

A Profile of Canadian Farmers with Disabilities

by

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ABSTRACT

Background: Agriculture is identified as being one of the most hazardous industries in Canada. The different types of injuries that Canadian farmers experience have been addressed by other academic researchers. However, Canada does not have any national database that captures the overall prevalence of disability among farmers, regardless of the cause of their disability. Henceforth, this study provides a profile of Canadian farmers with disabilities in 2001 and in 2006.

Purpose: The overall purpose of this study was to determine and compare the prevalence of disability among the adult Canadian farming population in two time periods, 2001 and 2006. Specific objectives were to analyze the differences in age, gender, type of disability, severity of disability, and accessibility to health and social services among farmers with disabilities.

Methods: This cross-sectional secondary data analysis focused on the prevalence of disability within the Canadian farming population. Adult data were retrieved from two Statistics Canada national surveys known as the Participation and Activity Limitations Survey (PALS) 2001 and PALS 2006. Microdata from the PALS 2001 and PALS 2006 were accessed through the Research Data Centre at the University of Manitoba.

Results: Approximately 10% of Canadian farmers self-reported one or more activity limitation in 2001 and this figure increased to 20.3% in 2006. On the provincial level, the greatest proportion of farmers living with disabilities is situated in Ontario (27.92% in 2001; 27.04% in 2006), Alberta (17.14% in 2001; 26.12% in 2006), Manitoba (7.9% in

2001; 10.43% in 2006), and Quebec (7.52% in 2001; 10.16% in 2006). This study also reveals the prevalence of disability in both 2001 and 2006. The prevalence of disability is greatest among the senior farmers, i.e., those 65 years of age or older. Of all the Canadian farmers aged 65 and older, 28.1% reported experiencing a disability in 2001 and this prevalence increased to 47.2% in 2006. Of all reported disabilities in the Canadian farming community, physical disabilities accounted for 78.08% in 2001 and 59.04% in 2006. “Mild degree of severity” was the leading degree of severity in 2001 (56.98%) and 2006 (39.09%).

Conclusion: One of the most significant findings suggests that there has been a significant increase in disability among Canadian farmers over five years’ time, especially among those over 65 years of age or older. The results from this study raise awareness of specific issues such as aging among Canadian farmers with disability, increasing prevalence of disability, and accessibility to health care and social services. This study concludes that future research should be directed toward the impact of disabilities in the agricultural community to guide health professionals and policy makers in designing cost-effective programs suited to Canadian farmers with disabilities.

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If you would not be forgotten as soon as you are dead and rotten, either write something
worth reading or do something worth writing.

Benjamin Franklin

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1.0 INTRODUCTION

1.1. Statement of the problem

Canada is home to 346,200 Canadian farmers (Agriculture Census, 2001). Many Canadians take pride in their agricultural role as Canadians are internationally known to have one of the most efficient agricultural production systems within the developed world (Agriculture Census, 2001). Canadian agriculture farms accounted for 1.3% of the Total Canadian Gross Domestic Product (GDP) in 2005 (Agriculture and Agri-Food Canada, 2007).

Agricultural producers, commonly known as farmers, are defined as agricultural operators who produce products that are intended for sale. These goods include crops, livestock, poultry, animal products, and other farming products such as sod, honey, and maple syrup (Agricultural Census, 2001).

Unlike other workers who are employed by a company or organization with specific job descriptions, many farmers across the developed world are self-employed individuals whose work involves a wide variety of physical activities that deal with heavy machinery, toxic chemicals, and livestock (Friedberger, 1988; Donham & Thelin, 2006). The activities and responsibilities are linked to the farmers' family size (Friedberger, 1988; Donham & Thelin, 2006). On a typical farm, the entire family works on the farm. Women can either be the primary agricultural producers or co-owners who administer the family business. For example, females of the family commonly manage and market farm products, purchase supplies, assist in long-term planning, and act as bookkeepers (Tyler, 1997). The communal structure of the family often ensures that sons and daughters will become farmers themselves. Some farm families have farmed on the same land for many generations (Friedberger, 1988; Donham & Thelin, 2006). From a social and

psychological point of view, this type of family business entails a broad spectrum of work and is a unique way of life.

A farming lifestyle also comes with many occupational risks. Agriculture has been recognized as one of the most hazardous occupations in Canada in the prevalence of diseases and injuries. It ranked fourth among the riskiest occupations in 1999 (Pickett et al, 1999). The Canadian economic burden from farming injuries alone is estimated to cost \$200 to \$300 million per year (Locker, Dorland, Hartling & Pickett, 2003). According to The Canadian Agricultural Injury Surveillance Program (CAISP) (2003), approximately 100 Canadians farmers die each year and an additional 1,500 Canadians require hospitalization as a result of farming injuries (Hagel, 2004).

Since farmers are involved in many wide-ranging occupational activities, health professionals are challenged to meet the needs of a disabled farmer. For example, health professionals need to consider the farming culture, agricultural tasks, farming environments, and modified equipment that farmers with disabilities require (Jorge, 2006).

Disability may result from various occupational and non-occupational injuries and hazards. A study conducted by Purdue University provides an example of non-occupational injuries that cause disability. From 1999 to 2000, severely disabled farmers reported to the Breaking New Ground Resource Center at Purdue University that motor-vehicle and recreational-related injuries accounted for more disabilities than occupational-related accidents (Field & Jones, 2006).

An American study conducted by Stalones (2002) provides an example of occupational- related illnesses. Pesticides are a major peril that disables many American

farmers. Calvart (2003) noted that 531 American youths working in agricultural jobs had a higher incidence of pesticide-related illnesses than all other American workers combined. Linkages between agricultural chemicals and health conditions such as Parkinson's disease and severe depression have been suggested (Stalones, 2002).

On the other hand, even though agriculture is one of the most dangerous industries, Australia, a nation similar to Canada with a mechanized farming industry, has one of the highest return-to-work rates after an injury among farmers. Australian agricultural workers' return-to-work rate was 61.7% compared to 41.1% in other industries in Australia (Young, Strasser & Murphy, 2004). In Canada, a study of 47 Canadian farmers with disabilities examined the effects of disability in the farming community. Surprisingly, 83% of the participants continued to farm after experiencing a severe work-related injury which placed many workers at a higher risk of experiencing a secondary injury. A high return-to-work rate after an injury among farmers does not necessarily indicate successful rehabilitation processes (Molyneaux-Smith, Townsend & Guernsey, 2003).

Most research on agricultural injuries and disabilities has focused on the causes and prevalence of farm-related injuries (Dimich-Ward, 2004; McCurdy and Carroll, 2000; Pickett et al., 1999). According to Friesen, Krassioukova-Enns, Ringaert, and Isfeld (2009), there is a lack of Canadian epidemiological studies pertaining to farmers with disabilities from any and all causes. The impact and prevalence of disabilities among Canadian farmers have not been investigated. This study investigated the prevalence and selected characteristics of disability, regardless of etiology, among Canadian farmers.

1.2. Significance of the Study

According to Statistics Canada (2001), there are about 4.4 million Canadians who have one or more disabilities. However, there is no published academic literature that differentiates how many of the disabled Canadians are farmers (Friesen et al., 2009). This study will give us this data. With more complete data, public policy makers should be in a better position to plan for funding resources and strategies which attend to the needs of this segment of the population. The aim of this study was to identify the prevalence and selected characteristics of disability among adults in the Canadian farming population. All relevant variables within PALS 2001 and PALS 2006 were explored and compared on a provincial and national perspective.

1.3. Purpose of the Study

The overall purpose of this study was to determine and compare the prevalence of disability among the adult Canadian farming population in two time periods, 2001 and 2006. Specific objectives were to analyze the differences in age, gender, type of disability, severity of disability, and accessibility to health and social services among farmers with disabilities.

1.4. Objectives of the study

The following were the objectives of the study:

- a. To describe and compare the prevalence of disability among Canadian farm operators categorized by provinces, gender, and age in 2001 and in 2006.
- b. To describe and compare the different types of disabilities that Canadian farm operators reported in 2001 and 2006.
- c. To describe and compare the severity of disability that Canadian farm operators experienced in 2001 and 2006.
- d. To examine and compare farm operators' visits to health care and social service providers, out-of-pocket expenses, and accessibility to health care and social services between 2001 and 2006.

2.0. LITERATURE REVIEW

2.1. Introduction

Farmers with disabilities can experience a wide range of etiologies--occupational hazards can lead to illness or disease and non-farm-related injuries or illnesses may also cause disability (Field & Jones, 2006; Donham & Thelin, 2006). However, few data sources definitively capture farmers' prevalence of disabilities within the Canadian agricultural community. More specifically, the types and severity of disabilities are not commonly studied in Canada (Deboy, Jones, Field, Metcalf and Tormoehlen, 2008). Due to their complex and wide-ranging occupation and life style, farmers are a difficult population to study and few researchers have examined the epidemiology of farmers with disabilities across Canada.

To be clear, there is a lack of Canadian epidemiological study that pertains to people with disabilities in the farming community; however, there are a number of epidemiological studies that address farm-related "injuries" and "illnesses", i.e. those illnesses and injuries resulting from or directly related to the hazards of farm work. This literature review explores the nature of farmers' work-related injuries and illnesses as well as disability in the agricultural population due to other causes. The literature review focuses on studies completed within developed nations.

