

Health service utilization among demented individuals with or without mood disorders in

Canada

By

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Abstract

Aim: To assess how comorbid mood disorders were associated with health service utilization of individuals with Alzheimer's disease or other dementias in a Canadian household population.

Methods: The study utilized a population-based secondary data analysis approach, using data from the Canadian Community Health Survey (CCHS) 2011-2012 annual component.

Results: Mood disorders were found to be more prevalent among persons with Alzheimer's disease or other dementias compared to those without (26.7% vs 7.7%). Multivariable analysis showed that individuals with Alzheimer's disease or other dementias and a comorbid mood disorder were more likely to use community and medical mental health services (AOR: 1.79, $P=0.030$) (AOR: 6.58, $P=0.000$).

Conclusion: The increased usage of health services in persons with Alzheimer's disease or other dementias and a comorbid mood disorder exhibit the importance of understanding the needs of these individuals to help shift public policy. This will aid researchers in developing and implementing improved services.

Keywords: Alzheimer's disease, dementia, mood disorders, health service utilization

Table of Contents

Acknowledgments.....	i
Abstract	ii
Table of Contents	iii
List of Figures	v
List of Tables	vi
List of Appendices	vii
Chapter 1: Introduction.....	1
1.1 Literature review strategy.....	3
1.2 Mental health.....	4
1.3 Mental health comorbidity in persons with dementia	6
1.4 Health Service Utilization	9
1.4.1 Community health service utilization of persons with dementia.....	9
1.4.2 Medical health service utilization of persons with dementia.....	12
1.4.3 Health services utilization of persons with mood disorders	16
1.4.4 Issues of non-access.....	18
1.5 Importance of early detection as applied to health service utilization	19
1.6 Gaps in knowledge	21
1.7 Rationale & Significance	21
1.8 Aims and objectives	22
1.9 Research Questions	23
1.10 Hypotheses	23
Chapter 2 Materials and Methods	24
2.1 Research Design	24

2.2 Data Source	24
2.3 Statistical Analysis	27
2.4 Ethical Considerations.....	31
Chapter 3: Results.....	33
3.1 Prevalence of mood disorders in the Alzheimer’s disease or other dementias	35
3.2 Descriptive statistics by mood disorder of adults with Alzheimer’s disease or other dementias in the community household sample for individuals who were asked about community care	39
3.3 Descriptive statistics by medical mental health service use of adults with Alzheimer’s disease or other dementias in the community household sample excluding proxy interview	45
3.4 Binary logistic regression by community health service use of adults with Alzheimer’s disease or other dementias in the community household sample for individuals who were asked about community care.....	50
3.5 Binary logistic regression by medical mental health service use of adults with Alzheimer’s disease or other dementias in the community household sample excluding proxy interview	51
Chapter 4: Discussion	53
4.1 Study Strengths and Limitations	61
4.2 Implications for Future Research and Practice	65
4.3 Conclusion.....	67
References.....	69

List of Figures

Figure 1:	Participant breakdown from original CCHS sample	34
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List of Tables

Table 1: Characteristics of older adults with Alzheimer’s disease or other dementias with or without a comorbid mood disorder, Community household population aged 35 years and over, Canada, 2011-2012	36
Table 2: Un-weighted prevalence of mood disorders with and without AD&D.....	38
Table 3: Weighted prevalence of mood disorders with and without AD&D.....	39
Table 4: Characteristics of older adults with Alzheimer’s disease or other dementias with or without a comorbid mood disorder, Community household population aged 35 years and over, Canada, who were asked about their community health service utilization. Sample includes Alberta, New Brunswick, Ontario and Newfoundland and Labrador, 2011-2012	43
Table 5: Characteristics of older adults with Alzheimer’s disease or other dementias with or without a comorbid mood disorder, Community household population aged 35 years and over, Canada, who were asked about their medical mental health service use.	48
Table 6: Binary logisting regression predicting past year community health service use among adults with Alzheimer’s disease or other dementia	51
Table 7: Binary logistic regression predicting past year medical mental health service use among adults with Alzheimer’s disease or other dementias	52

List of Appendices

Appendix A:	Glossary	76
Appendix B:	Ethical Approval	80
Appendix C:	Statistics Canada Remote Access Application	81

Chapter 1: Introduction

Dementia is considered one of the most debilitating health conditions in the world. Its most common form, Alzheimer's disease, is now among the leading causes of death in many developed countries.¹ Dementia is characterized by progressive deterioration of thinking ability and memory as the brain becomes damaged.² Alzheimer's disease specifically is the death of brain cells when cell to cell connections are lost.² Our society is aging at an unparalleled rate.³ This is largely due to the aging of the baby boomer generation who were born from 1946 to 1965. It was estimated that by 2031 there will be nine million Canadians over the age of 65.⁴ Dementia is an age-related condition. As population ages one can expect the prevalence of dementia to increase. Our aging society, coupled with an increasingly longer life expectancy, will only lead to a greater number of affected persons.⁵ Dementia is a neurological disorder that affects people of all cultures, educational and income levels. It also leads to both social and occupational functioning decline.⁶ Globally, 35.6 million people were living with dementia in 2010. This number is estimated to double every 20 years, with the greatest increase in low and middle income countries.⁷

In Canada, the Alzheimer's Society of Canada has taken steps to forecast the burden of dementia in Canada. The *Rising Tide Report* provided details and recommendations for the Canadian government in approaching dementia care.² The forecasts commissioned provide great insight into how dementia will affect Canadians.² Some key points in this study included that there was a new case every five minutes in 2008 and that in there will be a new case every two minutes in Canada.² Furthermore, the prevalence is projected to increase from 480,600 people in 2008 to 1,125,200 people

in 2038. This shows us that over the next 25 years the prevalence of dementia is expected to more than double in Canada.² The total economic burden of dementia in 2008 alone was 14.9 billion dollars. From this, the total direct costs were 8.1 billion dollars, the total indirect costs were 1.8 billion dollars and the total unpaid caregiver's opportunity costs were 5 billion dollars.² These numbers are expected to increase to 36.7 billion dollars for total economic burden by 2018 with 19.5 billion in total direct costs, 4.8 billion in total indirect costs and 12.3 billion in total unpaid caregiver's opportunity costs.² By 2038 the total economic burden is estimated at 152.6 billion dollars with 92.8 billion in total direct costs, 4.1 billion in total indirect costs, and 55.7 billion in total unpaid caregiver's opportunity costs.² Direct costs pertaining to dementia include prescription medication, long-term care staff costs, support staff costs, and physician and hospital costs. Indirect costs of dementia include loss in wages, and in corporate profits that result from the reduction in labour productivity. Opportunity costs of informal caregivers are the wages these caregivers could have earned had they been able to participate in the work force.² This report provides a positive step towards mitigating the impact of dementia in Canada. However, it does not provide any insight into how mental health comorbidity will affect service utilization. Understanding the role of comorbidity in dementia is an integral and important part of forecasting burden, treatment options, and funding allocation in the future.

Appropriate health service utilization should be a priority in Canada. Research shows that persons with dementia utilize more medical health services, such as long-term care beds but utilize community health resources less frequently.⁸⁻¹² In the same report, the Alzheimer's Society predicted there will be a shortage of long-term care beds due to

the increases in the number of individuals with dementia over the next 3 decades.² This shortage is expected to be picked up by community health services, making research that examines how persons with dementia utilize health services even more important than ever before to mitigate both the increased direct and indirect costs associated with economic and health burden.⁹

1.1 Literature review strategy

A literature review was conducted to identify current research of medical and community health service utilization among persons with dementia and comorbid mood disorders. The literature search was conducted using ProQuest, Medline, and PubMed. To complete this search, specific keywords were devised. Included in these keywords were dementia, Alzheimer's disease, service utilization, service use, depression, mental health, bipolar, and mood disorder. Multiple combinations of these keywords were used together to examine the current work available. Searches were logged as to not repeat the same search more than once, and to not duplicate results of articles. The literature will be limited to articles within a ten year period from January 2005 to January 2014. These articles were limited to English, full text scholarly and peer reviewed articles such as quantitative studies and review articles. Excluded from searches were letters to the editor, meta-summaries, qualitative studies and individual reports. Articles from Canada were the primary focus, although articles from United States of America and other countries were included if deemed relevant. Identified articles were reviewed for appropriateness for the study. To maximize the literature, additional relevant articles were identified by reviewing the references section of each selected article.

1.2 Mental health

Mental health is a fundamental component of good health. The World Health Organization¹⁰ defines mental health as “a state of well-being in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community.” Persons with dementia often have poor mental health.¹¹ These people have continuous cognitive decline such as memory deficits, language difficulties, and loss of executive function.¹² Persons with dementia also have a range of psychiatric symptoms such as delirium, depression, and anxiety.¹² These psychiatric symptoms lead to excess disability and a lower quality of life.¹¹

Mental health affects all people, directly or indirectly. The Canadian Mental Health Association estimates that 8% of Canadian adults will experience major depression at some time in their lives.¹³ This is also highlighted in a study by Patten and colleagues¹⁴ who utilized data from the Canadian Community Health Survey (CCHS). Using this survey it is estimated that 12.2% of the Canadian population experienced a major depressive episode. It was also seen that women have a higher prevalence of major depression, in comparison to men.¹⁴ Depression is also related to other chronic conditions, such as dementia, as well as the social determinants of health¹⁴ Factors such as employment and working conditions, food insecurity, social exclusion, unemployment, and income levels are all associated with depression.^{14 15} Persons who are married had the lowest prevalence of depression.¹⁴ This study found that the older single males had higher prevalence of depression.

Mental health promotion speaks to the actions that are taken in an effort to strengthen mental health of all people and subgroups of people in a population.¹⁶ Mental health promotion is important specifically for persons with dementia as it has a strong focus on the improvement of well-being. As there is still no cure for dementia, the primary focus is on managing symptoms such as memory loss and on improving the well-being of those affected.¹⁶

Mental health promotion enhances capacity to take control of life and health, promotes resiliency, relies on intersectoral linkages, and takes a positive perspective.¹⁶ Through mental health promotion we can help reduce the impact of dementia and other cognitive degenerative diseases that are exceedingly prevalent in the age cohort of 65 and older.¹⁷ Community mental health programs that offer physical activity, social engagement, and cognitive activities are valuable examples of mental health promotion. These health promotion activities have shown to have positive health outcomes in increasing cognition and helping slow the onset dementia in some cases.¹⁷

By targeting selected specific at risk groups, mental health promotion would allow individuals to take control of their own health outcomes in terms of managing their own conditions. If we can begin to encourage people in the early stages of dementia onset to take advantage of such programs offered by communities, we can potentially improve their health and well-being.¹⁷ For example, persons with dementia and a mood disorder, such as depression, would feel less isolation in their conditions by learning positive coping methods, which in turn lowers the burden of dementia.

1.3 Mental health comorbidity in persons with dementia

Mental health and psychiatric symptoms are common in persons with dementia. Evidence suggests that psychiatric symptoms can be a warning sign of dementia.¹¹ Moreover, mental health comorbidity lowers the quality of life of persons with dementia, and increases morbidity. This leads to an increase in disease burden of and increases the difficulty of treatment.¹¹ Other research has shown that depression is a common mental health comorbidity among persons with dementia.¹² Depression is difficult to diagnose within the dementia population due to overlapping symptoms between the diseases.^{12, 18} These overlapping symptoms make the complexity of dementia and depression difficult to understand. Bhat and Rockwood¹¹ found that depression was noted in up to 25% of persons with dementia. It was further shown that depressive symptoms can be present in over 80% of persons with dementia, and can affect up to 50% of persons with Alzheimer's disease.¹⁹ People with a history of mental health issues are also at an increased risk of developing comorbid depression with dementia.¹⁹ Onset of dementia has also been linked to the prevalence of comorbid depression.¹⁹ The earlier the age of onset of dementia is, the greater likelihood of major depressive symptoms developing. 30% of persons with Alzheimer's disease have seen major depression.¹⁹ The overlapping symptoms between dementia and depression play a role in service utilization. If individuals are not being diagnosed, they will not utilize the services available to them. Furthermore, the overlap of symptoms between dementia and depression can lead physicians to diagnose dementia at varying severities if symptomology of both diseases are not clearly understood.¹⁹ This difficulty in diagnosis makes the criteria for defining depression among person with dementia very important.

