41 or more’ were found to be similar and not significantly different when compared (p>0.05).

3.9 Section Correlations

After completing the bivariate analysis, we opted to further identify any significant correlations ($p<0.05$) present within each section of the questionnaire and when comparing each section to all other sections of the questionnaire. There were an extensive number of significant correlations (Appendix J) as these correlations were based on responses to each question of the questionnaire. The correlations were stronger within each section, where one section was compared to itself, examining if the question responses in the section were correlated in any way. This was an expected finding as each section set of questions were related to one another. When comparing each section to all other sections, various correlations were identified when comparing Timiskaming to Peel. The most important correlations identified were regarding smoking and alcohol intake as these factors have been explored together in the published literature. Timiskaming and Peel have very different correlations between smoking and alcohol as the two risk factors seem to be significantly correlated in Peel participants, but only slightly correlated in Timiskaming participants (Table J.2, Appendix J). Correlations were also present in both participant groups when assessing socio-demographic/general health information, housing characteristics, pesticide/organochlorine use, and metal toxin exposure sections (Tables J.3, J.4, and J.5, Appendix J). There were very few correlations with ionizing radiation as this section was represented by a single question and ultimately was not a relevant finding (Table J.8, Appendix J).

4.0 Discussion

Identifying the dominant non-nutritional modifiable environmental risk factors between two communities will help to understand the cancer disparities that accompany these communities. The participants of Timiskaming and Peel clearly portray differences that were observed with the community based approach. These differences were stronger regarding the risk factors of tobacco/smoking and alcohol intake and for parts of housing characteristics, metal toxins, and pesticides/organochlorines. The results can be further discussed to understand what specific differences exist and the possible explanations as to why these differences exist.

4.1 Influential Socio-demographic Characteristics

More females participated in this study as they were most interactive with the community centre and child care in the household. The largest age range for participation was from ages 25 to 45 which signifies the general age range of community centre users. This range was expected, as the community centre is catered towards parents with young children. The self-reported health status among both communities presented a significant difference as Timiskaming participants reported a generally lower health status than those in Peel. This was an unexpected finding that may relate self-perceived health to the actual health of these individuals.

Socioeconomic status (SES) is a component of health that involves education and income level among populations. SES has been correlated with cancer risk with varying outcomes as much of the available published literature focuses on the association to survival rates. Kim, Masyn, Kawachi, Laden, & Colditz (2010) identified that women with a college degree or greater education who lived in a higher SES neighbourhood had

a significantly inverse relationship with risk for colon cancer. They also found a significantly inverse relationship with females who resided in a higher SES neighbourhood and rectal cancer risk. Byers et al. (2008) found that residing in low SES areas were associated with advanced stage of breast and prostate cancer, however unrelated to colorectal cancer. Thus, they concluded that SES had no effect on mortality in colorectal cancer. These inconsistent findings surrounding survival rates do not clearly indicate risk for colorectal cancer incidence.

Albano et al. (2007) investigated educational attainment in black and white males and found education to be strongly and inversely related to the mortality of all cancers combined. They had little evidence regarding the incidence of colorectal cancer, however it was found that both white males and females had a 2.2 times higher mortality rate from colorectal cancer with 0-8 years of education in comparison to individuals with 17 or more years of education. This pattern was not similar in other ethnic groups such as in black males and females, as they had a higher mortality risk compared to white males and females. The magnitude of relative risks for colorectal cancer mortality when comparing the lowest three and highest three education levels in each race were found to be significantly different (Albano et al., 2007). Education status among the participant communities was significantly different which may ultimately be related to the risk of colorectal cancer. Peel participants had a higher level of education (56% had a bachelor's or professional degree) whereas 57% of Timiskaming participants had non-university/college certificate level education or below. Education may play an important role in colorectal cancer risk and should be addressed more thoroughly in future studies to alleviate inconsistency. A non-significant difference was present for income level

among both groups, even though this factor is often associated with education level to account for socioeconomic status. This may suggest that education and income level are not associated to one another in each of the participant communities.

Rapid changes in the incidence of colorectal cancer can result from ethnic variation or migration. As communities migrate to host nations, environmental influences may alter the colorectal cancer rates in these migrant communities towards that of the host nation (Kim et al., 2010). Ethnic disparities are present in incidence and mortality of colorectal cancer and it is important to account for these differences in relation to environmental risk factors. Western Europe, North America, and Australia have shown to have higher incidence of colorectal cancer rates in comparison to South Asia, Latin America, and Africa. As populations of the latter nations migrate to the former nations, the incidence among these migrated communities becomes similar to that of the nations they migrated to. For example, native Chinese colorectal cancer rates are significantly lower than that of Chinese-Americans (Virk, Gill, Yoshida, Radley, & Salh, 2010). Virk et al. (2010) assessed the racial differences in incidence of colorectal cancer in South Asians, Chinese, and Caucasians in British Columbia, Canada. They found the lowest incidence rates to be in South Asian Canadians (8.3 per 100 000/year), followed by Chinese Canadians (30.8 per 100 000/year), and followed by Caucasian Canadians (58.9 per 100 000/year). These findings were supported by previous studies examining these three particular ethnic groups. Hispanic/Latino and Black/African American groups were also presented in other studies but in reference to having lower survival rates, less screening accessibility, and less diagnostic evaluation when compared to Caucasian Americans (Laiyemo et al, 2009). Once again the accessible published literature

demonstrates inconsistent findings but ultimately recognizes that ethnic background and migration patterns may alter the risk for colorectal cancer.

The participants from Timiskaming were primarily of Caucasian background (96.2%) and of North American (Canadian) descent (92.4%). This corresponds with immigration/emigration patterns in the community (0.7%) (PHAC, 2011). This low percentage makes the Timiskaming district hold the lowest visible minority population in all of Ontario. These patterns may contribute to the fairly consistent cancer incidence rates in Timiskaming. The Peel participants, on the other hand, were primarily of Caucasian (34.4%), South Asian (26.2%), and East Asian (23.0%) background. The high ethnic diversity and large population size of Peel may contribute to the low risk of colorectal cancer rates, as the population is constantly changing. Peel has the highest visible minority population in all of Ontario accounting for 50% of its total population (PHAC, 2011). Peel's colorectal cancer rates may change as the population increases in diversity and as the environmental influences in Peel begin to potentially impact the migrated communities. When asked about birth place, Peel participants were distributed among different regions but the most commonly selected areas were North America (38.3%), Asia (26.7%), and Europe (16.7%). This distribution may ultimately balance the influence that ethnic background has on colorectal cancer risk as Asian populations tend to have lower colorectal cancer incidence rates and the latter two are known to have higher colorectal cancer incidence rates. Birth place and ethnic background tie in together and represent the main differences between the two communities. It would be noteworthy to account for the length of time participants have lived in Canada in order to understand the exposure time periods more thoroughly.

It is challenging to characterize the effect of colorectal cancer in native Aboriginal populations in Canada and the United States due to incomplete population assessment or coverage, misclassification, and under reporting. Weir, Jim, Marrett, & Fairley (2008) utilized an Indian Health Service database and two federal programs monitoring cancer burden to identify a significant increased risk of colorectal cancer in American Indians and Alaskan Natives females (aged 20-44 years). This is however, specific to the community residing in the United States and may not be comparable to Canada. Timiskaming has a low Aboriginal participant population (11.3%) which was still significantly different from Peel, as the latter community had no self-identifying Aboriginal participants. This difference may not be significant as it is a very small difference but it does relate to the general population statistics of both communities where only 5.6% of the entire Timiskaming population and 0.5% of the entire Peel population are of Aboriginal descent (Statistics Canada, 2011b; Statistics Canada, 2011c).

The non-modifiable risk factors described may provide some influence over the risk of colorectal cancer. As many of the published studies provide varying findings, it is difficult to pinpoint how much influence these factors really have as these factors cannot be altered. Therefore, it is important to explore the modifiable environmental risk factors that can be changed to ultimately reduce the risk for colorectal cancer.

4.2 Risk Associated with Patterns of Active Smoking and Second-hand Smoke

The risk factor of tobacco exposure presented the highest number of differences between the two communities. This section branched from the general questions of smoking into the specificities of smoking patterns, second hand exposure, and use of other tobacco products. A greater number of Timiskaming participants indicated having smoked a whole cigarette in their lifetime in comparison to Peel participants. The age at which the first whole cigarette was smoked was also clearly defined at a much younger age for Timiskaming participants than for Peel participants. Timiskaming participants started as early as 10 years of age, whereas Peel participants began slightly later, at 14 years of age. The current smoking pattern was an indication of how often smokers were smoking. The Timiskaming participants who identified themselves as smokers were mainly in the 'every day' category, whereas the Peel participant smokers were evenly distributed among 'every day' and 'some days'. This distribution may imply that Timiskaming smokers smoke quite often, while Peel smokers either smoked quite often or just occasionally. This difference can be critical as current smokers do have an increased risk of colorectal cancer incidence and mortality, when compared to lifetime non-smokers or past smokers. Moreover, current smokers are at a higher risk than former smokers, and continuous smoking also contributes to an elevated risk for colorectal cancer (Liang et al., 2008).

When asked at what age participants began smoking daily, Timiskaming participants presented a younger age onset starting at 10 years of age. This may be representative of the social or familial culture in Timiskaming as smoking may be more of a social aspect and may not be necessarily regarded as a detrimental impact on

lifestyle. In Peel however, smokers began at a much later age, initiating at age 30 years or onwards and this significant difference may account for particular characteristics of the Peel community. The Peel community is one of the most diverse communities in Ontario and a significant number of Peel residents may have arrived or settled in Peel much later than participants from Timiskaming. A majority of Peel participants were females from diverse ethnic backgrounds and smoking make not have been a recognized or accepted behaviour in these ethnic cultures contributing to the late onset. The concern regarding the age of initiation of smoking is with having considerable exposure to tobacco starting at an earlier age which may accelerate colorectal cancer diagnosis at a much earlier age than those who have smoked less or never smoked in their lifetime (Peppone et al., 2008). Age of initiation of smoking ties into daily cigarette consumption, duration, and pack years; all of which increase the risk for colorectal cancer (Liang et al., 2008). The age of when smokers stopped smoking daily resembled their age of onset indicating that the smokers may have continued as non-daily smokers or that the smokers did not ever stop smoking daily.

When asked about the current number of cigarettes smoked daily, Timiskaming smokers ranged from 3 to 25 cigarettes whereas Peel smokers only indicated 1 cigarette being smoked daily. This may suggest habitual smoking patterns in Timiskaming and more occasional or social smoking patterns in Peel. The smoking pattern in the past month demonstrated that over half of Timiskaming smokers smoked at least 1 cigarette a day during the past month, whereas a little over half of Peel smokers did not smoke at all in the past month. When asked about the actual number of cigarettes smoked in the past month, over half of the Timiskaming smokers indicated 5 to 10 cigarettes, and over half

of the Peel smokers indicated 1 to 2 cigarettes. Further examining the number of cigarettes, participants were asked about the highest number of cigarettes ever smoked in a day. Once again Timiskaming was quite different ranging from 3 to 40 cigarettes, whereas Peel ranged from 1 to 5 cigarettes. This significant variation may contribute to the daily smoking of Timiskaming members and the more social or occasional smoking of Peel members. The increased daily cigarette consumption and increased duration of smoking in Timiskaming may increase the risk for colorectal cancer among Timiskaming smokers.

Second hand smoke exposure did not vary significantly among the communities as the questions in the tool for this exposure were general in nature and may not have accurately accounted for exposure. There were no differentiating findings for exposure to second hand smoke in vehicles, household, or in public areas and this is consistent with published literature findings. Estimates for second hand exposure tend to focus primarily on attributable risk among those who were never smokers but were spouses or children of smokers. Second hand smoke exposure in workplace settings, public areas, and in the household (aside from exposure to a spouse smoker) are often overlooked due to assessment limitations (Holowaty et al., 2002). The use of questionnaire tools or historical data has shown to be the ideal methods of assessing second hand smoke exposure in populations as there is no consistent biomarker for this exposure. However, utilizing a questionnaire tool resumes the difficulty of quantifying second hand smoke exposure accurately in participants (Paskett et al., 2007; Taylor et al., 2007). Although second hand smoke assessment tools have clear limitations, there was one significant finding in our study regarding the smoking pattern of other household members.

Timiskaming participants indicated that other household smokers smoked every day or almost every day (75%), whereas a significantly smaller portion of Peel participants indicated this (26.7%). This may imply that Timiskaming participants are more exposed to second hand smoke in the household than Peel participants due to the smoking patterns of other household individuals. When asked about using other tobacco products such as cigars, pipes, or smokeless tobacco, there was no significant variation as these products were only used by a few participants in both communities.

Questions regarding smoking cessation presented no statistically significant findings as many participants did not qualify to answer this section due to no indication of attempting or committing to cessation in the present time. As only a few smokers provided information in the cessation component of the questionnaire, this may direct the importance of enhancing cessation programs to educate the communities on adequate resources available. Also, the standardized question of smoking 100 cigarettes in one's lifetime did not show any significant variation potentially meaning that smokers in both communities did actually smoke around the same number of cigarettes in their entire lifetime.

Smoking behaviour is an important component to determining the risk for colorectal cancer as it encompasses smoking status, age of initiation, and the actual duration of smoking (Paskett et al., 2007). The Timiskaming participant population indicated a higher number of individuals smoking and with an earlier age onset for smoking. It is unclear as to how long these smokers have been smoking as most of them have indicated continuing to smoke without much implication for cessation. The duration of smoking is difficult to identify as the ages of the participants were defined by

categories, grouping consecutive ages together. Future studies should further investigate the identified smoking components in Timiskaming so that necessary resources can be allocated to promote cessation of smoking and to reduce smoking behaviour in the community. Gender also plays an important role as the published literature evidence focuses on male smoking patterns, providing evidence that males who are heavy, long term smokers are at an increased risk for colorectal cancer. However, this may not be the case for female smokers as they tend to be less classified as heavy, long term smokers (Peppone et al., 2010). Although women may have different smoking patterns, the exposure and risk for colorectal cancer may be similar to that in men. Our study was quite unique as a majority of the participants were female and a significant difference between Timiskaming and Peel female smokers was identified. Replicating this study with better representation from the male population in both communities will facilitate the understanding of smoking patterns and the differences or similarities to that of the female smoker populations. Overall, there is a noticeable difference between the two communities with regards to tobacco smoke exposure. This difference can further help to understand if tobacco exposure is a primary factor in colorectal cancer risk or if it plays an accompanying role to the other non-nutritional modifiable environmental risk factors being studied.

4.3 Risk Associated with Alcohol Consumption

Alcohol consumption was found to be higher in Timiskaming participants than in Peel participants. Over half of the Timiskaming participants who indicated consuming alcohol also indicated having 100 or more drinks in his or her lifetime. In Peel however, only 25% of the participants who consume alcohol indicated having 100 or more drinks.

This large difference is a general impression of how different the alcohol drinking patterns are in the communities. More specifically, the difference in the number of drinks in the past 12 months corresponds to the monthly patterns of alcohol use. The majority of Peel participants were consuming alcohol only once a month, whereas Timiskaming participants had more frequent consumptions of alcohol within the month. Narrowing consumption down even further provided more insight on participant patterns. A portion of Timiskaming participants differed from Peel participants when identifying that they had consumed five or more drinks in one occasion more often in a month. This tied into having five or more drinks in a row or in two hours which again demonstrated that Timiskaming participants had more frequent alcohol consumption than Peel participants. Although these characteristics do not visibly differentiate between heavy drinkers and light drinkers, it is clear that Timiskaming participants did consume more alcohol than Peel participants. Colorectal cancer risk has been linked with heavy alcohol drinking and the prolonged consumption or increased alcohol intake is a dire risk (Mizoue et al., 2008). As chronic consumption may affect risk of colorectal cancer, assessing drinking habits over a longer period of time and more accurately may reflect exposure levels more precisely (Bongaerts et al., 2008).

Even as many of the studies have been performed in the East Asian population as colorectal risk in relation to alcohol use is perceived to be higher in this population than in the North American population, this was not a significant factor in the region of Peel. Only a small portion of Peel participants stated being of East Asian background so this could not be accounted for effectively. As both participant groups were primarily composed of females, there may be indication of alcohol consumption being a risk for

colorectal cancer only in females. Both genders tend to be similar in risk for colorectal cancer with increased alcohol consumption however, male drinkers are often closely associated to colorectal cancer as male drinkers are seen to usually have higher alcohol intake than female drinkers (Moskal, Norat, Ferrari, & Riboli, 2006). Ethnic background may have some influence over alcohol drinking habits however no correlations were found in this study when associating ethnic background to alcohol intake. The findings of our study demonstrate that alcohol consumption is a present risk factor and may be related to colorectal cancer risk as Timiskaming participants differed significantly when compared to the participants of Peel. There may also be synergistic effects involving alcohol intake and tobacco smoking, further increasing the risk for colorectal cancer in Timiskaming participants who are exposed to both modifiable risk factors.

4.4 Risk Associated with Housing Characteristic Differences

The age and length of time living in the most current home/residence will help to understand the patterns of residential exposure in both populations. Looking at the age of the current home/residence revealed that Timiskaming participants reside in much older homes than Peel participants. Most of the Timiskaming participants indicated their homes were built between 1978 and 1989 or prior to 1940, whereas most of the Peel participant homes were built 1978 and onwards. This variation can account for major exposures that can be classified as toxic metals or chemicals in the household. In Timiskaming there may be immense exposure to lead metals if the homes built before 1978 were painted at the time they were built. Up until the 1960s, large quantities of lead were added to industrial and household paint products in Canada to make the pain more efficient and usable. However, after the *Hazardous Products Act* was introduced in 1976, the amount

of lead in paint dropped significantly. The concern arises with the older buildings and homes that did use the high lead based paint and did not have the paint effectively removed, which can contribute to constant lead exposure in residential areas or communities (Health Canada, 2010). Furthermore, many of the homes in Timiskaming are built above or around the mining grounds which can also contribute to exposure to other metals used for mining, such as mercury or arsenic. Pathways to the home through water sources, pipes, soil, air, and food can also increase this exposure. In Peel, the housing units and water systems are more recent and constantly updated as the Peel population is growing exponentially requiring updated services and health assessments. There are countless available resources provided through the Region of Peel website that account for extensive water maintenance, appropriate waste water treatment, and housing efficiency (Region of Peel, 2011).

There was no significant difference in the length of time the participants lived at their current home/residence between the communities. The non-significant difference provides consistency of the finding that Timiskaming participants may have higher levels of exposure to toxins previously indicated than the participants from Peel. Water source is also an important implication of exposure as it depends much on what the water source is and if the water is treated for chemicals or toxins. Metal toxins like lead were used in drinking water service lines in Canada until around 1975 however this was significantly reduced after the 1990s. These toxins may be residing in water systems and pipes in regions that have not updated their water systems effectively (Health Canada, 2010). As Timiskaming participants significantly differed from Peel participants in terms of using a public/private company or private/public well, this may indicate potential exposures

through the water source. Timiskaming was a highly regarded mining community in the 1990s and the water sources are a potential pathway of exposure to the chemicals or metals used as a significant portion of individuals identified using a public/private well water source. The difference between the two water sources is that the public/private company water is mainly serviced by the municipal government and uses only surface water. The public/private wells are based on ground water and tend to be localized on private property or in very small communities as it would be very inefficient to use well water for large, growing communities. Well water may have a higher concentration of arsenic, iron, and manganese toxins than surface water as it is drawn from deep underground aquifers through a mechanical pump. Well water may vary in terms of depth, water quality, and water volume. The well water used in Timiskaming may be community or private property based meaning that a small number of individuals in a community may be using a shared well or a single household may have their own private well. No Peel participants identified using well water as the area of the participating community centre (Mississauga) was an urban setting using municipal water sources. The area of Caledon in Peel maintains a portion of private wells on private properties as this area is more of a rural setting (Region of Peel, 2011).

As Caledon is much further from the participant community centre area, there are likely no individuals from Caledon who participated in our study. Even though the community centre in Peel was in an urban region, it is important to recognize that most of the Timiskaming district is also defined as an urban region, holding more rural areas than the Peel region. According to Statistics Canada (2011a), an urban area has a minimum of 1,000 persons with a population density of at least 400 persons per square kilometre. This

means that ultimately both community centres were located in the urban regions of the districts, even though both have differing degrees of rural areas. It was also interesting to find that more Peel participants used water treatment devices than Timiskaming participants as this significant finding may further support that Peel's water sources are less contaminated than those in Timiskaming.