2.2. Epidemiology of Agricultural Injury and Illness

Farming is sometimes mistaken to be an occupation where farmers are living in a slow-paced environment in the wide open fields. On the contrary, recent economic pressure has transformed the agriculture field into a highly intensive production industry

(Friedberger, 1988; Donham & Thelin, 2006). In other words, Canadian farmers are working in a mechanized industry that imposes intensive physical and mental demands (Friedberger, 1988 ; Donham & Thelin, 2006).

Rapid changes in technology and productivity jeopardized farm operators' health and safety (Friedberger, 1988; Donham & Thelin, 2006). According to Statistics Canada (2007b), fractures (20.70%), open wounds (19.79%), and back injuries (14.59%) were the most common types of injuries that farm operators experienced. The most frequently injured body system was the musculoskeletal system (51.95%). Farmers increasingly experienced occupationally induced acute and chronic health conditions (Kirkhorn and Shenker, 2002). Pesticide-related illnesses, cancers, and hearing loss were a few examples of the work-related illnesses that occur in the farming community (Kirkhorn and Shenker, 2002).

Another shortcoming that American farming communities have faced is its high male injury rates. According to previous research, American men had a significantly higher chance of experiencing farm-related injuries compared to women (Dimich-Ward, 2004; McCurdy and Carroll, 2000; Pickett et al., 1999). In fact, American males were nine times more likely to sustain a farm-related injury; this ratio increased to thirty-nine times when farm operators reached the age of 70 (Dimich-Ward, 2004). Stallones and Beseler (2003) also found gender differences among agricultural related injuries. Agricultural machinery injuries showed similar differences in Ontarians who were 60 years of age or older. Compared to other Canadian provinces from 1985 to 1996, Ontario had the highest male to female injury ratio of 15.9:1 (Locker, et al , 2002). Over the years, Ontario male to female farm-related injuries varied from 3.6:1 to 15.9:1 (Locker et

al., 2002). Locker and colleagues (2002) suggest these differences between male and female farmers may be due to behavioral and work-assignment differences.

Although occupational and non-occupational injuries impose a serious threat to farmers, another major etiology that affects both female and male farmers is illnesses. Cooper, Buffler, and Wagener (1993) reported that 31.9% of the American female farming population and 17.2% of the American male farming population had activity limitations caused by chronic disease; ages ranged from 17 to 64 years of age. However, when the numbers of restricted activity days were compared to the number of days actually worked in the preceding year, these proportions increased to 43.2% for women and the men's percentage dropped to 14.3% (Cooper et al., 1993). This suggests that women in the farming community are more likely to have an activity limitation because of chronic diseases.

Osteoarthritis and musculoskeletal diseases are common disabling conditions in the agricultural workforce. Based upon an epidemiological study of agriculture-related osteoarthritis in Wisconsin, Kirkhorn, Greenlee and Reeser (2003) found that the osteoarthritis prevalence among men is greater in a farm cohort than a rural non-farm cohort. According to an agricultural employment project in the United States, known as the AgrAbility Project, 10% to 12% of the referrals to the AgrAbility Project were arthritis-related that resulted in disability (Kirkhorn, Greenlee & Reeser, 2003). Back pain, joint injury, and orthopedic injury represent 38% of state referrals; hip and knee osteoarthritis significantly affect farmworkers' ability to complete their tasks (Kirkhorn, Greenlee & Reeser, 2003).

Increasing evidence also shows that farmers are exposed to respirable dusts and chemicals that result in respiratory illnesses. For example, 1,620 of New York farmers and farm residences were asked whether they experienced symptoms that are indicative of respiratory illnesses or are indicative of increased sensitivity to respirable dusts and chemicals. The findings revealed that 18.2% of New York farmers have a respiratory illness as they experienced wheezing. Approximately 57.4% of the respondents have an increased sensitivity to dusts and chemicals as they reported stuffy nose and watery eyes. These potentially limiting respiratory illnesses may affect farmers' performances and limit productivity (Gomez et al., 2004).

Age is an important factor in determining agricultural injuries and illnesses. As stated in Census of Agriculture 2001, the average Canadian farm operator's age was 49.9 years of age compared to 47.5 years of age in the Census of 1991. While farm operators under the age of 35 have decreased in number from 19.9% in 1991 to 11.5% in 2001, farm operators aged 55 and older increased from 32.1% to 34.9% in 2001. Clearly, the Canadian farming community is an aging segment of the population.

In a retrospective review of hospital discharge data from Saskatchewan Health, Hagel (2004) found a highly significant association between the nature and rate of injury and age. The findings in the literature suggested that older farmers had a higher risk of work-related injuries than their younger counterparts (Voaklander, Hartling, Pickett, Dimich-Ward, & Brison, 1999; Voaklander et al., 2006). This may be due to certain risk factors that are associated with older farmers. For example, Hansen (1986) suggested that older farmers were more likely to use older equipment that lack safety devices. As well, unlike other vocations, farmers tend to keep working even during old age; there is no

mandatory retirement age. Furthermore, older farmers coping with chronic illnesses such as arthritis, back pain or joint mobility problems had a higher risk of farm-related injuries (Lewis et al., 1998; Voaklander et al., 2006; Sprince, Zwerling, Lynch, Whitten, Thu, Gillette et al., 2003). A secondary data-analysis study revealed how reduced reaction time made older farmers more prone to injury (Etherton et al., 1991).

However, other studies found that both the youngest and oldest farm operators were more likely to have a higher risk of injuries (Lewis et al., 1998; McCurdy and Carroll, 2000). The two age groups sustained different injuries. Those in the older age group were more likely to experience fall injuries. Younger operators were more likely to sustain machinery-related injuries (Hagel, 2004; Sprince, 2002).

The literature shows that there is a positive association between gross annual farm income and farm injury risk. For example, Browning et al. (1998) noted that the risk of farm injuries was greater for farm operators with farm receipts exceeding \$40,000. Studies in Ontario and New York have reported a positive association between farm sizes, gross income, and injury rates (Pickett et al., 1995; Pratt et al., 1992). For example, Pickett et al. (1995) found that farmers operating farms with a larger gross income tended to have a greater risk of work-related injuries than their counterparts who operated smaller income farms.

Finally the literature on Canadian farming injuries does not indicate whether high incidence of injury translates to a high prevalence of disability. Other developed countries, such as Ireland, have already studied this crucial injury and disability association. McNamara, Ruane, Whelan, and Connolly (2007) examined the cause,

nature, and impact of disability among a sample of 119,500 Irish farming households in 2001. Questions relating to disability were appended to the Irish Agriculture and Food Development National Farm Survey. This recent nationwide survey from Ireland's farming population revealed that 70% of disability that arose from injuries occurred from farm work, while only 30% of disability was rendered from non-farm work (McNamara, Ruane, Whelan, and Connolly, 2007).

2.3. Epidemiology of Disability and Implications

While there have been a number of studies concerning the prevalence and causes of injury and illness, few researchers have investigated farmers who sustain a permanent impairment. In the United States, 140,000 persons in the agricultural industry sustained a disabling injury each year (Reed & Claunch, 2002) and most injuries resulted in permanent impairment (Merchant, 1991). In 2000, the U. S. Department of Labor reported approximately 288,000 agricultural workers who had a disability that affected their ability to perform one or more activities of daily living (ADLs) (AgrAbility, 2000). The disability prevalence in the American agricultural workforce was estimated to range from 14.0% to 19.4% between 1997 to 2006 (Deboy, Jones, Field, Metcalf and Tormoehlen, 2008).

In a national survey from Ireland, the prevalence of disability in the Irish farming population was 19.5% in 2001. Physical disability accounted for 80.1%. Non-physical disability, such as learning and mental disabilities, only accounted for 19.9%.

Furthermore, compared to their younger counterparts, senior farm operators reported the

highest prevalence of disability in the Irish farming community in 2001 (McNamara, et al., 2007). Similar statistics concerning agricultural workers in Canada are unavailable.

Although farming may be hazardous to any agricultural producer, many Canadian and American farmers with disabilities believed that they were at greater risk of experiencing an injury due to their disability (Allen et al., 1995). A survey study of 627 Canadian and American farmers with disabilities was conducted in 1995 to examine injury risks for farmers and ranchers with physical disabilities (Allen et al., 1995). Allen et al. (1995) reported that 81% of the respondents self-reported having difficulties performing necessary work-related tasks on their farms. When they did conduct their usual duties, farm operators' disabilities limited them in performance of their duties. The authors of the survey study also noted that 60.1% of their sample believed that they were at greater risk of injuries as a result of their disabilities. The reported injuries were related to an exposure to livestock and accidental falls. Of all the reported injuries, 43% required medical attention (Allen et al., 1995).

Furthermore, farmers with disabilities and co-workers who assist them may be at risk for sustaining injury when using equipment that has been modified for disability accommodation. In a study of 20 co-workers who used tractors that had been modified for farmers with spinal cord injury, 65% of the co-workers reported cuts, knee pain, slipping, falling and difficulties when accessing the tractor. According to the respondents, the modified equipment was the cause of their injuries (Willkomm, 1997).

As farmers with disabilities return to work, they face three major barriers: physical barriers, environmental barriers, and financial barriers. Physical barriers are the most prominent limitations that farmers with disabilities experience. For example,

fatigue, non-functioning or poorly designed prostheses, and phantom pains are common physical barriers (Reed and Claunch, 1998; Reed, 2004). Environmental barrier is the second major barrier that farmers with disabilities face. Specifically, farmers with disabilities are isolated from rehabilitation services and a shortage of trained professionals in the rural area limit farmers from accessing proper medical rehabilitation. In addition to these barriers, many farmers with disabilities operate equipment that has not been modified to accommodate their disabilities. This hindered the disabled farmers from successfully completing their tasks (Reed and Claunch, 1998; Reed, 2004).