Depression and other mood disorders are often underdiagnosed in the general population.²⁰ Having dementia makes diagnoses of mood disorders even more difficult.²¹ In a study by Kales, only 35% of patients with coexisting dementia and depression were correctly diagnosed and receiving adequate treatment for their depression.²¹ There are many symptoms that are present in both depression and dementia.²¹ Archery²² noted that depression has atypical symptoms which may be mistaken for symptoms in persons with dementia. The fact that depression can mask itself as psychotic delusions coinciding with agitation could contribute to further difficulties in characterizing depression in the dementia population. Also, as Barua and colleagues iterate²³, when looking at an older population subgroup, you have to be cautious in which symptoms are attributed from general aging and which can be attributed to depression.²³ For example, using a symptom such as inattentiveness in a depression diagnosis would be a poor choice. On the other hand, verbal fluency is a better choice when differentiating between depressed and regular aging.²³

Differing depression rating scales or tests and available diagnostic criteria can cause issues in defining and identifying depression.²⁴ Scales such as the Beck Depression Inventory and the Geriatric Depression scale are used extensively in depression diagnosis. The Beck Depression Inventory (BDI-II) has been proven to demonstrate good reliability and validity in clinical and nonclinical samples.^{25 26} Interestingly, the Geriatric Depression scale has been demonstrated to be a reliable screening tool for depressive symptoms in persons with mild cognitive impairment, but not in persons with Alzheimer's disease or other dementia.²⁷ Research conducted by Bergen²⁰ shows that depression is difficult to diagnose even without additional

overlapping symptoms like those found in persons with dementia. Their research also highlighted the importance of a multidisciplinary approach. It was found that a multidisciplinary approach is best suited for treatment of depression. In this way a team of health care professionals can combine their individual expertise and this can lead to more effective management.²⁰ Unfortunately, most depression was not diagnosed this way, but through a consultation with a primary care physician and a referral to a specialist (e.g. psychiatrist, neurologist). This makes the importance of adequate health service utilization critical to the timely diagnosis of depression.

A study by Porta-Etessam and colleagues²⁴ found that persons with depression and depressive symptoms had reduced physical functional status (e.g. walking, brushing teeth). A lower functioning status further reduces the independence of persons with dementia. As a result, lower functioning statuses within this population effect their access to health care services, and in turn their health care utilization.²⁴ This is particularly detrimental for persons with dementia, as lower physical functioning was related to an increase in the need to be institutionalized.²⁴

There has also been seen to be an increase of dementia in persons with bipolar disorder.²⁸ Specifically, bipolar disorder, as seen in major depression, can also worsen the course of dementia.²⁸ Bipolar and dementia also share similar symptomology.²⁹ Agitation, psychotic, mood and cognitive symptoms are present in both, however, with dementia having a much stronger focus on cognitive symptoms. Interestingly, diagnosis of dementia increased by 6% for every readmission of bipolar patients to the hospital.²⁸ Persons with both dementia and bipolar disorder were also seen to be hospitalized much more than persons with just dementia.²⁸ This is particularly important as it shows

persons with dementia and bipolar disorder may use health care services more regularly than persons with dementia and no bipolar disorder.

1.4 Health Service Utilization

The use of health services for persons with dementia is important. Health care utilization refers to the measure of the population's use of the health care services available to them. Evidence suggests that the level of access and use of both community and medical health services is different in the dementia population compared to the general population.³⁰ When compared to the general population, access to medical care services such as primary care physicians is higher among persons with dementia.

Community services access as well as access to a specialist (e.g. neurologists) is lower.³¹ The only exception is access to a mental health care specialist, such as a psychiatrist. This is extremely important as dementia has a high prevalence of mental health comorbidities.

²³ Accessing health care services is important for positive health outcomes in persons with dementia and for maintaining health related quality of life.³¹ Indeed, the ability for persons with dementia to utilize community health services is critically important not only to maintain a healthy population, but to minimize the growing financial burden on the health care system.²

1.4.1 Community health service utilization of persons with dementia

A systematic review by Weber and colleagues³¹ examined the utilization of community health services in the United States. The authors found that community health services are largely underutilized among persons with dementia. Community services are services and support to help people with care needs to live as independently as possible in their communities.³² Services that fall under community health services include adult day

care services, meal plans, transportation services (e.g. meals on wheels), counselling services, support groups, and physical therapy. In Canada, community health services can be provided either privately or publically, and differ from province to province. A study by Hill and colleagues³³ looked at community health service utilization as it pertained to persons with dementia who did not use services such as caregiver assistance. It was found that those who did not receive assistance were less compliant with medications and less likely to follow physician directives and care plans.³³ Without proper utilization of community services it would limit persons with dementia in adequately managing their condition and any other comorbidities of dementia.

Community health services play an integral part of managing mental illness in persons with dementia. Evidence suggests that as mental health and community services expand, there is a concomitant increase in health service use due to an increased availability.³⁰ Moreover, it is also reported that access to mental health services in other geographical areas, such as central regions compared to northern and coastal areas actually decreases.³⁰ The service use differentiated across different counties within the Hill study group. The variance in service utilization was associated with the following social determinants of health including insurance status, age, and poverty rate within the community.³³ This suggests that service utilization was associated with various key social determinants of health, and how readily available the community makes its services to persons with dementia in terms of location and costs.

Based on the systematic review by Weber³¹ the average rates of service utilization for persons with dementia in the United States can be derived. For home health services the rate varied between 3.8 to 9.67 yearly home visits. This was shown through

examining three studies by Hill³³, Richards³⁴, and Fillet³⁵ in the United States. Hill³³ reported 4.87 for Alzheimer's disease and 7.62 for vascular dementia home health visits a year. Other studies found an average of 3.8 visits a year and 9.67 visits a year respectively in the United States.^{34 35} When examining the variable of adult day care, three studies were examined in the systematic review on how persons with dementia utilized this service. Toseland and colleagues³⁶ found that 15.5% of their study group in the United States attended adult day care in a year. A study by Collins et al,³⁷ found that 9.7% of their participants from the United States used day care in the past three months, and in a study by Leon et al,³⁸ found that 18% of their sample used the service in the past month in the United States. When looking at meal delivery service use of persons with dementia in the United States the data varied between 3.2%- 27.6%.^{36 37 39} Although there is a wide range, these numbers suggested that service utilization and access were quite low. When looking at transportation assistance, the numbers are similar to that of delivered meals. The rate of transportation utilization in the United States it was between 5.4% and 22.7% depending on the study.^{36 39 37} The study by Toseland³⁶ had the highest rates of utilization at 22.7%. The final community service that Weber³¹ looked at was counseling, support groups, and respite care in the United States. Other studies^{36 37 39} also reported very low usage of community service in the United States, ranging from 3.2% - 13.7%. There is currently a lack of literature on Canadian data for service utilization.

In Canada, previous studies have used the Canadian Community Health Survey (CCHS) to examine the use of community-based health services for persons with dementia.⁴⁰ It was found that 46.9% of people used personal care, 47.9% used nursing care, 35.6% received care for housework, 18.7% used meal assistance programs, and

18.5% of people used respite care.⁴⁰ In this study, gender was found to be very important in determining community based service utilization. Women reported better health and received more supportive care, but had more unmet home care needs than men.⁴⁰ However, this study did not look at persons with dementia with comorbid mental conditions.

1.4.2 Medical health service utilization of persons with dementia

The systematic review by Weber and colleagues³¹ mentioned previously also reported on the medical health service utilization of persons with dementia. In comparison, medical health services were used by persons with dementia to a much higher degree.³¹ Services such as primary care physician visits, hospitalizations, and emergency room visits are all examples of medical health services that are employed extensively by persons with dementia.³¹ The only exception to these services is that of specialist physician visits (e.g. neurologist, psychiatrists). Persons with dementia do not access specialist care except in the instance of psychiatric care. Persons with dementia use the specialist services of a psychiatrist frequently.³¹ Similar findings were noted in a study conducted in a Houston Veterans Affairs Medical Center by Kunik and colleagues.⁴¹ In this study two thirds of the sample of persons with dementia has a psychiatric comorbidity. After a two year health service research examination was completed it was found that persons with dementia and a comorbid psychiatric condition such as depression had higher rates of psychiatric inpatient and outpatient care when compared to persons with dementia and no comorbidity in comparison to individuals without a diagnosis of dementia. This increase in use of psychiatric services has been attributed to

the high rate of psychiatric symptoms.⁴¹ Psychiatric comorbidity has a strong effect on the likelihood of psychiatric service use.⁴¹

Further research that explored the utilization of medical health services in persons with dementia was conducted by Arrighi and colleagues.⁸ This research looked at persons with dementia who had functional limitations in the United States from 2001 to 2005. This study used data from the National Health Interview Survey, which is an in-person survey of the population that is non-institutionalized. The purpose was to assess how persons with dementia used medical health services and how functional limitations affected this service use. It was concluded that persons with physical functional limitations and dementia used medical services such as mental health professionals, nurse practitioners, and emergency rooms more frequently than persons without any physical functional limitations or physical functional limitations unrelated to dementia (e.g. amputations, wheel-chair bound).⁸ Similar results were found in a study by Hill and colleagues.³³ The study also compared healthcare utilization among persons with vascular dementia to service utilization of persons with cerebrovascular disease, Alzheimer's disease, other dementias, and a control group. It was found that persons with vascular dementia had significantly higher hospital admission and hospital days compared to the other four groups.³³ When comparing vascular dementia to cerebrovascular disease, it was found that persons with dementia had twice as many hospital admissions (0.83 vs. 0.46), three times as many hospital days (10.35 vs. 3.59), and approximately five more days per hospital admission (12.5 days vs. 7.8 days).³³

A Finnish study by Aaltonen used data from the National Health Registrars within specific time periods to determine health service use by persons with dementia, in

comparison to those without dementia.¹ The investigators found that persons with dementia used long term care facilities more frequently, but used hospital and home care to a much lesser extent.¹ This is an important study because it suggests that persons with dementia are not accessing services that would allow them to even be diagnosed in the first place with comorbid depression.

Grober and colleagues⁴² conducted a study to examine dementia and medical comorbidities and their role in health service utilization.⁴² It was found that while examining emergency room department visits from a group of older age adults that both dementia and comorbidities independently were associated with more emergency room visits and hospital admissions.^{42 43} Other research concluded that primary care physicians are not to be relied on exclusively for the treatment of Alzheimer's disease and dementia in general.⁴⁴ The study by Aupperle⁴⁴ used a cohort study which compared two subgroups of persons with dementia based on care received. One group only was seen by primary care physicians, while the other group saw both primary care and a geriatric psychiatry faculty member. The results showed that persons who only saw a primary care physician had a higher rate of institutionalization, higher clinical dementia rating, and less of the recommended drug treatment prescribed to them. The opposite was seen when compared to the subgroup of which in addition to a primary care physician also saw a geriatric psychiatry faculty member.⁴⁴ This finding suggests that persons with dementia who only see a primary care physician utilize more services, both medical and community based. Persons with dementia are using the services more with only the primary care physician, but perhaps the rates of those services are being utilized is not appropriate or efficient.⁴⁴ It also appears that under the care of a geriatric psychiatrist,

more psychotropic medication is being prescribed. This may be a possible reasoning for the lower levels of use of services in this subgroup of geriatric psychiatry care.

There are many studies that looked at how often persons with dementia utilized the service of outpatient physician visits. Hill and colleagues³³ studied health maintenance organization (HMO) with 100,000 participants over a three-year span. They found that persons with Alzheimer's disease visited a physician office 9.12 times a year; 6.82 times for persons with vascular dementia, and 7.31 times for other dementias.³³ These numbers were also similar to studies by Richards et al,³⁴ and Zhao et al,⁴⁵ who found that persons with dementia had an average of 9.00 and 8.46 visits a year respectively in the United States.

With respect to specialist (e.g. psychiatrists, neurologists) visits for outpatient care among persons with dementia, Kunik and colleagues⁴⁶ examined the number of times study participants visited a specialist during a one-year period in the United States. They found that on average, persons with dementia spent 5.75 psychiatric outpatient visits per year.⁴⁶ A similar figure was shown in a study by McCormick et al.⁴⁷ This study looked at specialist visits of already deceased persons with dementia. They witnessed a mean of 5.8 times during their last three years of life.⁴⁷ However, this study did not disseminate exactly which specialist study participants were visiting.

There are a variety of studies that have reviewed hospitalization rates of persons with dementia in the United States. Eaker and colleagues⁴⁸ reported that persons with dementia averaged 3.0 hospital days if they had Alzheimer's disease, and 3.7 days for other dementias.⁴⁸ This research conflicted with other research such as Fillit³⁵ and

colleagues and Hill,³³ where much lower rates of hospital admissions for persons with dementia were observed at 0.61 days and 0.50 days, respectively.

Eaker and colleagues⁴⁸ found that persons with Alzheimer's disease used the emergency room approximately 2.3 times a year before an official diagnosis, and this number increased to 2.7 after a diagnosis was made.⁴⁸ This was comparable to another study by Richards and associates³⁴ who found that the yearly average of emergency room visits was 2.0 times a year. Other studies by Fillit³⁵, McCormick⁴⁷, and Bass⁴⁹ in the United States, saw lower averages ranging from 0.43 and 1.3 times a year.

