

# Sleep Patterns in Ancient and Modern-day

A Major Canadian Health and Safety Issue

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## **Executive Summary**

This report examines the sleep patterns of Canadians, how they are changing, and the problems their sleep patterns are causing for health, finances, and safety. Sleep deprivation has become a major issue over the past number of years owing to numerous factors, including the advent of artificial lighting and technology. The purpose of this report is to highlight a major Canadian health and safety issue and educate readers on the impact of sleep patterns on ourselves, those around us, and our country as a whole. A multitude of sources have been examined including, but not limited to, research papers, scholarly reports, news articles, and documentaries.

The main approach to this report is to outline the history of sleep patterns and understand how they have changed. It reports on the consequences these newly-adapted sleep patterns have had on Canadian society and how the problem is portrayed in the media. By examining the history of sleep patterns, this report shows how drastically they have changed with the development of lighting and technology. Initially, this resulted in a shift from segmented to consolidated sleep.

The evolution of how we sleep has caused countless problems and consequences. The most significant concern is the effect on our mental and physical health. More and more sleep problems are causing irreversible damage to our bodies and minds. They are now recognized on a much wider scale. The number of news articles on the subject has grown dramatically from the year 2000 with 98 per cent of articles being published in the last six years. This report concludes with recommended solutions to current sleep problems, as well as increased benefits on our health, safety, and economy.

## **Introduction**

Throughout history we've seen a shift in human sleep patterns. Our habits and practices are continuously evolving and this does not exclude the way in which we sleep. Evidence has shown that our ancestors practiced a segmented sleep, meaning our recommended eight hours of sleep used to be separated into two distinct portions. However, the historian Roger Ekirch, who originally published the research, found that references to segmented sleep started to disappear during the late 17<sup>th</sup> Century and had disappeared completely by the 1920s. The original shift in our sleep patterns has been attributed to improvements in street lighting, artificial lighting, as well as coffee houses and other businesses beginning to stay open all night. An Oxford professor of circadian neuroscience writes that a significant number of medical problems presented to doctors stem from sleep, whether directly or indirectly. However, it is often ignored in medical training. Today, we see a rise in sleep centers and studies. Conversely, we also see a rise in problems affecting our sleep. The prevalence of insomnia, hypersomnia, and Obstructive Sleep Apnea is often covered and discussed in studies, medical journals, and general media. The fact of the matter is that sleep disturbances are becoming a significant public health problem. In turn, this can be quite costly to both our health and our economy. Research shows that sleep disturbances can lead to a multitude of problems affecting our health, work habits, and abilities, including the operation of motor vehicles, and our interpersonal relationships. This research paper presents what a sleep pattern is, a brief history of how our ancestors slept, as well as what has been impacting our sleep and causing us to adopt new sleep patterns. Moreover, I will examine and assess the problems associated with our current sleep habits and the direct consequences for our bodies, minds, and lives. Are there solutions to these problems that are becoming such a burden – both individually and socially? With this research, I hope to shed

some light on possible solutions to what has been called a ‘global epidemic’ (CBC Health News).

## **Background**

We all seem to know that eight solid hours of sleep is what we should be getting. However, that wasn’t always the case. Roger Ekirch, a historian at Virginia Tech, has put years of research into this fact. What he found are copious amounts of historical evidence that our ancestors used to sleep in two distinct chunks. These references were found in medical books, literature, personal journals, and court records, but “[i]t’s not just the number of references – it is the way they refer to it, as if it was common knowledge” (qtd. in Hegarty). People used the time between first and second sleep to read, write, smoke tobacco, pray, and visit neighbours. A medical manual from the 16<sup>th</sup> century even recommended this period as the best time to conceive as people “did it better” and got more enjoyment than at the end of a long day of work (Hegarty). Nearing the end of the 17<sup>th</sup> century references to segmented sleep started to disappear, beginning in Northern Europe with the upper class, making its way through to Western Society and disappearing completely by the 1920s. Russell Foster, a professor of circadian neuroscience at Oxford University, believes that the reason some people today wake up at night is because their bodies are reminding them of its natural preference for a segmented sleep.