When returning to work, a significant barrier that many Canadian farmers with disabilities face is the financial barrier. According to a mixed-method study conducted by Molyneaux-Smith and colleagues (2003), disabled farmers stated that they did not usually receive financial compensation for their disability from Workers Compensation Boards or other private insurance companies--this frustration was reported in a one-on-one interview and in a survey questionnaire. Disabled farmers generally experience economic constraints when they purchase expensive equipment necessary to continue farming after acquiring a disability. According to 47 Canadian farmers with disabilities who participated in the survey questionnaire and 8 participants who were interviewed, equipment modifications and purchasing new equipment to accommodate for their disability cost up to \$100,000, and bank loans are usually unavailable (Molyneaux-Smith et al., 2003).

Despite these barriers, many farmers with disabilities continue to farm. A study of 47 Canadian farmers with disabilities was conducted to examine the effect of disability amongst the farmers (Molyneaux-Smith et al., 2003). Eighty-three percent of the

respondents continued to farm after their disabling injury. Individual volition and determination to keep farming sustained their farming lifestyle. Nearly all 47 farmers with disabilities indicated they had developed coping skills and were able to successfully manage their emotional and physical challenges (Molyneaux-Smith et al., 2003).

2.4. Literature Review Conclusions

The evidence of disabling injuries is more apparent in the agriculture industry than most other industries in the developed world (Field & Jones, 2006). Studies have focused on farm-related injuries in the Canadian agricultural community, however, few data sources capture either the prevalence or the nature of permanent disability within the Canadian farming community. Considerable evidence suggests that disabling conditions may increase the disabled farmer's risk of injury and this can easily affect anyone assisting him/her. In addition, as the trend toward an increasing older farm population continues, the issue of disability within this workforce becomes even more significant.

After reviewing the literature on farmers with disabilities, it is apparent that no available data sources provide statistics concerning the prevalence and demographics of Canadian farmers with disabilities. This study filled the gap in the literature as it investigated the prevalence and demographics of disability within the Canadian farming community. This study promotes awareness for both policy makers and health professionals. Ultimately, this study will contribute to information for both policy makers and health professionals that could enhance and expand services provided to this underrepresented segment of the Canadian population.

3.0 METHODOLOGY

3.1. Study Design

In order to determine the prevalence of disability among the Canadian farming population, this secondary data analysis study involves two cross-sectional population-based national surveys from 2001 and 2006.

Data from the Research Data Centre (RDC) of Statistics Canada were analyzed by using Statistical Package for the Social Sciences (SPSS) version 16 and SUDAAN version 10.

3.2. Target Population

In this study, Canadian farm operators with disabilities were the target population. All ten Canadian provinces were included in this study. Since the 2001 cross-sectional population-based national survey excluded the three northern territories, Yukon, Northwest Territories, and Nunavut were excluded from this study, accordingly.

3.3. Study Sample

The participants were drawn from two Statistics Canada databases: Participation and Activity Limitation Survey (PALS) 2001 and PALS 2006. This study was based on PALS 2001 and PALS 2006 adult survey (respondents were aged 15 and older). The sample consisted of participants who reported agricultural jobs identified in PALS by the titles: farmer, farm manager, specialized livestock worker, farm supervisor, and general farm worker.

3.4. Data Sources

Data from two waves of PALS, 2001 and 2006 were used. The adult survey questionnaires from PALS 2001 and PALS 2006 are included in Appendix A and Appendix B respectively.

PALS 2001 and PALS 2006 are post-censal surveys, conducted in both English and French. These two databases focus on the participation of persons with activity limitations. Human Resources and Social Development Canada (HRSDC) funded PALS 2001 and PAL 2006 (Statistics Canada, 2007a; Statistics Canada, 2002a).

The following two questions from the 2001 and 2006 Census are cited as the “trigger questions” for inclusion in the PALS surveys:

1. Do you have any DIFFICULTY hearing, seeing, communicating, walking, climbing stairs, bending, learning or doing any similar activity?
- 2a. Does a physical condition OR mental condition OR health problem REDUCE THE AMOUNT OR THE KIND OF ACTIVITY you can do at home?”
- 2b. Does a physical condition OR mental condition OR health problem REDUCE THE AMOUNT OR THE KIND OF ACTIVITY you can do at work or at school?
- 2c. Does a physical condition OR mental condition OR health problem REDUCE THE AMOUNT OR THE KND OF ACTIVITY you can do in other activities, for example, transportation or leisure? (Statistics Canada, 2002a)

Although a post-census tool, the surveys were voluntary. Individuals living in private and collective households within all 10 provinces were surveyed. Due to accessibility difficulties, persons living on First Nations reserves and residents of institutional collectives were excluded from the sample. Persons living on military bases, Canadian Armed Forces vessels, merchant vessels, guard vessels, campgrounds and parks were also excluded (Statistics Canada, 2002a).

PALS 2001 had a total sample size of 43,276. The PALS 2001 data collection reference period ranged from October 09, 2001 to January 31st, 2002. The response rate of PALS 2001 was 82.5% (Statistics Canada, 2002a).

PALS 2006 data collection ranged from October 30th, 2006 to February 2nd, 2007 and the final sample size was 39,000 adults. The PALS 2006 response rate was 75% (Statistics Canada, 2007a).

PALS 2001 and PALS 2006 identified its target population by using the Census as a sampling frame (Statistics Canada, 2007a; Statistics Canada, 2002a). Each respondent was assigned a weight, creating a representative for a number of people. In other words, each respondent did not only characterize herself or himself; each respondent represented other people that were not surveyed. Thus, the weighting of the data maintained consistency in all estimations (Statistics Canada, 2007a; Statistics Canada, 2002a).

PALS 2001 and PALS 2006 included detailed questions about the nature and severity of people's disabilities. In 2001 and 2006, different types of disabilities were identified and the degree of severity was based on the degree of activity limitations. The types of disabilities included were impairments of hearing, seeing, speech, mobility,

agility, pain, learning, memory, developmental, psychological, and unknown (Statistics Canada, 2002a; Statistics Canada, 2007a). The degree of severity ranged from very severe, severe, moderate, and mild (Statistics Canada, 2002a; Statistics Canada, 2007a). PALS 2001 and PALS 2006 also explored the respondent's need for access to assistance, education, employment, income, housing, and transportation (Statistics Canada, 2007a).

3.5. Study Variables

Demographic characteristics, disability-related measures, and health and social services are three study areas that categorize the current study's variables. Each study category is further described in the following sections.

3.5.1. Demographic Characteristics

Respondents with agricultural job titles were selected. Farmers, farm managers, farm supervisors, specialized livestock workers, and general farmworkers were all screened from the databases and this became the target population of the study. Each Canadian province had its own count of individuals who fit the vocation profile. Subsequently, the sums of all the provinces' agricultural workers were recorded for this study (Statistics Canada, 2007a; Statistics Canada, 2002a).

To further identify the selected individuals' demography, the agricultural workers' gender was identified. The total number of female agricultural workers across the provinces were summed up and recorded; the male agricultural workers followed the same procedure (Statistics Canada, 2007a; Statistics Canada, 2002a).

The last considered demographic characteristic within this target population was the age of the individuals. The structured age ranges were provided from PALS; ages 15 to 44, ages 45 to 64, and ages 65 and over were all defined in both PALS 2001 and PALS 2006. The number of participants in each age category was tallied and the sum of each age group from all 10 provinces was respectively identified (Statistics Canada, 2007a; Statistics Canada, 2002a).

3.5.2. Disability-Related Measures

The Canadian farmers' prevalence of disabilities was measured by this study's established definition of disability, type of disability, and severity of disability between 2001 and 2006. Details of this measure are described below.

3.5.2.1. Disability

PALS adopted the World Health Organization's (WHO) definition of disability provided by the International Classification of Functioning (ICF). Disability was defined as, "the outcome or result of a complex relationship between an individual's health condition and personal factors, and of the external factors that represent the circumstances in which the individual lives". (Statistics Canada, 2007a; Statistics Canada, 2002a).

On the operational level, PALS defined disability as individuals who answered "yes" to the disability filter questions in the Census and "yes" to the same disability filter questions in PALS or "yes" to the detailed questions on activity limitation in PALS (Statistics Canada, 2007a; Statistics Canada, 2002a).

3.5.2.2. Type of Disability

For the purpose of this study, the types of disability were grouped into four major categories: “physical disability,” “mental disability,” “physical and mental disabilities,” and “unknown.” Physical disability included six types of disabilities characterized by PALS 2001 and PALS 2006: difficulty with hearing, seeing, speech, mobility, agility, and pain were identified as physical disabilities. Agricultural workers with physical disabilities were counted across each province and the total sum revealed the number of farmers with physical disabilities in Canada (Statistics Canada, 2007a; Statistics Canada, 2002a).

Mental disability included learning disabilities, psychological disabilities, and problems with memory. The “physical and mental disability” category constituted a combination of mental disability, physical disability and developmental disability. The type of disability was categorized as unknown if respondents did not identify their type of disabilities when responding to the survey questionnaire (Statistics Canada, 2007a; Statistics Canada, 2002a).

3.5.2.3. Severity of Disability

In PALS, severity of disability was a variable derived from the respondents’ self-reported intensity and frequency of their activity limitations. The severities of the disability were divided into four main categories: mild, moderate, severe, and very severe. PALS 2001 and PALS 2006 both provided this classification concerning the severity of disability. As with every other variable in this study, each category was tallied nationally.