A significant difference was expected regarding the knowledge of present or abandoned mining industries in both regions. Timiskaming participants clearly differentiated from Peel as the Timiskaming participants identified living near mining industries that mined silver, gold, or both. There are no known mining industries in Peel as none were identified in the historical data accessed and this was further confirmed by the participants as no participants identified having knowledge of any present or abandoned mining industries in their region (Region of Peel Archives, 2012). However, it was interesting that only 52.1% of Timiskaming participants were aware of the nearby mining industries. Even though there was significant difference found between the communities, only a little over half of the Timiskaming participants were aware of the surrounding mining industries. This disproportion may be due to Timiskaming participants not necessarily acknowledging that they live near the mining industry or being completely unaware that the nearby mining industries exist or existed in the past. It is critical to inform the community on the present and past mining industries in their region so that they have the knowledge and understanding of associated exposures regarding mining deposits and contaminants.

4.5 Risk Associated with Increased Pesticide & Organochlorine Use

Use of pesticides, insecticides, and other chemicals vary depending on the area of the home, availability of resources, and provincial regulations. The province of Ontario is regarded as an average user of pesticides when compared to the other provinces. The percentage of households using pesticides in Ontario had dropped from 34% to 30% from 1994 to 2007 (Environment Canada, 2011b). A limitation to pesticide use came in 2009, when the *Cosmetic Pesticide Ban Act* took action in the province of Ontario. This ban denotes that pesticide use for cosmetic purposes on residential areas cannot be used as there are less toxic pesticide alternatives available. The ban furthered to the toxins used in pesticides accounting for the ban of 95 pesticide ingredients. There are exceptions to this ban surrounding public health and safety, public works, agriculture, and other settings (Ministry of Environment, 2012). The role of these regulations can impact the availability of pesticides or insecticides, further determining the community use of these chemicals. When comparing Timiskaming to Peel, a significant difference was observed showing that more Timiskaming participants used insecticides when compared to Peel participants. This may mean that Timiskaming participants required insecticides more frequently than Peel participants in relation to their residential area and location. The question of having a lawn at the current home/residence was an important element in determining if use of pesticides or insecticides was applicable to participants. There was a notable difference between the communities as 96% of Timiskaming participants indicated having a lawn and only 66.7% of Peel participants indicated this. The Timiskaming district contains many older homes and there are very few apartment or compact building residential areas. As there is also more open land in Timiskaming, this makes the use of pesticides or insecticides more necessary in this community. The Peel

community is a fast growing urban area that requires more efficient housing to hold its dense population. Peel has an assortment of housing options and many are high rise condos or compact living. The reduced use of pesticides and insecticides in Peel may correspond with the finding that there are less participants in Peel than in Timiskaming that have a lawn.

Another intriguing finding was the significant difference in the time frame of using professional lawn service for pesticides, insecticides, or weed killers. Of those who utilized professional lawn services, 63.6% of Timiskaming participants used the service more frequently between the years of 2000 to 2007 whereas 90.0% of Peel participants did so from the years 2008 to 2011. It is questionable whether this finding is an accurate representation of the participant use of the professional lawn service. However, there may be subtle implications as to why this dispersion exists. Timiskaming participants demonstrated a significant drop in pesticide use after 2007 possibly displaying the effect of the cosmetic pesticide ban in Ontario. Peel utilized pesticides more frequently between 2008 and 2011 and it is possible that the majority of them used the pesticides in 2008 prior to the ban in Ontario (Peel Public Health, 2009). It may also imply that Peel participants used pesticide or insecticide alternatives provided by the professional lawn services that were not banned by the province, such as organic pesticides or less toxic pesticides. Another possible reason could involve the concerns over the West Nile Virus in the region of Peel in 2008. In Peel, there were increased wet summer conditions in 2008 contributing to significant increases in mosquito batches that sparked concern in the communities. This was a reported finding and may have resulted in the use of specific insecticides or pesticides by professional services as directed by the city of Peel (Peel

Public Health, 2009). As the ban states there are exceptions in times of public health and safety concerns (specifically with insects that carry disease), this may have allowed for the use of pesticides or insecticides more frequently in 2008 in parts of Peel.

There are also low level exposures that can contribute to increased risk of colorectal cancer. Low level exposures are critical as they can occur over a long period of time and are often unrecognized by individuals. For example, flea collars used on household pets may contribute to exposure to pesticides and insecticides. The flea collars contain these chemicals to keep away unwanted fleas or other insects. Timiskaming participants demonstrated a significantly higher usage of these flea collars in comparison to Peel participants. If contact with flea collars is not cautiously regarded, then individual exposure to these chemicals can definitely pose an ongoing health risk. Furthermore, the use of chemicals to control for mould or mildew was used significantly more in Timiskaming than in Peel. This may correspond with the older housing areas of Timiskaming, increasing the occurrence of mould and mildew. There are a vast number of chemicals used to control for mould and mildew depending on the location and abundance of the growth. Another substance used more significantly by Timiskaming participants was paint thinner or pain stripper. These substances are used for painting to either thin paint, contribute to the efficiency of the paint job, or to remove paint. These tasks require the chemical compounds which are found in paint thinners and paint strippers. Again, paint thinners or paint strippers along with the use of flea collars and chemicals to control mould/mildew may all contribute to low level exposure to chemicals in the participant households. Timiskaming participants indicated using these products

more often than Peel participants, potentially increasing their exposure to toxins which may only increase their risk for colorectal cancer.

There was little acknowledgment from both communities of use of specific chemicals to control for mosquitoes and this may undermine the notion that Peel participants used more pesticides after the year of 2008 due to mosquito batch growth. Additionally, the use of any other chemicals aside from pesticides and insecticides by participants or other household members did not significantly vary among the communities. This may mean that participants from both communities preferred using professional services rather than using chemicals themselves. The use of household surface cleaners was consistent in both communities as products like Lysol were commonly used, more often on a weekly basis. This finding was expected as most households do carry a variety of surface cleaners and apply them often. Overall, this section was inclusive of many different chemical exposures and our study observed varying results. Distinct differences that may increase exposure to harmful pesticides and insecticides is recognized as there is higher use of insecticides and quite a few low level chemical exposures (such as chemicals from flea collars, controlling mould/mildew, and paint thinner/stripper) in the households of Timiskaming participants when compared to Peel participants.

4.6 Risk Associated with Community and Household Metal Exposure

Metal toxins can be present within the household or the community and are often associated with industrial work and household products. The significant difference between the communities based on gold and silver mining indicated that Timiskaming had these two types of mining industries present near or within the community, whereas

Peel indicated having neither. In the 1900s, silver mining was prevalent in the town of Cobalt in Timiskaming and with this came many potential contamination risks. As the Cobalt mining industry grew to become the centre of Ontario and eventually diminished, it left behind an environmental legacy. The silver extracted was commonly composed of nickel and arsenic compounds that would later dissemble into the mine tailings and waste rock (Dumaresq, 2009). As the silver mining industry closed down, the mine tailings containing arsenic continued to contaminate nearby lakes and streams. Ultimately, Cobalt became one of the largest sources of arsenic release in Canada. As the housing units in Cobalt were essentially built on these closed mines, there is concern over high levels of metal toxins being present within and near the households and in the water and soil resources. Mercury is another commonly used metal for gold extraction and may be an exposure to those living near the gold mining industry in Kirkland Lake, Timiskaming. As the gold mining industry is presently still open this may prolong exposure for community residents. Appropriate clean up techniques and mine tailing release need to be adequately reviewed in order to prevent extensive exposure to these toxins. There is no published information on any mining taking place in the past or present in the region of Peel.

Participants were asked if their house/residence was built prior to 1978, replicating the previous housing section question. This was precisely to account for possible lead exposure. As previously mentioned, lead paint was banned after 1978 in Canada and prior to this it was substantially used making up to 50% of paint products utilized (Health Canada, 2007). Over time, this exposure can build up to significant trace amounts in the air, household dust, food, and drinking water. The greatest concern is that

this low level exposure over a long period of time can have detrimental health effects on those living in the lead painted homes. When participants who lived in a house/residence build prior to 1978 were asked if the house was painted at the time it was built, there was no indication of such activity. There was also no indication of lead based water pipes being used for the current house/residence of the participants, however this was unclear as most participants were unsure of this exposure. Again, this form of lead exposure was explored due to the use of lead based water lines up until 1975 in Canada (Health Canada, 2010). There may be residing metal toxins in the water pipes that are not clearly identifiable by residents.

The significant difference between the communities regarding having metal dental amalgams was interesting as this was not an expected observation. Additionally, the time frame of having the metal dental amalgam was also significantly different among the communities as more participants in Timiskaming than in Peel continue to have the metal dental amalgams. Dental amalgams are composed of mercury, silver, tin, and other metallic substances. These amalgams are generally more lasting than the alternatives and have been used for many years. The issue that has surfaced is the potential mercury vapours being released from these amalgams throughout the time of having the amalgams (Ucar & Brantley, 2011). The significant difference regarding dental amalgams may suggest low level exposure to the mercury toxin over a long period of time as many of the individuals who continue to have the dental amalgam in Timiskaming did so since childhood or from a young age. Aside from the dental amalgams, there was no difference in exposure to fluorescent light bulbs as the use of these showed a similar pattern in both communities. Fluorescent light bulbs contain

mercury within them and may pose a hazard if they are broken or not recycled appropriately. There were also similarities in the use of nickel cadmium batteries and the recycling of these batteries as individuals from both regions were not familiar with the type of batteries used in his or her household and most did not recycle these products.

4.7 Distribution of Occupational Exposures

Occupational exposures were only assessed in terms of distribution as statistical analysis could not be performed on the open ended question and as the sample size of individuals in this section was too low. The distribution of occupations was relatively similar in both communities; however there were few notable differences. It was recognized that 31% of Timiskaming participants had held an occupation in social science, education, or the government sector at some time in their lifetime, and 38% currently work in this field. This high percentage may represent the population that had access to the study questionnaire. As the community centre's primary focus is on education and health and as the centre is government run, this may have created the bias of more participants participating who were in contact with the centre. The distribution in Peel for occupations in social science, education, or the government sector was identified by 18% who had worked in this field at some point in their lifetime and 23% who were currently working in this field. This is quite different from the Timiskaming population and may identify that more Timiskaming participants were connected to the community centre, whereas Peel participants branched from different occupations. The second most common type of occupation held by Timiskaming participants was in the sales and services field where 26% had worked in this field at some point in their lifetime and 28% were currently working in this field. In Peel, 21% worked in this field at some point in

their lifetime and 18% were currently working in this field. A similar relationship appeared for the business, finance, and administration field. Timiskaming presented 16% of participants who had worked in this field at some point in their lifetime, with only 8% currently working in this field, whereas Peel demonstrated 21% had worked in this field in their lifetime and 18% were currently working in this field. In Timiskaming, no participants worked or are currently working in the field of art, culture, recreation, or sports. Peel had no participants currently working in the processing, manufacturing, or utilities related field. The remaining occupational categories of health occupations, trades/transport/equipment operations, management, and natural/applied sciences presented similar distribution in both communities. When observing participants who did not indicate an occupation, the findings compared to each of the community unemployment rates. According to the 2006 census, the unemployment rate in Timiskaming was 8.18%, whereas in our study 2.0 - 4.0% of the participants did not declare an occupation. When observing Peel, the unemployment rate was found to be 6.4%, which corresponded with our finding of 6.0 to 8.0% of participants declaring no occupation (Statistics Canada, 2006).

Participants were also asked about 14 different occupational exposures, and only a small portion of participants identified ever being exposed to them. Occupational exposure to battery manufacturing was the only exposure not identified by participants from either community. Most of the exposures presented a distribution sample under 5 individuals and so the significance of the differences in all the exposures could not be tested. There were however slight differences in the community responses that should be discussed. There were slight differences in exposures to cooking/kitchen, exhaust fumes,

industrial food processing/heating/packing, burning of coal/wood/kerosene, and to radiation (x-ray machines, radiation labs). Further studies could explore these exposures more in depth to address which occupations correspond to specific exposures. It would also be important to examine the location of the occupations and the length of time participants worked at these occupations. Many of the occupational exposures overlap with the other environmental risk factors explored in this study and thus it becomes difficult to differentiate the single source of exposure. Determining whether the exposure is primarily from the occupations, from the other environmental risk factors, or from the combination of occupational and other environmental risk factors would aid to achieve better understanding. Looking at the major occupations held in the communities and exploring all exposures from these occupations may help to narrow down the exposure types. A central limitation with the occupational section is that it explored lifetime occupational exposures and the identified exposures by participants may not represent exposures solely from the communities of interest. The occupational exposures may be from different regions or even different nations as the location and length of time of the occupations was not investigated.

4.8 Patterns of X-ray Use

Ionizing radiation exposure was primarily measured by the number of x-rays participants had in his or her lifetime. The distribution was quite similar in both communities indicating that there is no significant difference between the communities with regards to having x-rays. There is no available published literature in the past 10 years that relates ionizing radiation to colorectal cancer risk. It is a difficult exposure to

quantify and assess as it can be specific to an occupation or may not be recognized as a potential risk factor as it is often associated with medical or technological needs.

4.9 Significant Section Correlations

As many correlations were observed among the section comparisons, it is difficult to narrow down which significant correlations are ultimately the most significant. Following the published literature, we can see that there may be some interaction between the risk factors of tobacco/smoking and alcohol intake, but there are still inconsistencies with this interaction. Tsong et al. (2007) found tobacco smoking and alcohol intake to be independent factors for only rectal cancer, and indicated that these two additive factors may increase the risk for colorectal cancer. In our study, it was observed that tobacco smoking and alcohol intake were very minimally correlated in Timiskaming participants, possibly indicating that these two risk factors are independent in the Timiskaming participant population. However, when examining the data from Peel participants, tobacco smoking and alcohol intake were highly correlated. Further sections also show differences in correlations between the two communities however these correlations are not clearly explained by the evidence in the available literature. These unsupported correlations may contribute to the environmental risk factors pertaining to cancer disparities and should be assessed in future studies.

4.10 Strengths of the Study

Our study presented different strengths, notably as it is the first cancer study performed in Timiskaming. This primary study assessed the possible relationship between non-nutritional modifiable environmental risk factors and colorectal cancer at a

community level. It provided insight on the potential non-nutritional modifiable environmental risk factors and the further diverging disparities between Timiskaming and Peel. As the findings are not generalizable, they provide a new realm of research for future studies to examine the region of Timiskaming and other regions that demonstrate high cancer incidence rates. Our study allowed for recognition of potential environmental risk factors in the community of Timiskaming and Peel, contributing to enhancing community and individual knowledge while providing understanding of these risks. This will help to achieve individual and community empowerment as the knowledge provided outlines the different options for community members and allows participants to make more informed decisions. Having a community partnership with both community centres effectively allowed for a successful community based approach to the level that could be achieved with the given time constraints. The community involvement in the objectives and method of data collection enhanced the progress of the project to encompass the interests of the communities. The data collection questionnaire method also provided for a non-invasive, simple, and effective way of assessing the risk factors. There was also further community integration as the primary investigator volunteered in the Timiskaming and Peel communities making frequent visits prior to data collection. This strengthened the partnerships, allowing for profound understanding of the goals, objectives, and dynamics of the communities.

4.11 Limitations of the Study

There are evident limitations present with our approach as it was a preliminary study involving several variables. Two community centres were utilized, namely as a convenient sample and this may have excluded members of the community who were not

in access of the community centres. The community centre in Timiskaming had two satellite centres which helped to be more inclusive, however only one centre in Peel was used so this may have prevented those living outside the region of the centre to participate. To help alleviate this limitation, three different methods were used to reach the community – a group administered approach, online availability, and a pick-up/take home option. Additionally, only a portion of the populations was assessed, so it is important to avoid ecological fallacy by not attributing all results to the entire community. The findings of our study allow for the exploration and discussion of potential environmental risk factors present in the communities. As a questionnaire tool was used as the primary method of data collection, this may have presented recall bias as participants may not have been able to remember exposures or they may have answered questions inaccurately. The questionnaire tool was only printed in English, creating a limitation for the French population in Timiskaming. The questionnaire also only encompassed quantitative type survey questions thus excluding qualitative type survey tools and questions. Another limitation was the exclusion of air pollution and ionizing radiation as there was no current published evidence in the literature regarding these two risk factors and so these factors could not be appropriately assessed in the participant communities.

A limitation in the recruitment process through the use of community centres is that a majority of the participants from the centres were females. This is because many of the users of the centre are females who are ultimately the primary care givers of their children which then excluded much of the male population. The centres also mainly work with families with children ages 0 to 6 years which would exclude the remaining

population. Even though access to the questionnaire was provided through online and pick up/take home options, portions of the population would have still been excluded if these options were not accessible to them. This resulted in a small sample size which does not indicate if the patterns found are true to the entire population or just the subset that participated.

5.0 Conclusions & Recommendations

As the global population continues to develop and modify lifestyle activities and behaviours, the relationship to cancer also continues to change and evolve. The activities and choices that influence individuals and communities may affect the incidence, mortality, and disparities of cancer. In order to understand cancer patterns, the disparities and potential risk factors behind these differences are important to assess. Looking at specific forms of cancer at a community level can help to recognize distinct patterns that can potentially stem into greater populations over time. In our study, using a community based ecological approach was useful to observe any relationships that emerge before indulging into further research approaches. The topic of cancer and its importance in Timiskaming has not been previously explored or published in the available literature so examining any of the prevalent cancers would be useful. Colorectal cancer is often discussed regarding incidence rates in Canada however the environmental risk factors that possibly contribute to colorectal are often undermined. The emergence of colorectal cancer in Canada reveals the importance of filling the gaps in the available published literature regarding colorectal cancer and potential environmental risk factors. Our approach helped to demonstrate if there are dominant non-nutritional modifiable

environmental risk factor differences between the community of Timiskaming and the reference community of Peel. Utilizing the elements of community based research which has not been used previously in Timiskaming allowed for successful community participation and integration, ease of data collection, and a future partnership with both communities.

Our study exhibited that it is possible to identify the dominant non-nutritional modifiable environmental risk factors when comparing two communities that have diverging cancer incidence rates. Revising the seven risk factors of smoking/tobacco, alcohol, metal toxins, occupational exposures, pesticides/organochlorines, ionizing radiation, and air pollution demonstrate that four of these factors were identified with the questionnaire tool. The four non-nutritional modifiable environmental risk factors that demonstrated significant differences between the two communities were smoking/tobacco, alcohol, metal toxins, and pesticides/organochlorines. Looking even further into these categories, specific questions presented significant differences whereas some aspects of the categories did not present significant differences. With the risk factor of smoking/tobacco exposure, there were significant differences between the communities regarding age of first whole cigarette smoked, current smoking pattern, age of when individuals first started smoking, age of when smokers last smoked cigarettes, current number of cigarettes smoked daily, the number of days in the past month having smoked 1 or more cigarettes, number of cigarettes smoked each day in the past month, highest number of cigarettes smoked daily, and for other household member smokers smoking every day or almost every day. With alcohol exposure, significant differences were found for the number of days during lifetime with at least one drink of alcohol,

number of drinks in the past 12 months, having five or more drinks of alcohol in one occasion in the past 12 months, and for having five or more drinks in a row or in two hours in the past month. Exposure regarding housing characteristics essentially combined elements of metal toxins, water contaminants, and mining industries. Significant differences were apparent for the year that the current home/residence was built, source of tap water, use of water treatment devices, and living near present or abandoned mining industries. The risk factor of pesticide use or organochlorines demonstrated significant differences regarding insecticide use at the home/residence, having a lawn at the current home/residence, the most recent time of use of professional lawn service using pesticides/insecticides/weed killers, living or having lived with a pet with a flea collar, use of chemical products to control mould or mildew, and the use of paint thinner or stripper at the home/residence. The risks with metal toxins presented significant differences when participants were asked about knowing if silver or gold mining was taking place near or within the community, if the home were built prior to 1978, having a dental amalgam, and the time frame of having this dental amalgam. There were no significant differences found between the communities regarding the non-nutritional modifiable environmental risk factors of occupational exposures and ionizing radiation. The risk factors of ionizing radiation and air pollution were not effectively applicable as they were not found in the available published literature when relating these factors to colorectal cancer.