In the early 1990s, psychiatrist Thomas Wehr, a researcher at the National Institute of Mental Health, conducted an experiment to determine how our natural circadian clock behaved during the time of our ancestors. With the help of eight healthy men and a dark room, Wehr naturally recreated a pattern of segmented sleep. Placing the men in complete darkness for 14 hours at night, equivalent to the natural duration of daylight during winter, first caused their schedules to shift to 11 straight hours of sleep. Wehr predicted that this was the body’s natural

way of “catching up on many lost naps” (Brown). Eventually the subjects started falling asleep much slower and receded into patterns of segmented sleep – about four hours of sleep, one to three hours awake, and again four hours of sleep, giving them a total of 8.9 hours. There was also a shift in the amount of time it took in order to fall asleep; 15 minutes at the beginning of the study to about two hours once they settled into a “comfortable” pattern.

“Waking up after a couple of hours may not be insomnia,” Wehr says, “it may be normal sleep” (qtd. in Brown). The findings of Wehr and Ekirch helped many gain insights on modern sleeping problems. We’ve learnt that waking up in the middle of the night may not be due to insomnia, but to our minds and bodies’ preference for a divided sleep. Mary Carskadon, a sleep researcher at Brown University, reports that even if our bodies have a natural preference for segmented sleep, we may never fall back into our ancestral ways. “It’s hard to adapt to two bouts of sleep when you have to be at work at 8 A.M.,” she says (qtd. in Brown). Not only that, but the major factor differentiating us from our ancestors is the advent of artificial lighting.

During the time of our ancestors when sleep was segmented, night was associated with crime, from prostitutes, to drunks and felons – it was seen as unsafe. Things started to change when religious groups began holding secret meetings during the night due to avoid persecution. They continued to change when improvements in street lighting made the night a more welcoming time and place. People didn’t want to waste any more time laying in bed. Paris was the first city in the world to light the streets in 1667 using wax candles inside glass lamps. By the end of the 17<sup>th</sup> century more than 50 of Europe’s major cities had followed suit. The beginning of the 19<sup>th</sup> century marked the beginning of gas lighting and by the end of the century entire factories, theaters, and homes were lit by electric filament lamps. People were making more use of their days and forcing a change in their sleep patterns. A medical journal from 1829 pressed

people to start forcing their children into a consolidated 8 hours of sleep (Hegarty), which has since become the norm. Ekirch believes that the shift in sleep patterns, due to artificial lighting and our natural inclination for segmented sleep, is the main cause for most of the sleep problems we are face today.

Undeniably, insomnia affects up to 35 per cent of the Canadian population and presents a multitude of symptoms varying greatly from one individual to another. Insomnia is generally described as a dissatisfaction with the quality or duration of sleep (Morin). It can present itself as difficulty falling asleep or maintaining sleep, waking up frequently throughout the night, difficulty falling back asleep after waking, or non-restorative sleep. The second most common sleep disturbance is sleep apnea with 3% of adults over 18 years of age reporting being affected. Sleep apnea is described as a breathing disorder related to sleep. A person with this disorder experiences pauses in breathing lasting 10 to 30 seconds until the brain reacts by waking them in order to consciously resume breathing. Though these are the most prevalent sleep disorders they are two among many, including but not limited to: hypersomnia, narcolepsy, sleep paralysis, shift work sleep disorder, night terrors, and restless leg syndrome.

Any of these sleep disorders can lead to problems with attention and memory, dysphoria, irritability, loss of energy, fatigue, and can be the cause of anxiety, stress, and depression. Sleep disorders are a growing public health issue affecting up to 45 per cent of the world's population (CBC News) and we are seeing serious repercussions. They are clearly affecting our health. What we may not realize, though, is that it is also affecting our social lives and having a growing financial impact, not only on individuals and families, but also on our government, our employers, and our society as a whole.

Consistent sleep deprivation can cause permanent, irreversible damage to mental and physical health. Firstly, sleep is necessary to keep the central nervous system working properly. Deprivation can affect short and long-term memory by interfering with attention levels and ability to learn. It reduces decision-making abilities and affects a person's emotions by increasing the risk of mood disturbances, such as mood swings and short tempers. People with insomnia and other sleep disturbances show evidence of having less enjoyment from interpersonal relationships and more days where they are absent from work. This is due to the inability to participate or carry-out regular, day-to-day activities. These same people also have higher incidences of serious psychiatric disorders such as anxiety, substance abuse, and major depression (Morin).