In Canada, a previous study of the CCHS looked at the medical service utilization of persons with dementia.⁴⁰ It was found that 96.2% of persons with dementia saw a family physician in the past 12 months. This study further classified consultation with a health-care provider into multiple categories. Other physician consultations were seen to be used 44% in one year. Eye specialists were used 50.1% in a year, dentists were used 41.5%, nurses were seen 30.0%, and a social worker was seen 19.5% in one year.⁴⁰ This study also found that 27.8% of persons with dementia were hospitalized within the past year.⁴⁰

1.4.3 Health services utilization of persons with mood disorders

The Canadian Mental Health Association estimates that almost one half of individuals who have suffered from either anxiety or depression have never gone to a physician to seek help for their problem.¹³ Mental health disease, specifically depression can significantly contribute to lower medical health service utilization within the older adult population, largely due to stigma.⁵⁰ This study utilized the CCHS to characterize

service use of seniors with mental health problems. Seniors living with depression were more likely to have access to a psychiatrist or family physician, but a very small number of them actually did.⁵⁰ Hence, although they access services more often than the general population, it still would appear to be insufficient to meet unmet needs. This was shown in the literature with another common mental health issue in older adults; namely anxiety. Mental health service use among those with anxiety disorders has been underutilized within the older age demographic in Canada.⁵¹ Although seniors with mental health concerns are accessing more health care services, they are still not utilizing the amount of services they should be based on their noted needs. In some literature; however, it was suggested that depression leads to a greater health service utilization.^{52 53} For example, a study by Qureshi and colleagues looked at veterans with Parkinson disease with comorbid depression in the United States. They found that dementia persons who had comorbid depression used dementia medication and other health services more than those without depression.⁵²

A study conducted by Crabb and Hunsley⁵⁴ on the utilization of mental health care services among older adults who had depression in Canada came to the conclusion that although there are many services available for older adults, a very small amount access any of them.⁵⁴ This Canadian data conflicts with some of the other published research in that they state persons with depression access services readily, but not in the numbers they should be.⁵² This study also claimed that only small numbers of persons in the 65 and older age group with depression access any kind of care at all.

1.4.4 Issues of non-access

Persons seeking health care services for mental illness such as dementia and mood disorders experience a great deal of social stigma. Persons with dementia are seen as incapable, and old. These ageist attitudes can negatively affect care experiences in older adults.⁵⁵ Stigma is when groups of people are shamed, excluded, or discriminated against without any just causes. In addition, stigma can further inhibit persons with dementia from accessing and utilizing community or medical mental health services adequately.⁵⁶

Among persons with early onset dementia, it has been seen that stigma has led many individuals to conceal their mental health symptoms.⁵⁶ This effectively delays their access to the necessary medical or community health care services they require. There was also a belief among persons with dementia, their family members and even health care professionals that services did not have anything to offer in terms of improving symptoms or quality of life; which may have contributed to the underdiagnoses of persons with mental illness. This contributed to the underdiagnoses of persons with mental illness from medical professionals. Issues that arise from stigma attached to mental illness, directly impact health service utilization. Education of primary care physicians and other health care professionals as well as the public will need to be implemented to address this issue. Education will ensure that those who are in need of the services will have the opportunity and availability to access the resources adequately.⁵⁶

Stigma of mental illness also impacts persons with mood disorders. Research has shown that for psychiatric disorders, individuals with mental illness have a higher degree of stigma than for other health conditions.⁵⁷ For depression, stigma prevents people from seeking care or using mental health services available to them. It was also seen to lower

the quality of life and worsen health care outcomes.⁵⁷ For persons with dementia and comorbid mood disorders, stigma is especially important to address. Studies have shown small cognitive improvements in people who adequately utilize home care services.⁴⁹ These individuals are particularly vulnerable to stigma being in an older age demographic with more than just one mental illness. In order to promote mental health, persons with dementia and depression need to be aware of the services available to them in their communities. Among persons with dementia who do not have proper access to community services (i.e. home services) they often have a higher rate of institutionalization.⁵⁸

1.5 Importance of early detection as applied to health service utilization

As found by Bartfay and colleagues⁵ the importance of early detection of persons with dementia is imperative for reducing both patient and caregiver burden. Individuals with dementia are considered to be high users of health care resources. As seen above, persons with dementia use many more health care services, compared to that of the general population. A study by Weimer and Sager⁵⁹ saw that many patients were not being diagnosed or were being diagnosed at much later stages of the disease. Resources needed for care will differ depending on stage of disease. If persons with dementia are being diagnosed at an earlier time, high levels of care may be delayed.⁹ Although the prevention of dementia is an ambition, delaying disability may be the more achievable goal. Small delays in the onset and progression of Alzheimer's disease can reduce the global burden of disease.⁹

Evidence also suggests that emergency room visits, and institutionalization rates would lower if the disease onset or progression was delayed.² This would lower the

economic burden associated with dementia. This makes the role of primary care physicians and other health care professional's especially important for diagnosing and educating clients about health care services available in their community or region.

1.6 Summary

Dementia is a progressive and crippling health condition. ¹ Not only is this an issue for Canada, but it is an issue for many developed countries as a leading cause of death. As previously discussed, the prevalence of dementia in Canada is expected to double by 2038 to nearly 1.1 million. ² Mental health comorbidity within persons with dementia is common. ¹¹ Dementia shares many psychiatric symptoms that are common in many mood disorders, leading to an underdiagnoses of mood disorders. ¹⁹ Studies have suggested that persons with mood disorders such as depression have a reduced physical functional status. This further limits independence, affects access to health care services and leads to an increased need for institutionalization.

Health service utilization differs in persons with dementia. ³⁰ Medical mental health services include primary care physician visits, hospitalizations, ER visits and use of a specialist. These services are typically used to a much higher degree, with the exception of specialists. Specialists, such as an optometrist or dentist are used less while psychiatrists and psychologists are used more. The available research was largely focussed on the United States. Community health services include day care, meal plans, transportation services, counselling, etc. Persons with dementia have been seen to underutilize community health services. ³¹ These services play an important role in the managing of a mental illness. ³⁰ Again, the vast majority of research available was conducted in the United States.

1.7 Gaps in knowledge

There has been a large amount of research into service use by persons with depression and mood disorders in Canada. There was also a great deal of literature on service utilization of individuals with dementia. However, there was no information on service use of the dementia subgroup within that population. There is a gap in the literature related to knowledge of dementia and mood disorders together and how service utilization in the dementia population is changed by comorbid mood disorders. As prevalence of dementia in Canada and other countries around the world continue to increase, more knowledge into the understanding of the impacts on health care services use is imperative for future researchers and policy makers.²⁷

1.8 Rationale & Significance

Dementia has been recognized as an impending issue in Canada. However, there is a lack of research into health care service utilization among persons with dementia who also suffer from mental health comorbidity, such as a mood disorder, and how comorbidity would affect service utilization. There is also a limited amount of investigations examining how mental illness affects service use by individuals with dementia. Furthermore, the majority of these studies were out of date, and none were from Canada specifically. This shows the need for more research in assessing the impact of mood disorders as they relate to health service utilization among persons with dementia. Research is also needed to examine the prevalence of mood disorders among persons with dementia from a uniquely Canadian perspective. This will provide us with insights into both barriers to service utilization and how funding is being spent.

By studying service utilization of persons with dementia and comorbid mood disorders we will be better equipped to understand which health care services are being utilized and which are not. With the expected increase in prevalence of both dementia and mood disorders, costs of treating persons with dementia will only increase.² Understanding which services need to be utilized could lead to better financial allocation and changes in policy to help mitigate the financial impact that dementia will have in the future.

This study was constructed to understand which health care services in Canada are being utilized by persons with dementia and how clinically diagnosed mood disorders affects that service utilization. The next section will discuss the specific aims and objectives of this study, including the research questions that will be examined.

1.9 Aims and objectives

This study will examine how having mood disorders and dementia are associated with health care service utilization in Canada. The primary aim of this research is to assess how comorbid mood disorders are associated with health service utilization of persons with dementia. This study will also look at the prevalence of clinically diagnosed mood disorders among persons with dementia. It will examine which services are utilized the most and which services are underutilized by persons with dementia and mood disorders. This study will also provide important insight into possible barriers for access for this, noted population; as well as determining where potential health service funding should be reallocated.

1.10 Research Questions

This research study focuses on the following three main research questions that address mood disorders in persons with dementia and how this relates to service utilization:

- 1) What is the prevalence of mood disorders in persons with dementia in Canada?
- 2) Will persons with dementia and comorbid mood disorders in Canada access community health services more or less than persons with dementia but no mood disorder?
- 3) Will persons with dementia and comorbid mood disorders in Canada access medical mental health services more or less than persons with dementia but no mood disorder?

1.11 Hypotheses

This research study will critically examine the following three hypotheses:

- 1) Prevalence of mood disorders is higher among persons with dementia than persons without dementia;
- 2) Persons with mood disorders and mood disorders will be more likely to access medical mental health services than persons with dementia but no mood disorders, and
- 3) Persons with dementia and mood disorders are less likely to access community health services than persons with dementia but no mood disorders

Chapter 2 Materials and Methods

To achieve the noted aim of this study, a population-based secondary data analysis approach was employed. The study population includes persons from Canada with diagnosed dementia and a comorbid diagnosed mood disorder in the years 2011-2012.

2.1 Research Design

Quantitative studies are useful in dealing with large population samples and determining trends.⁶⁰ They are very useful in letting us look at a population and seeing trends that affect many people. This study used a quantitative secondary data analysis approach in analysing a large set of data from a nationwide self-report survey. Through this approach the study gained insightful details into how persons with dementia and a comorbid mood disorder were using health services, and what the prevalence of a mood disorder was among persons with dementia within the Canadian population.

This cross-sectional study has allowed us to see which services were being used in persons with dementia and comorbid mood disorders. Hence, I was able to examine which health care services are being utilized or underutilized and address why.

2.2 Data Source

The data for this study came from the Canadian Community Health Survey (CCHS) 2011-2012 annual component. Data were collected by the Statistics Canada-Health Statistics division, population health survey. The CCHS is a cross-sectional, nationally representative survey. Data were collected from January, 2011 to December, 2012 directly from survey respondents and interviews are voluntary in nature. This

survey was administered using computer-assisted interviewing (CAI).⁶¹ For persons with dementia who were not capable of participating fully due to their condition, as was assessed by the trained interviewer, a household member served as proxy. Although proxy interviews allow for reporting, they pose a limitation in reliable reporting. The purpose of the annual component was to support health surveillance programs by providing health data at the national, provincial and intra-provincial levels; provide a single data source for health research on small populations and rare characteristics; timely release of information easily accessible to a diverse community of users; and create a flexible survey instrument that includes rapid response option to address emerging issues related to the health of the population .⁶¹ Researchers from various fields used the information to conduct research to improve health. As well, government agencies such as the federal and provincial departments, and social service agencies use the information to monitor, plan, implement and evaluate programs to improve the health of the Canadian population.⁶¹ This survey included information related to health, health care services, lifestyle and social conditions, social economic status, age, sex, and mental health and well-being for the Canadian population.⁶¹

The survey took into account respondents over the age of 12 living in private dwellings in the 115 health regions covering the ten provinces and the three territories. It did not take into account persons living on reserves and other Aboriginal settlements; full-time members of the Canadian Forces and the institutionalized population. These exclusions only represented approximately 3% of the target population. The CCHS covered approximately 98% of the Canadian population aged 12 and over. The CCHS aimed for a sample of 65,000 respondents each year to provide reliable estimates by

province for four age groups (15-24, 25-44, 45-64 and 65+) and by sex. For the 2011-2012 component a targeted sample size of 131,498 was attempted. CAI has many benefits. Having the data collected already in a computer allowed for easy dissemination. It also allowed for specific variables in the data easy to search and identify even when coded.⁶² Creating this data set quickly further allowed for easy transfer of the data to systems such as Statistical Package for the Social Sciences (SPSS) and other statistical software.⁶² Statistics Canada,⁶¹ has also outlined a variety of advantages of using CAI over other collection methods. Question text, such as reference periods and pronouns were easily automatically customised to address factors such as age and sex of the respondent, the date of the interview and answers to previous questions. CAI also allowed for edits to check for inconsistent answers or out-of-range responses. The system automatically applied changes to the data and on-screen prompts are seen when an invalid entry is recorded. The survey was also much more efficient as questions that are not applicable to the respondent are automatically skipped in the survey and not tabulated as part of the results.⁶³ Reliable estimates were required at national, provincial levels and individual health region levels. The CCHS used three sampling frames to select the sample of households. 40.5% of the sample came from the area frame, 58.5% came from a list frame of telephone numbers and the remaining 1% came from a Random Digit Dialling (RDD) sampling frame.⁶³

The Labour Force Survey (LFS) was used as the area frame. In this frame the clusters are selected using a sampling method with a probability proportional to size. From this, the final sample is chosen using a systematic sampling of dwellings in the cluster. The CCHS uses the LFS clusters, which it then stratifies by health regions. It then

lastly selects a sample of clusters and swellings in each HR. The list frame of telephone numbers is used in all but 5 health regions to complement the area frame. The list frame consists of the Canada Phone directory which is an external administrative database of names, addresses and telephone numbers from telephone directories in Canada updated every six months. Telephone numbers are selected using a random sampling process in each health region. In four health regions, a Random Digit Dialling (RDD) sampling frame of telephone numbers is used in accordance with the working banks technique. Only 100-number banks with at least one valid residential telephone number are retained. The banks are grouped in RDD strata to encompass, as closely as possible, the HR areas. Within each stratum, a 100-number bank is randomly chosen and a number between 00 and 99 is generated at random to create a complete, ten-digit telephone number. This procedure is repeated until the required sample size is reached.⁶³ Once the dwelling or telephone number sample has been chosen, one member from each household aged 12 years or over is selected at the time of contact using various selection probabilities based on age and household composition.⁶³

2.3 Statistical Analysis

Data analysis was performed using Statistical Package for Social Science (SPSS) version 19 (SPSS Inc., Chicago, Illinois, USA) throughout the study. As discussed earlier, the primary focus of this research was to determine if persons with dementia and a diagnosed mood disorder are more or less likely to utilise health services in comparison to persons with dementia but no diagnosed mood disorder. There were two outcome variables. The first was medical mental health service utilization. This was measured by respondent responses under the category of consultations- mental health module

(DOCMH). The outcome variable of medical mental health service utilization was measured by respondent responses under the category of consultations- mental health module. This category asked respondents about what health services they use; and how often in the past 12 months they consulted with a health care professional about their emotional or mental health. Variables included consultations with any of the following: family doctor, psychiatrist, psychologist, nurse, social worker, and other. For the purposes of my analysis, consultations with any of these about mental health was measured collectively as a yes/no answer.