3.5.3. Health Care and Social Services

The next sets of variables examined were visits, out-of-pocket costs and accessibility to health care and social services. In both PALS 2001 and PALS 2006, agricultural workers with activity limitations completed the Healthcare and Social Services Module.

3.5.3.1. Visits to Health Care and Social Services Providers

Participants were asked to identify how often have they seen or conversed with health care and social services practitioners within the past 12 months. The completed survey revealed the frequency of visits to health care/social services professionals concerning participants' physical, emotional or mental conditions. Contacts at home with health professionals providing specialized nursing care or medical treatment were excluded in PALS 2001 and PALS 2006 (Statistics Canada, 2007a; Statistics Canada, 2002a). PALS 2001 and 2006 provided questionnaires that inquired how often the agricultural workers visited a physician, a physiotherapist or an occupational therapist, an audiologist or a speech therapist, a chiropractor, a massage therapist, a psychologist or a social worker or a counselor, or any other specified health care or social services provider. Due to small sample sizes, the researcher simplified the PALS ordinal scale into a categorical scale. According to PALS 2001 and 2006, responses were structured as "at least once a week", "at least once a month", "less than once a month" to "never/ don't know/ refusal" (Statistics Canada, 2007a; Statistics Canada, 2002a). Due to RDC regulations on small sample sizes, this study collapsed PALS' responses to "yes" or "no". Respectively, the mentioned health care and social services were quantified nationally.

3.5.3.2. Out-of-Pocket Expenses

Another area of interest within the health care and social services module was the out-of-pocket or direct expenses for health care and social services in the past 12 months. These amounts included expenses such as over limits, deductibles and exclusions not covered by insurance. The respondents were asked if they had out-of-pocket expenses in last 12 months in 2001 and 2006. Their responses were organized in an ordinal scale in both PALS 2001 and PALS 2006. Again, due to small sample sizes, this study collapsed the ordinal scale into a categorical scale. Responses such as “less than \$200,” “\$200 to less than \$500,” “\$500 to less than \$1000,” “\$1000 to less than \$2000,” “\$2000 to less than \$5000,” “\$5000 or more,” “don’t know,” and “refusal” were simplified to “yes” or “no” (Statistics Canada, 2007a; Statistics Canada, 2002a).

3.5.3.3. Accessibility to Health Care and Social Services

Finally, PALS 2001 and PALS 2006 inquired whether there was ever a time when people with activity limitations felt that they needed health care or social services because of their condition, but they did not receive proper professional care. Participants could respond: “yes” or “no” (Statistics Canada, 2007a; Statistics Canada, 2002a).

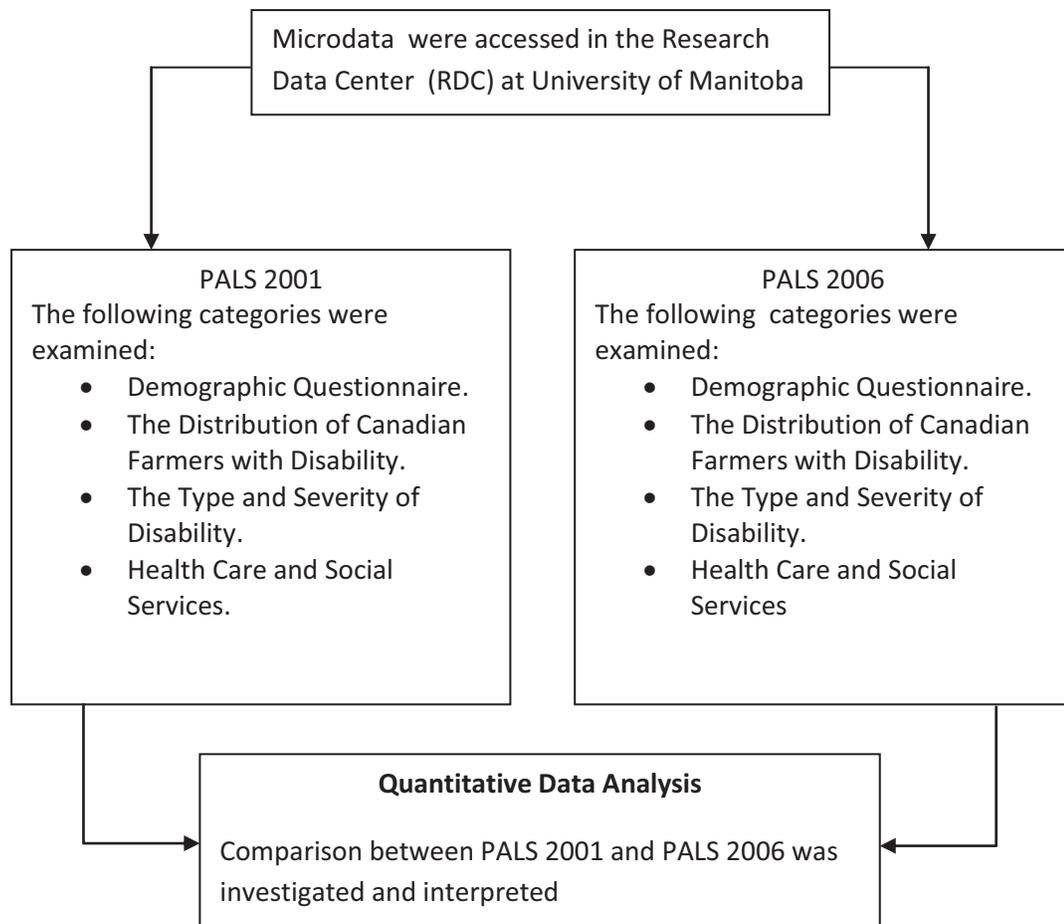
PALS 2001 and 2006 are scales that asked the participants to suggest a reason why they did not receive proper health care and social services. PALS 2001 and PALS 2006 offered several explanations that the participants could mark off which included: “They are not covered by insurance,” “They are too expensive,” “Your condition is not serious enough,” “You do not know where or how to obtain them,” and “They are not

available in the area.” Other reasons could be specified (Statistics Canada, 2007a; Statistics Canada, 2002a).

3.6. Procedure

This study accessed the microdata housed in the RDC at University of Manitoba. This project proposal was submitted to Statistics Canada as well as an adjudicating committee, operating under the auspices of the Social Sciences and Human Research Council (SSHRC), at the University of Manitoba (Statistics Canada, 2008a). According to Statistics Canada (2008) guidelines, stringent confidentiality procedures were enforced. Figure 1 depicts the procedures that took place in this study.

Figure 1. Study Procedure



3.7. Ethical Approval

Ethics approval was granted by University of Manitoba Health Research Ethics Board (see Appendix C) and Statistics Canada Research Data Centre at the University of Manitoba (see Appendix D). The study was conducted in accordance with the Statistics Act. Statistics Canada is prohibited by law from releasing any records that would disclose information which identifies any person, business or organization without the prior knowledge or written consent from that specific person, business or organization (Statistics Canada, 2007a; Statistics Canada, 2002a).

3.8. Data Management

The data management was carried out as follows:

- i Merging the non-disabled files from PALS 2001 into PALS 2001 adult data files was the first step. Likewise, the nondisabled files from PALS 2006 were merged into adult data files from PALS 2006. The nondisabled files included individuals from the 2001 and 2006 Census who did not identify themselves as disabled.
- ii All variables from the two merged files were then defined by the researcher.
- iii Since RDC requires 10 respondents per cell, a cross-tabulation was executed on unweighted data. In the case where the tables did not meet the RDC regulation, the variables were redefined until the variables met the RDC requirement.
- iv The next stage was to combine both PALS 2001 and PALS 2006 adult data files together for analysis.
- v The master weight variable was used when analyzing national and provincial prevalence. The weight of each respondent was based on the corresponding Census.