Sleep deprivation also has negative effects on the immune system. "When you're sleeping, your immune system produces protective cytokines and infection-fighting antibodies and cells" (Pietrangelo). By reducing productivity of the immune system, the body is less able to fight illness, making a person more susceptible to bacterial infection and viruses such as the flu. An affected person is also less likely to recover quickly. Chronic sleep deprivation also increases the risk of developing diabetes and cardiovascular disease for this same reason. Sleeping five hours or less per night halts the production of leptin, a hormone produced by the stomach that creates a feeling of fullness and controls fat storage in the body. This in turn causes the consumption of more calories during the day (Cohen). A smaller amount of sleep also means higher production of cortisol, the stress hormone that increases blood sugar, suppresses the immune system, and decreases bone formation (Bennington). This increases blood pressure, which increases the risk of heart disease, kidney disease, arteriosclerosis, eye damage, and stroke



(MedicineNet). Experiments also show that sleep is a time that allows the brain to eliminate proteins that cause Alzheimer's and dementia (Cohen).

In a like manner, sleep deprivation can have significant effects on social life. As we saw earlier, one of the biggest consequences of inadequate sleep is the onset of major depression. Depression affects all aspects of life. Symptoms include loss of interest in usual activities, feelings of worthlessness and guilt, and lack of energy to name a few, all of which can lead to someone closing themselves off emotionally and secluding themselves from the people around them. Multiple studies show the impact of sleep deprivation on depression and the impact of depression on sleep deprivation. Both factors feed into each other causing a downward spiral that is hard to escape.

In addition to health and social problems associated with sleep deprivation, a serious issue is its financial impact. Each year, countries lose billions of dollars due to the direct and indirect costs of insomnia alone. "A new study indicates that the indirect costs of untreated insomnia are significantly greater than the direct costs associated with its treatment" (American Academy of Sleep Medicine). Though the indirect costs associated with insomnia are hard to quantify the total estimated costs in the province of Quebec is 6.5 billion Canadian dollars (American Academy of Sleep Medicine). Indirect costs consist of the use of medical services, loss in productivity and absences from work, as well as increased risk of accidents. Though indirect costs account for the largest portion (76 per cent) of all costs related to insomnia, direct costs should not be overlooked. These consist of the consumption of resources, such as physician consultations, testing, prescription medication, etc. The highest direct cost of insomnia is attributed to the use of alcohol for sleep promotion. "The total estimated annual cost [in Canada] of alcohol used for promoting sleep is \$339.8 million, [...] representing 60 per cent of all direct

costs and five per cent of all insomnia-related costs” (American Academy of Sleep Medicine). The cost of consultations, prescription medication, and drug-store product use combined is lower than that of alcohol use. The estimated cost per-person for those with insomnia syndrome is \$5,010 and \$1,431 for those diagnosed with symptoms of insomnia (American Academy of Sleep Medicine).

Furthermore, a big factor that is often overlooked in studies estimating costs related to sleep problems is that of costs relating to traffic accidents caused by sleep-deprived drivers. Studies show that people having six hours or less of sleep over extended periods of time have “a similar reaction time to a person with a blood-alcohol concentration of 0.1%” (ASAPscience). A person with this level of blood-alcohol concentration is beyond the legal driving limits and is considered legally drunk. “The US National Highway Traffic Safety Administration (NHTSA) reports that more than 4000 non-fatal and 1550 fatal crashes each year are attributed to sleep-deprived drivers” (TruckNews). One of the sleep disorders currently being studied is Obstructive Sleep Apnea (OSA), as described in the previous section. “A study [...] published in the March 2009 *Journal of Occupational and Environmental Medicine*, recommends mandatory OSA screening of truck drivers” (TruckNews). This study shows that the risk of falling asleep at the wheel is increased two to seven times in people having symptoms of OSA. What the study doesn’t show is who will cover the costs associated to mandatory testing of up to 3.9 million commercial drivers in the US that would fall into the categories requiring screening.

Additionally, it’s not only the financial impact that is significant when it comes to the lives of commercial drivers. Sleep problems pose a big safety risk for truck drivers and all other drivers on the road. Moreover, commercial drivers are not the only workers whose safety is at risk when it comes to sleep problems. A major issue is sleep deprivation for “workers in high-

risk, high-pressure jobs, where public safety is at stake: police, firefighters, doctors, and airline personnel” (Breus). All of these jobs require critical decision making that put the workers and the public in danger if not performed at best capacity. Workers and those with insomnia and other sleep problems are 1.9 times more likely to experience workplace injury and 1.5 times more likely to experience non-workplace injury than those getting adequate sleep (Breus).