The second outcome variable was community health service utilization. This was measured by respondent responses under the category of home care services (DOHMC). The outcome variable of community health service utilization was measured by respondent response under the category of home care services module. This category asked respondents about what home care services they use; and how often in the past 12 months they used home care services with the cost covered by either the government or private insurance. Variables included receiving nursing care, health services, personal care, housework, meals, shopping, respite care, medical equipment and other. For the purposes of my analysis, receiving any of these services from either private or government was measured collectively as a yes/no answer.

The main independent variables of diagnosed dementia and mood disorders was available through the data in the CCHS. Diagnostic information was available for whether a person has been diagnosed with dementia or Alzheimer's disease, as well as if a person has a diagnosed mood disorder. Each respondent was classified into two

separate groups: (1) diagnosed dementia and no mood disorder, or (2) diagnosed dementia and comorbid mood disorder.

Other independent variables included in the analysis were demographic variables (e.g. age, sex, marital status and family income). For geographical data, the variable “urban- rural classification- grouped” will be used. This variable identified whether the respondent lives in a population centre or rural area. Population centres are those continuously built-up areas having a population concentration of 1,000 or more and a population density of 400 or more per square kilometre based on current census population counts. This variable relied on respondent address information, specifically, postal code. The Canadian postal code offered a unique reference system which provides a means of identifying a mail delivery location. Other variables that were included will be perceived health, satisfaction with life in general, positive mental health classification, BMI/self-report, type of drinker in the past 12 months, smoking status in the past 12 months, has an anxiety disorder, has cancer, has diabetes, and has heart disease. An individual was considered an occasional drinker if they consumed alcohol less than once a month during the past 12 months. A regular drinker was classified as drinking at least once a month to 2-3 times a week during the past 12 months.

Activities of daily living (ADL) were not available to all respondents. As such, the variables that were included to indicate functional status were available under the variable of pain health status (HUPDPAD). Pain health status refers to the degree of pain that is usually felt by a person. This concept also considers whether this pain prevents him or her from performing certain activities. It includes no pain or discomfort, pain-

does not prevent activity, pain prevents a few activities, pain prevents some activities, and pain prevents most activities.

The first step in the data analysis was data inspection and cleaning. This examined unusual or missing values as well as outliers and errors. The CCHS takes steps in error detection of the data. Most data editing was performed at the time of interview by the CAPI application. It was not possible for the interviewer to enter out-of-range values and flow errors were controlled through programmed skip patterns.⁶³ Warning messages were used in response to inconsistent or unusual reporting, but no corrections were made at the time of interview. In some cases, corrections were performed after data collection at Head Office. If data were inconsistent, it was corrected by setting one or both of the variables to “not stated”.⁶³ Following data inspection and cleaning, univariable analysis was used for continuous and categorical variables. For continuous variables a t-test was used, and a chi square test was used for categorical variables. After which, a multiple logistical regression modelling was used to examine the adjusted effects of the other variables.

The appropriate weights provided by Statistics Canada were applied when necessary to ensure the sample is representative of the Canadian population. The final CCHS 2011-2012 weight is found on the data file with the variable name WTS_M. A P-value of ≤ 0.05 was deemed significant a priori for all statistical procedures. No quality assurance checks were completed, as access to the master file was not available.

2.4 Ethical Considerations

Statistics Canada is prohibited by law from releasing any data which would divulge information obtained under the Statistics Act (1970) that relates to any identifiable person, business or organization without the prior knowledge or the consent in writing of that person, business or organization.⁶¹ The CCHS achieved this through the use of Public Use Microdata Files (PUMFs). PUMFs grouped or completely removed sensitive variables from the files to protect the anonymity of individual survey respondents. PUMFs also allowed for small health regions to be collapsed with other regions largely due to small population sizes that could lead to disclosure. Access to master file data is available through Research Data Centers (RDCs). If access to an RDC is not feasible and the public use micro-data files do not provide enough information, researchers can apply for remote access. This provides researchers with synthetic data from which they develop and test their computer programs (in SAS or SPSS), and then transmit them to Statistics Canada. The programs are run on the secure data servers, and then outputs vetted for disclosure issues. The vetted outputs are returned to the use via e-mail.

As the CCHS has disclosure controls already in place there is no need for secure storage of data. There is no risk of a breach in confidentiality as the researcher themselves do not have access to identifiable variables. If access to those variables was needed, consent and vetting was done through Statistics Canada.

Ethical approval was obtained from The University of Ontario Institute of Technology Research Ethics Board. No analysis was performed without written approval by The University of Ontario Institute of Technology Research Ethics Board. This study

has met the TCPSII guidelines for the ethical conduct of research concerning humans.

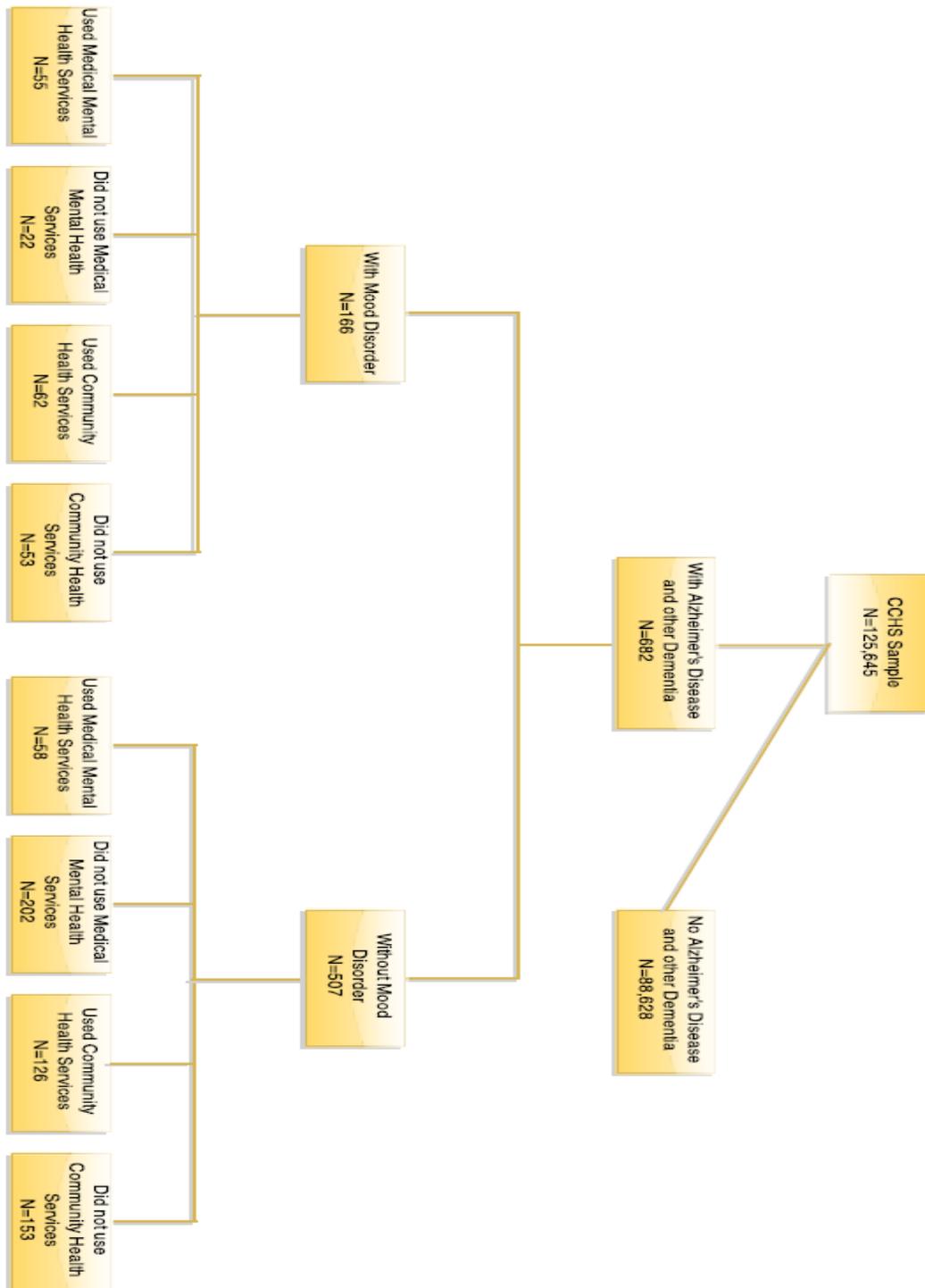
See Appendix B for REB approval by The University of Ontario Institute of Technology

Research Ethics Board.

Chapter 3: Results

This chapter presents the results of healthcare utilization of persons with Alzheimer's disease or other dementias (AD&D) and with and without a mood disorder. Figure 1 visualizes the breakdown of participants from original sample, to the specific samples used in this study. Section 3.1 summarizes the descriptive statistics of the entire sample of 682 individuals. In addition, it summarizes the results for the prevalence of mood disorders in persons with AD&D. In section 3.2, I summarize the results for descriptive statistics regarding community services utilization by all AD&D by mood disorder status. Section 3.3 summarizes the results for descriptive statistics regarding medical mental health services utilization by all AD&D by mood disorder status. In section 3.4, I summarize the results of the binary logistic regression for medical mental health service use of adults with AD&D. Section 3.5 summarized the results of the binary logistic regression for community health service use of adults with AD&D.

Figure 1: Participant breakdown from original CCHS sample



3.1 Prevalence of mood disorders in the Alzheimer's disease or other dementias

Of the 125,645 residents sampled in the community household sample, 89,186 were asked about having a mood disorder in the AD&D sample. There were 166 individuals had both AD&D and a mood disorder while 507 individuals reported only having AD&D. For individuals who had both AD&D dementia and a mood disorder, the mean age was 77.5 years old (SD=11.2). The mean age with no mood disorder was 73.6 (SD=12.7). The difference was statistically significant ($P=0.001$). Interestingly, there were more males than females with a comorbid mood disorder. Of the sample of AD&D and no mood disorder, there were 255 male and 252 female. With a mood disorder, 98 individuals were male and 68 were female. The difference was statistically significant ($P=0.05$).

Individuals with a comorbid mood disorder were more likely to report worse satisfaction with life ($P=0.000$), and more likely to report pain that prevented daily activities ($P=0.000$). Interestingly, individuals with a comorbid mood disorder are less likely to be a regular or occasional drinker in the last 12 months ($P=0.004$). Individuals with a comorbid mood disorder were more likely to be a current smoker, have languishing mental health, have an anxiety disorder and have cancer. The differences were statistically significant ($P=0.002$), ($P=0.001$), ($P=0.000$) and ($P=0.05$) respectively. Further descriptive statistics for are summarized in Table 1.