Our study also generally assessed demographic characteristics which are classified as non-modifiable risk factors. These factors included age, gender, relationship, education, birth place, aboriginal background, ethnic background, language, and total

household income. Health status was also assessed to identify what the participants felt his or her health was like compared to those of their age. The distinguishable significant differences were for education, birth place, ethnic background, and health status. These demographic characteristics are important to assess to understand the patterns of the communities and to acknowledge any outstanding differences that may play a role in community health. Peel demonstrated a higher education and health status, while holding an immense diversity among birth places and ethnic backgrounds of participants in comparison to Timiskaming participants. As further studies evolve to examine colorectal cancer risk factors, it may be important to revisit these non-modifiable factors and assess the relationship these have to the modifiable risk factors.

There are many future recommendations that can improve the quality of the questionnaire tool and achieve substantial community based research. With regards to the questionnaire tool, it can be catered to address further specific elements related to each risk factor depending on which questions were successful or not in this study. The questionnaire can be divided up more thoroughly into segments encompassing more questions per risk factor. It is also important to provide the tool in languages that are relevant to the community of interest to increase participation. In the case of Timiskaming, it would be useful to provide a French version of the questionnaire in order be more inclusive within the community. The community based approach can also be further developed by continuing the relationships with the communities of interests and expanding to the Public Health Units and Local Health Integration Networks (LHINs) of the communities. Other data collection means can also be used to rigorously assess the environmental risk factors through community assessments, measurements, and sample

collection. This can be achieved, for example, by examining the water sources or pesticide levels within the community environments or by collecting blood and urine samples of participants. To contribute to more of a community based participatory approach, studies can incorporate focus groups or other types of community integration methods. Focus groups can help to understand individual exposure and additional information that cannot be assessed through questionnaire tools. Looking at more specific questions that correspond to the already used questions may help to provide more in depth results. For example, examining the length of time participants have resided in the communities of interest may account for important lengths of time regarding exposure. Examining a larger sample size is also essential to acquiring accurate evidence to account for the sample population. This would mean being more inclusive to other groups such as males and Aboriginals as this may help to uncover different exposure patterns or sources. As progress is made with the community of Timiskaming, it would be interesting to also examine cross border associations. There is extensive English-French integration between the region of Timiskaming and the region of l'Abitibi-Temiscamingue (Quebec, Canada) due the proximity of the borders being primarily divided by Lake Timiskaming. The region of l'Abitibi-Temiscamingue has a colorectal cancer incidence rate at 50.3 cases per 100, 000 for all ages combined. To reiterate, the region of Timiskaming in Ontario has a colorectal cancer incidence rate at 70.4 cases per 100, 000 for all ages combined (Public Health Agency of Canada, 2011). Due to the proximity of these two communities, it is important to understand why these communities present very different colorectal cancer incidence rates.

Initiating these approaches in the future regarding community health will provide much needed knowledge on local and regional colorectal cancer incidence, disparities and the non-nutritional modifiable environmental risk factors. Ultimately, this will help reduce colorectal cancer incidence and disparities, provide knowledge and health research, and reveal environmental risk factors that will eventually help implement prevention strategies.

6.0 References.

Adami, H. O., Hunter, D., & Trichopoulos, D (Ed.). (2008). Textbook of cancer epidemiology (2nd ed.). New York: Oxford University Press Inc.

Albano, J. D., Ward, E., Jemal, A., Anderson, R., Cokkinides, V. E., Murray, T.,...Thun, M. J. (2007). Cancer mortality in the united states by education level and race. *Journal of the National Cancer Institute, 99*, 1384-1394. doi:10.1093/jnci/djm127

Alexander, D. D., Cushing, C. A., Lowe, K. A., Sceurman, B., Roberts, M. A. (2009). Meta-analysis of animal fat or animal protein intake and colorectal cancer. *The American Journal of Clinical Nutrition, 89*, 1402-1409. doi:10.3945/ajcn.2008.26838

Aliyu, O. A., Cullen, M. R., Barnett, M. J., Balmes, J. R., Cartmel, B., Redlich, C. A.,...Omenn, G. S. (2005). Evidence for excess colorectal cancer incidence among asbestos-exposed men in the beta-carotene and retinol efficacy trial. *American Journal of Epidemiology, 162*(9), 868-878. doi:10.1093/aje/kwi285

American Cancer Society. (2007). Alcohol and cancer. Retrieved December 1, 2011, from http://www.cancer.org/acs/groups/content/@healthpromotions/documents/document/acsq-017622.pdf

Bongaerts, B. W. C., van den Brandt, P. A., Goldbohm, R. A., de Goeij, A. F. P. M., & Weijenberg, M. P. (2008). Alcohol consumption, type of alcoholic beverage and risk of colorectal cancer at specific subsites. International Journal of Cancer, 123, 2411-2417. doi:10.1002/ijc.23774

Byers, T. E., Wolf, H. J., Bauer, K. R., Bolick-Aldrich, S., Chen, V. W., Finch, J. L.,...Yin, X. (2008). The impact of socioeconomic status on survival after cancer in the united states. *American Cancer Society, 113*(3), 582-591. doi:10.1002/cncr.23567

Canadian Cancer Society. (2010). Cancer statistics in ontario. Retrieved August 3, 2011, from http://www.cancer.ca/ontario/about%20cancer/cancer%20statistics/ontario%20cancer%20statistics.aspx

Canadian Cancer Society. (2011). Canadian cancer statistics 2011 featuring colorectal cancer. Retrieved November 30, 2011, from http://www.cancer.ca/~/media/CCS/Canada%20wide/Files%20List/English%20files%20heading/PDF%20-%20Policy%20-%20Canadian%20Cancer%20Statistics%20-%20English/Canadian%20Cancer%20Statistics%202011%20-%20English.ashx

Cancer Care Ontario. (2009). Central west LHIN. Retrieved December 20, 2011, from https://www.cancercare.on.ca/cms/One.aspx?portalId=40955&pageId=41295

Cancer Care Ontario. (2009). North east LHIN. Retrieved December 20, 2011, from https://www.cancercare.on.ca/cms/One.aspx?portalId=40955&pageId=41351

Centers for Disease Control and Prevention. (2010). Survey questionnaires, examination components and laboratory components 2009-2010. Retrieved December 17, 2010, from http://www.cdc.gov/nchs/nhanes/nhanes2009-2010/questexam09_10.htm

Centers for Disease Control and Prevention. (2011). Fast facts about colorectal cancer. Retrieved November 30, 2011, from http://www.cdc.gov/cancer/colorectal/basic_info/facts.htm

Centres for Disease Control and Prevention. (2004). National health interview survey: The joint Canada/united states survey of health. Retrieved December 16, 2010, from http://www.cdc.gov/nchs/nhis.htm

Chen, K., Qiu, J. L., Zhang, Y., & Zhao, Y. W. (2003). Meta analysis of risk factors for colorectal cancer. *World Journal of Gastroenterology, 9*, 1568-1600.

Cho, E., Smith-Warner, S. A., Spiegelman, D., Beeson, W. L., van den Brandt, P. A., Colditz, G. A.,...Hunter, D. J. (2004). Dairy foods, calcium, and colorectal cancer: A pooled analysis of 10 cohort studies. *Journal of the National Cancer Institute, 96*(13), 1015-1022. doi:10.1093/jnci/djh185

Domagala-Kulawik, J. (2008). Effects of cigarette smoke on the lung and systematic immunity. *Journal of Physiology and Pharmacology, 59*(Suppl 6), 19-34.

Dumaresq, C. (2009). Cobalt mining legacy. Retrieved July 10, 2010, from http://www.cobaltmininglegacy.ca/index.php

Englehart and District. (2011). Family health team – meet our team. Retrieved December 20, 2011, from http://www.edfht.on.ca/team.html

Environment Canada. (2011a). Environmental indicators. Retrieved January 26, 2011, from http://www.ec.gc.ca/indicateurs-indicators/default.asp?lang=en&n=7F04A6AB-1

Environment Canada. (2011b). Household use of chemical fertilizers and pesticides data. Retrieved March 15, 2012, from http://www.ec.gc.ca/indicateurs-indicators/default.asp?lang=en&n=A621B230-1

Goodman, W. M. (2009). Modern statistics: A canadian perspective . USA: Nelson Education Ltd.

Haggar, F. A., & Boushey, R. P. (2009). Colorectal cancer epidemiology: Incidence, mortality, survival, and risk factors. *Clinics in Colon and Rectal Surgery, 22*(4), 191-197. doi:10.1055/s-0029-1242458

Health Canada. (2007). Lead and health. Retrieved February 29, 2012, from http://www.hc-sc.gc.ca/ewh-semt/pubs/contaminants/lead-plomb-eng.php

Health Canada. (2010). Draft human health state of the science report on lead. Retrieved March 14, 2012, from http://www.hc-sc.gc.ca/ewh-semt/pubs/contaminants/dhhssrl-rpecscepsh/index-eng.php

Henry, K. A., Niu, X., & Boscoe, F. P. (2009). Geographic disparities in colorectal cancer survival. International *Journal of Health Geographics, 8*(48), 1-13. doi:10.1186/1476-072X-8-48

Hill, T. & Lewicki, P. (2007). STATISTICS: Methods and applications. Tulsa, OK: StatSoft.

Holowaty, E. J., Marrett, L. D., Parkes, R., & Fehringer, G. (1998). Colorectal cancer in ontario 1971-1996, preface/introduction. Ontario, Canada: Cancer Care Ontario.

Howsam, M., Grimalt, J. O., Guino, E., Navarro, M., Marti-Rague, J., Peinado, M. A.,...Moreno, V. (2004). Organochlorine exposure and colorectal cancer risk. *Environmental Health Perspectives, 112*(15), 1460-1466. doi:10.1289/ehp.7143

International Agency for Research on Cancer. (2012). Agents classified by the IARC monographs, volumes 1-104. France: World Health Organization.

Jemal, A., Bray, F., Center, M. M., Ferlay, J., Ward, E., & Forman, D. (2011). Global cancer statistics. A Cancer *Journal for Clinicians, 61*(2), 69-90. doi:10.3322/caac.20107

Kim, D., Masyn, K. E., Kawachi, I., Laden, F., & Colditz, G. A. (2010). Neighbourhood socioeconomic status and behavioural pathways to risks of colon and rectal cancer in women. *Cancer, 116*(17), 4187-4196. doi:10.1002/cncr.25195

Kim, D., Smith-Warner, S. A., Spiegelman, D., Yaun, S., Colditz, G. A., Freudenheim, J. L.,...Leitzmann, M. (2010). Pooled analyses of 13 prospective cohort studies on folate intake and colon cancer. *Cancer Causes Control, 21*(11), 1919-1930. doi:10.1007/s10552-010-9620-8

Kirkland and District Hospital. (2011). Medical staff directory. Retrieved November 4, 2011, from http://www.kdhospital.com/guide/Medical.aspx

Laiyemo, A. O., Doubeni, C., Pinsky, P. F., Paul Doria-Rose, V., Bresalier, R., Lamerato, L. E. (2010). Race and colorectal cancer disparities: Health care utilization vs different cancer susceptibilities. *The Journal of the National Cancer Institute, 102*(8), 538-546. doi:10.1093/jnci/djq068

Lee, W., Sandler, D. P., Blair, A., Samanic, C., Cross, A. J., & Alavanja, M. C. R. (2007). Pesticide use and colorectal cancer risk in the agricultural health study. *International Journal of Cancer, 121*(2), 339-346. doi:10.1002/ijc.22635

Liang, P. S., Chen, T., & Giovannucci, E. (2009). Cigarette smoking and colorectal cancer incidence and mortality: Systematic review and meta-analysis. *International Journal of Cancer, 124*, 2406-2415. doi:10.1002/ijc.24191

Malloy, E.J., Miller, K. L., & Eisen. E. A. (2007). Rectal cancer and exposure to metalworking fluids in the automobile manufacturing industry. *Occupational and Environmental Medicine, 64*, 244-249. doi:10.1136/oem.2006.027300

Margel, D., & Fleshner, N. E. (2011). Oral contraceptive use is associated with prostate cancer: An ecological study. *BMJ Open, 1*(2), e000311. doi:10.1136/bmjopen-2011-000311

Mayer, R. J. (2001). Gastrointestinal tract cancer. In Braunwald, E., Fauci, A. S., Kasper, D. L., Hauser, S. L., Longo, D. L., & Larry Jameson, J. (Ed.), Harrison's principles of internal medicine (15th ed., pp. 581-586). United States of America: McGraw-Hill.

Ministry of Environment. (2012). Ontario's cosmetic pesticides ban. Retrieved March 15, 2012, from http://news.ontario.ca/ene/en/2009/03/ontarios-cosmetic-pesticides-ban.html

Ministry of Ontario Children and Youth Services. (2010). Ontario early years centres. Retrieved January 5, 2010, from http://www.children.gov.on.ca/htdocs/English/topics/earlychildhood/oeyc/index.aspx

Mizoue, T., Inoue, M., Wakai, K., Nagata, C., Shimazu, T., Tsuji, I.,...Tsugane, S. (2008). Alcohol drinking and and colorectal cancer in japanese: A pooled analysis of results from five cohort studies. *American Journal of Epidemiology, 167*(1397), 1406. doi:10.1093/aje/kwn073

Moghaddam, A. A., Woodward, M., & Huxley, R. (2007). Obesity and risk of colorectal cancer: A meta-analysis of 31 studies with 70,000 events. *Cancer Epidemiology, Biomarkers, & Prevention, 16*(12), 2533-2547. doi:10.1158/1055-9965.EPI-07-0708

Moskal, A., Norat, T., Ferrari, P., & Riboli, E. (2006). Alcohol intake and colorectal cancer risk: A dose-response meta-analysis of published cohort studies. *International Journal of Cancer, 120*, 664-671. doi:10.1002/ijc.22299

Park, J. Y., Mitrou, P. N., Dahm, C. C., Luben, R. N., Wareham, N. J., Khaw, K., & Rodwell, S. A. (2009). Baseline alcohol consumption, type of alcoholic beverage and risk of colorectal cancer in the European prospective investigation into cancer and nutrition-norfolk study. *Cancer Epidemiology, 33*, 347-354. doi:10.1016/j.canep.2009.10.015

Park, Y., Hunter, D. J., Spiegelman, D., Bergkvist, L., Berrino, F., van den Brandt, P. A.,...Smith-Warner, S. A. (2005). Dietary fibre intake and risk of colorectal cancer. *JAMA, 294*(22), 2849-2857.

Paskett, E. D., Reeves, K. W., Rohan, T. E., Allison, M. A., Williams, C. D., Messina, C. R.,...Hunt, J. R. (2007). Association between cigarette smoking and colorectal cancer in the women's health initiative. *Journal of the National Cancer Institute, 99*, 1729-1735. doi:10.1093/jnci/djm176

Peel Public Health. (2009). 2008 west nile virus in the region of peel. No. 8). Ontario: Peel Public Health.

Peel Public Health. (2011). Health services. Retrieved September 10, 2011, from http://www.peelregion.ca/health/

Peppone, L. J., Hyland, A., Moysich, K. B., Reid, M. E., Piazza, K. M., Purnell, J. Q.,...Morrow, G. R. (2009). Examining the association between cigarette smoking and colorectal cancer using historical case control data. *Cancer Epidemiology, 33*(3-4), 182-188. doi:10.1016/j.canep.2009.07.004

Peppone, L. J., Mahoney, M. C., Michael Cummings, K., Michalek, A. M., Reid, M. E., Moysich, K. B.,...Hyland, A. (2008). Colorectal cancer occurs earlier in those exposed to tobacco smoke: Implications for screening. *Journal of Cancer Research and Clinical Oncology, 134*(7), 743-751. doi:10.1007/s00432-007-0332-8

Peppone, L. J., Reid, M. E., Moysich, K. B., Morrow, G. R., Jean-Pierre, P.,. (2010). The effect of secondhand smoke exposure on the association between active cigarette smoking and colorectal cancer. *Cancer Causes Control, 21*, 1247-1255. doi:10.007/s10552-010-9552-3

Public Health Agency of Canada. (2011). Chronic disease infobase. Retrieved January 15, 2011, from http://204.187.39.30/surveillance/Index.aspx

Region of Peel. (2011). Peel hospitals. Retrieved October 15, 2011, from http://www.peelregion.ca/contactus/phonenos.htm#hospitals

Region of Peel. (2011). Water report. Retrieved March 14, 2012, from http://www.peelregion.ca/planning/soe/waterreport.htm

Region of Peel Archives. (2012). Peel heritage complex. Retrieved March 14, 2012, from http://www.peelregion.ca/heritage/

Robb, K., Miles, A., & Wardle, J. (2004). Demographic and psychosocial factors associated with perceived risk for colorectal cancer. *Cancer Epidemiology, Biomarkers, & Prevention, 13*, 366.

Sanchez, O. (2011). ECWG 2011-2012. [PowerPoint slides].

Sanjoaquin, M. A., Allen, N., Couto, E., Roddam, A. W., & Key, T. J. (2004). Folate intake and colorectal cancer risk: A meta-analytical approach. *International Journal of Cancer, 113*, 825-828. doi:10.1002/ijc.20648

Sears, M. E., Kerr, K., & Bray, R. (2011). Arsenic, cadmium, lead, and mercury in sweat – a systematic review. Ontario: Retrieved from www.hindawi.com/journals/jeph/aip/184745.pdf

Silent Spring Institute. (1999). Cape cod breast cancer and environment study survey instruments. Retrieved December 16, 2010, from http://www.silentspring.org/cape-cod-breast-cancer-and-environment-study-survey-instruments

Statistics Canada. (2004). Joint Canada/United states survey of health (JCUSH). Retrieved December 16, 2010, from http://www.statcan.gc.ca/cgi-bin/imdb/p2SV.pl?Function=getSurvey&SDDS=5020&lang=en&db=imdb&adm=8&dis=2

Statistics Canada. (2006). 2006 community profiles. Retrieved January 7, 2010, from http://www12.statcan.ca/census-recensement/2006/dp-pd/prof/92-591/index.cfm

Statistics Canada. (2010). Canadian community health survey (CCHS). Retrieved December 16, 2010, from http://www.statcan.gc.ca/cgi-bin/imdb/p2SV.pl?Function=getSurvey&SDDS=3226&lang=en&db=imdb&adm=8&dis=2

Statistics Canada. (2011a). From urban areas to population centres. Retrieved March 14, 2012, from http://www.statcan.gc.ca/subjects-sujets/standard-norme/sgc-cgt/urban-urbain-eng.htm

Statistics Canada. (2011b). Health profile, october 2011: Peel regional health unit. Retrieved November 20, 2011, from http://www12.statcan.ca/health-sante/82-228/details/page.cfm?Lang=E&Tab=1&Geo1=HR&Code1=3553&Geo2=PR&Code2=35&Data=Rate&SearchText=Peel&SearchType=Contains&SearchPR=01&B1=All&Custom=

Statistics Canada. (2011c). Health profile, october 2011: Timiskaming health unit. Retrieved November 20, 2011, from http://www12.statcan.ca/health-sante/82-228/details/page.cfm?Lang=E&Tab=1&Geo1=HR&Code1=3563&Geo2=PR&Code2=35&Data=Rate&SearchText=Timiskaming&SearchType=Contains&SearchPR=01&B1=All&Custom=

Stevens, J. J., Graham, B., Walker, A. M., Tchounwou, P. B., & Rogers, C. (2010). The effects of arsenic trioxide on DNA synthesis and genotoxicity in human colon cancer cells. *International Journal of Environmental Research and Public Health, 2*, 2018-2032. doi:10.3390/ijerph7052018

Taylor, R., Najafi, F., & Dobson, A. (2007). Meta-analysis of studies of passive smoking and lung cancer: effects of study type and continent. *International Journal of Epidemiology, 36*(5), 1048-1059, doi: 10.1093/ije/dym158

Temiskaming Hospital. (2011). Physician recruitment. Retrieved December 2, 2011, from http://www.temiskaming-hospital.com/PhysicianRecruitment/FPVacancies.php

Town of Kirkland Lake. (2010). Kirkland lake: A historical perspective. No. 2010). Ontario: Department of Economic Development and Tourism.

Tsoi, K. K. F., Pau, C. Y. Y., Wu, W. K. K., Chan, F. K. L., Griffiths, S., & Sung, J. J. Y. (2009). Cigarette smoking and the risk of colorectal cancer: A meta-analysis of prospective cohort studies. *Clinical Gastroenterology and Hepatology, 7,* 682-688. doi:10.1016/j.cgh.2009.02.016

Tsong, W. H., Koh, W. P., Yuan, J. M., Wang, R., Sun, C. L, & Yu, M. C. (2007). Cigarettes and alcohol in relation to colorectal cancer: The singapore chinese health study. *British Journal of Cancer, 96*(5), 821-827. doi:10.1038/sj.bjc.6603623

Ucar, Y. & Brantley, W. A. (2011). Biocompatibility of dental amalgams. *International Journal of Dentistry*, 1-7. doi:10.1155/2011/981595

Virk, R., Gill, S., Yoshida, E., Radley, S., & Salh, B. (2010). Racial differences in the incidence of colorectal cancer. *The Canadian Journal of Gastroenterology, 24*(1), 47-51.