As mentioned earlier, sleep deprivation slows both physical and mental reaction time, increasing the risk of using incorrect actions at sensitive times. Workers who are exposed to chemicals and heavy machinery are at high risk of accident when affected by sleep deprivation. Moreover, many hazards are present to those working with high levels of noise, extreme heat, and vibrations when reaction time and level of attention are reduced. As we can see insomnia and other sleep problems pose a great safety risk in and out of the workplace.

Sleep disorders are a serious growing problem that is not only regarded in medical journals, studies, and statistics but also in the media. A quick YouTube search with the words “sleep problems” generates more than 250,000 videos posted on the subject in the past year. News articles relating to sleep problems are also on the rise. A Google News search comes up with more than 7.2 million hits since the year 2000. It is evident that the issue is becoming more and more popular in the media by the fact that 98 per cent of these news articles have been published in the last six years. A few of the most prominent problems linked to sleep disturbances described in the media are the use of cell phones and technology, the link between sleep problems and other health problems, as well as the predominance of sleep problems with the female gender.

“According to scientists, the extensive popularity of mobile devices could cause a huge leap in sleep disorders” (Path). Blue light suppresses the production of melatonin, the hormone

that makes you feel sleepy, and stimulates the production of cortisol, the hormone that makes you feel awake. “Settling down for sleep with your laptop, tablet, or smartphone makes it much more difficult to get a healthy night’s sleep” (Path). A study conducted in the US found that even though devices emit about half as much light as a typical light bulb. The blue light has a greater effect on the brain due to the source being much closer to the eyes (Agg). “This is why reading something on a phone or tablet before bed could be more likely to keep you awake than reading a book with your bedside light – and it’s why sleep experts advise a ban on screen time two to three hours before bed” (Agg). This also means that, if someone is having trouble falling asleep, passing time by browsing the Internet or watching videos on a cell phone, it is only postponing the possibility of sleep.

Studies show that sleep disturbance from mobile devices is caused not only by the blue light being emitted from them, but also by the fact that always being connected to our devices has made us hypervigilant. Tom Stafford, a lecturer at Sheffield University, says that there isn’t always something new or exciting when we check our phones. Even so we are driven by the fact that there might be (Agg). “According to Time’s Mobility Poll, around 68% of us sleep within reach of our smartphones” (Path). Also, any disturbance, such as a vibration or flash of light, will likely cause someone to wake up. As we saw earlier, a short flash of light is enough to disturb hormone levels, but a study also showed that 40% of people are likely to check their phone if they’re disturbed by it in the night (Agg). By doing so, they are exposing themselves to higher amounts of blue light and further decreasing their chances of falling back to sleep right away.

Many recent news articles show the link among sleep problems and other health issues. As we saw earlier, there is a high rate of comorbidity between sleep disturbances and other psychological or health problems. One problem that is repeatedly covered in the media is the

presence of sleep problems in cancer patients. A study shows that "sleep problems are very significant among patients with cancer prior to undergoing radiotherapy, and the problems [are] found to be associated with progression of cancer, prior treatments, and other psychosomatic symptoms caused by the disease (e.g., anxiety)" (Sleep Review). The study shows that sleep problems increase with the severity of the disease and are also greatly impacted by the presence of anxiety in patients.

Moreover, an article published on Endocrine Web reports that women having sleep disturbances or difficulties are at a 45 per cent higher risk of developing Type 2 diabetes (Doheny). Scientists collected data from 133,535 women during ten years and found that women who reported difficulty sleeping also reported a "higher [body mass index], less physical activity, and more hypertension and depression" (Bakalar). The senior author of the report states that these health risks are associated with sleep quality as well as quantity. Yanping Li, MD, PhD, a research scientist at Harvard School of Public Health, adds that it's even worse than they thought; "the more types of sleep problems a woman has, the higher her risk [of developing Type 2 diabetes]" (Doheny).