Table 1: Characteristics of older adults with Alzheimer’s disease or other dementias sample with or without a comorbid mood disorder, Community household population aged 35 years and over, Canada, 2011-2012

	Has AD or other dementia and no mood disorder	Has AD or other dementia and a mood disorder	χ^2 or <i>t</i>	<i>P</i> - value
	N (%) or mean \pm SD	N (%) or mean \pm SD		
Age	73.6 \pm 12.7	77.5 \pm 11.2	-3.52	0.001
Sex			3.83	0.05
Male	255 (50.3)	98 (59.0)		
Female	252 (49.7)	68 (41.0)		
Marital status			0.07	0.79
Married/common-law	292 (57.6)	97 (58.8)		
Not currently married	215 (42.4)	68 (41.2)		
Education (categorical)			0.64	0.42
Secondary and below	293 (61.7)	90 (58.1)		
Any post-secondary	182 (38.3)	65 (41.9)		
Income			4.45	0.21
<15,000	55 (10.8)	18 (10.8)		
15,000-39,999	215 (42.4)	83 (50.0)		
40,000-69,999	149 (29.4)	46 (27.7)		
70,000+	88 (17.4)	19 (11.4)		
Urban and rural Areas			0.004	0.95
Rural	121 (23.9)	40 (24.1)		
Urban	386 (76.1)	126 (75.9)		
Perceived health			22.70	0.000
Good to excellent	243 (48.2)	45 (27.1)		
Poor/fair	261 (51.8)	121 (72.9)		
New Language spoken to doctor			0.005	0.94
English	384 (78.9)	125 (79.1)		
Other	103 (21.1)	33 (20.9)		
Satisfaction with life in general	7.3 \pm 2.3	5.5 \pm 2.6	-5.43	0.000
Satisfaction with life in general			25.95	0.000
Satisfied/Very Satisfied	195 (75.0)	34 (44.2)		
Neither satisfied or dissatisfied to very dissatisfied	65 (25.0)	43 (55.8)		
Pain health status			40.00	0.000
No pain or discomfort or doesn't prevent act.	358 (72.3)	80 (48.8)		
Pain prevents few/some activities	68 (13.7)	26 (15.9)		
Pain prevents most activities	69 (13.9)	58 (35.4)		
Positive Mental Health			11.72	0.001

Classification				
Flourishing mental health	161 (66.8)	32 (44.4)		
Languishing/Moderate mental health	80 (33.2)	40 (55.6)		
BMI/self-report	25.7±5.0	26.3±6.0	0.79	0.43
Type of Drinker (12M)			11.52	0.004
Regular Drinker	191 (38.7)	40 (24.7)		
Occasional Drinker	70 (14.2)	33 (20.4)		
No Drink in Last 12M	233 (47.2)	89 (54.9)		
Smoking Status (12M)			9.91	0.002
Current Smoker	37 (7.6)	26 (16.0)		
Current Non-Smoker	450 (92.4)	136 (84.0)		
Has Anxiety Disorder				
Yes	36 (7.2)	57 (34.8)	78.29	0.000
No	466 (92.8)	107 (65.2)		
Has Diabetes			3.20	0.07
Yes	110 (21.7)	47 (28.5)		
No	397 (78.3)	118 (71.5)		
Has Cancer			3.98	0.05
Yes	43 (8.5)	23 (13.9)		
No	461 (91.5)	143 (86.1)		
Has Heart Disease			1.97	0.16
Yes	121 (24.2)	49 (29.7)		
No	379 (75.8)	116 (70.3)		

SD, standard deviation; AD, Alzheimer's disease; M, months. *N*'s for the two groups may not be equal to final sample due to missing data.

Based on this sample it was estimated that approximately 24.7% of the individuals with AD&D also had a comorbid mood disorder. Compared to the sample of individuals who did not have AD&D, there were 7459 individuals who had a mood disorder, while 81054 individuals did not. These numbers suggested that 8.4% of these individuals had a mood disorder. My data suggest that mood disorders were much more prevalent among individuals with AD&D than those without. Un-weighted prevalence data can be seen in Table 2.

Table 2: Un-weighted prevalence of mood disorders with and without AD&D

	Has Mood Disorder	No Mood Disorder	Total
Has AD&D	166 (24.7%)	507 (75.3%)	673
No AD&D	7459 (8.4%)	81054 (91.6%)	88513
Total	7625	81561	89186

% shown to be number within has mood disorder

Counts were also weighted to be representative of the Canadian sample through master weights supplied by Statistics Canada. In the sample of persons with AD&D 33,988 individuals were seen having a comorbid mood disorder while 93,180 were seen to have no mood disorder. This equated to 26.7% of the AD&D sample having a comorbid mood disorder. In the sample of individuals who have no AD&D 1,457,500 individuals were seen to have a comorbid mood disorder while 17,533,600 were seen to have no comorbid mood disorder. This equated to only 7.7% of the sample of no AD&D having a comorbid mood disorder. The weighted count is consistent with the un-weighted

count in seeing mood disorders be much more prevalent in the AD&D sample compared to those without. Weighted prevalence data can be seen in Table 3.

Table 3: Weighted prevalence of mood disorders with and without AD&D

	Has Mood Disorder	No Mood Disorder	Total
Has AD&D	34,000 (26.7%) ^E	93,200 (73.3%)	127,200
No AD&D	1,457,500 (7.7%) ^E	17,533,600 (92.3%)	18,991,100
Total	1,491,500	17,626,800	19,118,300

% shown to be number within has mood disorder; ^E Coefficient of variation equals 16.6% to 33.3% (interpret with caution)

3.2 Descriptive statistics by mood disorder of adults with Alzheimer’s disease or other dementias in the community household sample for individuals who were asked about community care

Of the 125,645 residents sampled in the community household sample, 394 individuals were diagnosed with AD&D that were also in the sample that were asked about their community care service use. Provinces included in this analysis were Alberta, New Brunswick, Ontario and Newfoundland and Labrador. The other provinces and territories were excluded from the analysis as they were not asked about their community care usage. For individuals who had both AD&D and a mood disorder, the mean age was 72.1 years old (SD=13.1). The mean age with no mood disorder was 77.1 (SD=11.7). The difference was statistically significant ($P=0.000$). Receiving home care services was not statistically significant ($P=0.11$).

Individuals with a comorbid mood disorder were less likely to report good to excellent perceived health. There were 134 individuals reported good to excellent perceived health from the AD&D and no mood disorder group with 143 reporting poor/fair perceived health. From the AD&D and a mood disorder group 33 individuals reported good to excellent health while 82 reported poor/fair. The difference was statistically significant ($P=0.000$). In conjunction with this, individuals with a comorbid mood disorder were more likely to report worse satisfaction with life in contrast to individuals with dementia and no mood disorder. Satisfaction with life mean was measured on a scale from 0 to 10, where 0 denotes “Very dissatisfied” and 10 denotes “Very satisfied”. For individuals who had AD&D and a mood disorder the mean response was 5.5 (SD=2.8). The mean response for Alzheimer’s disease and no mood disorder was 7.3 (SD=2.2). The difference was statistically significant ($P=0.000$). In addition, individuals with mood disorders were more likely to report languishing or moderate mental health when asked about their mental health. The difference was statistically significant ($P=0.008$).

Pain that prevented daily activities was more prevalent in individuals with a comorbid mood disorder. Of the sample of AD&D and no mood disorder, 199 individuals reported no pain or discomfort or pain doesn’t prevent activity, 39 individuals reported pain prevents a few or some activities and 36 individuals reported pain preventing most activities. In the sample of AD&D and a mood disorder, 54 individuals reported no pain or discomfort or pain doesn’t prevent activity, 18 individuals reported pain prevents a few or some activities and 42 reported pain prevents most activities. The difference was statistically significant at ($P=0.000$).

Interestingly, individuals with a comorbid mood disorder are less likely to be a regular drinker, but are seen to be occasional drinkers more frequently over the last 12 months. The group of AD&D and no mood disorder had 104 individuals respond as regular drinker, 37 individuals responded as occasional drinker, and 130 individuals responded as no drink in last 12 months. Comparatively, the group of AD&D and a mood disorder had 29 individuals respond as a regular drinker, 24 respond as occasional drinker and 59 respond as no drink in past 12 months. The difference was statistically significant ($P=0.03$).

Individuals with a comorbid mood disorder were more likely to be a current smoker. In the group of AD&D and no mood disorder 20 individuals were current smokers and 246 individuals are currently non-smokers in the last 12 months. In the group of AD&D and a mood disorder 20 individuals were current smokers and 92 are current non-smokers. The difference is statistically significant ($P=0.003$).

Importantly, anxiety disorders were, again, much more prevalent among individuals who had a mood disorder. For the sample of Alzheimer's disease and no mood disorder 15 individuals had an anxiety disorder and 264 individuals did not. For the sample of Alzheimer's disease and a mood disorder, 40 individuals had a comorbid anxiety disorder and 74 individuals did not.

It was further found that there was no statistical differences in sex ($P=0.17$), marital status ($P=0.77$), education level ($P=0.79$) income level ($P=0.08$) or urban vs rural area ($P=0.77$). There was also no difference in having diabetes ($P=0.11$), having cancer ($P=0.09$) or having heart disease ($P=0.50$). BMI/self-report was also found to not

be statistically significant ($P=0.14$). However, again, the sample size for this variables was significantly lowered due to sample coverage and exclusions. All descriptive statistics are summarized in Table 4.

Table 4: Characteristics of older adults with Alzheimer’s disease or other dementias sample with or without a comorbid mood disorder, Community household population aged 35 years and over, Canada, who were asked about their community health service utilization. Sample includes Alberta, New Brunswick, Ontario and Newfoundland and Labrador, 2011-2012

	Has AD or other dementia and no mood disorder	Has AD or other dementia and a mood disorder	x ² or <i>t</i>	<i>P</i> - value
	N (%) or mean ± SD	N (%) or mean ± SD		
Age	77.1 ± 11.7	72.1 ± 13.1	-3.57	0.000
Sex			1.86	0.17
Male	142 (50.7)	67 (58.3)		
Female	138 (49.3)	48 (41.7)		
Marital status			0.09	0.77
Married/common-law	165 (58.9)	69 (60.5)		
Not currently married	115 (41.1)	45 (39.5)		
Education (categorical)			0.07	0.79
Secondary and below	149 (57.8)	64 (59.3)		
Any post-secondary	109 (42.2)	44 (40.7)		
Income			3.05	0.08
29,999	91 (32.5)	48 (41.7)		
30,000+	189 (67.5)	67 (58.3)		
Urban and rural Areas			0.08	0.77
Rural	62 (22.1)	27 (23.5)		
Urban	218 (77.9)	88 (76.5)		
Perceived health			12.87	0.000
Good to excellent	134 (48.4)	33 (28.7)		
Poor/fair	143 (51.6)	82 (71.3)		
Satisfaction with life in general, mean	7.3 ± 2.2	5.5 ± 2.8	-4.24	0.000
Satisfaction with life in general			18.57	0.000
Satisfied/Very Satisfied	107 (75.9)	24 (43.6)		
Neither satisfied or dissatisfied to very dissatisfied	34 (24.1)	31 (56.4)		
Pain health status			30.51	0.000
No pain or discomfort or doesn’t prevent act.	199 (72.6)	54 (47.4)		
Pain prevents few/some activities	39 (14.2)	18 (15.8)		
Pain prevents most activities	36 (13.1)	42 (36.8)		
Positive Mental Health Classification			7.12	0.008
Flourishing mental health	88 (66.7)	23 (45.1)		

Languishing/Moderate mental health	43 (33.3)	28 (54.9)		
BMI/self-report	25.7±4.6	27.1±6.1	1.45	0.14
Type of Drinker (12 months)			6.92	0.03
Regular Drinker	104 (38.4)	29 (25.9)		
Occasional Drinker	37 (13.7)	24 (21.4)		
No Drink in Last 12M	130 (48.0)	59 (52.7)		
Smoking Status (12M)			8.90	0.003
Current Smoker	20 (7.5)	20 (17.9)		
Current Non-Smoker	246 (92.5)	92 (82.1)		
Has Anxiety Disorder			59.29	0.000
Yes	15 (5.4)	40 (35.1)		
No	264 (94.6)	74 (64.9)		
Has Diabetes			2.54	0.11
Yes	60 (21.4)	33 (28.9)		
No	220 (78.6)	81 (77.1)		
Has Cancer			2.94	0.09
Yes	23 (8.2)	16 (13.9)		
No	256 (91.8)	99 (86.1)		
Has Heart Disease			0.45	0.50
Yes	75 (27.1)	35 (30.4)		
No	202 (72.9)	80 (69.6)		
Received Home Care Services (Used Community Health Services)			2.50	0.11
Yes	126 (45.2)	62 (53.9)		
No	153 (54.8)	53 (46.1)		

SD, standard deviation; AD, Alzheimer's disease; M, months. *N*'s for the two groups may not be equal to final sample due to missing data

3.3 Descriptive statistics by medical mental health service use of adults with Alzheimer's disease or other dementias in the community household sample excluding proxy interview

Of the 125,645 residents sampled in the community household sample, 337 individuals were diagnosed with AD&D that were also in the sample that were asked about their medical mental health service use. Proxy interviews were excluded from the analysis. For individuals who had both AD&D and a mood disorder, the mean age was 68.5 years old (SD=14.1). The mean age with no mood disorder was 74.9 (SD=12.3). The difference was statistically significant ($P=0.000$). Persons with AD&D without a mood disorder were more likely to be married/common-law than persons with AD&D and a mood disorder. The difference was statistically significant ($P=0.05$). Consulting a mental health professional (using mental medical health services) was found to be highly significant ($P=0.000$). There were 58 individuals with AD&D and no mood disorder used consulted a mental health professional, while 202 did not. Within the group of persons with AD&D and a mood disorder, 55 individuals consulted a mental health professional, while 22 did not.