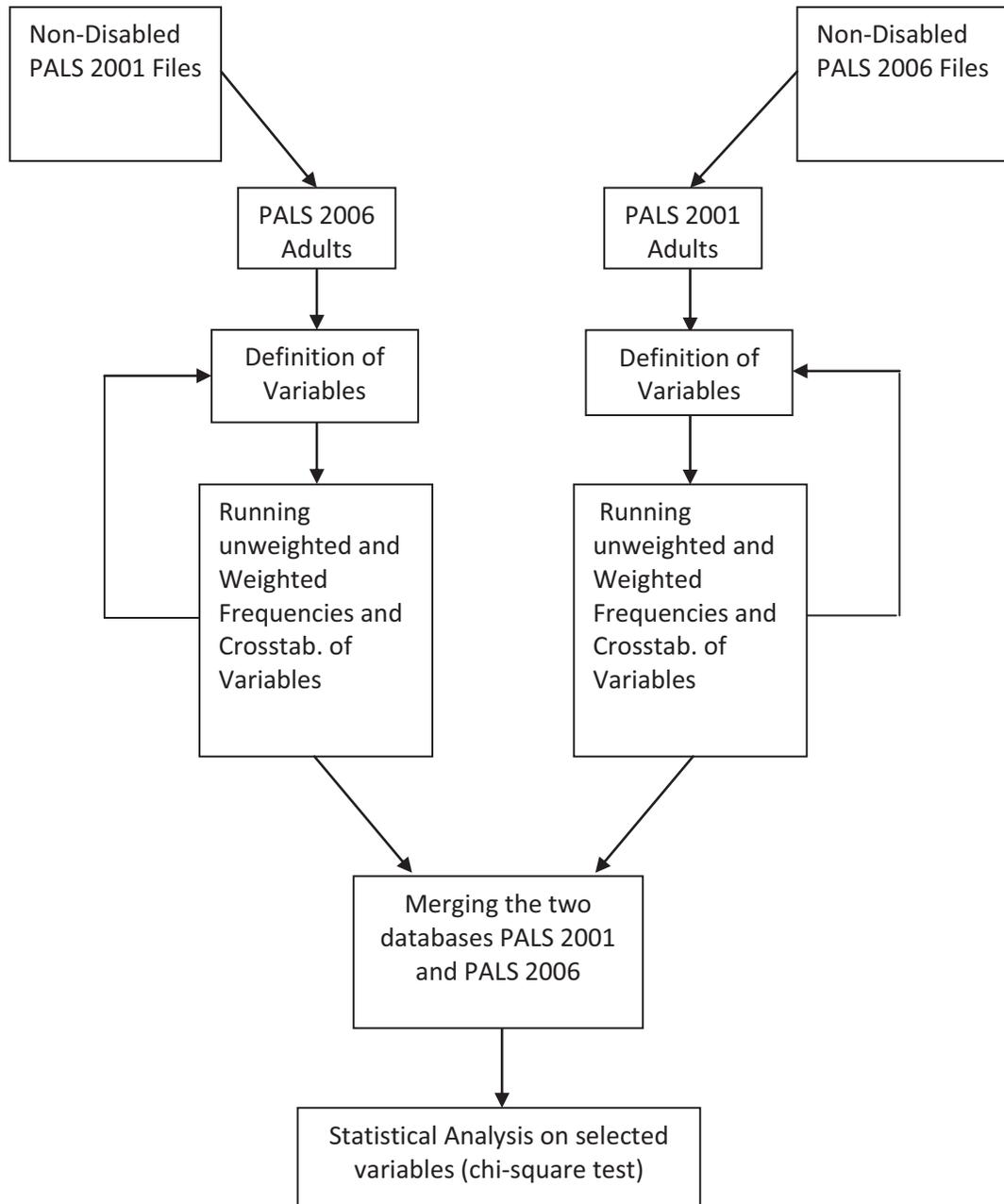
The weighting process was adjusted for non-response (Statistics Canada, 2007a; Statistics Canada, 2002a).

- vi Bootstrapping analysis was used for age, gender, type of disabilities, severity of disability, out-of-pocket costs, and accessibility to health care and social services.

Bootstrapping is a re-sampling technique that produces multiple samples from one single sample. As a result, the confidence intervals are based on many samples which bring the results one step closer to a population-based statistics (Statistics Canada, 2004).

All PALS 2001 and PALS 2006 adult data files were managed and analyzed at the University of Manitoba RDC, and only the weighted data was released after approval from the RDC officer. All the weighted and unweighted microdata files will be stored in the RDC. Only the researcher and the researcher's supervisor, Dr. Margaret Friesen, will have access to the data. See Figure 2, Data Management.

Figure 2. Data Management



3.9. Data Analysis Plan

The statistical analyses of the data was planned to include the procedures outlined on

Table 1.

Table 1. Data Analysis and Statistical Procedures Plan

RESEARCH OBJECTIVES	DATA USED	STATISTICAL PROCEDURE ($p \leq 0.05$)
1. To describe and compare the prevalence of disability among Canadian farmers operators in 2001 and 2006 .	Demographic variables: - Age - Gender - Province	- Frequency - Cross-tabulation - Chi-square
2. To describe and compare the different types of disabilities of Canadian farm operators experienced in 2001 and 2006.	- Types of disability	- Frequency - Cross-tabulation - Chi-square
3. To describe and compare the severity of disability that Canadian farm operators experienced.	- Severity of disability	- Frequency - Cross-tabulation - Chi-square
4. To examine health care and social services for farmers with disabilities in 2001 and 2006.	- Visits to health care and social services providers - Out-of-pocket expense - Accessibility to health care and social services	- Frequency - Cross-tabulation - Chi-square

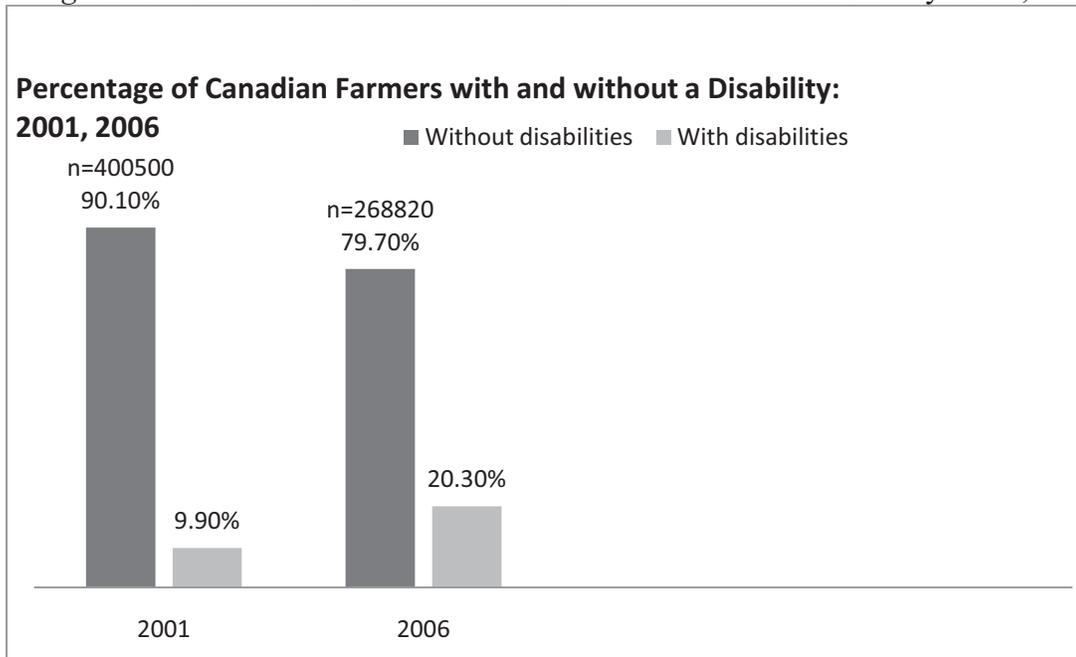
4.0. RESULTS

Findings from this study contributed to a descriptive profile of Canadian farmers with disabilities in 2001 and 2006. The participants were drawn from two post-census databases: PALS 2001 and PALS 2006. The results section presents the data on the Canadian farmers reporting disability based on the weighted data of 444,330 farmers in 2001 and 337,090 farmers in 2006. The findings from these two time periods identify the prevalence of disability among adults in the Canadian farming population based on national and provincial data. Secondly, this study reports the findings based on variables including age, gender, the types of disability, the severity of disability, and accessibility to health care and social services.

4.1. Prevalence of Disability among Canadian Farmers

In 2001, the estimated number of adult Canadian farmers living with disability was 43,840 which represented 9.9% of the total Canadian farming population. Of the 2001 Canadian farming population with disabilities aged 15 and over, 75.6% were males and 24.5% were females. In 2006, there were 68,270 Canadian farmers with disabilities or 20.3% of the Canadian farming population; 75.7% males and 24.4% females. There was a significant increase in the number of Canadian farmers reporting disability between 2001 and 2006, $\chi^2 (1, N=112,110), p = .00$. This is noted in Figure 3.

Figure 3. Prevalence of Canadian farmers with and without a disability: 2001, 2006



4.2. Prevalence of Disability by Province

Table 2 provides the estimated prevalence of disability among Canadian farmers by province in 2001 and 2006. Due to insufficient data, Newfoundland and Labrador was excluded. Among 9 provinces in 2001, the highest prevalence of disability was reported from Nova Scotia (17.7%). The second highest prevalence of disability was recorded from British Columbia (15%). In regards to the remaining provinces displayed in Table 2, the 2001 prevalence of disability provincial rankings were as follows: Ontario ranked third highest (11.8%), New Brunswick ranked the fourth highest (11.5%), Prince Edward Island ranked the fifth highest (11.4%), and Saskatchewan ranked the sixth highest (10.9%). Not all provinces in 2001 revealed a high disability prevalence - Manitoba, Quebec, and Alberta respectively reported 8.1%, 7.3%, and 7.3%. These three provinces' prevalence of disability were lower than the national prevalence of 9.9% in 2001.

Five years later in 2006, the provincial disability prevalence among Canadian farmers provided a different perspective. In 2006, provinces with the highest disability prevalence were reported from British Columbia (29.2%), Alberta (27.2%), and New Brunswick (23.3%). Provinces within national average disability prevalence were Ontario (21.2%), Saskatchewan (19.8%), and Manitoba (17.9%). The lowest prevalence of disability in 2006 was reported from Prince Edward Island (14.9%), Nova Scotia (11.4%), and Quebec (9.6%). All of the analyzed provinces showed a significant increase in the number of farmers reporting disability between 2001 and 2006, except Prince Edward Island. Table 2 shows the prevalence of disability by province.

Table 2. Prevalence of Canadian farmers with a disability by province.