Wallerstein, N. B., & Duran, B. (2006). Using community-based participatory research to address health disparities. Health Promotion Practice, 7(3), 312-323. doi:10.1177/1524839906289376

Weir, H. K., Jim, M. A., Marrett, L. D., & Fairley, T. (2008). Cancer in american indian and alaska native young adults (ages 20-44 years): US, 1999-2004. *Cancer, 113*(5 Suppl), 1153-1167. doi:10.1002/cncr.23731

Wolin, K. Y., Yan, Y., & Colditz, G. A. (2011). Physical activity and risk of colon adenoma: A meta-analysis. British *Journal of Cancer, 104*, 882-885. doi:10.1038/sj.bjc.6606045

World Health Organization. (2011). Cancer. Retrieved November 30, 2011, from http://www.who.int/mediacentre/factsheets/fs297/en/

RESEARCH ETHICS BOARD
OFFICE OF RESEARCH SERVICES

Appendix A Ethics Approval

Date: May 17th, 2011

To: Jeavana Sritharan (PI), Otto Sanchez (Faculty Supervisor)

From: Amy Leach, REB Chair REB File #: 10-091

Project Title: Investigating the relationship between environmental risk factors and high incidence of cancer: a community based control study
DECISION: APPROVED
START DATE: May 17th, 2011 EXPIRY: May 17th, 2012

The University Of Ontario Institute Of Technology Research Ethics Board has reviewed and approved the above research proposal. The application in support of the above research project has been reviewed by the Research Ethics Board to ensure compliance with the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans (TCPS) and the UOIT Research Ethics Policy and Procedures.
Please note that the Research Ethics Board (REB) requires that you adhere to the protocol as last reviewed and approved by the REB.

Always quote your REB file number on all future correspondence.

Please familiarize yourself with the following forms as they may become of use to you.

- **Change Request Form:** any changes or modifications (i.e. adding a Co-PI or a change in methodology) must be approved by the REB through the completion of a change request form before implemented.
- **Adverse or unexpected Events Form:** events must be reported to the REB within 72 hours after the event occurred with an indication of how these events affect (in the view of the Primary Investigator) the safety of the participants and the continuation of the protocol. (I.e. unanticipated or un-mitigated physical, social or psychological harm to a participant).
- **Research Project Completion Form:** must be completed when the research study has completed.
- **Renewal Request Form:** any project that exceeds the original approval period must receive approval by the REB through the completion of a Renewal Request Form before the expiry date has passed.

All Forms can be found at http://research.uoit.ca/EN/main/231307/Research_Forms.html.

UNIVERSITY OF ONTARIO 2000 SIMCOE STREET NORTH PH (905) 721-8668, ext. 3693 INSTITUTE OF TECHNOLOGY OSHAWA, ON, CANADA L1H 7K4 FX (905) 721-3119

REB Chair		Ethics and Compliance Officer
Dr. Amy Leach, SSH	Amy Leach	Sascha Tuuha, (905) 721-8668 ext. 3693
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Appendix B Questionnaire for Participants

Investigating the Relationship between Environmental Risk Factors and High Incidence of Cancer: A Community Based Case Control Study

This questionnaire is only intended for persons 18 years of age or older. If you are attending a group administered session then you will be guided page by page. If you are completing this questionnaire individually, please feel free to ask any questions during the questions session or by contacting the administrator.

The following questions deal with various environmental risk factors that may affect your health. Please acknowledge that the questions presented in this questionnaire do not directly cause cancer, but are potential risk factors that contribute to the different cancer rates in Ontario. When responding to the questions, please ***circle only ONE response per question****.*

Section A. General & Health Status

Q1. Please select your gender.

1) Male
2) Female

Q2. Please state your age group.

1) 18 to 24 years
2) 25 to 45 years
3) 46 to 59 years
4) 60 to 75 years
5) 75 years or older

Q1. In comparison to others of your same age group, would you say your health is

1) Excellent
2) Very good
3) Good
4) Fair
5) Poor
6) Don’t Know

Section B. Tobacco Smoke and Cigarettes

Below, I will be asking you questions on your personal cigarette intake.

Part 1. Individual Exposure

Definition: Cigarette smoking refers to **processed tobacco**. It does not include cigars, marijuana, or any other 'cigarette like substance'.

Q1. Have you ever smoked a whole cigarette?

1) Yes
2) No (Go to Part 3)
3) Don't know (Go to Part 3)

Q2. At what age did you smoke your first whole cigarette?

_____ Age in Years

Don't Know

Q3. Have you smoked at least 100 cigarettes in your entire life?

1) Yes
2) No
3) Don't know

Q4. How often do you smoke cigarettes?

1) Every day
2) Some days (Go to Q7)
3) Not at all (Go to N5)
4) Don't know

N5. If you answered NO for Q3 then proceed to Part 3.
Otherwise, proceed to Q9.

Q5. How old were you when you FIRST started to smoke (cigarettes) daily?

_____ Age in Years

Don't Know

Q6. How old were you when you LAST smoked cigarettes daily?

_____ Age in years

Don't Know

Q7. How many cigarettes do you smoke each day now?

_____ Cigarettes

Don't know

Q8. In the past month, on how many days have you smoked 1 or more cigarettes?

_____ Days (If you answered 0 days then please go to Q10)

Don't know

Q9. On those days, about how many cigarettes did you smoke each day?

_____ Cigarettes

Don't know

Q10. Have you ever smoked cigarettes daily for more than 3 months?

1) Yes
2) No (Go to Q12)
3) Don't know (Go to Q12)

Q11. At what age did you begin to smoke (cigarettes) every day?

_____ Age in years

Don't know

Q12. When you smoked your most, how many cigarettes did you usually smoke each day?

_____ Cigarettes

Don't know

If you answered YES to Q10, and EVERY DAY to Q4, proceed to PART 2a. Otherwise proceed to Q13.

Q13. When did you stop smoking EVERY DAY?

1) Never smoked every day
2) Less than one year ago
3) 1 year to less than 2 years ago
4) 2 years to less than 3 years ago
5) 3 or more years ago
6) Don't know

Q14. When did you COMPLETELY stop smoking?

1) Less than one year ago
2) 1 year to less than 2 years ago
3) 2 years to less than 3 years ago
4) 3 or more years ago
5) Don't know

Proceed to Part 3.

Part 2a. Cessation of Smoking

Q1. Are you seriously considering quitting smoking within the next 6 months?

1) Yes
2) No (Go to Q3)
3) Don't know (Go to Q3)

Q2. Are you seriously considering quitting within the next 30 days?

1) Yes
2) No
3) Don't know

Q3. In the past 12 months, did you stop smoking for at least 24 hours because you were trying to quit?

1) Yes
2) No (Go to Part 3)
3) Don't know (Go to Part 3)

Q4. How many times? (In the past 12 months, did you stop smoking for at least 24 hours because you were trying to quit)

_____ Times

Don't know

Part 2b. Health Care and Cessation of Smoking

Q5. Do you have a regular medical practitioner?

1) Yes
2) No (Go to Part 3)
3) Don't know (Go to Part 3)

Q6. In the past 12 months, did you go to see your medical practitioner?

1) Yes
2) No
3) Don't know

Q7. Does your medical practitioner know that you were or are smoking cigarettes?

1) Yes
2) No
3) Don't know

Q8. In the past 12 months, did your medical practitioner advise you to quit smoking?

1) Yes
2) No
3) Don't know

Q9. In the past 12 months, did your medical practitioner give you any specific help or information to quit smoking?

1) Yes
2) No
3) Don't know

Q10. What type of help did the medical practitioner give? (Check off all that apply)

1) Referral to a one on one cessation program
2) Referral to a group cessation program
3) Recommended use of nicotine patch or nicotine gum
4) Provided self-help information (ex. pamphlet, referral to website)
5) Own doctor offered counselling
6) Other
7) Don't know

Part 3. Second Hand Smoke Exposure

Definition: Second hand smoke is also known as passive smoke, which is when tobacco smoke that is exhaled by a smoker or given off by a burning cigarette is inhaled by persons nearby.

Q1. Are you currently living with others in your household?

1) Yes
2) No (Go to Q4)
3) Don't know (Go to Q4)

Q2. Does anyone in your household smoke cigarettes, cigars, or pipes anywhere inside the home?

1) Yes
2) No (Go to Q4)
3) Don't know (Go to Q4)

Q3. Do they smoke every day or almost every day?

1) Yes
2) No
3) Don't know

Q4. In the past month, were you exposed to second hand smoke, every day or almost every day, in a car or other private vehicle?

1) Yes
2) No
3) Don't know

Q5. In the past month, were you exposed to second hand smoke, every day or almost every day, in public places (such as bars, restaurants, shopping malls, arenas, bingo halls, bowling alleys)?

1) Yes
2) No
3) Don't know

Q6. Is smoking allowed inside your home?

1) Yes
2) No (Go to Part 4)
3) Don't know (Go to Part 4)

Q7. Is smoking inside your home restricted in anyway?

1) Yes
2) No (Go to Part 4)
3) Don't know (Go to Part 4)

Q8. If you answered yes to the above question, how is smoking restricted inside your home? (Check off all that apply)

1) Allowed in certain rooms only
2) Restricted in the presence of young children
3) Allowed only if windows are open or with another type of ventilation
4) Other restrictions(s)
5) Don't know

Part 4. Other Tobacco Products

Q1. In the past month, have you ever smoked cigars?

1) Yes
2) No
3) Don't know

Q2. In the past month, have you smoked a pipe?

1) Yes
2) No
3) Don't know

Q3. In the past month, have you used smokeless tobacco (ex. chewing tobacco)?

1) Yes
2) No
3) Don't know

Section C. Alcohol Use

Definition: Alcohol use includes beer, wine, wine coolers, and liquor such as rum, gin, vodka, or whiskey. This does not include drinking a few sips of wine for religious purposes.

Q1. How old were you when you had your first drink of alcohol, other than a few sips?

1) I never had a drink of alcohol (Skip to Section D)
2) 8 years or younger
3) 9 or 10 years old
4) 11 or 12 years old
5) 13 or 14 years old
6) 15 or 16 years old
7) 17 years old or older
8) Don't know

Q2. During your life, on how many days have you had at least one drink of alcohol?

1) 1 or 2 days
2) 3 to 9 days
3) 10 to 19 days
4) 20 to 39 days
5) 40 to 99 days
6) 100 or more days
7) Don't know

Q3. During the past 12 months, have you had a drink of any alcoholic beverage?

1) Yes
2) No (Go to Section D)
3) Don't know

Q4. During the past 12 months, how often did you drink alcoholic beverages?

1) Less than once a month
2) Once a month
3) 2 to 3 times a month
4) Once a week
5) 2 to 3 times a week
6) 4 to 6 times a week
7) Every day
8) Don't know

Q5. How often in the past 12 months have you had 5 or more alcoholic drinks on one occasion?

1) Never
2) Less than once a month
3) Once a month
4) 2 to 3 times a month
5) Once a week
6) More than once a week
7) Don't know

Q6. During the past 30 days, on how many days did you have at least one drink of alcohol?

1) none
2) 1 or 2 days
3) 3 to 5 days
4) 6 to 9 days
5) 10 to 19 days
6) 20 to 29 days
7) All 30 days
8) Don't know

Q7. During the past 30 days, on how many days did you have 5 or more drinks of alcohol in a row, that is, within 2 hours?

1) none
2) 1 day
3) 2 days
4) 3 to 5 days
5) 6 to 9 days
6) 10 to 19 days
7) 20 or more days
8) Don't know

Q8. Thinking back over the past week from today, did you have a drink of any alcoholic beverage?

1) Yes
2) No (Go to Section D)
3) Don't know (Go to Section D)

Q9. Starting with yesterday, that is Day 1, and working your way back one week, how many drinks did you have yesterday?

_____ Number of drinks

Q10. How many drinks did you have on Day 2?

_____ Number of drinks

Q11. How many drinks did you have on Day 3?

_____ Number of drinks

Q12. How many drinks did you have on Day 4?

_____ Number of drinks

Q13. How many drinks did you have on Day 5?

_____ Number of drinks

Q14. How many drinks did you have on Day 6?

_____ Number of drinks

Q15. How many drinks did you have on Day 7?

_____ Number of drinks

Section D. Housing Characteristics

I would like to ask you a few questions about your current home/residence.

Q1. When was your current home/residence originally built?

1) 1990 to present
2) 1978 to 1989
3) 1960 to 1977
4) 1950 to 1959
5) 1940 to 1949
6) Before 1940
7) Don't know

(Year Built – refers to when the original construction completion date when unit was ready for occupancy)

Q2. How long have you/has your family lived at the current address?

1) Less than one month
2) 6 months
3) 1 to 5 years
4) 5 to 10 years
5) More than 10 years
6) Don't know

Q3. What is the source of tap water in this home? Is it a private or public water company, a private or public well, or something else?

1) Private/public water company
2) Private/public well
3) Other, please state _____
4) Don't know

Q4. Are there any water treatment devices being used in your home?

1) Yes
2) No
3) Don't know

(Water Treatment Devices – refers to any device intended to improve the safety and quality of water in the home. There are eight many types of treatments: carbon filters, fibre filters, reverse osmosis units, neutralizers, chemical feed pumps, disinfection and softeners. Brita and other pitcher water filters should also be counted as water treatment devices).

Q5. Are you aware of any present or abandoned mining industries near your home/residence?

1) Yes
2) No (Go to Section E)
3) Don't know (Go to Section E)

Q6. If yes, then please indicate what types of mining industries they were (in other words, what did they mine?)

I1	
I2	
I3	

Section E. Volatile Chemicals/Fumes/Pesticide Use

Q1. In the last three days, did you breathe in fumes from any of the following?

Degreasing cleaners

1) Yes
2) No
3) Don't know

Diesel fuel or kerosene

1) Yes
2) No
3) Don't know

Paint thinner, brush cleaner, or furniture stripper

1) Yes
2) No
3) Don't know

Dry-cleaning fluid or spot remover

1) Yes
2) No
3) Don't know

N2. Now I will be asking you about products that may have been used in or around your home.

First, I am interested in products that may have been used to control insects and bugs, such as ants, carpenter ants, cockroaches, termites, bees, wasps, fleas, and ticks. We are interested in sprays, fumigants, bombs, pellets, and powders that may be household products or used for treatment by professionals. However, do not include the little traps such as ant traps or roach motels.

Q2. Was your current residence/home treated by you or anyone else to control insects and bugs, such as ants, carpenter ants, cockroaches, termites, bees, wasps, fleas, or ticks?

1) Yes
2) No (Go to N8)
3) Don't know (Go to N8)

Q3. In what year was the first time your residence/home was treated by you or someone else for insects or bugs?

_____ Year or _____ Years ago

Q4. In what year was the most recent time your place was treated by you or someone else for this?

_____ Year or _____Years ago

Q5. At your current residence/home, about how many times was your home treated to control any kind of insects or bugs

1) Never
2) Once or twice
3) 3 to 10 times
4) More than 10 times
5) Don't know

Q6. At your current residence/home, about how many times did you have to leave your home for a few hours because it was being fumigated?

1) Never
2) Once or twice
3) 3 to 10 times
4) More than 10 times
5) Don't know

Q7. Thinking specifically about termites and carpenter ants, at your current residence/home, did you ever live in a place that was treated by you or anyone else to control termites or carpenter ants?

1) Yes
2) No
3) Don't know

N8. Now, I am interested in products that may have been used to control mosquitoes in or around your home (this includes treatment or spraying by professionals). I am interested in sprays, fumigants, bombs, pellets, pest strips, paints, and powders. Do not include electric bug-zappers or products applied to a person's skin.

Q8. Was your current residence/home ever treated by you or someone else to control mosquitoes?

1) Yes
2) No (Go to N12)
3) Don't know (Go to N12)

Q9. At your current residence/home, about how many times was your home treated to control mosquitoes?

1) Once or twice
2) 3 to 10 times
3) More than 10 times
4) Don't know

Q10. In what year for the first time, was your current residence/home treated by you or someone else for mosquitoes?

_____ Year or _____Years ago

Q11. In what year was the most recent time your place was treated by you or someone else for mosquitoes?

_____Year or _____Years ago

N12. Now I am going to ask you about chemical products, such as pesticides, insecticides, or weed killers, that are used on flowers, plants, trees, and lawns to treat insects, diseases, or weeds.

Q12. To begin, do you have a lawn at your current residence/home?

1) Yes
2) No (Go to Q21)
3) Don't know (Go to Q21)

Q13. At your current residence/home, did you or anyone else ever apply these kinds of chemicals to your lawn? This does not include fertilizers, Miracle-Gro, or mineral supplements such as lime.

1) Yes
2) No (Go to Q17)
3) Don't know (Go to Q17)

Q14. At your current residence/home, how many times total was your lawn treated with these chemicals?

1) Once or twice
2) 3 to 20 times
3) More than 20 times

Q15. In what year was the first time your lawn was treated with these chemicals?

_____ Year or _____ Years ago

Q16. In what year was the most recent time your lawn was treated?

_____ Year or _____ Years ago

Q17. At your current residence/home, did you ever have a professional lawn service treat your lawn with pesticides, insecticides, or weed killers? (This does not include fertilizers, Miracle Gro, or mineral supplements such as lime)

1) Yes
2) No (Go to Q21)
3) Don't know (Go to Q21)

Q18. At your current residence/home, about how many times total was your lawn treated with these chemicals by a professional lawn service?

1) Once or twice
2) 3 to 20 times
3) More than 20 times
4) Don't know

Q19. In what year was the first time your lawn was treated by a professional lawn service?

_____ Year or _____Years ago

Q20. In what year was the most recent time your lawn was treated by a professional lawn service?

_____ Year or _____ Years ago

N21. Now, I would like to ask about chemical products for plants, including outdoor plants such as trees, flowers, shrubs, and vegetables, and indoor plants.

Q21. At your current residence/home, did you or anyone else apply chemicals such as pesticides, insecticides, herbicides, or weed killers to any plants? This does NOT include fertilizers, Miracle-Gro, or mineral supplements such as lime.

1) Yes
2) No (Go to N25)
3) Don't know (Go to N25)

Q22. At your current residence/home, about how many times did you use these chemical products on your plants?

1) Once or twice
2) 3 to 20 times
3) More than 20 times
4) Don't know

Q23. In what year was the first time you used these chemical products on your plants?

_____ Year or _____ Years ago

Q24. In what year was the most recent time you used them?

_____ Year or _____ Years ago

N25. Now we will ask you a few questions concerning flea or tick control on pets.

Q25. At your current residence/home, did you ever live with a dog, cat, or other family pet who wore a flea collar?

1) Yes
2) No (Go to N31)
3) Don't know (Go to N31)

Q26. For how many years have you lived with a pet when it was wearing a flea collar?

_____ Number of Years

Q27. What about other kinds of flea and tick control products? Did you personally ever treat a pet for fleas or ticks by using a shampoo, dip, powder, or spray?

1) Yes
2) No
3) Don't know

Q28. About how many times in your life, did you treat a pet for fleas or ticks with a shampoo, dip, powder, or spray?

1) Once or twice
2) 3 to 10 times
3) More than 10 times
4) Don't know

Q29. In what year was the first time you did this?

_____ Year or _____ Years ago

Q30. In what year was the most recent time?

_____ Year or _____ Years ago

N31. Next I am interested in cleaning and housekeeping products used by you or someone else in your home.

Q31. At your current residence/home, did you regularly use chemical products to control mildew or mould (ex. Ajax, CLR)?

1) Yes
2) No (Go to Q38)
3) Don't know (Go to Q38)

Q32. In what year did you first regularly use products to control mildew or mould?

_____ Year or _____ Years ago

Q33. In what year was the most recent time you regularly used products to control mildew or mould?

_____ Year or _____ Years ago

Q34. For the years when you regularly used products to control mildew or mould, we are interested in what products were used.

Did you use chlorine bleach?

1) Yes
2) No (Go to Q36)
3) Don't know (Go to Q36)

Q35. About how often did you use chlorine bleach?