Individuals with a comorbid mood disorder were less likely to report good to excellent perceived health. There were 114 individuals reported good to excellent perceived health from the AD&D and no mood disorder group with 144 reporting poor/fair perceived health. From the AD&D and a mood disorder group 49 individuals reported good to excellent health while 28 reported poor/fair. The difference was statistically significant ($P=0.003$). Similarly, individuals with a comorbid mood disorder were more likely to report worse satisfaction with life in contrast to individuals with

dementia and no mood disorder. Satisfaction with life mean was measured on a scale from 0 to 10, where 0 denotes “Very dissatisfied” and 10 denotes “Very satisfied”. For individuals who had AD&D and a mood disorder the mean response was 5.6 (SD=2.6). The mean response for Alzheimer’s disease and no mood disorder was 7.3 (SD=2.6). The difference was statistically significant ($P=0.000$). In addition, individuals with mood disorders were more likely to report languishing or moderate mental health when asked about their mental health. The difference was statistically significant ($P=0.001$).

Pain that prevented daily activities was more prevalent in individuals with a comorbid mood disorder. Of the sample of AD&D and no mood disorder, 189 individuals reported no pain or discomfort or pain doesn’t prevent activity, while 69 individuals reported pain prevents a few or some or most activities. In the sample of AD&D and a mood disorder, 38 individuals reported no pain or discomfort or pain doesn’t prevent activity, 39 individuals reported pain prevents some or most activities. The difference was statistically significant at ($P=0.000$).

Interestingly again, individuals with a comorbid mood disorder were more likely to be a current smoker. In the group of AD&D and no mood disorder 30 individuals were current smokers and 225 individuals were currently non-smokers in the last 12 months. Within the group of AD&D and a mood disorder 21 individuals are current smokers and 55 are current non-smokers. The difference is statistically significant ($P=0.001$).

Anxiety disorders were, again, much more prevalent among individuals who had a mood disorder. For the sample of Alzheimer’s disease and no mood disorder 16 individuals had an anxiety disorder and 240 individuals did not. For the sample of

Alzheimer's disease and a mood disorder, 24 individuals had a comorbid anxiety disorder and 52 individuals did not. The difference was significant ($P=0.000$).

It was further found that there was no statistical differences in sex ($P=0.56$), education level ($P=0.44$) income level ($P=0.06$) or urban vs rural area ($P=0.36$). There was also no difference in having diabetes ($P=0.93$), or having heart disease ($P=0.93$). All descriptive statistics are shown in Table 5.

Table 5: Characteristics of older adults with Alzheimer’s disease or other dementias sample with or without a comorbid mood disorder, Community household population aged 35 years and over, Canada, who were asked about their medical mental health service use.

	Has AD or other dementia and no mood disorder	Has AD or other dementia and a mood disorder	χ^2 or t	P - value
	N (%) or mean \pm SD	N (%) or mean \pm SD		
Age	74.9 \pm 12.3	68.5 \pm 14.1	-3.88	0.000
Sex			0.34	0.56
Male	128 (49.2)	35 (45.5)		
Female	132 (50.8)	42 (54.5)		
Marital status			3.88	0.05
Married/common-law	115 (44.2)	24 (31.6)		
Not currently married	145 (55.8)	52 (68.4)		
Education (categorical)			0.59	0.44
Secondary and below	154 (60.4)	41 (55.4)		
Any post-secondary	101 (39.6)	33 (44.6)		
Income			3.51	0.06
29,999	117 (45.0)	44 (57.1)		
30,000+	143 (55.0)	33 (42.9)		
Urban and rural Areas			0.83	0.36
Rural	60 (23.1)	14 (18.2)		
Urban	200 (76.9)	63 (81.8)		
Perceived health			8.98	0.003
Good to excellent	114 (44.2)	49 (63.6)		
Poor/fair	144 (55.8)	28 (36.4)		
Satisfaction with life in general, mean	7.3 \pm 2.6	5.6 \pm 2.6	-5.39	0.000
Satisfaction with life in general			21.71	0.000
Satisfied/Very Satisfied	186 (74.7)	34 (45.9)		
Neither satisfied or dissatisfied to very dissatisfied	63 (25.3)	40 (54.1)		
Pain health status			15.51	0.000
No pain or doesn’t prevent act.	189 (73.3)	38 (49.4)		
Pain prevents activities	69 (26.7)	39 (50.6)		
Positive Mental Health Classification			12.02	0.001
Flourishing mental health	156 (67.2)	31 (44.3)		
Languishing/Moderate mental health	76 (32.8)	39 (55.7)		
BMI/self-report	25.6 \pm 4.5	26.4 \pm 6.0	1.02	0.14
Type of Drinker (12M)			3.94	0.14

Regular Drinker	110 (42.8)	24 (31.2)		
Occasional Drinker	38 (14.8)	11 (14.3)		
No Drink in Last 12M	109 (42.4)	42 (54.5)		
Smoking Status (12M)			11.31	0.001
Current Smoker	30 (11.8)	21 (27.6)		
Current Non-Smoker	225 (88.2)	55 (72.4)		
Has Anxiety Disorder			35.48	0.000
Yes	16 (6.3)	24 (31.6)		
No	240 (93.8)	52 (68.4)		
Has Diabetes			0.008	0.93
Yes	56 (21.5)	16 (21.1)		
No	204 (78.5)	60 (78.9)		
Has Heart Disease				
Yes	62 (24.1)	20 (26.0)		
No	195 (75.9)	57 (74.0)		
Consulted mental health professional (Used mental medical health services)			64.31	0.000
Yes	58 (22.3)	55 (71.4)		
No	202 (77.7)	22 (28.6)		

SD, standard deviation; AD, Alzheimer's disease; M, months. *N*'s for the two groups may not be equal to final sample due to missing data

3.4 Binary logistic regression by community health service use of adults with Alzheimer's disease or other dementias in the community household sample for individuals who were asked about community care

Binary logistic regression analysis was used to determine factors that were associated with community health service use. For this analysis, an individual was considered to have used community health services if in the past 12 months, they had responded yes to receiving home care services with the costs either covered or not covered by the government. My main independent variable was having a mood disorder. Other independent variables included were marital status, pain health status, income, perceived health, sex, age, having an anxiety disorder, smoking status, and drinking status. The adjusted odds ratio for having a mood disorder was 1.79 (95% confidence interval [CI] 1.06-3.03, $P=0.030$), suggesting that individuals who were diagnosed with a mood disorder were 1.79 times more likely to use community health services. Among other variables, age had an adjusted odds ratio of 0.97 (95% confidence interval [CI] 0.95-0.99, $P=0.004$), suggesting that a year increase in age increases the odds of using community health services by 3%. Drinking status had an adjusted odds ratio of 0.58 (95% confidence interval [CI] 0.37-0.892, $P=0.020$), suggesting that individuals who drink had a 42% increase in community health service use. Sex, marital status, pain health status, income, perceived health and smoking status were all not significant predictors of community health service use. Table 6 summarizes the results from the binary logistic regression analysis.

Table 6 Binary logistic regression predicting past year community health service use among adults with Alzheimer’s disease or other dementias

	Adjusted odds ratio	95% CI	<i>P</i> -value
Mood disorder	1.79	(1.06, 3.03)	0.030
Age	0.97	(0.95, 0.99)	0.004
Sex	0.94	(0.59, 1.51)	0.805
Marital status	0.78	(0.47, 1.30)	0.344
Pain health status	0.84	(0.51, 1.38)	0.491
Income	0.81	(0.49, 1.30)	0.420
Perceived health	1.46	(0.91, 2.33)	0.119
Anxiety disorder	0.91	(0.45, 1.83)	0.794
Drinking status	0.58	(0.37, 0.92)	0.020
Smoking status	1.38	(0.64, 2.99)	0.418
Constant	11.18		0.056

3.5 Binary logistic regression by medical mental health service use of adults with Alzheimer’s disease or other dementias in the community household sample excluding proxy interview

Binary logistic regression analysis was used to determine factors that were associated with medical mental health service use. For this analysis, an individual was considered to have used medical mental health services if in the past 12 months, they had responded yes to seeing or talking to a health professional about their emotional or mental health. My main independent variable was having a mood disorder. Other independent variables included were age, sex, income, marital status, pain health status, perceived health, satisfaction with life in general, having an anxiety disorder, and smoking status. The adjusted odds ratio for having a mood disorder was 6.58 (95% confidence interval [CI] 3.46-12.64, $P=0.000$), suggesting that individuals who were diagnosed with a mood disorder were 6.5 times more likely to use medical mental health services than those without a mood disorder. Among other variables, satisfaction with life

was associated with using medical mental health services. This suggests that those who were not satisfied with life did access medical mental health services. The adjusted odds ratio for satisfaction with life was 1.14 (95% confidence interval [CI] 1.91-1.30). The adjusted odds ratio having an anxiety disorder was 2.30 (95% confidence interval [CI] 0.97-5.44, $P=0.059$). Although not within 95% confidence interval it is still close to significance, suggesting that individuals diagnosed with an anxiety disorder were 2.3 times more likely to use medical mental health services. Marital status, pain health status, income level, sex, age, and smoking were all not significant predictors of medical mental health service use. Table 7 summarizes the results from the binary logistic regression analysis.

Table 7 Binary logistic regression predicting past year medical mental health service use among adults with Alzheimer’s disease or other dementias

	Adjusted odds ratio	95% CI	<i>P</i> -value
Mood disorder	6.58	(3.46, 12.64)	0.000
Age	1.02	(0.99, 1.04)	0.147
Sex	0.69	(0.39, 1.22)	0.199
Marital status	1.19	(0.64, 2.21)	0.583
Pain health status	1.84	(0.90, 3.75)	0.096
Income	0.79	(0.42, 1.48)	0.789
Perceived health	1.07	(0.57, 2.03)	0.825
Satisfaction with life	1.14	(1.01, 1.30)	0.036
Anxiety disorder	2.30	(0.97, 5.44)	0.059
Smoking Status	1.84	(0.83, 4.09)	0.134
Constant	0.00		0.000

Chapter 4: Discussion

The primary aim of this research was to assess how comorbid mood disorders were associated with health service utilization of persons with dementia. Although a growing number of studies have addressed health service utilization within the dementia population, there is a lack of research involving how a comorbid mood disorder affects service utilization within the dementia population. Secondary to this, an updated look at the prevalence of prevalence of mood disorders within the dementia in contrast to the population without dementia was also assessed in this study.

Dementia is a multifaceted issue for not only Canada, but around the world. With the increasing older age demographic, dementia prevalence is expected to increase. It was estimated that by 2031 there will be nine million Canadians over the age of 65.⁴ To my knowledge, this study was the first investigation to simultaneously examine the effects of having a mood disorder on service use in the dementia population living in the community. The findings from this study were consistent with previous research on prevalence of mood disorders in the Canadian community population by Nabalama and colleagues⁶⁴. Specifically, this previous research found that the prevalence of mental disorders, which included mood disorders was higher in persons with Alzheimer's disease or other dementias in a Canadian household population.

This study hypothesized that the prevalence of mood disorders was higher among persons with dementia than persons without dementia. Based on my data, I reject the null hypothesis and accept the alternative hypothesis. Specifically, the prevalence of mood disorders was 24.7% within the Alzheimer's disease or other dementias population. This

contrasted to persons without Alzheimer's disease or other dementias as a mere 8.4% of individuals without Alzheimer's disease or other dementias had a diagnosed mood disorder. Similarly, the prevalence of mental disorders using 2005 CCHS annual component data by Nabalamba and Patten⁶⁴ reported that 19.5% of persons with Alzheimer's disease or other dementias aged 55 years and over while only 5.3% of individuals without Alzheimer's disease or other dementias reported a mood disorder. In their study the prevalence of mood disorders was found to be high in the Alzheimer's disease or other dementias population. However, their results are significantly outdated.

In the present study, the prevalence of mood disorders was found to be significantly higher in persons with Alzheimer's disease or other dementias compared to those without. These results are the most recent describing the prevalence of mood disorders in the Alzheimer's disease and other dementia in the non-institutionalized Canadian population. My results suggest that the prevalence of mood disorders has increased since the previous study by Nabalamba and Patten⁶⁴. These trends show us that mood disorders are still an ongoing issue in persons with dementia living in the community. There are many possible reasons for this increase such as better awareness, more readily diagnosed and a decrease in stigma people may feel since 2005.