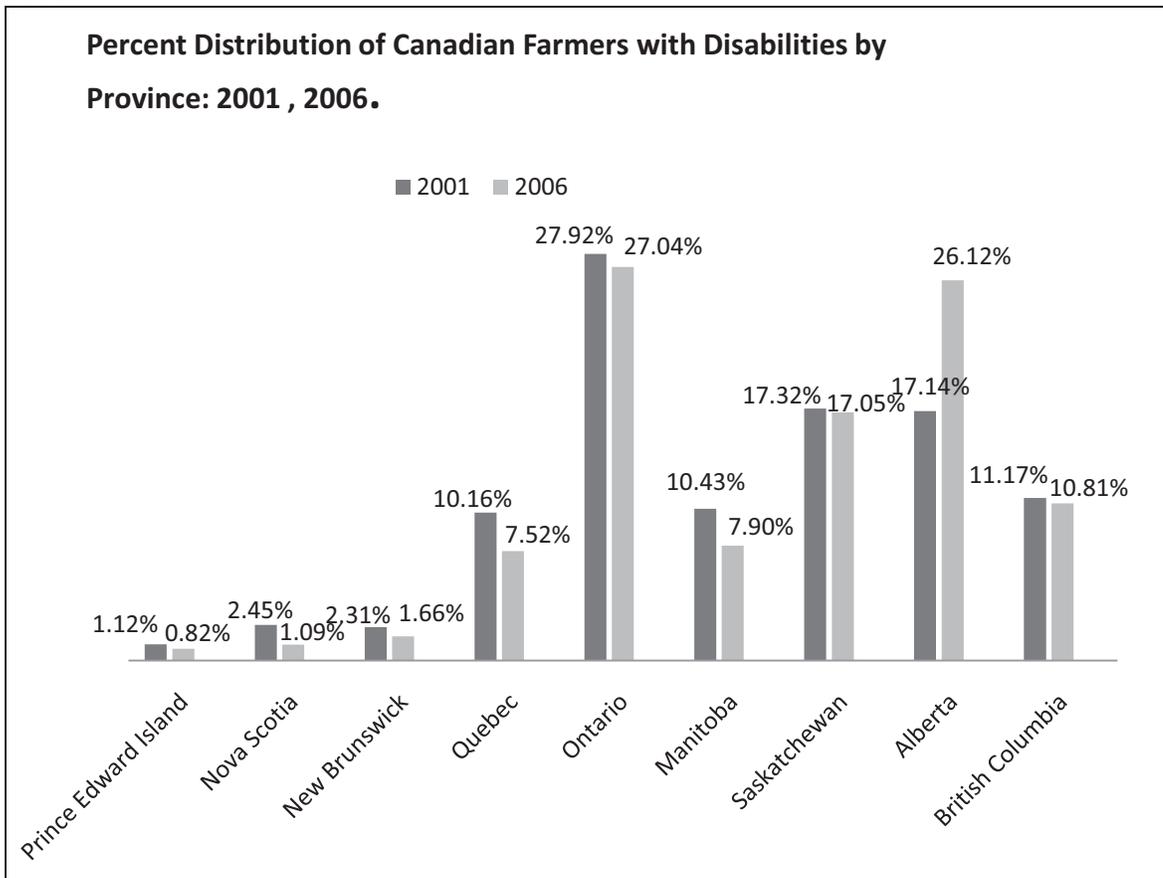
	2001		2006		df	P-value*
	N	%	N	%		
Prince Edward Island	490	11.4%	550	14.9%	1	.055
Nova Scotia	1070	17.7%	740	11.4%	1	.00*
New Brunswick	1010	11.5%	1130	23.3%	1	.01*
Quebec	4440	7.3%	5120	9.6%	1	.00*
Ontario	12200	11.8%	18420	21.2%	1	.00*
Manitoba	4560	8.1%	5380	17.9%	1	.00*
Saskatchewan	7570	10.9%	11610	19.8%	1	.00*
Alberta	7490	7.3%	17790	27.2%	1	.00*
British Columbia	4880	15%	7360	29.2%	1	.00*

Note: N indicates the number of farmers reporting a disability; *chi-square test level of significance reported at $p \leq .05$.

4.3. Provincial Distribution of Canadian Farmers with Disabilities

Figure 4 compares the distribution of Canadian farmers with disabilities in each province in 2001 and 2006. The greatest proportion of farmers living with disability was situated in Ontario (27.9%) in 2001. Respectively, the following two provinces with the second and third largest proportion of farmers living with disability were reported from Saskatchewan (17.32%) and Alberta (17.14%) in 2001. In British Columbia (11.17%), Manitoba (10.43%), and Quebec (10.16%), there were fewer Canadian farmers with disabilities. However, the percentages of farmers with disabilities were lowest in Nova Scotia (2.45%), New Brunswick (2.31%), and Prince Edward Island (1.12%).

Figure 4. Percent Distribution of Canadian Farmers with Disabilities by Province: 2001, 2006.



Farmers' disability distribution patterns were relatively consistent in 2006 throughout the Canadian provinces; nonetheless, some differences did emerge. Although Ontario (27.04%) consistently comprised the greatest percentage of farmers with a disability, Alberta (26.12%) closely trailed Ontario in 2006. Saskatchewan and British Columbia had the third and fourth largest proportion of farmers with disabilities with 17.05% and 10.81% respectively. The percentage of farmers with disabilities was lower in Manitoba (7.9%) and Quebec (7.52%) in 2006. The provinces with the smallest percentage of farmers with a disability were found in New Brunswick (1.66%), Nova Scotia (1.09%), and Prince Edward Island (0.81%).

4.4. Prevalence of Disability by Age Group

Among farmers aged 15 to 44 in the total Canadian farming population, 3.1% in 2001 and 9.8% in 2006 reported one or more disabilities. Among farmers aged 45 to 64, the disability prevalence was 13.2% in 2001 and 19.6% in 2006. Compared to other age groups, farmers 65 and older were more likely to report a disability. In this age group, 28.1% reported having a disability in 2001. In 2006, 47.2% of all farmers aged 65 and older reported having one or more disabilities. There was no significant difference in prevalence of disability within the three age groups between 2001 and 2006, as shown in Table 3.

Table 3. Prevalence of Disability by Age.

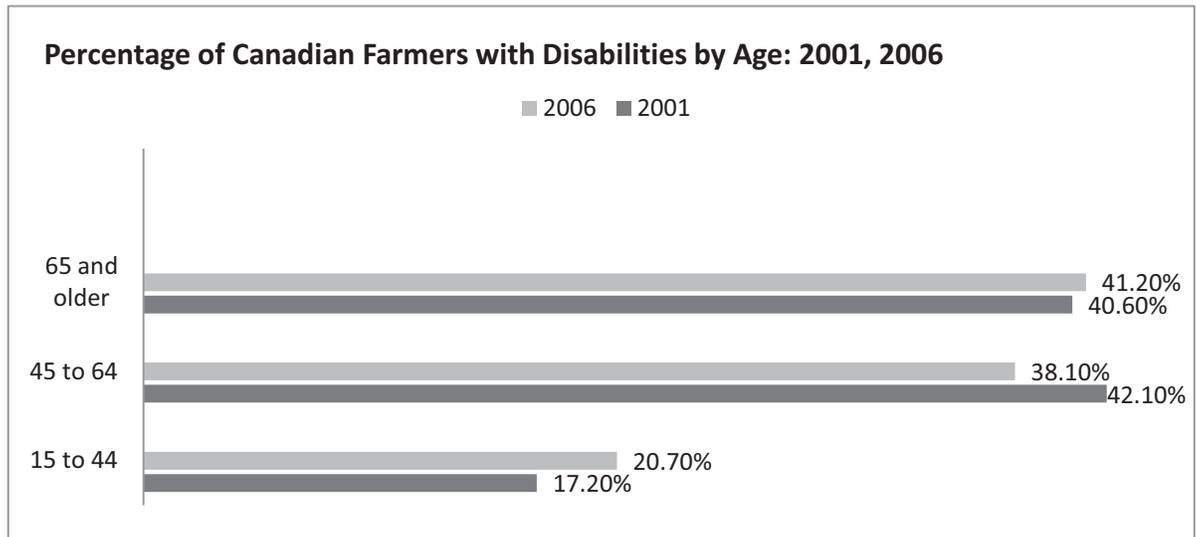
Age Group (Years)	2001		2006		df	p-value*
	N	%	N	%		
15-44	7,560	3.1%	14,160	9.85%	2	0.76
45-64	18,470	13.2%	26,010	19.6%	2	0.76
65 and over	17,810	28.1%	28,100	47.2%	2	0.76

Note: N; indicate the number of farmers reporting a disability; *chi-square test level of significance reported at $p \leq .05$)

4.5. Age Distribution of Canadian Farmers with Disabilities

According to PALS 2001 and PALS 2006, the largest proportions of Canadian farmers who had a disability were aged 65 and older. In 2001, this older age group comprised 40.6% of Canadian farmers with disabilities. The same age group in 2006 accounted for 41.2% of the Canadian farmers with disabilities. Adults aged 45 to 64 comprised 42.1% in 2001 and 38.1% in 2006. Farmers aged 15 to 44 accounted for 17.2% in 2001 and 20.7% in 2006, as shown in Figure 5.

Figure 5. Percentage of Canadian Farmers with Disabilities by Age: 2001, 2006.



4.6. Gender Differences

Among males in the Canadian farming population, 11% of men reported one or more disabilities in 2001. However, in 2006 the percentage of men in the farming community who reported one disability or more increased to 20.8%. Among females within the Canadian farming population, 18.6% of women reported one disability or more in 2006. The percentage of Canadian females who reported having a disability had also increased in five years time, as 7.5% of women in the farming population reported one disability or more in 2001. There was significant gender difference in the number of Canadian farmers reporting disability between 2001 and 2006. This is noted on Table 4.