1) Daily
2) Weekly
3) Monthly
4) Less than once a month
5) Don't know

Q36. Did you regularly use other products to control mildew or mould?

1) Yes
2) No
3) Don't know

Q37. What were they?

_____

Q38. Did you ever use surface cleaners such as Lysol?

1) Yes
2) No (Go to Q40)
3) Don't know (Go to Q40)

Q39. About how often did you use surface cleaners such as Lysol?

1) Daily
2) Weekly
3) Monthly
4) Less than once a month
5) Don't know

Q40. At your current residence/home, did you ever use paint thinner or paint stripper?

1) Yes
2) No (Go to section F)
3) Don't know (Go to section F)

Q41. How many times would you say you ever used paint thinner or paint stripper?

1) 1 to 2 times
2) 3 to 6 times
3) 7 to 15 times
4) More than 15 times
5) Don't know

Section F. Metal Toxins

Metals can be found in numerous products and locations. I will now ask you about 4 specific metals: arsenic, cadmium, lead, and mercury.

Part 1. Arsenic

Q1. Are you aware of any gold mining taking place within or near your community?

1) Yes
2) No
3) Don't know

Q2. Are you aware of any silver mining taking place within or near your community?

1) Yes
2) No
3) Don't know

Q3. Copper Chromated Arsenic has been banned for residential use in 2004, but is still present in some areas. Are you aware of Copper Chromated Arsenic being used in your home renovations or any woodwork by your or someone else in your household?

1) Yes
2) No
3) Don't know

Part 2. Cadmium

Q1. Nickel Cadmium batteries are abbreviated NiCd or NiCad and are a type of rechargeable battery. Some examples of where these batteries are used are portable electronics and toys, emergency lighting, and cordless/wireless telephones.

Do you currently have nickel cadmium batteries within your household?

1) Yes
2) No
3) Don't know

Q2. With regards to any batteries used within your household, do you recycle them appropriately once they have expired or run out of charge? (Consider both disposable and rechargeable batteries)

1) Yes
2) No
3) Don't know

Part 3. Lead

N1. Lead compounds are opaque and have been used for their white or red colours within paint products.

Q1. Was your current home/residence built before 1978?

1) Yes
2) No (Go to Q3)
3) Don't know (Go to Q3)

Q2. If yes, was your house painted at this time?

1) Yes
2) No
3) Don't know

Q3. Have you or anyone else in your household used red rust proof paint on your vehicle or if you have a barn, has it been painted with lead paint previously?

1) Yes
2) No
3) Don't know

Q4. Are you aware of any lead containing drinking water pipes or lead containing brass fixtures within or around your home?

1) Yes
2) No
3) Don't know

Part 4. Mercury

N1. Mercury is present in a variety of household items; such as glass thermometers, thermostats, and fluorescent light bulbs.

Q1. Do you currently have mercury filled thermometers or thermostats within your household? The mercury filling is usually present in a glass at the centre of the thermometer or thermostat.

1) Yes
2) No
3) Don't know

Q2. Do you utilize fluorescent light bulbs in your household?

1) Yes
2) No
3) Don't know

Q3. Mercury is also used as one of the metals in the mixture used for dental fillings known as dental amalgams. Have you ever had a dental amalgam?

1) Yes
2) No (Go to Section G)
3) Don't know (Go to Section G)

Q4. Please indicate the time frame of how long you have had this dental amalgam, and if you currently have it then please indicate since when.

1) I HAD a dental amalgam(s) in _____
2) I HAVE a dental amalgam(s) since _____
3) Don't know

Section G. Occupational Exposures

Q1. If you are currently working or previously have worked then please tell me all the types of work you have done in the past that you can remember (please do not use abbreviations)**. If you have never worked, please continue to Section H.**

Occupation 1	
Occupation 2	
Occupation 3	
Occupation 4	
Occupation 5	
Occupation 6	
Occupation 7	
Occupation 8	
Occupation 9	
Occupation 10	

Q2. Did your work involve any of the following? (Check off all those that apply)

W1	☐	Cooking or kitchen
W2	☐	Industrial food processing involving heating or cooking food
W3	☐	Contact with exhaust fumes from cars and other vehicles (ex. Bus conductor, car park attendant)
W4	☐	Textiles (production, sewing, packing)
W5	☐	Contact with glass wool, slag wool, or other mineral fibres
W6	☐	Processing or packing of fine grit or powder from mineral sand
W7	☐	Metal smelting
W8	☐	Burning of coal/wood/kerosene or oil
W9	☐	Radiation (working with X-ray machines, radiation labs)
W10	☐	Waste Incineration
W11	☐	Recycling of electronics, cable, or scrap metal
W12	☐	Chemical and plastics production/processing
W13	☐	Firefighting and emergency response
W14	☐	Battery Manufacturing

Section H. Ionizing Radiation

Q1. How many diagnostic x-rays have you had in your lifetime?

1) None
2) 1 to 2
3) 3 to 5
4) 6 to 10
5) 11 to 20
6) 21 to 40
7) 41 or more
8) Don’t know

Section I. Socio-Demographic Characteristics

Q1. Are your currently

1) Married
2) Living common law
3) Living with a partner
4) Widowed
5) Separated
6) Divorced
7) Single, never married
8) Don't Know

Q2. What is the HIGHEST level of school you have completed or the highest degree you have received?

1) Less than high school
2) High school degree or equivalent (GED)
3) Trades certificate or diploma from a vocational school or apprenticeship training
4) Non-university/college certificate or diploma from a community college, CEGEP, school of nursing, etc
5) University or College certificate below bachelor's level, i.e. associate degree
6) Bachelor degree
7) Master degree (Example: MA, MS, MEng, MEd, MBA), a Professional School degree (Example: MD, DDS, DVM, JD) or Doctoral degree (Example: PhD, EdD)
8) Don't know

Q3. Please state in which country you were born in

1) I was born in _____
2) Don't Know

Q4. Are you an Aboriginal person, that is, North American Indian, Métis, or Inuit?

1) Yes
2) No
3) Don't know

Q5. Please select one or more of the following that best identifies your ethnic background

1) Caucasian (ex. origins from Europe, North America)
2) Hispanic or Latino (ex. origins from Cuba, Mexico, Southern/Central America)
3) Black or African American (ex. Origins from Africa or America)
4) South Asian (ex. Origins from India, Pakistan, Sri Lanka)
5) East Asian (ex. Origins from China, Japan, North or South Korea)
6) West Asian or Middle Eastern (ex. Origins from Saudia Arabia, Turkey, Afghanistan)

Q6. What language do you speak most often at home?

1) English
2) French
3) Other, please specify _____

Q7. What is the total household income from all sources?

1) Less than $25, 000
2) $25,000 to less than $50,000
3) $50,000 to less than $80,000
4) $80,000 to less than $100, 000
5) $100, 000 or more
6) Don't know

~Thank you for completing the questionnaire~

Please return the questionnaire to the administrator

Appendix C Permission Forms

February 1, 2011

Dear Program Director,

This letter is a request for Mississauga Centre Early Years Centre's assistance with a project I am conducting as part of my Master's degree in the Faculty of Health Sciences at the University of Ontario Institute of Technology, Ontario, under the supervision of Dr. Otto Sanchez. The title of my research project is "Investigating the Relationship between Environmental Risk Factors and Incidence of Cancer: A Community Based Case Control Study". I would like to provide you with more information regarding the details of the project.

The purpose of this study is to assess numerous environmental risk factors that may contribute to the incidence rates of breast, colorectal, and lung cancer in Ontario. Knowledge and information generated from this study may help other researchers, populations, and community members.

It is my hope to connect with families who are engaged in the Early Years Centre to invite them to participate in this research project. I believe that the participants of your program are the appropriate group to understand and utilize the study. During the course of this study, I will be conducting group administered questionnaires to the adult group in order to assess the risk factors present in the community. At the end of this study the publication of this thesis will share the knowledge from this study with other cancer researchers, populations, and community members.

To respect the privacy and rights of the Mississauga Centre Early Years Centre and its participants, I will organize recruitment days in order to inform potential participants of the study and to select appropriate dates and times for questionnaire distribution. Contact information for my advisor and I will be contained in the detailed information letter provided during the recruitment days. Those who are interested in participating will be asked to select one of the dates provided on the invitation form. Once the date(s) are finalized, the Centre will be provided with the date(s) and time(s) chosen to relay back to the participants. On the selected date(s), participants will be provided with an information session to outline the consent form, followed by questionnaire administration.

Participation of any parent is completely voluntary. Each parent will make his/her own independent decision as to whether or not they would like to be involved. All participants will be informed and reminded of his/her rights to participate or withdraw before questionnaire distribution or at any time during the study. There are no known or anticipated risks to participants in this study.

To support the findings of this study, questionnaires will be coded with random numbers to protect the identity of the participants. Names of participants will not appear in the

thesis or reports resulting from this study. Participants will not be identifiable, and only described by gender and as age group.

If the Mississauga Centre Early Years Centre wishes the identity of the organization to remain confidential, a pseudonym will be given to the organization. All paper field notes collected will be retained and locked in my office in a secure cabinet in the Faculty of Health Sciences at the University of Ontario Institute of Technology. Furthermore, only I and my advisor, Dr. Otto Sanchez, in the Faculty of Health Sciences at the University of Ontario Institute of Technology will have access to these materials.

I would like to assure you that this study is being reviewed by the research ethics board and supervisory committee at the University of Ontario Institute of Technology. The questionnaire tool will also be piloted with a small group of participants prior to dissemination in Mississauga. If you have any questions regarding this study or would like additional information to assist you, please contact me at 289-404-9121 or by email jeavana.sritharan@uoit.ca. You may also contact my supervisor, Dr. Otto Sanchez, by email otto.sanchez@uoit.ca.

I hope that the results of my study will be beneficial to the Mississauga Centre Early Years Centre, to the Peel community as a whole, and to the greater population across. I very much look forward to speaking with you and thank you in advance for your assistance with this project.

Yours sincerely,

Jeavana Sritharan, BHSc
Master`s of Health Science Candidate
Faculty of Health Sciences
University of Ontario Institute of Technology

Dr. Otto Sanchez, MD, PhD
Faculty Advisor
Faculty of Health Sciences
University of Ontario Institute of Technology

Mississauga Centre Early Years Centre Permission Form

We have read the information presented in the information letter about the study being conducted by Jeavana Sritharan of the Faculty of Health Sciences at the University of Ontario Institute of Technology, Ontario, under the supervision of Dr. Otto Sanchez at the University of Ontario Institute of Technology. We have had the opportunity to ask any questions related to this study, to receive satisfactory answers to our questions, and any additional details we wanted.

We are aware that the name of our organization will only be used in the thesis or any publications that comes from the research with our permission. We were informed that study participants may withdraw from participation at any time without penalty by advising the researcher.

We have been informed that this project is being reviewed by the research ethics board and supervisory committee at the University of Ontario Institute of Technology and that questions may be directed to Jeavana Sritharan at 289-404-9121 or by email jeavana.sritharan@uoit.ca and Dr. Otto Sanchez by email otto.sanchez@uoit.ca.

We agree to help the researchers recruit participants for this study from among the families who are users of the program and services of the Mississauga Centre Early Years Centre.

□ YES □ NO

We agree to the use of the name of the Mississauga Centre Early Years Centre in any thesis or publication that comes of this research.

□ YES □ NO

If NO, a pseudonym will be used to protect the identity of the organization.

Program Director Name: _____ (Please print)

Program Director Signature: _____

Date: _____

Witness Name: _____ (Please print)

Witness Signature: _____

Date: _____

[This form has been signed by the Mississauga Centre Early Years Centre]

January 27, 2011

Dear Program Director,

This letter is a request for Timiskaming Early Years Center's assistance with a project I am conducting as part of my Master's degree in the Faculty of Health Sciences at the University of Ontario Institute of Technology, Ontario, under the supervision of Dr. Otto Sanchez. The title of my research project is "Investigating the Relationship between Environmental Risk Factors and Incidence of Cancer: A Community Based Case Control Study". I would like to provide you with more information regarding the details of the project.

The purpose of this study is to assess numerous environmental risk factors that may contribute to the incidence rates of breast, colorectal, and lung cancer in Ontario. Knowledge and information generated from this study may help other researchers, populations, and community members.

It is my hope to connect with families who are engaged in the Early Years Center to invite them to participate in this research project. I believe that the participants of your program are the appropriate group to understand and utilize the study. During the course of this study, I will be conducting a group administered questionnaire with the adult group in order to assess the risk factors present in the community. At the end of this study the publication of this thesis will share the knowledge from this study with other cancer researchers, populations, and community members.

To respect the privacy and rights of the Timiskaming Early Years Center and its participants, I will organize recruitment days in order to inform potential participants of the study and to select appropriate dates and times for questionnaire distribution. Contact information for my advisor and I will be contained in the detailed information letter provided during the recruitment days. Those who are interested in participating will be asked to select one of the dates provided on the invitation form. Once the date(s) are finalized, the Centre will be provided with the date(s) and time(s) chosen to relay back to the participants. On the selected date(s), participants will be provided with an information session to outline the consent form, followed by questionnaire administration.

Participation of any parent is completely voluntary. Each parent will make his/her own independent decision as to whether or not they would like to be involved. All participants will be informed and reminded of his/her rights to participate or withdraw before questionnaire distribution or at any time during the study. There are no known or anticipated risks to participants in this study.

To support the findings of this study, questionnaires will be coded with random numbers to protect the identity of the participants. Names of participants will not appear in the

thesis or reports resulting from this study. Participants will not be identifiable, and only described by gender and as age group.

If the Timiskaming Early Years Center wishes the identity of the organization to remain confidential, a pseudonym will be given to the organization. All paper field notes collected will be retained and locked in my office in a secure cabinet in the Faculty of Health Sciences at the University of Ontario Institute of Technology. Furthermore, only I and my advisor, Dr. Otto Sanchez, in the Faculty of Health Sciences at the University of Ontario Institute of Technology will have access to these materials.

I would like to assure you that this study is being reviewed by the research ethics board and supervisory committee at the University of Ontario Institute of Technology. The questionnaire tool will also be piloted with a small group of participants prior to dissemination in Timiskaming. If you have any questions regarding this study or would like additional information to assist you, please contact me at 289-404-9121 or by email jeavana.sritharan@uoit.ca. You may also contact my supervisor, Dr. Otto Sanchez, by email otto.sanchez@uoit.ca.

I hope that the results of my study will be beneficial to the Timiskaming Early Years Center, to the Timiskaming community as a whole, and to the greater population across. I very much look forward to speaking with you and thank you in advance for your assistance with this project.

Yours sincerely,

Jeavana Sritharan, BHSc
Master's of Health Science Candidate
Faculty of Health Sciences
University of Ontario Institute of Technology

Dr. Otto Sanchez, MD, PhD
Faculty Advisor
Faculty of Health Sciences
University of Ontario Institute of Technology

Timiskaming Early Years Center Permission Form

We have read the information presented in the information letter about the study being conducted by Jeavana Sritharan of the Department of Health Sciences at the University of Ontario Institute of Technology, Ontario, under the supervision of Dr. Otto Sanchez at the University of Ontario Institute of Technology. We have had the opportunity to ask any questions related to this study, to receive satisfactory answers to our questions, and any additional details we wanted.

We are aware that the name of our organization will only be used in the thesis or any publications that comes from the research with our permission. We were informed that study participants may withdraw from participation at any time without penalty by advising the researcher.

We have been informed that this project is being reviewed by the research ethics board and supervisory committee at the University of Ontario Institute of Technology and that questions may be directed to Jeavana Sritharan at 289-404-9121 or by email jeavana.sritharan@uoit.ca and Dr. Otto Sanchez by email otto.sanchez@uoit.ca.

We agree to help the researchers recruit participants for this study from among the families who are users of the program and services of the Timiskaming Early Years Center.

□ YES □ NO

We agree to the use of the name of the Timiskaming Early Years Center in any thesis or publication that comes of this research.

□ YES □ NO

If NO, a pseudonym will be used to protect the identity of the organization.

Program Director Name: _____ (Please print)

Program Director Signature: _____

Date: _____

Witness Name: _____ (Please print)

Witness Signature: _____

Date: _____

[This form has been signed by the Timiskaming Early Years Centre]

Appendix D Invitation Letters

Investigating the Relationship between Environmental Risk Factors and Incidence of Cancer: A Community Based Case Control Study

Dear Participant,

My name is Jeavana Sritharan and I am a Master's graduate student in the department of Health Sciences at the University of Ontario Institute of Technology. I am conducting a research study as part of the requirements of my Master's degree in Health Sciences, and I would like to invite you to participate.

I am studying the environmental risk factors that may contribute to the incidence rates of breast, colorectal, and lung cancer in men and women of Ontario. If you decide to participate, you will be asked to complete a questionnaire about the potential environmental risk factors for breast, colorectal, and lung cancer. The questionnaire will take place on **Friday September 23rd OR on Friday October 7th between 1pm-4pm** at the Mississauga Centre Ontario Early Years Centre. You will not need to remain at the centre for this entire time frame, as your participation will only be required for up to an hour and a half. On the selected date of preference, a 15 minute information session will be provided, followed by the group administered questionnaire that will take an estimated hour. Upon the completion of the questionnaire, participants will be given a feedback letter and given the opportunity to remain at the Centre for refreshments.

The follow up session date and time will be chosen upon mutual agreement with participants and community program directors for Sept 2012. The information collected from the questionnaire will be only reviewed by members of the research team who will analyze them. The study results will be disseminated into the community of Mississauga through a feedback session which will provide insight and knowledge on the risk factors that may contribute to breast, colorectal, and lung cancer. This feedback session will take place at some time in Sept 2012. After the research study, all data collected will be locked up and destroyed after five years.

Participation is completely confidential and all study information will be kept in a secure location at the University of Ontario Institute of Technology. The results of the study may be published or presented at professional conferences but your identity will not be revealed. You do not need to answer any questions that you are not comfortable with, and you may withdraw from the study at any point in time without consequences.

We will be happy to answer any questions you have about the study. You may contact me, the primary investigator, at (289) 404-9121 and jeavana.sritharan@uoit.ca or the faculty advisor, Dr. Otto Sanchez, at otto.sanchez@uoit.ca. If you have any questions about your rights as a research participant, you may contact the Compliance Officer from the Research Ethics Board at the University of Ontario Institute of Technology at (905) 721-8668 ext. 6393 or at compliance@uoit.ca.

If you would like to participate, please select the order of preference for the following dates of **Friday September 23rd and/or Friday October 7th**. The most selected date(s) will then be chosen for the study and will be provided to the Mississauga Centre Ontario Early Years Centre. On the selected date(s) for the study, we will provide you with an information session regarding consent forms, confidentiality and participation.

With kind regards,

Jeavana Sritharan
2000 Simcoe Street North
Oshawa, Ontario, Canada
L1H 7K4

(289) 404-9121
jeavana.sritharan@uoit.ca

Investigating the Relationship between Environmental Risk Factors and Incidence of Cancer: A Community Based Case Control Study

Dear Participant,

My name is Jeavana Sritharan and I am a Master's graduate student in the department of Health Sciences at the University of Ontario Institute of Technology. I am conducting a research study as part of the requirements of my Master's degree in Health Sciences, and I would like to invite you to participate.

I am studying the environmental risk factors that may contribute to the incidence rates of breast, colorectal, and lung cancer in men and women of Ontario. If you decide to participate, you will be asked to complete a questionnaire about the potential environmental risk factors for breast, colorectal, and lung cancer. The questionnaire will take place on **Tuesday, September 27, 2011 - 10:00 am in Haileybury, Thursday, September 29, 2011 - 10:00 am in Englehart, and Friday, September 30, 2011 - 10:00 am in Kirkland Lake** at each corresponding Early Years Centre. On the selected date and location of preference, a 15 minute information session will be provided, followed by the group administered questionnaire that will take an estimated hour. Upon the completion of the questionnaire, participants will be given a feedback letter and given the opportunity to remain at the Centre for refreshments.

The follow up session date and time will be chosen upon mutual agreement with participants and community program directors for Sept 2012. The information collected from the questionnaire will be only reviewed by members of the research team who will analyze them. The study results will be disseminated into the community of Timiskaming through a feedback session which will provide insight and knowledge on the risk factors that may contribute to breast, colorectal, and lung cancer. This feedback session will take place at some time in Sept 2012. After the research study, all data collected will be locked up and destroyed after five years.

Participation is completely confidential and all study information will be kept in a secure location at the University of Ontario Institute of

Technology. The results of the study may be published or presented at professional conferences but your identity will not be revealed. You do not need to answer any questions that you are not comfortable with, and you may withdraw from the study at any point in time without consequences.