This study also showed that prevalence of mood disorders within the dementia population significantly increased the amount of pain individuals reported that impacted their activity levels. Similarly, a study by Ching-Hua Lin and associates⁶⁵ demonstrated the link between depression, the most common mood disorder, and pain. This study further concluded that this pain exerted a direct influence on the impairment of daily functioning and quality of life of depressed patients. Although pain and dementia have

been linked in previous research ^{66 67}, my research suggests that a comorbid mood disorder increases the pain individuals reported that impacted their activity level. This suggests the need for better pain assessment and management in persons with Alzheimer's disease or other dementias living in the community who have a comorbid mood disorder. Pain that is untreated or ineffectually assessed can further contribute to the emotional, functional and behavioural impairment in persons with dementia. ⁶⁸ Additionally, research by Shega and colleagues ⁶⁹ further found that unrelieved pain in persons with dementia can lead to impaired cognition, depression and anxiety. This suggests that this increase in pain observed in my study may have potentially led to the development of a mood disorder, such as depression.

Variables that deal with an individual's self-reported health such as satisfaction with life, positive mental health classification, and perceived health all reported having poorer outcomes in persons with Alzheimer's disease or other dementias and a comorbid mood disorder. This may be explained by the fact that persons with mood disorders have been shown to have reduced quality of life (QOL). ⁷⁰ Specifically, mood disorders were found to be most impactful on subjective well-being. Additionally, a study by Jansen and colleagues ⁷¹ found that among young adults' ages 18-24 in Brazil who experience mood disorders, have impaired quality of life in comparison to the general population. This finding suggests that comorbid mood disorders are significantly impacting the satisfaction with life and health of persons with dementia and in turn, further lowering the QOL of this population.

Interestingly, lifestyle choices such as drinking status and smoking status within the past 12 months were found to be impacted by having a mood disorder. Persons with

mood disorders were found to be regular drinkers less than persons without a mood disorder. A regular drinker was classified as drinking alcohol once a month or more over the past 12 months. However, persons with a mood disorder were found to be occasional drinkers more than those without a mood disorder. An occasional drinker was classified as having a drink less than once a month. This was novel as mood disorders and substance abuse disorders frequently co-occur,^{72 73} having us expect to see a higher level of drinking from persons with mood disorders.

Smoking status was higher in individuals with mood disorders. This finding was consistent with findings from other research^{74 75} which found that not only are persons with mood disorders more likely to smoke, but may in fact do so as a method of self-medication. Additionally, smoking has been seen to lead to an increased risk of new onset of mood and anxiety disorders.⁷⁴ However, in that study, this finding was not significant in older adults. In my study only older adults were sampled and analyzed, making this finding novel. Nevertheless, there is no way of knowing if the smoking was preceded or followed by the mood disorder. This finding suggests that smoking in persons with dementia may be directly related to mood disorders. Whether an individual smokes as a way of self-medication to help cope with their mood disorder, or is the smoking leads to the mood disorder is an area that needs to be explored in future research.

Individuals with dementia tend to be older in age. The influence of age on having a co-morbid mood disorder was seen in this study. The average age of a person with both dementia and a co-morbid mood disorder was higher than that of a person with dementia and no comorbid mood disorder. This is consistent with other research which has suggested that persons who have depression or a mood disorder before the onset of

dementia, or have developed one after onset, have high levels of age-related cognitive decline.⁷⁶ Depression and other mood disorders typically develop at younger ages.⁷⁷ However, depression and other mood disorders often go undiagnosed among the elderly and symptomology can be mistaken for normal aging or masked by other mental health comorbidity, such as dementia. This may account for the difference in age between the groups.

Males with Alzheimer's disease or other dementias reported having mood disorders significantly more than females. This is contradictory to most research currently available, which suggests that women are much more likely over the course of their lifetime to develop a mood disorder.^{78 79} My research suggests that gender plays a pivotal role in the prevalence of mood disorders within the dementia population and should be looked at more closely in future research.

Past studies conducted in Canada are outdated.⁶⁴ The results from this study provide an updated status on the prevalence of mood disorders within the Alzheimer's disease and other dementia in Canada. This study not only provides an outlook on the current state of mood disorders in Canada, but also provide useful prevalence statistics to analyze trends over time.

My second hypothesis stated that persons with mood disorders and mood disorders were more likely to access medical mental health services than persons with dementia but no mood disorders. Based on my data, I reject the null hypothesis and accept the alternative hypothesis. Although this population need services frequently, it does not mean that they were being adequately treated or diagnosed. Evidence in the

literature suggests that in Canadian primary care settings, mood and anxiety disorders, such as major depressive disorder, bipolar disorder, panic disorder, generalized anxiety disorder and social anxiety disorder consistently are both underdiagnosed and misdiagnosed.⁸⁰ Moreover, dementia and many mood disorders such as depression and bipolar disorder have been seen to share symptomology, making diagnosis even more difficult.²¹ Consistently, a multidisciplinary approach has been shown necessary to approach mental health in primary care settings.²⁰ As reflected upon earlier, the Canadian Mental Health Association has estimated that almost one half of individuals who have suffered from either anxiety or depression have never gone to a physician to seek help for their problem.¹³ My research suggests that having dementia changes how people use mental health services, as having a mood disorder consistently has shown to reduced mental health service use.

Based on my multivariable analysis, satisfaction with life was a predictor of medical mental health service utilization. Persons with Alzheimer's disease or other dementias who were not satisfied with life accessed medical mental health services more. Conversely, studies surrounding the use of preventive health care services found that health life satisfaction was associated with higher use of many preventive services.⁸¹ However, people use health services for a variety of reasons. Research that looks primarily at service utilization and life satisfaction has found that higher levels of life satisfaction are associated with lower levels of health service utilization, specifically doctor visits.⁸² Further research into how satisfaction with life impacts the use of mental health services needs to be explored. Research into not just how services are used, but

why, would allow researchers to distinguish between people who use services due to address a problem, or as a preventative method.

My third hypothesis stated that persons with dementia and a mood disorder were less likely to access community health services than persons with dementia but no mood disorder. Based on my data I fail to reject the null hypothesis and this hypothesis was not supported. Persons with dementia and a mood disorder were more likely to access community services than persons with dementia but no mood disorder. There is a lack of research in the area of mood disorders and community health service use. However, research has shown by multiple studies that persons with Alzheimer's disease or other dementias frequently underutilize community health services.³¹ Although stigma may play a role in the service use of persons with mood disorders, it appears that having a mood disorder in addition to Alzheimer's disease or other dementias yields in higher usage of community health services.

Age was found to be a significant determinant of community health service use. Age is one of the most significant risk factors for the development of dementia.⁹ Persons with dementia living in the community had a mean age of 77.1 for persons with no mood disorder and 72.1 for having a mood disorder. However, when comparing these to numbers specifically for having Alzheimer's disease or other dementias and using/not using community health services, I found that persons who use community health services are older. As both age and dementia are associated with cognitive decline, research has shown that as people age, they will need to utilize more community care services.³³ This may explain the trends I found which suggested that an increase in age

leads to an increase in community health service use. Other demographic variables such as sex, marital status and income were not found to be significant in this study.

In previous studies, gender was found to be significant in determining community service use.⁴⁰ My study did not show these same results. Women have been shown to report better health and received more supportive care such as housework and personal care assistance.⁴⁰ However, these studies looked at which specific community and home services being used. My study only looked at using versus not using any service as my sample size was too small in nature to elicit significant results. I expected to see gender differences in community health service usage in my study. It was expected that women would receive more community health services. In other research, women provide a vast amount of informal care to their male partners,⁸³ which may suggest that males would use community health services less as they had a caregiver at home. However, in my study this connection was not found.

Interestingly, the study found that drinking status was associated with community health service use. Persons with Alzheimer's disease or other dementias used community health services more if they drank over the past 12 months. There is again, a lack of research regarding drinking and the use of health care services. The link between alcohol and dementia is a complex and debated subject. Research suggests that light to moderate drinking results in a reduced prevalence of dementia^{84 85}. As well, research also suggests that higher levels of drinking may in-fact lead to alcohol related dementia.⁸⁵ More research is needed on the impact of drinking on persons living with dementia. Research conducted by Zimmermann, Lubman and Cox⁸⁶ in Australia developed a community managed mental health organisation looked specifically at persons living in the

community to offer services to persons with serious mental illness. They found that 77% of their participants had a psychotic disorder, and 27.7% met the criteria for an alcohol use disorder, showing a high prevalence of alcohol use disorders within persons with mental health issues. Although there is a limited amount of research on alcohol consumption and community service use, studies looking at health-service utilization indicators such as inpatient and outpatient care have found that alcohol consumption is associated with a decrease use of health services.⁸⁷ This increase in health service use with an increase in drinking may suggest that alcohol further adds to the burden of dementia, requiring individuals to seek more services. Although some research has suggested that limited alcohol intake in earlier adult life may protect against dementia in later life⁸⁸, alcohol has negative effects such as digestive, heart and liver disease, which may exacerbate over time.

4.1 Study Strengths and Limitations

Not unlike any other research, this study had its share of both strengths and limitations. This was a quantitative cross-sectional study dealing with the prevalence of mood disorders in persons with Alzheimer's disease or other dementias, and how having a mood disorder would affect healthcare service utilization. The data collected was secondary data provided from Statistics Canada. Statistics Canada collected this data via survey of the Canadian population.

The use of surveys have a multitude of advantages. Cross-sectional studies such as the use of surveys are useful as they are cheap, easy and quick. They are useful for identifying pre-existing issues and problems without the loss of follow-up. Also, they are useful for finding prevalence data. By using a survey for this study it allowed for general

trends to be found in terms of who is using services, what services, and who is not using these services. The CCHS used phone interviews which have been shown in research to be a much more reliable type of survey when compared to mail surveys, web surveys, and to a lesser degree in-person surveys.⁸⁹ The CCHS phone interviews used a computer to assist facilitates the collection of the data and the analysis. Phone surveys also allowed for open-ended and follow up questions that are also available in a face-to-face interview style but not in a mail or web-based. Additionally, the use of computer-assisted interviewing (CAI) allowed for logical flow of questions and easy dissemination of data into a useable SPSS or SAS file. CAI also reduces errors in data. It was not possible for interviewers to enter out-of-range values and flow errors are controlled through programmed skip patterns. If there were unusual or inconsistent answers reported, warning messages were displayed.

Statistics Canada also preformed several different edits at Head Office during the data processing before it became available to researchers. Inconsistencies were typically corrected by applying a value of “not stated” to the data. Additionally, geography levels by sex and age groups were compared to estimates from previous years, confirming that estimates of key indicators are acceptable.⁶¹

Statistics Canada also ensured quality evaluation of the survey. Throughout the collection process, control and monitoring measures were in place and corrective action was taken to minimize non-sampling errors. Such measures included response rate evaluation, reported and non-reported data evaluation, on site observation of interviews and improved collection tools for interviewers. A validation program was run to compare estimates for health indicators taken from the common content with the previous year

survey. This validation was performed at various geographical levels, as well as by age and sex. Any differences that were deemed significant are further examined to find any anomalies within the data. The last quality evaluation step taken was an external validation. Share files were sent to provincial and federal partners for a two-week examination period before the release⁶¹. Data can be scrutinized and any anomalies were then informed to Statistics Canada as well. Through all these measures, it is clear that Statistics Canada data were highly reliable and valid source of data to utilize.

This study also has many limitations that must be recognized. Cross-sectional studies and surveys are only useful for current prevalence data. Trends across time were unable to be assessed. Surveys pose their own limitation when looking at reliability and validity of the data. As stated above, surveys are good for finding prevalence and general trends but they are not very useful in temporal sequence. Causality was not something a survey is a good data source for. Future studies will be needed to explore why this population is or is not using services, and what barriers there may be to access. Another limitation of using surveys was recall bias or dishonest answers. The respondent may not accurately remember the answer to many questions, or may not be completely truthful with the interviewer, perhaps due to stigma in some cases. This was especially true in this study as I was looking at a population with many potential cognitive issues within an older population with mental health conditions. Stigma associated with mental illness can affect self-report of conditions such as mood disorders and could lower the number of mood disorder self-reports within the data. Surveys are also not efficient for rare conditions as the sample population might not have enough people with the required variables present to conduct a meaningful statistical analysis.

Using the CCHS posed many issues while conducting this study as well. The CCHS did not take into account certain populations in its sampling. Aboriginals living on reserves, full-time members of the Canadian Forces, persons whom are institutionalized, and persons living in certain Quebec health regions were excluded from the data. These exclusions represented less than 3% of the of the target population of persons over the age of 15 living in any province or territory. Statistics Canada maintained full control over its data. Access to the master file was not available unless completed through a Research Data Center (RDC). This made it difficult to complete data analysis if you are not at a University with access to an RDC. Data had to of been accessed remotely, meaning that tests were to be developed via syntax and sent to Statistics Canada to run on the master file. Results were then vetted for disclosure issues, and outputs sent to researchers. Additionally, researchers have no control over the data collection, coding, variable or instruments designed.

Statistics Canada also provided two year combined data files, which were utilized for this study to boost sample size. Not all variables carry across two years. Many useful variables end up being excluded from the combined file due to a change in wording, or a question only being asked in 1 of the 2 years. Moreover, not all provinces are asked the same questions. When attempting analyze more than one province for a rare condition, many variables are only asked in a selection of provinces, making analysis difficult. Lastly, the CCHS used proxy interviews for individuals who are unable to answer specific questions. Many questions pertaining to health of individuals were not asked to proxy interviews. This exclusion further limited the data available to work with.