Table 4. The Percentage of the Canadian Farming Population with Disabilities, Categorized by Gender.

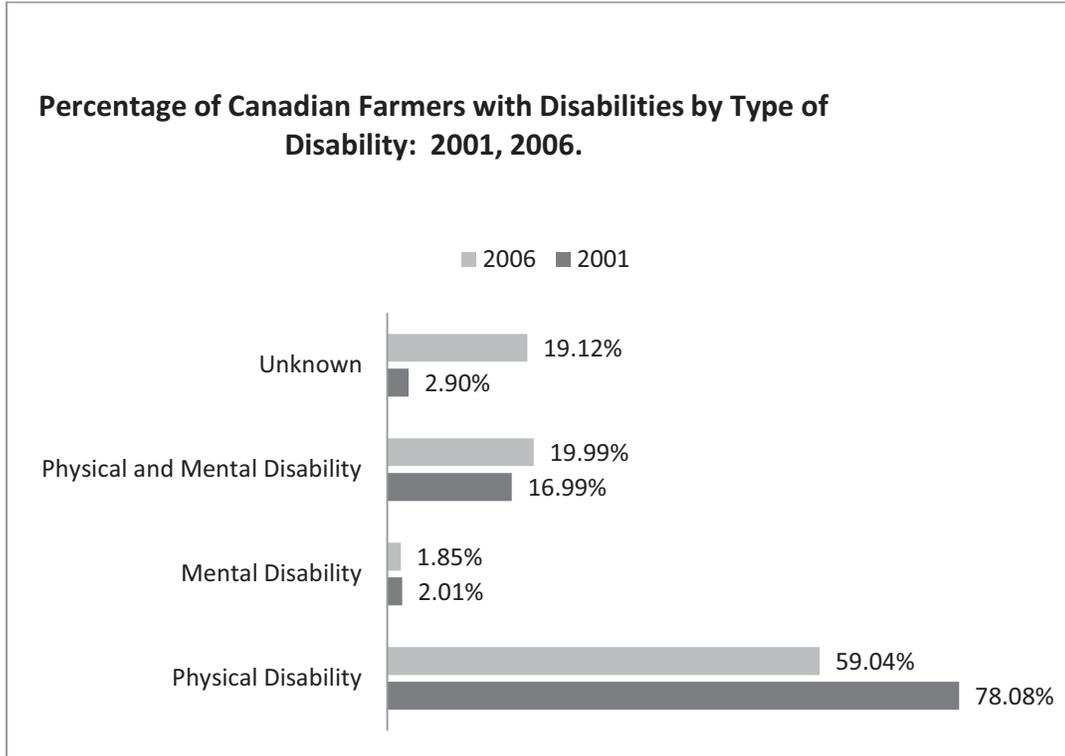
YEAR	Male		Female		df	p-value
	N	%	N	%		
2001	33,130	11%	10,710	7.5%	1	.00*
2006	51,710	20.8%	16,560	18.6%	1	.00*

Note: N; indicate the number of farmers reporting a disability; *chi-square test level of significance reported at $p \leq .05$)

4.7. Types of Disabilities

In 2001 and 2006 the most common type of disability amongst Canadian farmers aged 15 and older was physical. Physical disability accounted for 78.08% in 2001 and 59.04% in 2006. The physical and mental disability category accounted for 16.99% in 2001 and 19.12% in 2006. The mental disability category was reported with the smallest percentage, at 2.01% in 2001 and 1.85% in 2006. There was no significant difference in types of disability within the three disability groups between 2001 and 2006; χ^2 (2, N=97,771), $p = .5$ as shown in Figure 6.

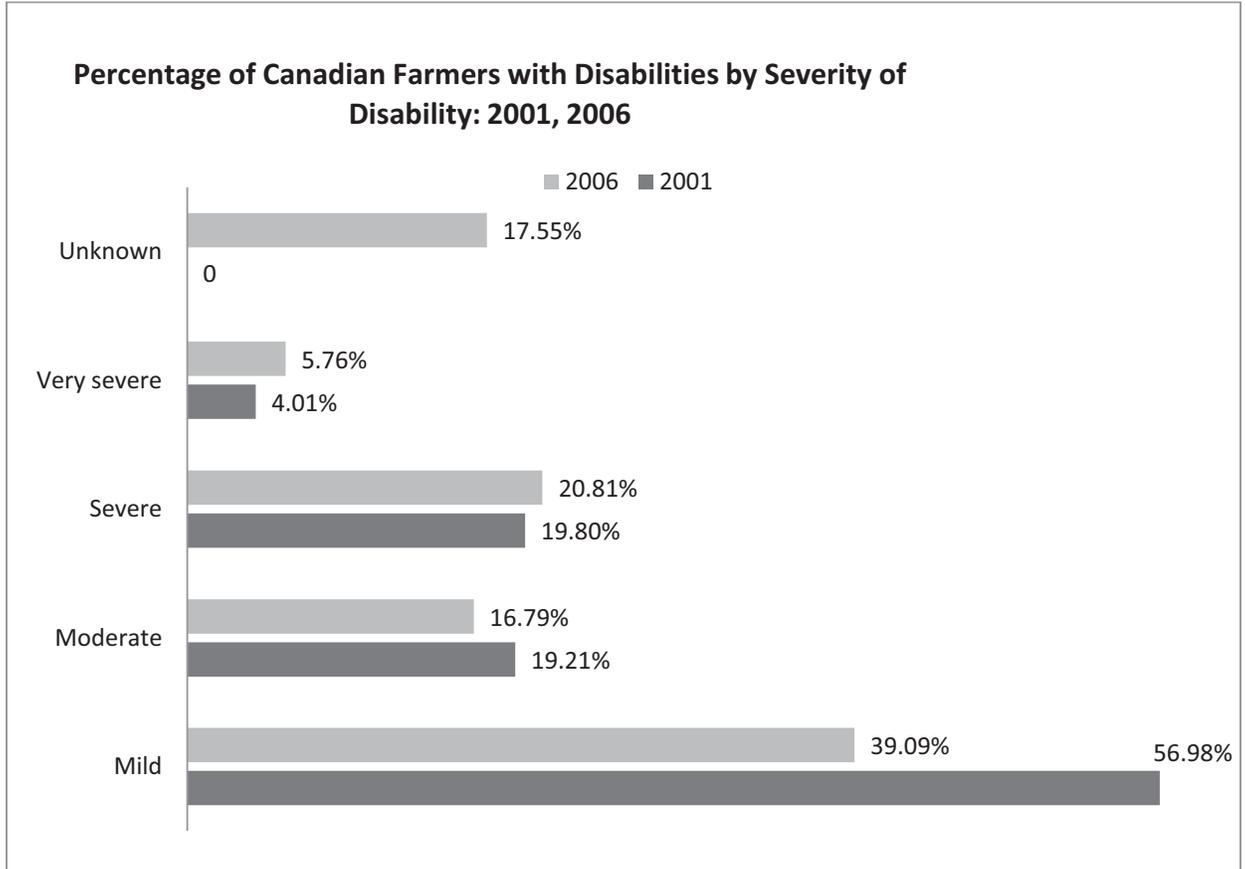
Figure 6. Percentage of Canadian Farmers with Disabilities by Type of Disability: 2001, 2006



4.8. Severity of Disability

Within the population of farmers with disabilities, the degree of severity varied. In 2001, the majority of Canadian farmers, 56.09%, reported that their disabilities were of a mild degree of severity. This figure decreased to 30.09% in 2006. In 2001, 19.21% of farmers rated their disabilities as moderate and this figure changed to 16.79% in 2006. Finally, 19.8% of the Canadian farming population self-reported their disability as severe in 2001. Five years later, 20.81% of the target population rated their disabilities as severe in 2006. Disabilities that were rated as very severe only represented 4.01% in 2001 and 5.67% in 2006. There was a significant difference in severity of disability within five severity groups between 2001 and 2006; χ^2 (4, N=11, 2103), $p = .00$ as shown in Figure 7.

Figure 7. Percentage of Canadian Farmers with Disabilities by Severity of Disability: 2001, 2006



4.9. Use of Health Care and Social Services

Table 5 shows the percentage of Canadian farmers with disabilities who visited health care and social services providers in the last 12 months in 2001 and in 2006. Physicians had the most contact with Canadian farmers with disabilities. Physicians were visited by 87.8% of farmers in 2001 and this figure remained high, 82.9%, in 2006. Although the physical therapists/ occupational therapists' category ranked the third most visited health care providers in 2001 (10.2%), there was a noteworthy increase in 2006 (18%). This increase ranked the physical therapists/occupational therapists' category second to physicians. Visits to chiropractors (17% in 2001, and

16% in 2006), audiologists/speech therapists (5.9% in 2001, and 5.6% in 2006) remained relatively the same in 2001 and 2006. However, visits to massage therapists (9.8% in 2001, and 15.8% in 2006) and psychologists and social workers or counsellors (3.3% in 2001, and 6% in 2006) were considerably higher in 2006 than in 2001.

Table 5. Visits to Health Care or Social Service Providers in 2001 and 2006.