We will be happy to answer any questions you have about the study. You may contact me, the primary investigator, at (289) 404-9121 and jeavana.sritharan@uoit.ca or the faculty advisor, Dr. Otto Sanchez, at otto.sanchez@uoit.ca. If you have any questions about your rights as a research participant, you may contact the Compliance Officer from the Research Ethics Board at the University of Ontario Institute of Technology at (905) 721-8668 ext. 6393 or at compliance@uoit.ca.

If you would like to participate, please select **one** date and location to participate on. On the selected date, we will provide you with an information session regarding consent forms, confidentiality and participation.

With kind regards,

Jeavana Sritharan
2000 Simcoe Street North
Oshawa, Ontario, Canada
L1H 7K4

(289) 404-9121
jeavana.sritharan@uoit.ca

Appendix E Participant Consent Form

Title of Research Study: Investigating the Relationship between Environmental Risk Factors and Incidence of Cancer: A Community Based Case Control Study

You are invited to participate in a research study entitled (Investigating the Relationship between Environmental Risk Factors and Incidence of Cancer: A Community Based Case Control Study). This study (#REB 10-091) has been reviewed by the University of Ontario Research Ethics Board and has been approved as of May 17, 2011. Please read this form carefully, and feel free to ask any questions you might have. *If you have any questions about your rights as a participant in this study, please contact the Compliance Officer at (905) 721-8668 ext. 3693 or compliance@uoit.ca*.

Researcher(s):

Primary Investigator:
Jeavana Sritharan, BHSc, graduate student at University of Ontario Institute of Technology (UOIT)
2000 Simcoe Street North, Oshawa, Ontario, Canada, L1H 7K4
Email: jeavana.sritharan@uoit.ca
Telephone: (289) 404-9121

Faculty Advisor:
Otto Sanchez, MD, PhD, Associate Professor in the Faculty of Health Sciences at University of Ontario Institute of Technology (UOIT)
2000 Simcoe Street North, Oshawa, Ontario, Canada, L1H 7K4
Email: otto.sanchez@uoit.ca
Telephone: (905)721-8668 ext 2994

Purpose and Procedure:

In 2010 alone, it was estimated that 173,800 people in Canada were diagnosed with cancer and 65, 100 of these people were from Ontario. Communities within Ontario vary in terms of cancer rates and potential risk factors. Environmental risk factors surround all communities and can be present in lifestyle, behavioural, and activity choices. This research will examine the three most common types of cancers in Ontario - breast, colorectal, and lung cancer. The environmental risk factors that may be associated with these three types of cancers that appear in the literature are tobacco smoke, occupational exposures, alcohol, organochlorines (ex. Pesticides), metal toxins, ionizing radiation (ex. X rays), and air pollution.

Over the course of two months (September 2011 to October 2011), two groups of adults (over the age of 18) from two Ontario Early Years Centres (Timiskaming & Mississauga Centre) will be subject to a group administered questionnaire. Prior to questionnaire dissemination, participants will be asked to sign a consent form outlining confidentiality and participant information. The dates for questionnaire administration will be decided in collaboration with community centre program director(s) to attain

specific dates. The questionnaires will each have a numeric code to maintain participant anonymity. This will also prevent participants from filling out questionnaires more than once. In September 2012, after data collection and analysis, the findings will be disseminated back to the participant communities, presented in conferences, and submitted to journals.

Potential Benefits:
By participating in this research, you will help to identify the environmental risk factors present in your community that could be related to common cancers in Ontario. Participants will gain knowledge and understanding about cancer and the environmental risk factors as this project is completed. With the follow up session revealing the results of the study, participants and community members will be able to learn about health promotion through identification and prevention of environmental risks. This research can further benefit communities by initiating future research utilizing this study's results to increase health promotion and cancer prevention as limited environmental research is available on Ontario communities. This research will further acknowledge any differences or similarities between communities in Ontario.

Potential Risk or Discomforts:
By participating in this research, there are no known obvious risks involved. The topic of cancer is a sensitive issue and participants are advised to keep in mind that the study will concern risk factors for specific cancers. Participants are advised to acknowledge that even though there are no distinct connections to cancer within the data collection tools, some level of sensitivity may remain. Furthermore, if there are any significant time length alterations or new information regarding participation, all participants will be informed of these changes. A thorough information introductory session will be provided prior to participation in order to ensure that potential participants are given the opportunity to understand the full research study.

Confidentiality:
All information retained in this study will be kept confidential and participant identities will be maintained anonymous. Completed questionnaires will be addressed by numeric codes and will not reveal the identities of the participants. Only the primary investigator (Jeavana Sritharan) and faculty advisor (Dr. Otto Sanchez) will have access to the collected data as it will be kept locked up safely in an office which only the primary investigator and faculty advisor have access to. Reporting of the results will be done so in an accumulated form. Your anonymity and confidentiality are of utmost importance and will be protected at all times. No information about your identity will be shared or published without your permission, unless required by the law. The data will be kept until the research is fully completed, published, and presented; all documents, data collected, and the numeric key will be destroyed after five years.

Rights to Withdraw:
Your participation is completely voluntary, and you can answer only those questions that you are comfortable with. The information that is shared will be held in strict confidence and discussed only with the research team. If you decide to withdraw from this research

project at any time, you will not be affected in any way and any data that you have contributed will be removed from the study. In order to withdraw from the study, please contact the primary investigator, Jeavana Sritharan, who will be present on site at all times during the study, or at 289-404-9121 (jeavana.sritharan@uoit.ca). Please remember that the data will be kept for up to 5 years after the project is complete, and after that all material will be destroyed and withdrawal will not be possible after the 5 years.

Participant Concerns and Reporting:
This research project has been approved by the University of Ontario Institute of Technology Research Ethics Board on May 17, 2011. If you have any questions concerning the research study, or experience any discomfort related to the study please contact the primary investigator at (289) 404-9121 or via email jeavana.sritharan@uoit.ca. Any questions regarding your rights as a participant, complaints or adverse events may be addressed to the Compliance Officer at the University of Ontario Institute of Technology at compliance@uoit.ca or (905) 721-8668 ext. 3693.

Debriefing and Dissemination of Results:
The knowledge attained from the study will be shared with participants and the community members during the feedback session before it is made widely available to the public. The results will be used for publications, conference presentations, and other academic means. If participants are interested in any further acknowledgement of the research results, then they can contact the primary investigator.

- I have read the consent form and understand the study being described.
- I have had an opportunity to ask questions and my questions have been answered. I am free to ask questions about the study in the future.
- I freely consent to participate in the research study, understanding that I may discontinue participation at any time without penalty. A copy of this Consent Form has been given to me for my records.

_____ _____

(Name of Participant) (Date)

_____

_____

(Signature of Participant) (Signature of Researcher)

Appendix F Feedback Letter for Participants

September 2011

Dear Participants,

I would like to thank you for your participation in this study. It is important to understand that the questions presented in the questionnaire tool are not directly linked with cancer outcomes. The objectives of this study are to identify if the questionnaire tool was applicable to the communities of interest and if this tool can demonstrate any similarities or differences between modifiable environmental risk factors.

The data collected from the questionnaires will contribute to a better understanding of the potential environmental risk factors that may be present in Ontario communities and may be risk factors for cancer incidence.

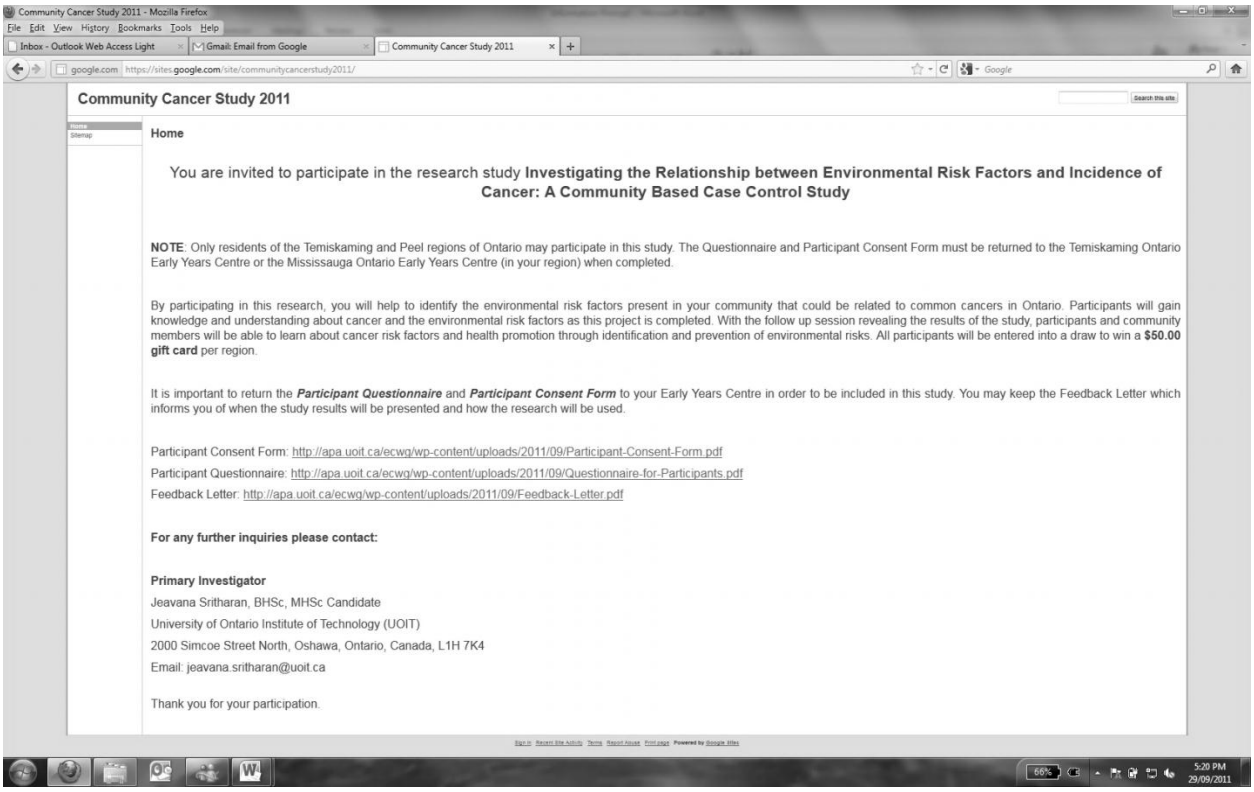
Please remember that any data pertaining to you as an individual participant will be kept confidential. Once all the data are collected and analyzed for this project, I plan on sharing this information with the research community of Timiskaming and Peel through a seminar in which I will present my findings. The results will also be published and presented at conferences, in journals, and within the academic circle. If you are interested in receiving more information regarding the results of this study, or if you have any questions or concerns, please contact me at either the phone number or email address listed at the bottom of the page. If you would like a summary of the results once the study is complete, please let me know by providing me with your email address. The study will be presented at the Timiskaming Ontario Early Years Centre and the Mississauga Centre Ontario Early Years Centre in September 2012.

As with all University of Ontario Institute of Technology involving human participants, this project was reviewed by, and received ethics clearance through, the Research Ethics Board at the University of Ontario Institute of Technology. Should you have any comments or concerns resulting from your participation in this study, please contact the Compliance Officer at (905) 721-8668 ext. 3693 or at compliance@uoit.ca.

Jeavana Sritharan
University of Ontario Institute of Technology
Faculty of Health Sciences

(289) 404-9121
jeavana.sritharan@uoit.ca

Appendix G Google Webpage



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Community Cancer Study 2011

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Home

You are invited to participate in the research study **Investigating the Relationship between Environmental Risk Factors and Incidence of Cancer: A Community Based Case Control Study**

NOTE: Only residents of the Temiskaming and Peel regions of Ontario may participate in this study. The Questionnaire and Participant Consent Form must be returned to the Temiskaming Ontario Early Years Centre or the Mississauga Ontario Early Years Centre (in your region) when completed.

By participating in this research, you will help to identify the environmental risk factors present in your community that could be related to common cancers in Ontario. Participants will gain knowledge and understanding about cancer and the environmental risk factors as this project is completed. With the follow up session revealing the results of the study, participants and community members will be able to learn about cancer risk factors and health promotion through identification and prevention of environmental risks. All participants will be entered into a draw to win a **$50.00 gift card** per region.

It is important to return the ***Participant Questionnaire*** and ***Participant Consent Form*** to your Early Years Centre in order to be included in this study. You may keep the Feedback Letter which informs you of when the study results will be presented and how the research will be used.

Participant Consent Form: http://apa.uoit.ca/ecwg/wp-content/uploads/2011/09/Participant-Consent-Form.pdf

Participant Questionnaire: http://apa.uoit.ca/ecwg/wp-content/uploads/2011/09/Questionnaire-for-Participants.pdf

Feedback Letter: http://apa.uoit.ca/ecwg/wp-content/uploads/2011/09/Feedback-Letter.pdf

For any further inquiries please contact:

Primary Investigator

Jeavana Sritharan, BHSc, MHSc Candidate

University of Ontario Institute of Technology (UOIT)

2000 Simcoe Street North, Oshawa, Ontario, Canada, L1H 7K4

Email: jeavana.sritharan@uoit.ca

Thank you for your participation.

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Appendix H Google Webpage Information Prompt

You are invited to participate in a research study entitled **Investigating the Relationship between Environmental Risk Factors and Incidence of Cancer: A Community Based Case Control Study**

NOTE: Only residents of the Timiskaming and Peel regions of Ontario may participate in this study. The Questionnaire and Participant Consent Form must be returned to the Timiskaming Ontario Early Years Centre or the Mississauga Ontario Early Years Centre (in your region) when completed.

By participating in this research, you will help to identify the environmental risk factors present in your community that could be related to common cancers in Ontario. Participants will gain knowledge and understanding about cancer and the environmental risk factors as this project is completed. With the follow up session revealing the results of the study, participants and community members will be able to learn about health promotion through identification and prevention of environmental risks. All participants will be entered into a draw to win a **$50.00 gift card** per region.

It is important to return the Questionnaire and Participant Consent Form to your Centre in order to be included in this study. You may keep the Feedback Letter which informs you of when the study results will be presented and how the research will be used.

For any further inquiries please contact:

Primary Investigator
Jeavana Sritharan, BHSc, MHSc Candidate
University of Ontario Institute of Technology (UOIT)
2000 Simcoe Street North, Oshawa, Ontario, Canada, L1H 7K4
Email: jeavana.sritharan@uoit.ca
Telephone: (289) 404-9121

Appendix I Questionnaire Log Sheet

Environmental Risk Factors: Community Research Study 2011

Please provide your name & phone number below, along with the questionnaire number which can be found at the top right hand side.

Name	Phone Number	Questionnaire Number

Environmental Risk Factors: Community Research Study 2011

Please use this form for surveys without a number at the top right hand corner (online questionnaires). Please indicate the participant's name and phone number.

Region: Mississauga		
Name	**Phone Number**	**Questionnaire Number**
		91
		92
		93
		94
		95
		96
		97
		98
		99
		100
		101
		102
		103
		104

Environmental Risk Factors: Community Research Study 2011

Please use this form for surveys without a number at the top right hand corner (online questionnaires). Please indicate the participant's name and phone number.

Region: Haileybury		
Name	**Phone Number**	**Questionnaire Number**
		46
		47
		48
		49
		50
		51
		52
		53
		54
		55
		56
		57
		58
		59
		60

Region: Kirkland Lake		
Name	**Phone Number**	**Questionnaire Number**
		61
		62
		63
		64
		65
		66
		67
		68
		69
		70
		71
		72
		73
		74
		75

Region: Englehart		
Name	**Phone Number**	**Questionnaire Number**
		76
		77
		78
		79
		80
		81
		82
		83
		84
		85
		86
		87
		88
		89
		90

Appendix J

Table J.1 Sections 1 & 9 Significant Correlations ($p<0.05$)

	Section 1 & 9	Section 2	Section 3	Section 4	Section 5	Section 6	Section 8
Timiskaming							
Gender	None	Q3.2	Q4, Q5, Q6, Q7, Q10, Q13, Q14	Q2	Q1A	None	None
Age	Ethnic background	Q7, Q8, Q3.1	Q9, Q11, Q13, Q14, Q15	None	Q23	None	None
Health status	Aboriginal, income	Q3.1	None	Q3	Q1A, Q1B	Q1.2	None
Aboriginal	Education, health	None	None	None	Q8, Q9, Q10, Q11	Q3.4, Q4.4	None
Education	Aboriginal, birthplace, income	Q5, Q6, Q7, Q8, Q9, Q12, Q3.4	Q14,Q15	None	Q1A, Q5, Q40	None	None
Birthplace	Education, ethnic background, language	None	None	None	Q1C	Q2.2	None
Ethnic background	Age, birthplace, language	None	None	None	Q17, Q21, Q38, Q39	None	None
Language	Birthplace, ethnic background	None	None	None	None	None	None
Income	Education, health, relationship	Q5, Q6, Q7, Q10, Q11, Q12	None	None	None	Q3.4	None
Relationship	Income	Q3.1	None	Q1	Q18	Q3.1, Q4.2	None
Peel							
Gender	None	None	None	None	None	None	None
Age	Education, ethnic background	Q3.2	None	Q2,Q3	Q1D, Q14, Q18, Q40	Q4.3	None
Health status	None	Q3.4	None	None	Q1A, Q25, Q26, Q27, Q28, Q29, Q30, Q31, Q32, Q33	Q4.3	None

Aboriginal (no participants)	None	None	None	None	None	None	None
Education	Age, income	Q7	Q2	Q2,Q4	Q13,Q16	Q3.2	None
Birthplace	Ethnic background, language	Q1	Q1	None	Q12, Q18, Q32, Q33, Q35	None	None
Ethnic background	Age, birthplace, language	None	None	Q1,Q2	Q13, Q18	None	None
Language	Birth place, ethnic background	Q10	Q2, Q4, Q5, Q6, Q7, Q8	Q4	Q23, Q25, Q26, Q27, Q28, Q29, Q30	None	None
Income	Education, relationship	Q3.1	Q2	Q2	Q1C, Q2, Q3, Q4, Q5, Q6, Q12, Q20	Q2.1	None
Relationship	Income	Q3.1	None	Q6	Q20, Q25, Q26, Q27, Q28, Q29, Q30	None	None

Table J.2 Section 2 Significant Correlations (p<0.05)

	Section 2	**Section 3**	**Section 4**	**Section 5**	**Section 6**	**Section 8**
Timiskaming						
Q1. Have you ever smoked a whole cigarette?	Q2, Q3, Q4, Q5, Q6, Q8, Q9, Q10, Q11, Q12, Q13, Q14, Q3.1	None	Q4	Q1D, Q31, Q32, Q33, Q35	None	None
Q2. At what age did you smoke your first whole cigarette?	Q1, Q3, Q4, Q13, Q14, Q3.4	None	None	Q25, Q27	Q4.3	None
Q3. Have you ever smoked at least 100 cigarettes in your entire life?	Q1, Q2, Q4, Q5, Q6, Q7, Q8, Q9, Q10, Q11, Q12, Q13, Q14, Q2.1, Q2.3, Q2.9, Q3.1	None	Q4	Q34, Q35	None	None
Q4. How often do you smoke cigarettes?	Q1, Q2, Q3, Q10, Q11, Q12, Q13, Q14, Q3.1	None	Q4	Q25, Q27, Q28, Q31, Q32, Q33, Q35	None	None