The third most reported issue in the media is the predominance of sleep problems in women. As we just read, women are at higher risk of developing health problems when affected by sleep problems. At the same time, though, articles also report the prevalence of sleep problems in post-pubescent, pre- and post-menopausal women, as well as pregnant women. An article posted on BT.com says "women are more likely to have trouble sleeping than men (46% compared to 36% of adult males)" (Jackson). This article shows that women are more likely to have sleep problems due to drastic changes in hormone levels linked to menopause. However, this only gives evidence as to why women who have reached, or are nearing, the age of

menopause – usually around 50 years of age – are presented with trouble sleeping. Another article states that “[m]any women have [...] difficulty sleeping before getting their period due to the sharp drop in the hormone progesterone” (Ting). These articles show that changes in hormone levels have a great impact on sleep problems and, that women continuously face drastic shifts in hormones, thus making them more susceptible.

## **Conclusion**

To conclude we can see that sleep deprivation, as well as difficulties such as insomnia and sleep apnea, cause a multitude of health and safety problems. Moreover, they can result in a broad range of economic problems due to measures needed to correct these health and safety issues. This paper has covered the history of sleep patterns – how our ancestors slept and how we have evolved in patterning our sleep today. Moreover, the paper has outlined the problems we experience and the consequences they have on our health, social lives, and economy – in addition to our safety in and out of the day-to-day workplace. Furthermore, it has shown how sleep problems are not only a growing problem in the medical world but also one that is highly portrayed in the media. We know that, even though our bodies have a natural preference for segmented sleep patterns practiced by our ancestors, it is highly unlikely that civilization will return to these times due to the advent of artificial lighting and technology. People today are too sensitive to efficiency. Being more time-conscious and wanting to get more out of work and play each day means going to bed later and waking up earlier. There is no longer time to spend awake in the middle of the night.

Though we know that we won’t be reverting to older, simpler times, there are still contemporary solutions to some of the problems we are facing today. As a first step, many sources suggest keeping cell phones out of the bedroom. By doing this people are considerably

less likely to be woken up by a ring or vibration, or a flash of light. In recent years, developers have introduced computer and phone applications to filter out blue light from your screens for a healthier circadian rhythm. However, many specialists still suggest abstaining from using computers, cell phones, and tablets – even certain e-readers – at least two hours before going to bed. This allows for the natural production of melatonin.

Many of us reach for a cup of coffee whenever we're tired and that could be a problem. Keeping track of caffeine consumption and refraining from all sources of caffeine later in the day could mean getting to bed at a more reasonable time and getting more rest during the night. One researcher suggests that if none of these usual methods help, at least make the most of your sleepless hours by using the time to meditate, make love, or just reflect on your life and your dreams. Relaxing will ultimately help you fall asleep.

## **Annotated Bibliography**

Agg, Jennie. "Why You Should NEVER Keep Your Mobile in Your Bedroom." *Mail Online*.

Associated Newspapers, 11 Mar. 2014. Web. 01 Feb. 2016.

This article presents facts about the effects of keeping your mobile phone in your bedroom. They suggest that not only does having your mobile phone in your bedroom present a source of blue light causing cortisol production, but it also makes you hypervigilant. Knowing your phone is next to you and there might be something exciting or new on it prevents you from getting a full rest from your sleep. This article is useful in my research because it addresses that it is not the electromagnetism that is the problem but more so the presence of the phone by your bed.

American Academy of Sleep Medicine. "Societal, Economic Burden Of Insomnia Is High."

ScienceDaily. ScienceDaily, 4 January 2009.

<[www.sciencedaily.com/releases/2009/01/090101083258.htm](http://www.sciencedaily.com/releases/2009/01/090101083258.htm)>.

This article presents a lot of data on the financial situation in Canada regarding costs associated with insomnia. It presents information from a few different studies and combines related information. It will be useful in defining direct and indirect costs as well as presenting statistics and definitions for these costs.

Angier, Natalie. "Modern Life Suppresses An Ancient Body Rhythm." *The New York Times*. The

New York Times, 13 Mar. 1995. Web. 04 Feb. 2016.

This article presents a study done on the sleep patterns of our ancestors. Dr. Thomas A. Wehr conducted an experiment that presented the light patterns of our ancestors by eliminating artificial light in the lives of a group of people. What he found is that the sleep patterns of these people fell back into a segmented sleep pattern that has been



speculated by other scientists. This article will be very helpful in presenting a history of our sleep patterns and our ability to fall back into a natural order. It also shows some differences on how gender is affected by seasonal change which will be helpful in making connections between the prevalence of sleep disturbances in men vs. women.