Counts in this survey for all data except the prevalence of mood disorders within persons with Alzheimer's disease or other dementia were not weighted. These results do not take into account the stratification and clustering of the sample's design nor the unequal probabilities of selection. As such, the estimates produced from this survey data are only representative of the sample itself, not the covered population.

As this study examined persons with dementia across Canada, inferences at the provincial level could not be made. As each province manages its own health care, which services are provided or funded publically differ based on each province. These results are not comparable across different health care systems. Access to services differ in each province and in each country. The literature on this subject is largely American based, and as different health care systems are not comparable, this may account for why my third hypothesis was not supported.

4.2 Implications for Future Research and Practice

There are many studies worldwide on the use of medical mental health services and community health service, but none have explored the effects that mood disorders have on this usage. Moving forward, more longitudinal and interventional studies are necessary to fully understand the role mood disorders play in persons with Alzheimer's disease or other dementias. In addition, studies should be conducted in different regions across Canada with much larger sample sizes. Although I found a link between the increased utilization of health services and having a mood disorder, my sample size was too small to study which services specifically are used.

Although this study explored the effects of urban vs rural, statistically significant differences were not supported. Future studies should focus on which services are available in which geographical regions. As evidence suggests, the use of healthcare services would be highly dependent on what services were available in each area. Specifically, regarding community healthcare services, many services may not be readily available in rural areas such as in Northern Canada. In addition, in remote areas, access to these services may be highly reduced due to lack of transportation or other disability. This is especially true in persons with Alzheimer's disease or other dementias as they have to overcome cognitive disability, old age and other comorbid health conditions.

As both medical mental health and community services are being used readily, research should also be conducted as to the funding and development of more services and programs. As the population continues to age and dementia prevalence expected to increase drastically, research into the development and implementation of more services should come to the forefront of dementia research. This type of research will become instrumental in reducing burden of disease for individuals with Alzheimer's disease or other dementias as well as caregivers and the economy. The role of comorbid mood disorders on the use of health services has now been seen to even further increase the use of services within the dementia population. Additionally, future research should analyze other instances of physical and mental health comorbidity in dementia, and how this impacts the use of health care services.

These findings have considerable implications for public health. As discussed in the introduction, both the number of seniors with dementia and the costs associated with dementia are expected to increase significantly leading up to 2038.² Dementia will not

only affect those with it and our health care system, but it will also affect the family of these individuals. Recent statistics have estimated that by 2038, 62% of Canadians ages 65+ with dementia will be living in their homes.² This is an estimated increase of 510,000 individuals from 2008 and would dramatically impact the amount of caregiver burden. This poses a complex public health problem as not only do we need to focus on support and services for persons with dementia, but should also look at how to support caregivers of persons with dementia as well. As Canada moves towards its plan of a national dementia strategy, policymakers should understand that not all persons with dementia, nor their caregivers are homogeneous. Future research into what different subgroups need will become highly important. My research contributes to the current literature by expanding on the needs of this growing population and will help inform policymakers to make evidence based decisions moving forward in a dementia strategy in Canada.

4.3 Conclusion

In conclusion, this study set out to examine the current prevalence of mood disorders within the Canadian community population with Alzheimer's disease or other dementias. Additionally, this study aimed to access the utilization healthcare services within this sample, and how having a co-morbid mood disorder affected this healthcare service utilization. These preliminary findings suggest that the prevalence of mood disorders is significantly higher within the Alzheimer's disease or other dementias population when compared to the population without. Additionally, my findings suggest that persons with Alzheimer's disease or other dementias utilize both medical mental and community health services more readily if a co-morbid mood disorder is present.

These findings are preliminary in nature and should be interpreted with caution. Further research, such as longitudinal studies need to be conducted in the future to further broaden the understanding of how co-morbid mental health conditions contribute to the utilization of health services in the dementia population. While the research and analysis are based on data from Statistics Canada, the opinions expressed do not represent the views of Statistics Canada.

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Appendix A: Glossary

Ageism: prejudice or discrimination against a particular age-group and especially the elderly

Alzheimer's disease: a degenerative brain disease of unknown cause that is the most common form of dementia, that usually starts in the late middle age or in old age, that results in progressive memory loss, impaired thinking, disorientation, and changes in personality and mood, that leads in advanced cases to a profound decline in cognitive and physical function, and that is marked histologically by the degeneration of brain neurons especially in the cerebral cortex and by the presence of neurofibrillary tangles and plaques containing beta-amyloid

Bipolar disorder: any of several mood disorders characterized usually by alternating episodes of depression and mania or by episodes of depression alternating with mild nonpsychotic excitement

Burden of disease: the total significance of disease for society beyond the immediate costs of treatment. It measures years of life lost to ill-health as the difference between total life expectancy and disability-adjusted life expectancy

Community health services: The blend of health and social services provided to an individual or family in his/her place of residence for the purpose of promoting, maintaining or restoring health or minimizing the effects of illness and disability. These services are usually designed to help older people remain independent and in their own

homes. They can include senior centres, transportation, delivered meals or congregate meals sites, visiting nurses or home health aides, adult day care and homemaker services.

Community health service utilization: the measure of the population's use of medically required health services consisting of receiving nursing care, health services, personal care, housework, meals, shopping, respite care, medical equipment or other

Comorbid: existing simultaneously with and usually independently of another medical condition

Comorbidity: the occurrence of comorbid conditions

Cross-sectional study: a study in which the disease or condition and potentially related factors are measured at a specific point in time for a defined population.

Dementia: a usually progressive condition (as Alzheimer's disease) marked by the development of multiple cognitive deficits (as memory impairment, aphasia, and inability to plan and initiate complex behaviour)

Depression: a mood disorder marked especially by sadness, inactivity, difficulty with thinking and concentration, a significant increase or decrease in appetite and time spent sleeping, feelings of rejection and hopelessness, and sometimes suicidal thoughts or an attempt to commit suicide

Dysthymia: a mood disorder characterized by chronic mildly depressed or irritable mood often accompanied by other symptoms (as eating and sleeping disturbances, fatigue, and poor self-esteem)

Gender: the behavioural, cultural, or psychological traits typically associated with one sex

Health care utilization: the measure of the population's use of the health care services available to them

Medical health services: medically required health services consisting of medical (hospital/physician) services such as physician visits in offices, hospitals, and outpatient departments

Medical mental health service utilization: the measure of the population's use of medically required health services consisting of consultations with a family doctor, psychiatrist, psychologist, nurse, social worker, or any other mental health professional

Mental health promotion: attempts to (a) encourage and increase protective factors and health behaviours that can help prevent the onset of a diagnosable mental disorder and (b) reduce risk factors that can lead to the development of a mental disorder

Mental health services: comprehensive mental health services, as generally defined under some national (or state) laws and statutes, include: inpatient care, outpatient care, day care and other partial hospitalization and emergency services; specialized services for the mental health of the elderly; consultation and education services and specialized programmes for the prevention, treatment and rehabilitation of alcohol and drug abusers. They generally include a variety of services provided to people of all ages, including counseling, psychotherapy, psychiatric services, crisis intervention and support groups. Issues addressed include depression, grief, anxiety and stress, as well as severe mental illnesses.

Mood disorder: any of several psychological disorders characterized by abnormalities of emotional state and including especially major depressive disorder, dysthymia, and bipolar disorder

Proxy interview: a person who is interviewed in place of the person who is incapable of performing the interview.

Quality of life (QOL): an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns.

Satisfaction with life: a measure of an individual's perceived level of well-being and happiness.

Sex: either of the two major forms of individuals that occur in many species and that are distinguished respectively as male or female

Social Determinants of Health: The conditions in which people are born, grow, live, work and age. These circumstances are shaped by the distribution of money, power and resources at global, national and local levels

Stigma: the identifying mark or characteristic, either mental or physical; *specifically:* a specific diagnostic sign of a disease

Appendix B: Ethical Approval



RESEARCH ETHICS BOARD
OFFICE OF RESEARCH SERVICES

Date: July 8th, 2014

To: Michael Ackerman (Graduate Student PI), Emma Bartfay (Supervisor)

From: Bill Goodman, REB Chair

REB File #: 13-123

Project Title: Health Service Utilization among Demented Individuals with or without a Mood Disorder in Canada

DECISION: APPROVED

RENEWAL DATE: July 8th, 2014

RENEWED EXPIRY: July 8th, 2015

The University of Ontario, Institute of Technology Research Ethics Board (REB) has reviewed and approved the above research proposal. This application has been reviewed to ensure compliance with the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans (TCPS2) and the UOIT Research Ethics Policy and Procedures.

Please note that the (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 Principal Investigator) the safety of the participants and the continuation of the protocol. (I.e. un-anticipated 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/faculty/policies-procedures-forms.php>.

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Appendix C: Statistics Canada Remote Access Application



**Statistics Statistique
Canada Canada**

Health Statistics Division - Population Health Surveys

National Population Health Survey - Canadian Community Health Survey

Application for Remote Access to NPHS and CCHS Master Data Files

Project title:

Health service utilization among demented individuals with or without a mood disorder in Canada

Goal of the project:

The goal of this project is to determine if persons with dementia and comorbid mood disorders utilize health services differently than persons with dementia but no comorbid mood disorders.

Project summary:

This project is a thesis for Master's degree of Health Sciences at the University of Ontario Institute of Technology (UOIT). Dementia is one of the most debilitating health conditions in the world. There is currently a lack of research into health care service utilization among persons with dementia who also suffer from mental health comorbidity, and how comorbidity affects service utilization. Using data from the CCHS, this study seeks to examine service utilization among persons with dementia and comorbid mood disorders. Specifically, the study will investigate which health services are being used by persons living with dementia with or without a mood disorder and how the services are being used. The research study focuses on three main research questions. First, what is the prevalence of a mood disorder in persons with dementia in Canada? Secondly, will persons with dementia and a comorbid mood disorder in Canada access community health services more or less than persons with dementia and no mood disorder? Lastly, will persons with dementia and a comorbid mood

disorder in Canada access medical health services more or less than persons with dementia and no mood disorder? I hypothesize that the prevalence of a mood disorder is higher among persons with dementia than persons without dementia; persons with dementia and a mood disorder will be less likely to access community services than persons with dementia without a mood disorder; and persons with dementia and a mood disorder are more likely to access medical services than persons with dementia without a mood disorder. The study will also investigate various barriers to service utilization among these individuals.

Data set(s) to which access is required - specify survey(s) and cycle(s):

Canadian Community Health Survey- 2011-2012 annual component (combined 24 month file)

Explain why the project requires access to the master data rather than the Public Use Microdata File(s):

This project requires access to the variable CCC_181- Dementia or Alzheimer's to identify participants with dementia or Alzheimer's disease. This is a very important variable to this study because I must include only persons with dementia and not other health issues. The variable CCC_181 is only available in the master data. In the Public Use Microdata File (PUMF), I can only access the grouped variable, which groups survey participants with epilepsy, Alzheimer's, schizophrenia, other psychosis, eating disorder, and another long-term chronic condition.

Explain why Remote Access is required rather than on-site access in one of Statistics Canada's Research Data Centres (RDCs):

Remote Access is required rather than on-site access in one of Statistics Canada's Research Data Centres (RDCs) because of non-affiliation as well as physical location constraints. My home university, UOIT, is not one of the affiliated institutions for RDCs. To gain access to the data, I will need to travel to the University of Toronto. This is the closest RDC location to my home (in Courtice) and my university (in Oshawa). To commute to the University of Toronto, it will take me more than two and a half hours of travel time per day. In addition, the University of Ontario Institute of Technology is not affiliated with the University of Toronto's RDC. I will be required to pay for data use at their site. I do not have the financial means or time necessary to travel to Toronto to access the data. The data analysis is projected to be completed by the end of the summer for me to stay on track with my graduate study timeline.

Applicant's name: Ackerman	Applicant's given name: Michael	Initials: D
Applicant's affiliation: University of Ontario Institute of Technology (UOIT)		
Name and affiliation of other researchers involved in the project - who may submit computer programs and/or contact us with respect to the project: Dr. Emma Bartfay- Thesis Supervisor- University of Ontario Institute of Technology (UOIT)		
Applicant's complete postal address - for delivery of synthetic data CD-ROM(s): Michael Ackerman c/o Dr. Emma Bartfay Faculty of Health Sciences University of Ontario Institute of Technology 2000 Simcoe Street North Oshawa, ON L1H 7K4		
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Telephone number: 9054390633	Fax number:	

Expected results - will the results be submitted for publication?:

Yes, the results will be published as a Master's thesis at the end of my Master's degree program. I also plan to submit the results as part of a manuscript to a peer-reviewed journal for possible publication in 2015

Period during which remote access is expected to be required (yyyy/mm/dd):

Start: 2014/06/01

End: 2014/12/31