Q5. How old were you when you first started to smoke cigarettes daily?	Q1, Q3, Q6, Q7, Q8, Q9, Q10, Q11, Q12, Q2.1, Q2.2, Q2.3, Q2.4, Q2.5, Q2.6, Q2.7, Q2.8, Q2.9, Q2.10, Q3.2, Q3.3, Q3.4, Q3.6, Q3.7, Q4.1, Q4.2	None	None	Q1A, Q7, Q16, Q18, Q19	Q1.2, Q3.3	None
Q6. How old were you when you last smoked cigarettes daily?	Q1, Q3, Q5, Q7, Q8, Q9, Q10, Q11, Q12, Q2.1, Q2.2, Q2.3, Q2.4, Q2.5, Q2.6, Q2.7, Q2.8, Q2.9, Q2.10, Q3.2, Q3.3, Q3.4, Q3.6, Q3.7, Q4.1, Q4.2	None	Q3	Q1A, Q7, Q16, Q18, Q19	Q3.3	None
Q7. How many cigarettes do you smoke each day now?	Q3, Q5, Q6, Q8, Q9, Q10, Q11, Q12, Q2.1, Q2.2, Q2.3, Q2.4, Q2.5, Q2.6, Q2.7, Q2.8, Q2.9, Q2.10, Q3.2, Q3.3, Q3.4, Q3.6, Q3.7	None	None	Q7	Q3.3	None
Q8. In the past month, on how many days have you smoked 1 or more cigarettes?	Q1, Q3, Q5, Q6, Q7, Q9, Q10, Q11, Q12, Q2.1, Q2.2, Q2.3, Q2.4, Q2.5, Q2.6, Q2.7, Q2.8, Q2.9, Q2.10, Q3.2, Q3.3, Q3.4, Q3.6, Q3.7, Q3.8, Q4.1, Q4.1	None	Q3	Q1A, Q8	Q3.3	None
Q9. On those days, about how many cigarettes did you smoke each day?	Q1, Q3, Q5, Q6, Q7, Q8, Q10, Q11, Q12, Q2.1, Q2.2, Q2.3, Q2.4, Q2.5, Q2.6, Q2.7, Q2.8, Q2.9, Q2.10, Q3.2, Q3.3, Q3.4, Q3.6, Q3.7	Q7	None	Q7	Q3.3, Q4.3, Q4.4	None
Q10. Have you ever smoked cigarettes daily for more than 3 months?	Q1, Q3, Q4, Q5, Q6, Q7, Q8, Q9, Q11, Q12, Q13, Q14, Q2.1, Q2.2, Q2.3, Q2.5, Q2.6, Q2.7, Q2.8,	None	None	Q1D, Q34	Q3.3	None

	Q2.9, Q3.3, Q3.6, Q3.7					
Q11. At what age did you begin to smoke every day?	Q1, Q3, Q4, Q5, Q6, Q7, Q8, Q9, Q10, Q12, Q13, Q14, Q2.1, Q2.2, Q2.3, Q2.4, Q2.5, Q2.6, Q2.8, Q2.9, Q2.10, Q3.3, Q3.6, Q4.1, Q4.2	None	None	Q7	Q3.3	None
Q12. When you smoked your most, how many cigarettes did you usually smoke each day?	Q1, Q3, Q4, Q5, Q6, Q7, Q8, Q9, Q10, Q11, Q12, Q13, Q14, Q2.1, Q2.2, Q2.3, Q2.5, Q2.6, Q2.7, Q2.8, Q2.9, Q2.10, Q3.3, Q4.1	None	None	Q7, Q19	Q3.3, Q4.3, Q4.4	None
Q13. When did you stop smoking every day?	Q1, Q2, Q3, Q4, Q10, Q11, Q12, Q14	None	None	None	Q4.1	None
Q14. When did you completely stop smoking?	Q1, Q2, Q3, Q4, Q10, Q11, Q12, Q13	None	None	None	Q1.1, Q4.1	None
Q2.1. Are you seriously considering quitting within the next 6 months?	Q3, Q5, Q6, Q7, Q8, Q9, Q10, Q11, Q12, Q2.2, Q2.3, Q2.4, Q2.5, Q2.6, Q2.7, Q2.8, Q2.9, Q2.10, Q3.2, Q3.3, Q3.4, Q3.6, Q3.7, Q3.8	Q1	Q1, Q3	Q1A, Q7	Q3.1, Q3.3	None
Q2.2. Are you seriously considering quitting within the next 30 days?	Q5, Q6, Q7, Q8, Q9, Q10, Q11, Q12, Q2.1, Q2.3, Q2.4, Q2.5, Q2.6, Q2.7, Q2.8, Q2.9, Q2.10, Q3.2, Q3.3, Q3.4, Q3.6, Q3.7, Q3.8	None	Q3	Q7	Q3.3, Q4.3	None
Q2.3. In the past 12 months, did you stop smoking for at least 24 hours to quit?	Q3, Q5, Q6, Q7, Q8, Q9, Q10, Q11, Q12, Q2.1, Q2.2, Q2.4, Q2.5, Q2.6, Q2.7, Q2.8, Q2.9, Q2.10, Q3.2, Q3.3, Q3.4, Q3.6, Q3.7, Q3.8, Q4.2	Q7	Q3	Q1A, Q7	Q3.3	None
Q2.4. How many times?	Q5, Q6, Q7, Q8, Q9,	Q7, Q12	Q3	Q6, Q7	Q3.3	None

	Q11, Q2.1, Q2.2, Q2.3, Q2.5, Q2.6, Q2.7, Q2.8, Q2.9, Q2.10					
Q2.5. Do you have a regular medical practitioner?	Q5, Q6, Q7, Q8, Q9, Q10, Q11, Q12, Q2.1, Q2.2, Q2.3, Q2.4, Q2.6, Q2.7, Q2.8, Q2.9, Q2.10, Q3.3, Q3.4, Q3.6, Q3.7, Q3.8	None	Q3	Q7	Q3.3	None
Q2.6. In the past 12 months, did you go see your medical doctors?	Q5, Q6, Q7, Q8, Q9, Q10, Q11, Q12, Q2.1, Q2.2, Q2.3, Q2.4, Q2.5, Q2.7, Q2.8, Q2.9, Q2.10, Q3.2, Q3.3, Q3.4, Q3.6, Q3.7, Q3.8	None	Q3	Q1A, Q7	Q3.3	None
Q2.7. Does your GP know that you were or are smoking cigarettes?	Q5, Q6, Q7, Q8, Q9, Q10, Q12, Q2.1, Q2.2, Q2.3, Q2.4, Q2.5, Q2.6, Q2.8, Q2.9, Q2.10, Q3.2, Q3.3, Q3.4, Q3.6, Q3.7, Q3.8	None	Q3	Q1A, Q7	None	None
Q2.8. In the past 12 months, did your GP advise you to quit smoking?	Q5, Q6, Q7, Q8, Q9, Q10, Q11, Q12, Q2.1, Q2.2, Q2.3, Q2.4, Q2.5, Q2.6, Q2.7, Q2.9, Q2.10, Q3.2, Q3.3, Q3.4, Q3.6, Q3.7, Q3.8	None	Q3	Q1A, Q7	Q3.3	None
Q2.9. In the past 12 months, did your GP give you any specific help or info to quit smoking?	Q3, Q5, Q6, Q7, Q8, Q9, Q10, Q11, Q12, Q2.1, Q2.2, Q2.3, Q2.4, Q2.5, Q2.6, Q2.7, Q2.8, Q2.10, Q3.2, Q3.3, Q3.4, Q3.6, Q3.7, Q3.8	None	Q3	Q7	Q3.3	None
Q2.10. What type of help did the GP give?	Q5, Q6, Q7, Q8, Q9, Q11, Q12, Q2.1, Q2.2, Q2.3, Q2.4, Q2.5, Q2.6, Q2.7,	Q7	Q3	Q4, Q6, Q7	Q3.3	None

	Q2.8, Q2.9, Q3.3, Q3.6, Q3.7					
Q3.1. Are you currently living with others in your household?	Q1, Q3, Q4	None	None	None	Q4.2	None
Q3.2. Does anyone in your household smoke cigarettes, cigars, or pipes inside your home?	Q5, Q6, Q7, Q8, Q9, Q2.1, Q2.2, Q2.3, Q2.4, Q2.6, Q2.7, Q2.8, Q2.9, Q3.3, Q3.4, Q3.6, Q3.7, Q3.8, Q4.2	None	None	Q7	None	None
Q3.3. Do they smoke every day or almost every day?	Q5, Q6, Q7, Q8, Q9, Q10, Q11, Q12, Q2.1, Q2.2, Q2.3, Q2.5, Q2.6, Q2.7, Q2.8, Q2.9, Q2.10, Q3.2, Q3.4, Q3.6, Q3.7, Q3.8, Q4.2	None	None	Q7	Q4.4	None
Q3.4. In the past month, were you exposed to second hand smoke every day or almost every day in a car or vehicle?	Q2, Q5, Q6, Q7, Q8, Q9, Q2.1, Q2.2, Q2.3, Q2.5, Q2.6, Q2.7, Q2.8, Q2.9, Q3.2, Q3.3, Q3.6, Q3.7, Q3.8, Q4.2	None	Q3	Q1A, Q1B, Q7	Q3.4	None
Q3.5. In the past month, were you exposed to second hand smoke, every day or almost every day in public places?	Q7, Q8	None	None	Q1C, Q21, Q40	Q1.1	None
Q3.6. Is smoking allowed inside your home?	Q5, Q6, Q7, Q8, Q9, Q10, Q11, Q2.1, Q2.2, Q2.3, Q2.5, Q2.6, Q2.7, Q2.8, Q2.9, Q2.10, Q3.2, Q3.3, Q3.4, Q3.7, Q3.8, Q4.1, Q4.2	None	Q3	Q1A, Q1B, Q7, Q8, Q10, Q11	Q3.4	None
Q3.7. Is smoking inside your home restricted in anyway?	Q5, Q6, Q7, Q8, Q9, Q10, Q2.1, Q2.2, Q2.3, Q2.5, Q2.6, Q2.7, Q2.8, Q2.9, Q2.10, Q3.2, Q3.3, Q3.4, Q3.5, Q3.6, Q3.8	None	None	Q7	None	None

Q3.8. If you answered yes to the above question, how is smoking restricted in your home?	Q8, Q2.1, Q2.2, Q2.3, Q2.5, Q2.6, Q2.7, Q2.8, Q2.9, Q3.2, Q3.3, Q3.4, Q3.5, Q3.6, Q3.7	None	Q3	Q1A	None	None
Q4.1. In the past month, have you ever smoked cigars?	Q5, Q6, Q8, Q11, Q12, Q3.6, Q4.2	None	None	Q8, Q9, Q10, Q11	Q1.2, Q3.4	None
Q4.2. In the past month, have you smoked a pipe?	Q5, Q6, Q8, Q11, Q2.3, Q3.2, Q3.3, Q3.4, Q3.6, Q4.1	None	None	Q1A, Q1B, Q8, Q9, Q10, Q11	Q3.4	None
Q4.3. In the past month, have you used smokeless tobacco?	None	None	None	None	None	None
Peel						
Q1. Have you ever smoked a whole cigarette?	Q2, Q3, Q4, Q5, Q6, Q7, Q8, Q9, Q10, Q11, Q12, Q13, Q14, Q3.3	Q1, Q2, Q3, Q4, Q5, Q8, Q9, Q10, Q11, Q12, Q13, Q14, Q15	None	Q1D, Q24, Q31, Q32, Q33, Q37	Q2.1, Q4.1, Q4.3, Q3.1	None
Q2. At what age did you smoke your first whole cigarette?	Q1, Q3, Q4, Q5, Q6, Q7, Q8, Q9, Q10, Q11, Q12, Q13, Q14	Q1, Q2, Q3, Q4, Q5, Q6, Q7, Q8, Q9, Q10 ,Q11, Q12, Q13, Q14, Q15	None	Q1C, Q24, Q25, Q26, Q27, Q28, Q29, Q30, Q31	Q2.1, Q4.1, Q4.3	None
Q3. Have you ever smoked at least 100 cigarettes in your entire life?	Q1, Q2, Q4, Q5, Q6, Q7, Q8, Q9, Q10, Q11, Q12, Q13, Q14, Q3.3	Q3, Q4, Q5, Q6, Q7, Q8, Q9, Q10, Q11, Q12, Q13, Q14, Q15	None	Q12, Q24, Q37	Q2.1, Q4.1, Q4.3, Q3.1	None
Q4. How often do you smoke cigarettes?	Q1, Q2, Q3, Q5, Q6, Q7, Q8, Q9, Q10, Q11, Q12, Q13, Q14, Q2.2, Q2.5, Q2.6, Q2.7, Q2.8, Q2.9, Q2.10, Q4.3	Q4, Q5, Q6, Q7, Q8, Q9, Q10, Q11, Q12, Q13, Q14, Q15	Q1, Q6	None	Q3.1, Q3.2	None
Q5. How old were you when you first started to smoke cigarettes daily?	Q1, Q2, Q3, Q4, Q6, Q7, Q8, Q9, Q10, Q11, Q3.4	Q4, Q5	None		None	None
Q6. How old were you when you last smoked cigarettes daily?	Q1, Q2, Q3, Q4, Q5, Q7, Q8, Q9, Q10, Q11, Q12, Q14, Q3.4	Q4, Q5, Q6, Q7, Q8, Q9, Q10	None	Q14	None	None

Q7. How many cigarettes do you smoke each day now?	Q1, Q2, Q3, Q4, Q5, Q6, Q7, Q8, Q9, Q10, Q11, Q12, Q13, Q2.2, Q2.5, Q2.6, Q2.7, Q2.8, Q2.9, Q2.10, Q3.3, Q3.4, Q4.3	Q4, Q5, Q9, Q10, Q13, Q14, Q15	None	None	Q3.1, Q3.2	None
Q8. In the past month, on how many days have you smoked 1 or more cigarettes?	Q1, Q2, Q3, Q4, Q5, Q6, Q7, Q9, Q10, Q11, Q3.3, Q3.4	Q4, Q5	None	None	None	None
Q9. On those days, about how many cigarettes did you smoke each day?	Q1, Q2, Q3, Q4, Q5, Q6, Q7, Q8, Q10, Q11, Q12, Q13, Q14	Q4, Q5, Q6	None	Q1C, Q12, Q14	Q4.1, Q4.3	None
Q10. Have you ever smoked cigarettes daily for more than 3 months?	Q1, Q2, Q3, Q4, Q5, Q6, Q7, Q8, Q9, Q11, Q12, Q13, Q14, Q2.5, Q2.6, Q2.7, Q2.8, Q2.9, Q2.10, Q4.3	Q4, Q5, Q6, Q7, Q8, Q9, Q10, Q11, Q13, Q14, Q15	Q1, Q6	Q14, Q38, Q39	Q3.1	None
Q11. At what age did you begin to smoke every day?	Q1, Q2, Q3, Q4, Q5, Q6, Q7, Q8, Q9, Q10, Q12, Q13, Q14, Q2.5, Q2.6, Q2.7, Q2.8, Q2.9, Q2.10, Q4.3	Q4, Q5, Q6, Q9, Q10, Q11	None	Q14, Q39	Q3.1	None
Q12. When you smoked your most, how many cigarettes did you usually smoke each day?	Q1, Q2, Q3, Q4, Q6, Q7, Q9, Q10, Q11, Q13, Q14, Q3.1	Q4, Q5, Q6, Q7, Q8, Q9, Q10, Q11, Q12, Q13, Q14, Q15	Q1, Q6	Q14, Q39	Q4.3, Q3.1	None
Q13. When did you stop smoking every day?	Q1, Q2, Q3, Q4, Q7, Q9, Q10, Q11, Q12, Q14, Q2.5, Q2.6, Q2.7, Q2.8, Q2.9, Q2.10, Q4.3	Q9, Q10, Q11, Q15	None	Q14, Q39	None	None
Q14. When did you completely stop smoking?	Q1, Q2, Q3, Q4, Q6, Q9, Q10, Q11, Q12, Q13	Q4, Q9, Q10, Q11, Q15	None	Q14, Q39	None	None
Q2.1. Are you seriously considering quitting within the next 6 months?	Q2.2, Q2.3, Q2.5, Q2.6, Q2.7, Q2.8, Q2.9, Q2.10, Q2.3, Q4.3	None	None	Q1A	None	None
Q2.2. Are you seriously considering quitting within the next 30 days?	Q4, Q7, Q2.1, Q2.3, Q2.5, Q2.6, Q2.7, Q2.8, Q2.9, Q2.10, Q2.3, Q4.3	None	None	Q1A, Q21, Q37	Q3.2	None

Q2.3. In the past 12 months, did you stop smoking for at least 24 hours to quit?	Q2.1,Q2.2, Q2.5, Q2.6, Q2.7, Q2.8, Q2.9, Q2.10, Q3.3, Q4.3	None	None	None	None	None
Q2.4. How many times?	None	None	None	None	None	None
Q2.5. Do you have a regular medical practitioner?	Q4, Q7, Q10, Q11, Q13, Q2.1, Q2.2, Q2.3, Q2.6, Q2.7, Q2.8, Q2.9, Q2.10, Q4.3	None	None	Q1A, Q21, Q31, Q32, Q33, Q37	Q3.1, Q3.2	None
Q2.6. In the past 12 months, did you go see your medical doctors?	Q4, Q7, Q10, Q11, Q13, Q2.1, Q2.2, Q2.3, Q2.5, Q2.7, Q2.8, Q2.9, Q2.10, Q4.3	None	None	Q1A, Q21, Q31, Q32, Q33, Q37	Q3.1, Q3.2	None
Q2.7. Does your GP know that you were or are smoking cigarettes?	Q4, Q7, Q10, Q11, Q13, Q2.1, Q2.2, Q2.3, Q2.5, Q2.6, Q2.8, Q2.9, Q2.10, Q4.3	None	None	Q1A, Q21, Q31, Q32, Q33, Q37	Q3.1, Q3.2	None
Q2.8. In the past 12 months, did your GP advise you to quit smoking?	Q4, Q7, Q10, Q11, Q13, Q2.1, Q2.2, Q2.3, Q2.5, Q2.6, Q2.7, Q2.9, Q2.10, Q4.3	None	None	Q1A, Q21, Q31, Q32, Q33, Q37	Q3.1, Q3.2	None
Q2.9. In the past 12 months, did your GP give you any specific help or info to quit smoking?	Q4, Q7, Q10, Q11, Q13, Q2.1, Q2.2, Q3.3, Q2.5, Q2.6, Q2.7, Q2.8, Q2.10, Q4.3	None	None	Q1A, Q21, Q31, Q32, Q33, Q37	Q3.1, Q3.2	None
Q2.10. What type of help did the GP give?	Q4, Q7, Q10, Q11, Q13, Q2.1, Q2.2, Q2.3, Q2.5, Q2.6, Q2.7, Q2.8, Q2.9, Q4.3	None	None	Q1A, Q21 Q31, Q32, Q33, Q37	Q3.1, Q3.2	None
Q3.1. Are you currently living with others in your household?	Q12, Q3.5	None	Q6	Q1C, Q20, Q25, Q26, Q27, Q28, Q29, Q30	None	None
Q3.2. Does anyone in your household smoke cigarettes, cigars, or pipes inside your home?	Q3.2, Q3.6, Q3.7, Q3.8	None	Q2, Q4, Q3	Q23	None	Q1
Q3.3. Do they smoke every	Q1, Q3, Q7, Q8,	Q13	Q3	Q13	None	Q1

day or almost every day?	Q2.1, Q2.2, Q2.3, Q3.2, Q3.4, Q3.6, Q3.7, Q3.8					
Q3.4. In the past month, were you exposed to second hand smoke every day or almost every day in a car or vehicle?	Q5, Q6, Q7, Q8, Q3.3	Q4, Q5, Q6, Q7	None	Q16, Q25, Q26, Q27, Q28, Q29, Q30	None	None
Q3.5. In the past month, were you exposed to second hand smoke, every day or almost every day in public places?	Q3.1, Q3.7, Q3.8	None	Q3	Q1B, Q1D, Q16, Q25, Q26, Q27, Q28, Q29, Q30, Q31, Q32, Q33	None	Q1
Q3.6. Is smoking allowed inside your home?	Q3.2, Q3.3, Q3.7, Q3.8	None	None	Q23, Q38, Q39	None	None
Q3.7. Is smoking inside your home restricted in anyway?	Q3.2, Q3.3, Q3.5, Q3.6, Q3.8	None	Q3	Q23	None	None
Q3.8. If you answered yes to the above question, how is smoking restricted in your home?	Q3.2, Q3.3, Q3.5, Q3.6, Q3.8	None	Q3	Q1D, Q23	None	None
Q4.1. In the past month, have you ever smoked cigars?	None	None	None	None	None	None
Q4.2. In the past month, have you smoked a pipe?	None	None	None	Q1D	None	None
Q4.3. In the past month, have you used smokeless tobacco?	Q4, Q7, Q10, Q11, Q13, Q2.1, Q2.2, Q2.3, Q2.5, Q2.6, Q2.7, Q2.8, Q2.9, Q2.10	None	None	Q1A, Q16, Q21, Q31, Q32, Q33, Q37	Q3.1, Q3.2	None

Table J.3 Section 3 Significant Correlations (p<0.05)