AsapSCIENCE. "How Much Sleep Do You Actually Need?" *YouTube*. AsapSCIENCE, 27 July 2014. Web. 01 Feb. 2016.

This video presents data on studies conducted in order to determine the lasting effects of sleep debt. It showed that short-term sleep debt is easy to recover from, however long-term sleep debt can have lasting effects that could cause permanent damage. I will be using data found in this video in order to describe the effects of sleep debt, mainly that after only a short term of two weeks with insufficient sleep patients present a reaction time similar to a person with a high enough blood-alcohol level to be considered legally drunk.

Bakalar, Nicholas. "Sleep Problems Tied to Type 2 Diabetes." *Sleep Problems Tied to Type 2 Diabetes Comments*. The New York Times, 4 Feb. 2016. Web. 29 Feb. 2016.

This news article presents information from studies conducted on the link between sleep problems and type 2 diabetes. It shows that women with sleep problems are more likely to develop type 2 diabetes. This article will be used in the media section of my report as a news article presenting links between sleep problems and other health problems.

Bennington, Vanessa. "The Ups and Downs of Cortisol: What You Need to Know." *Breaking Muscle*. Breaking Muscle, Fall 2015. Web. 22 Feb. 2016.

This article presents information on the cortisol hormone. It shows where cortisol comes from and how it impacts the body. It presents consequences on low and high cortisol

levels as well as how it helps deal with stress. This article will be used in order to give a description of what cortisol is and how it impacts the body.

Breslau, Naomi, et al. "Sleep Disturbance and Psychiatric Disorders: A Longitudinal Epidemiological Study Of Young Adults." *Biological Psychiatry* 6 (1996): 411. Academic OneFile. Web. 1 Feb. 2016.

This study of young adults shows that there is a significant link between sleep disturbance and psychiatric disorders. This study confirms Ford and Kamerow's findings in a study that evaluated associations between sleep disturbance and major depression, anxiety, and substance use disorders. It shows that there are significant connections between psychiatric disorders and sleep disorders. This study will be used in order to demonstrate that not only can psychiatric disorders cause sleep disturbances but the same can be said for the opposite. Many previous studies that I've looked at focus on the fact that psychiatric disorders affect our sleep.

Breus, Michael J. "An Under-Examined Danger of Insomnia." *Psychology Today*. Sleep Newzzz, 27 June 2012. Web. 24 Feb. 2016. <<https://www.psychologytoday.com/blog/sleep-newzzz/201206/under-examined-danger-insomnia>>.

This article explores the dangers of insomnia, in and out of the workplace. It presents a lot of the same information about insomnia and sleep deprivation from other articles. It will be useful in my report for presenting statistics related to accidents caused by sleep deprivation.

Brown, Walter A. "Ancient Sleep in Modern Times." *Scientific American Mind* 17.6 (2006): 14-15. Academic Search Complete. Web. 18 Feb. 2016.

This article shows the sleeping patterns of our time and of ancient times. It shows why and how or sleep patterns have shifted. It describes segmented sleep and presents a study done showing how people can easily and naturally revert back into ancient sleep patterns. This article will be used in order to describe the history of our sleep patterns, how they've changed and why, and how we can recreate them.

Cohen, Arianne. "7 Physical Effects of Sleep Deprivation" *Details*. Details Magazine, Winter 2015. Web. 22 Feb. 2016.

This article shows the physical effects of sleep deprivation. It describes the effects on the heart, the brain, and the stomach, as well as on our reflexes and blood pressure among other things. It will be used in my report to outline the physical effects and damage sleep deprivation can cause on the body.

Doheny, Kathleen. "Women's Sleep Problems Up Diabetes Risk." *EndocrineWeb*. 5 Feb. 2016. Web. 29 Feb. 2016.

This news article shows the link between sleep problems and diabetes in women. It presents data on the fact that women who have sleep problems are at higher risk of developing diabetes and the more types of sleep problems a woman has the higher the risk is. This article will be used in the media section of my report to present data on the comorbidity of sleep problems and diabetes as well as the predominance of sleep problems in women.