	Section 3	**Section 4**	**Section 5**	**Section 6**	**Section 8**
Timiskaming					

Q1. How old were you when you had your first drink of alcohol?	Q2, Q3, Q8, Q15	None	None	None	None
Q2. On how many days have you had at least one drink of alcohol?	Q1, Q3, Q4, Q5, Q6, Q7, Q8, Q11, Q15	None	Q19, Q20	None	None
Q3. During the past 12 months, did you have a drink of any alcoholic beverages?	Q1, Q2, Q4, Q5, Q6, Q7, Q8, Q15	None	None	None	None
Q4. During the past 12 months, how often did you drink alcoholic beverages?	Q2, Q3, Q5, Q6, Q7, Q8, Q9, Q10, Q11, Q12, Q13, Q14, Q15	Q2	Q20	None	None
Q5. How often in the past 12 months did you have 5 or more drinks of alcohol?	Q2, Q3, Q4, Q6, Q7, Q8, Q9, Q10, Q11, Q12, Q13, Q14, Q15	Q2	Q39	None	None
Q6. During the past 30 days, how many days did you have at least one drink of alcohol?	Q2, Q3, Q4, Q5, Q7, Q8, Q9, Q10, Q11, Q12, Q13, Q14, Q15	Q2	None	None	None
Q7. During the past 30 days, did you have 5 or more drinks in a row within 2 hours?	Q2, Q3, Q4, Q5, Q6, Q8, Q9, Q10, Q11, Q12, Q13, Q14, Q15	Q2	Q7, Q39	None	Q1
Q8. Did you have a drink in the past week?	Q1, Q2, Q3, Q4, Q5, Q6, Q7, Q9, Q10, Q11, Q12, Q13, Q14, Q15	Q2	None	None	None
Q9. Number of drinks yesterday (day 1)	Q4, Q5, Q6, Q7, Q8, Q10, Q11, Q12, Q13, Q14, Q15	Q2	Q13, Q20	Q3.3	None
Q10. Number of drinks two days ago (day 2)	Q4, Q5, Q6, Q7, Q8, Q9, Q11, Q12, Q13, Q14, Q15	None	None	None	None
Q11. Number of drinks on day 3	Q2, Q4, Q5, Q6, Q7, Q8, Q9, Q10, Q12, Q13, Q14, Q15	Q1, Q3	Q13	Q3.3	None
Q12. Number of drinks on day 4	Q4, Q5, Q6, Q7, Q8, Q9, Q10, Q11, Q13, Q14, Q15	Q3	None	Q3.3	None
Q13. Number of drinks on day 5	Q4, Q5, Q6, Q7, Q8, Q9, Q10, Q11, Q12, Q14, Q15	Q2	Q13, Q17, Q20	None	None
Q14. Number of drinks on day 6	Q4, Q5, Q6, Q7, Q8, Q9, Q10, Q11, Q12, Q13, Q15	Q2	Q13	None	None
Q15. Number of drinks on day 7	Q1, Q2, Q3, Q4, Q5, Q6, Q7, Q8, Q9, Q10, Q11, Q12, Q13, Q14	Q3	Q13, Q17	None	None

Peel					
Q1. How old were you when you had your first drink of alcohol?	Q2, Q3, Q4, Q5, Q6, Q7, Q8	None	None	None	None
Q2. On how many days have you had at least one drink of alcohol?	Q1, Q3, Q4, Q5, Q6, Q7, Q8	None	Q5, Q6, Q31, Q32, Q33, Q38, Q39	Q2.2	Q1
Q3. During the past 12 months, did you have a drink of any alcoholic beverages?	Q1, Q2, Q4, Q5, Q6, Q7, Q8, Q9, Q10, Q13, Q14, Q15	None	Q36, Q39	Q4.3	None
Q4. During the past 12 months, how often did you drink alcoholic beverages?	Q1, Q2, Q3, Q5, Q6, Q7, Q8, Q9, Q10, Q11, Q12, Q13, Q14, Q15	Q3	Q5, Q6, Q36, Q38, Q39	Q2.1, Q4.3, Q4.4	None
Q5. How often in the past 12 months did you have 5 or more drinks?	Q1, Q2, Q3, Q4, Q6, Q7, Q8, Q9, Q10, Q11, Q12, Q13, Q14, Q15	None	Q36, Q38, Q39	Q2.1, Q4.3, Q4.4	None
Q6. During the past 30 days, how many days did you have at least one drink of alcohol?	Q1, Q2, Q3, Q4, Q5, Q7, Q8, Q9, Q10, Q11, Q12, Q13, Q14, Q15	None	Q17, Q36, Q39	Q2.1, Q4.3, Q4.4	None
Q7. During the past 30 days, did you have 5 or more drinks in a row within 2 hours?	Q1, Q2, Q3, Q4, Q5, Q6, Q8, Q9, Q10, Q11, Q12, Q13, Q14, Q15	None	Q36, Q38, Q39	Q2.1, Q4.3, Q4.4	None
Q8. Did you have a drink in the past week?	Q1, Q2, Q3, Q4, Q5, Q6, Q7, Q9, Q10, Q11, Q12, Q13, Q14, Q15	None	None	Q2.1, Q4.3, Q4.4	None
Q9. Number of drinks yesterday (day 1)	Q3, Q4, Q5, Q6, Q7, Q8, Q10, Q11, Q12, Q13, Q14, Q15	Q3	Q2, Q6	Q2.2, Q4.3, Q4.4	None
Q10. Number of drinks two days ago (day 2)	Q3, Q4, Q5, Q6, Q7, Q8, Q9, Q11, Q12, Q13, Q14, Q15	Q3, Q6	None	Q4.3, Q4.4	None
Q11. Number of drinks on day 3	Q4, Q5, Q6, Q7, Q8, Q9, Q10, Q12, Q13, Q14, Q15	Q1, Q6	Q17	Q2.2, Q3.1, Q4.3, Q4.4	None
Q12. Number of drinks on day 4	Q4, Q5, Q6, Q7, Q8, Q9, Q10, Q11, Q13, Q14, Q15	None	Q6	Q4.4	None
Q13. Number of drinks on day 5	Q3, Q4, Q5, Q6, Q7, Q8, Q9, Q10, Q11, Q12, Q14, Q15	None	Q6	Q4.3	None
Q14. Number of drinks on day 6	Q3, Q4, Q5, Q6, Q7, Q8, Q9, Q10, Q11, Q12, Q13, Q15	Q6	Q6	Q4.3	None

Q15. Number of drinks on day 7	Q3, Q4, Q5, Q6, Q7, Q8, Q9, Q10, Q11, Q12, Q13, Q14	Q3, Q6	None	Q4.3	None

Table J.4 Section 4 Significant Correlations (p<0.05)

	Section 4	**Section 5**	**Section 6**	**Section 8**
Timiskaming				
Q1. When was your current home/residence built?	None	Q3, Q4, Q6, Q25, Q26, Q27, Q28, Q29, Q30	Q3.1, Q3.2	None
Q2. How long have you lived at your current residence/home?	None	Q17, Q36, Q41	None	None
Q3. What is the source of your home/residence tap water?	None	None	None	None
Q4. Are there any water treatment devices being used in your home/residence?	None	Q27, Q31, Q33, Q35	Q2.1, Q4.3, Q4.4	None
Q5. Are you aware of present or abandoned mining industries near your home/residence?	Q6	Q16, Q18	Q1.1, Q4.2	None
Q6. List of any mining industries present.	Q5	Q16, Q18	Q1.1	None
Peel				
Q1. When was your current home/residence built?	Q6	Q2, Q3, Q4, Q5, Q6, Q10, Q11, Q12, Q36	Q3.1, Q3.2, Q4.2, Q4.3, Q4.4	None
Q2. How long have you lived at your current residence/home?	None	Q32, Q33	Q4.2	None
Q3. What is the source of your home/residence tap water?	None	Q1D, Q40	None	None
Q4. Are there any water treatment devices being used in your home/residence?	None	Q13, Q14	None	None
Q5. Are you aware of present or abandoned mining industries near your home/residence?	None	None	None	None
Q6. List of any mining industries present.	Q1	None	Q3.1	None

Table J.5 Section 5 Significant Correlations (p<0.05)

	Section 5	Section 6	Section 8
Timiskaming			
Q1A. In the last 3 days, did you breathe in fumes from degreasing cleaners?	None	Q1.1, Q3.1	None
Q1B. In the last 3 days, did you breathe in fumes from diesel fuel or kerosene?	None	None	None
Q1C. In the last 3 days, did you breathe in fumes from paint thinner, brush cleaner, or furniture stripper?	None	None	None
Q1D. In the last 3 days, did you breathe in fumes from dry-cleaning fluid or spot remover?	None	None	None
Q2. Have you ever used insecticides?	Q3, Q4, Q5, Q6, Q14, Q41	Q1.1	None
Q3. First time using insecticides	Q2, Q4, Q5, Q6, Q7, Q14, Q21, Q40, Q41	Q2.2	None
Q4. Most recent time using insecticides	Q2, Q3, Q5, Q6, Q14	None	None
Q5. How many times have you used insecticides?	Q2, Q3, Q4, Q6, Q7, Q14	None	None
Q6. How many times did you leave because of your home/residence being fumigated?	Q2, Q3, Q4, Q5, Q14	Q2.2	None
Q7. Was your home/residence ever treated for termites or carpenter ants?	Q3, Q5	None	None
Q8. Was your home/residence ever treated to control for mosquitoes?	Q9, Q10, Q11	Q3.4	None
Q9. How many times was your home treated to control mosquitoes?	Q8, Q10, Q11, Q38	Q3.4	None
Q10. First time treating mosquitoes	Q8, Q9, Q11	Q3.4	None
Q11. Most recent time treating mosquitoes	Q8, Q9, Q10	Q3.4	None
Q12. Do you have a lawn at your residence?	None	Q4.2	None
Q13. Have you or anyone else in your	Q37	Q4.2	None

home/residence ever used chemical treatments on your lawn?			
Q14. How many times in total was your lawn treated with these chemicals?	Q2, Q3, Q4, Q5, Q6, Q25, Q26, Q28	None	None
Q15. First time your lawn was treated	Q22, Q24	None	None
Q16. Most recent time your lawn was treated	Q18, Q19		
Q17. Did you ever have professional lawn service to use pesticides/insecticides/weed killers?	None	Q4.4	Q1
Q18. How many times in total?	Q16, Q35, Q41		
Q19. First year treated with professional lawn service using pesticides/insecticides/weed killers	None	Q4.4	None
Q20. Most recent year treated with professional lawn service using pesticides/insecticides/weed killers	Q24	None	None
Q21. Did you or anyone else in your household use any chemicals like pesticides/insecticides/weed killers?	Q1C	Q3.1	None
Q22. How many times?	Q15, Q34	None	None
Q23. First year treated with pesticides/insecticides/weed killers	None	None	None
Q24. Most recent year treated pesticides/insecticides/weed killers	Q15, Q34, Q36	None	None
Q25. Did you ever live with a dog, cat, or family pet with flea collar?	Q14, Q26, Q27, Q28, Q29, Q30	Q3.1, Q4.3	None
Q26. How many years did you live with a pet wearing a flea collar?	Q14, Q25, Q27, Q28, Q29, Q30	Q3.1	None
Q27. Did you use other tick or flea products?	Q25, Q26, Q28, Q29, Q30	None	None
Q28. How many times did you use these products?	Q14, Q25, Q26, Q27, Q29, Q30	Q3.1	None
Q29. First year of use of flea products	Q25, Q26, Q27, Q28, Q30	Q3.1	None
Q30. Most recent year of use of flea products	Q25, Q26, Q27, Q28, Q29	Q3.1, Q4.3	None
Q31. Did you regularly use chemical products to control mould or mildew?	Q32, Q33, Q35, Q37	Q2.1	None

Q32. First time using products to control mould or mildew	Q31, Q33, Q35, Q36, Q37	Q2.1	None
Q33. Most recent time using products to control mould or mildew	Q31, Q32, Q35, Q37	Q2.1	None
Q34. Did you ever use chlorine bleach for mould or mildew?	Q22, Q24, Q35, Q40, Q41	None	None
Q35. How often did you use chlorine bleach?	Q18, Q31, Q32, Q33, Q34, Q37, Q40, Q41	None	None
Q36. Did you use any other products for mould or mildew?	Q24, Q32	Q4.3	Q36
Q37. What were these other products?	Q13, Q31, Q32, Q33, Q35, Q40, Q41	None	None
Q38. Do you use surface cleaners like Lysol?	Q9, Q39	None	None
Q39. How often do you use these surface cleaners?	Q38	None	None
Q40. Did you ever use paint thinner or paint stripper at your current residence?	Q1C, Q37, Q41	Q1.1, Q1.2	None
Q41. How many times would you say you ever used paint stripper/thinner?	Q1B, Q1C, Q18, Q34, Q35, Q37, Q40	None	None
Peel			
Q1A. In the last 3 days, did you breathe in fumes from degreasing cleaners?	Q38, Q39	Q3.1	None
Q1B. In the last 3 days, did you breathe in fumes from diesel fuel or kerosene?	Q1D	None	None
Q1C. In the last 3 days, did you breathe in fumes from paint thinner, brush cleaner, or furniture stripper?	Q25, Q26, Q27, Q28, Q29	None	None
Q1D. In the last 3 days, did you breathe in fumes from dry-cleaning fluid or spot remover?	Q1B	Q3.2	None
Q2. Have you ever used insecticides?	Q3, Q4, Q5, Q6, Q10, Q11, 18, Q22, Q39	Q2.2	None
Q3. First time using insecticides	Q2, Q4, Q5, Q6, Q10, Q11, Q16, 18, Q40, Q41	Q2.2	None
Q4. Most recent time using insecticides	Q2, Q3, Q5, Q6, Q10, Q11, 18	Q2.2	None
Q5. How many times have you used insecticides?	Q2, Q3, Q4, Q6, Q10, Q11, 18	Q2.2	None
Q6. How many times did you leave	Q2, Q3, Q4, Q5, Q10, Q11, 18	Q2.2	None

because of your residence being fumigated?			
Q7. Was your residence ever treated for termites or carpenter ants?	None	None	None
Q8. Was your residence ever treated to control for mosquitoes?	None	None	None
Q9. How many times was your home treated to control mosquitoes?	None	None	None
Q10. First time treating mosquitoes	Q2, Q3, Q4, Q5, Q6, Q11, Q40, Q41	Q3.1, Q3.2	None
Q11. Most recent time treating mosquitoes	Q2, Q3, Q4, Q5, Q6, Q10, Q40, Q41	Q3.1, Q3.2	None
Q12. Do you have a lawn at your residence?	Q23	None	None
Q13. Have you ever used chemical treatments on your lawn?	Q34	None	None
Q14. How many times in total was your lawn treated with these chemicals?	Q17, Q18, Q21, Q22, Q24	None	None
Q15. First time your lawn was treated	Q19, Q20	None	None
Q16. Most recent time your lawn was treated	Q1C, Q25, Q26, Q27, Q28, Q29, Q30, Q31, Q32, Q33	Q3.1	None
Q17. Did you ever have professional lawn service to use pesticides/insecticides/weed killers?	Q14, Q38, Q41	None	None
Q18. How many times in total?	Q2, Q3, Q4, Q5, Q6, Q14, Q22, Q24	None	None
Q19. First year treated with professional lawn service using pesticides/insecticides/weed killers	Q15	None	None
Q20. Most recent year treated with professional lawn service using pesticides/insecticides/weed killers	Q15	None	None
Q21. Did you or anyone else in your home/residence use any chemicals like pesticides/insecticides/weed killers?	Q14, Q36, Q37	Q3.2	None
Q22. How many times?	Q2, Q18	None	None
Q23. First year treated with pesticides/insecticides/weed killers	Q12, Q38, Q39	None	
Q24. Most recent year treated pesticides/insecticides/weed killers	Q14, Q18	None	None

Q25. Did you ever live with a dog, cat, or family pet with flea collar?	Q1C, Q16, Q26, Q27, Q28, Q29, Q30, Q31, Q32, Q33, Q33, Q35	None	None
Q26. How many years did you live with a pet wearing a flea collar?	Q1C, Q16, Q25, Q27, Q28, Q29, Q30, Q31, Q32, Q33, Q34, Q35	None	None
Q27. Did you use other tick or flea products?	Q1C, Q16, Q25, Q27, Q28, Q29, Q30, Q31, Q32, Q33, Q33, Q35	None	None
Q28. How many times did you use these products?	Q1C, Q16, Q25, Q28, Q29, Q30, Q31, Q32, Q33, Q35	None	None
Q29. First year of use of flea products	Q1C, Q16, Q25, Q26, Q27, Q28, Q30, Q31, Q32, Q33, Q35	None	None
Q30. Most recent year of use of flea products	Q1C, Q16, Q25, Q26, Q27, Q28, Q29, Q31, Q32, Q33, Q35	None	None
Q31. Did you regularly use chemical products to control mould or mildew?	Q16, Q25, Q26, Q27, Q28, Q29, Q30, Q32, Q33, Q35	None	None
Q32. First time using products to control mould or mildew	Q16, Q25, Q26, Q27, Q28, Q29, Q30, Q31, Q33, Q35	None	None
Q33. Most recent time using products to control mould or mildew	Q16, Q25, Q26, Q27, Q28, Q29, Q30, Q31, Q32, Q35	None	None
Q34. Did you ever use chlorine bleach for mould or mildew?	Q13	None	Q1
Q35. How often did you use chlorine bleach?	Q16, Q35, Q26, Q27, Q28, Q29, Q30, Q31, Q32, Q33	None	None
Q36. Did you use any other products for mould or mildew?	Q13, Q21, Q35	Q3.1, Q3.2	None
Q37. What were these other products?	None	Q3.2	None
Q38. Do you use surface cleaners like Lysol?	Q1A, Q17, Q23, Q39	None	None
Q39. How often do you use these surface cleaners?	Q1A, Q1B, Q23, Q38	None	None
Q40. Did you ever use paint thinner or paint stripper at your current residence?	Q1C, Q10, Q11, Q41	None	Q1
Q41. How many times would you say you ever used paint stripper/thinner?	Q1C, Q10, Q11, Q17, Q40	None	Q1

Table J.6 Section 6 Significant Correlations (p<0.05)

	Section 6	Section 8
Timiskaming		
Q1.1. Are you aware of any gold mining taking place within or near your community?	Q1.2	None
Q1.2. Are you aware of any silver mining taking place within or near your community?	Q1.1	None
Q1.3. Are you aware of Copper Chromated Arsenic being used in your house renovations or woodwork?	None	None
Q2.1. Are you using nickel cadmium batteries within the household?	None	None
Q2.2. Do you recycle your batteries appropriately?	None	None
Q3.1. Was your current house built before 1978?	Q3.2	None
Q3.2. If yes, was it painted at this time?	Q3.1	None
Q3.3. Are you aware of any use of lead red rust proof paint on your vehicle or barn?	None	None
Q3.4. Are you aware of any lead containing drinking water pipes or brass fixtures within or around your home?	None	None
Q4.1. Do you currently have mercury filled thermometers or thermostats within your household?	None	None
Q4.2. Do you utilize fluorescent light bulbs?	None	None
Q4.3. Have you ever had dental amalgam?	None	None
Q4.4. Time frame of having the dental amalgam	Q4.3	None
Peel		
Q1.1. Are you aware of any gold mining taking place within or near your community?	None	None
Q1.2. Are you aware of any silver mining taking place within or near your community?	None	None
Q1.3. Are you aware of Copper Chromated Arsenic being used in your house renovations or woodwork?	None	None

Q2.1. Are you using nickel cadmium batteries within the household?	None	None
Q2.2. Do you recycle your batteries appropriately?	None	Q1
Q3.1. Was your current house built before 1978?	Q4.3	None
Q3.2. If yes, was it painted at this time?	Q3.1, Q3.2	None
Q3.3. Are you aware of any use of lead red rust proof paint on your vehicle or barn?	None	None
Q3.4. Are you aware of any lead containing drinking water pipes or brass fixtures within or around your home?	None	None
Q4.1. Do you currently have mercury filled thermometers or thermostats within your household?	None	None
Q4.2. Do you utilize fluorescent light bulbs?	Q4.3	Q1
Q4.3. Have you ever had dental amalgam?	Q3.1, Q4.1	Q1
Q4.4. Time frame of having the dental amalgam	Q4.3	None

Table J.8 Section 8 Significant Correlations (p<0.05)

	Section 8
Timiskaming	
Q1. How many diagnostic x-rays have you had in your lifetime?	None
Peel	
Q1. How many diagnostic x-rays have you had in your lifetime?	None