Hegarty, Stephanie. "The Myth of the Eight-hour Sleep - BBC News." *BBC News*. BBC World Service, 22 Feb. 2012. Web. 31 Jan. 2016.

This article presents a historic theory that sleep was once segmented. It states our ancestors used to sleep in segments and also shows that some of our current problems

such as anxiety, depression, alcoholism, etc., could be due to our adopted patterns of . I plan to use this report as a big part of the history of my issue.

Jackson, Abi. "8 Ways to Sleep Better during and after the Menopause." *BT.com*. 2 Feb. 2016. Web. 29 Feb. 2016.

This article presents advice for menopausal and post-menopausal women on how to get a better sleep. It presents facts on why menopausal women have more trouble sleeping than pre-menopausal women as well as tips in order get a better sleep for those who fall into this category. This article will be used in the media section of my report in order to present facts on the predominance of sleep problems in women.

Lava, Neil, MD. "Sleep Disorders Pictures: REM / NREM Sleep Cycle Graphs, Keeping a Sleep Diary, and More." *WebMD*. WebMD, 21 Apr. 2015. Web. 04 Feb. 2016.

This slideshow provides brief overviews of what is a sleep disorder, the dangers of not getting enough sleep, symptoms of a sleep disorder, insomnia, sleep apnea, and numerous other sleep conditions, causes, treatments, and tips on having better sleep habits. It will be very useful in helping me define terms and find other sources for my research.

McKinsey & Company. *The Price of Fatigue: The Surprising Economic Costs of Unmanaged Sleep Apnea*. Boston: Division of Sleep Medicine Harvard Medical School, Dec. 2010. PDF.

A meta-analysis relying on existing data and focusing on the link between Sleep Apnea and the costs incurred. This study presents the estimated annual economic costs of Obstructive Sleep Apnea in the United States as well as how the awareness, diagnosis, and treatment of SOA are limited. I will be using this report as a guidance as it is an American source I will take it generally to base further research on.

MedicineNet. "High Blood Pressure Causes, Symptoms and Hypertension Diet." *MedicineNet*. 18 Feb. 2014. Web. 23 Feb. 2016.

This article describes the symptoms and causes of high blood pressure. It shows how high blood pressure affects the body and how to control it. It presents facts on the number of Americans suffering from high blood pressure and gives advice on how to control or reduce blood pressure through diet and exercise. This article will be used in order to describe what high blood pressure is and how it affects the body and sleep patterns.

Morin, Charles M., PhD. "Insomnia: Prevalence, Burden, and Consequences." *Insomnia Rounds* 1.1 (2012). *Insomnia Rounds*. Web. 31 Jan. 2016. <[http://css-scs.ca/downloadfolder/150-001\\_Eng.pdf](http://css-scs.ca/downloadfolder/150-001_Eng.pdf)>.

This source provides information on the prevalence and consequences of insomnia. It presents the costs associated, not only financially but psychosocially. It gives statistics on the number of Canadians suffering with insomnia and their increased risk of psychiatric disorders. This article will be useful my research in order to present the burden and costs of insomnia to Canadians.

NAFMP. "Project History." *North American Fatigue Management Program*. North American Fatigue Management Program. Web. 31 Jan. 2016.

This article gives an overview and history of a multi-year collaborative research. It provides me with a brief description of the reports I will be using further on in my research. It describes that the studies were done to test a fatigue management program for commercial vehicle operators by understanding the issues, opportunities, and challenges with managing operator fatigue in commercial trucking.

News, CBC. "Lack of Sleep Called 'global Epidemic'" *CBCnews*. CBC/Radio Canada, 8 Mar. 2011. Web. 21 Jan. 2016.

This report presents statistics on the hours of sleep the average Canadians are getting. The report concludes that the majority of Canadians are sleep-deprived. It also shows some side effects and consequences of sleep-deprivation. These statistics would be useful in my report by showing trends in statistics.

Path, Main. "Here's How Your Mobile Device Is Impacting Your Sleep." *CollectiveEvolution RSS*. Collective Evolution, 13 Sept. 2015. Web. 01 Feb. 2016.

This article shows that in the past fifty years, with the boom in technology, sleep quality and duration has significantly decreased. It shows that the blue light from cellphones has a big effect on the natural timing of the circadian clock, by repressing the production of melatonin causing significant sleeping problems. This light emits from not only cellphones, but tablets, some reading devices, and videogames. This source suggests ways to improve sleep by keeping our mobile devices in another room completely and investing in a regular alarm clock.

Peri, Camille. "How Skimping on Sleep Affects Your Work." *WebMD*. WebMD, 5 Feb. 2013. Web. 04 Feb. 2016.

Exactly as titled, this short article explains how sleep loss affects your brain. It shows that if you get less than seven hours of sleep you're not at your best abilities. It shows that regularly missing sleep can reduce attention and concentration, reaction time, decision making, and memory. This article will be very useful in presenting the consequences of sleep disorders and deprivation.

Pietrangelo, Ann. "Effects of Sleep Deprivation on the Body." *Healthline*. George Krucik, MD, MBA, 19 Aug. 2014. Web. 22 Feb. 2016.

This article shows the effects of sleep deprivation on the body from the central nervous system and the immune system to the respiratory, digestive, and cardiovascular system.

This article will be useful in describing the effects of sleep deprivation in my report and how it can cause, sometimes irreversible, damage.

Public Health Agency of Canada. *What Is the Impact of Sleep Apnea on Canadians?* Rep. Public Health Agency of Canada, 10 Dec. 2010. Web. 22 Feb. 2016.

This report presents the statistics and facts on Canadians with sleep apnea. What sleep apnea is, who it is affecting, and what are the causes. This report will be useful in describing what sleep apnea is and how it is affecting Canadians.

Sleep Review. "Research Warns About Sleep Disturbances in Cancer Patients - Sleep Review." *Sleep Review*. 23 Feb. 2016. Web. 29 Feb. 2016.

This news article talks about the comorbidity between cancer and sleep disturbance. It shows facts that sleep problems are present in cancer patients before and during treatment. It will be used in my report as a news article describing the link between cancer and sleep disturbance.

Sutton, D A, H Moldofsky, and E M Badley. "Insomnia And Health Problems In Canadians." *Sleep* 24.6 (2001): 665-670.*MEDLINE*. Web. 31 Jan. 2016.

This study determines a number of factors associated with insomnia. It reports on the prevalence of insomnia in Canadians above the age of 15 and identifies which factors contribute the most to this sleep disorder. This study is very helpful in my research as it either backs up or eliminates a number of other bivariate studies on the subject. It looks at

sociodemographic, lifestyle, health and stress factors and determines the most contributing factors.

Ting, Diane. "6 Symptoms of Hormonal Imbalance That Can Cause Health Changes." *Parent Herald RSS*. 29 Feb. 2016. Web. 29 Feb. 2016.

This news article presents 6 symptoms of hormonal imbalance in women. It shows that hormonal imbalance can cause sleep problems, among other things. This article shows that drops in progesterone can cause a disturbance in a woman's sleep problem before the arrival of her period. The article will be used in the media section of my report to present predominance of sleep problems in women.

Truck News. "Canadian Policy And Program Needed On Sleep Apnea Testing - Truck News." *Truck News*. 1 July 2009. Web. 31 Jan. 2016.

This article presents great information and statistics from the National Highway Traffic Safety Administration and the North American Fatigue Management Program. I will be using this report to present information about about the increasing risk of road accidents associated to sleep deprivation and drowsiness. The article also presents possible financial issues on regulating testing and treatment for Obstructive Sleep Apnea in commercial drivers across Canada and the United States.

Wickwire, Emerson M., PhD. "Financial Costs of Insomnia - Sleep Review." *Sleep Review*. 2 Dec. 2014. Web. 31 Jan. 2016.

This article outlines the costs associated to treatment of insomnia and which treatments are most cost-effective. It presents estimates of costs related to insomnia in the United States and what they include. It states that costs related to insomnia are growing each year and include treatment costs, costs for medical services, costs associated to increased



accident risk and loss of workplace productivity. The article suggests that in the long run, treating insomnia will save money.

Williams, Bill. "A History of Light and Lighting." *A History of Light and Lighting*. Bill Williams, 1999. Web. 22 Feb. 2016.

This is a timeline of the advent of lighting. It shows how lighting was discovered and where it started be used. This timeline will be used in order to pinpoint when changes in lighting occurred in society and when they started impacting our sleep patterns.