	2001		2006	
	Yes	No	Yes	No
physician	87.8%	12.1%	82.9%	17.1%
physical /occupational therapist	10.2%	89.7%	18%	82%
audiologist or speech therapist	5.9%	94.1%	5.6%	94.4%
chiropractor	17%	83%	16%	84%
massage therapist	9.8%	90.2%	15.8%	84.2%
psychologist, social worker	3.3%	96.7%	6%	94%
other health care provider	8.5%	91.5%	8%	92%

4.10. Out-of-Pocket Expenses and Accessibility to Health Care and Social Services

In response to their disabilities, farmers were asked to indicate if they had had out-of-pocket expenses in the last 12 months in 2001 and 2006. 18% in 2001 and 17.3% in 2006 indicated that they had out-of-pocket expenses, while the majority indicated “no” out-of-pocket expenses were being made. However, there were no significant difference of farmers with disabilities reporting out-of-pocket expenses between 2001 and 2006, $\chi^2 (1, N=81,956) p = .23$. In 2001 7.7%, and 6.8% in 2006, felt that they needed health care and social services which were not received, which was not significantly different between 2001 to 2006, $\chi^2 (1, N=93,777) p = .7$. See Table 6.

In 2001, farmers with disabilities indicated that they did not receive the needed health care and social services since they did not realize where such assistance could be found. In 2006, farmers with disabilities indicated that they failed to receive health care and social services due to high costs.

Table 6. Out of-pocket expenses and accessibility to health care and social services for farmers with disabilities: 2001 and 2006.

Year	Had out-of-pocket-Expense	Needed health care & social services Did not receive them.
	2001	18%
2006	17.8%	6.8%

5.0. DISCUSSION

5.1. Prevalence of Disability

Although the prevalence of disability increased in both the general population and the farming population between 2001 and 2006, it was noticeably higher in the farming community in 2006. In 2001, findings from this study reveal that prevalence of disability in the Canadian farming population (9.9%) was lower than the national prevalence of disability (12.4%) (Statistics Canada, 2001). Five years later, the prevalence of disability in the Canadian farming population (20.3%) was higher than the national prevalence of disability (14.3%) in 2006 (Statistics Canada, 2006).

The explanation for this increase in prevalence of disability within the Canadian farming population may be attributed, in part, to the steady decline of the Canadian farming population. The farming population declined by 6.2% between 2001 and 2006 (Statistics Canada, 2008b); the opposite trend occurred in the general Canadian population as its numbers grew more rapidly between 2001 and 2006 (+5.4%) (Statistics Canada, 2009). The prevalence of disability among Canadian farmers more than doubled from 2001 to 2006. This general increase is true for every province except Nova Scotia and Prince Edward Island. Further possible factors that explain the increase in prevalence of disability among the farming population will be discussed below.

5.1.1. Social and Demographic Trends That May Affect Prevalence of Disability

There are three social and demographic trends that may explain why the prevalence of disability among the Canadian farming population increased within five years time. This study suggests that the aging trend in farming, the changed perception

of disability, and volition to farm may have attributed to a growing number of farmers who self-report having a disability.

5.1.1.1. An Aging Trend in Farming

This study suggests that farmers are more likely to have a disability as they age. In 2006, close to half of the Canadian farmers over the age of 65 have at least one or more disability. Less than one-fifth of the Canadian farming population between the ages of 45 and 64 had one or more disability in 2006. Young adults between 15 and 44 constituted less than one-tenth of the Canadian farming population in the same year; younger adults reported the lowest number of disability. This was true in 2001 where disability among Canadian farmers similarly increased with age. These findings are consistent with results from the age distribution of the total Canadian farming population and age of onset of disability.

Since the largest proportion of the Canadian farming population is aged 65 and older (Statistics Canada, 2008b), this is the age group that is most likely to acquire a disability. This study's results are consistent with the previous literature which identified an unmistakable pattern where older farmers experience disability (McCurdy and Carroll, 2000; Browning et al., 1998; Lewis et al., 1998).

According to the 2006 Canadian Agriculture Census (Statistics Canada, 2007b), farmers were an aging group with a median age of 51.0 years. Farmers have the highest median age compared to other occupations in the country—41.2 years represents the median age in the general Canadian labour force (Statistics Canada, 2008b). Since farming is dominated by an older age group, there is a higher probability of injuries that lead to disabilities (McCurdy and Carroll, 2000; Browning et al., 1998; Lewis et al.,

1998). Once older farmers are diagnosed with a disability such as arthritis, rheumatism, hearing problems or a loss of visual acuity, further disabling injuries may result on the fields (McCurdy and Carroll, 2000; Browning et al., 1998; Lewis et al., 1998). Another barrier may arise when elderly farmers use their older machinery which tends to lack safety gears and devices (Hansen, 1986). Many elderly farmers continue performing many agricultural tasks even though they lack the capability to farm safely. For example, slower reflex speeds make older farmers more predisposed to disabling injuries (Etherton et al., 1991). The available literature on older farmers may explain this study's dramatic increase in prevalence of disability. As the proportion of older farmers constitutes the majority of the Canadian farming population, it comes as no surprise that this study recognizes how aging is a contributing factor which increases the prevalence of disability from 2001 to 2006.

5.1.1.2. Changed Perception of Disability

Another factor that potentially contributes to this increase in the prevalence of disability among Canadian farmers may be related to the increase in societal acceptance; the perception and awareness of disability have been gradually accepted and more people may be willing to disclose their disability (Statistics Canada, 2006). Since PALS 2001 and PALS 2006 measurement of disability was solely based on respondents' self-report, the way in which respondents perceive their activity limitations directly affects results. The perception of disability is always evolving throughout the course of history. From penalizing disability to attributing disability to supernatural sources to the limited definition of disability within a medical model, the perceptions of disability have evolved throughout time (Statistics Canada, 2006). PALS 2006 data may imply how Canadian

society continues to adopt differences in people and evolve along this continuum towards increased social acceptance. Hence, this may explain why more respondents were willing to report their disability in 2006 than in 2001 (Statistics Canada, 2006).

5.1.1.3. Volition to Farm

The final factor that may have contributed to the increase in disability among the Canadian farming population can be explained by farmers' volition to farm; in other words, farmers will to continue farming even with a disability. This potentially illustrates farmers' resilient nature; unlike other occupations, farmers recognize farming as a lifestyle and abandoning their work is highly improbable (Molyneaux-Smith et. al., 2003). Likely, many Canadian farmers with disability do cope with performance and habituation changes. Although changing habits, routines, and roles were reported as being extremely difficult, these emotional and physical challenges are unmatched compared to farmers' will to farm (Molyneaux-Smith et al., 2003). Many farmers sustain a positive perspective in life as they remain committed to the land and rural lifestyle. Generally, Canadian farmers with disability do not attribute their activity limitations as being the most limiting factor in performing their work activities (Molyneaux-Smith et. al., 2003).

5.2. Type of Disability

A considerable amount of literature supports that the agriculture industry is a labour intensive occupation; farmers are involved in a variety of physical activities that deal with heavy machinery, toxic chemicals, and livestock with high incidence of injuries

(Friedberger, 1988; McCurdy and Carroll, 2000; Pickett et al., 1999; Dimich-Ward, 2004). Thus, it comes as no surprise that the most common type of disability among Canadian farmers with disability was physical disability both in 2001 and 2006. The next most common type of disability was the “physical and mental disability” category in 2001 and 2006. Mental disability was the least common type of self-reported disability in 2001 and 2006, which is in contrast to the growing amount of literature that reported how farmers were exposed to a high degree of stress (Walker and Walker, 1988), depression, and suicide (Gregoire, 2002). Conceivably, there may be several explanations why mental disability is under-represented in this study and it is further described below.

5.2.1. Influences that Minimize Reports of Mental Disability

There are several reasons why mental disability may be under-reported. Mental disability is less visible compared to physical disability. If the individual was not diagnosed by a physician, the respondent may not perceive and attribute their stress or anxiety to having a mental disability (Statistics Canada, 2006). Many farmers may not be diagnosed with a mental disability as there is a shortage of psychiatrists and psychologists in rural communities (AIHW, 2002 as cited in Fraser, et al, 2005). Long distances and poor road conditions reduce access to health care providers, especially if farmers are situated in a remote location (Fox, Merwin, & Blank as cited in Fraser, et al, 2005). Furthermore, social stigma plays a major role in limiting access to mental health services (Fox, Blank, Berman, & Rovnyak as cited in Fraser, et al, 2005). This barrier is further amplified as farmers fear being discriminated by their community members for visiting psychologists or psychiatrists. The small community heightens the possibility of

being noticed at a clinic and this stigma haunts many farmers (Fraser, et al, 2005). All these reasons may explain the low number of reported mental disability cases within the census' target population.

5.3. Reported Degrees of Severity

The degree of severity of disability that Canadian farmers reported depends on the frequency and intensity of limitations associated with their disabilities (Statistics Canada, 2002b). The percentages of farmworkers reporting very severe, severe, and moderate degrees of severity remained relatively consistent between 2001 and 2006. There were however, differences between 2001, 2006 for farmers reporting mild disability.

5.3.1. Barriers to Recognizing Mild Disability

The greatest difference between 2001 and 2006 proportions of disabled Canadian farmers reporting a mild, moderate, severe, or very severe disability was among those reporting mild activity limitations. In 2001, 56.98% of the farmers experienced mild disability while 39.09% of the farmers experienced a mild disability in 2006.

This decrease may be attributed to the nature of mild disability. Generally, people are on the margin between reporting and not reporting mild disability (Statistics Canada, 2006). The degree of activity limitation is subjective for the individual. How severe their disability may be perceived varies and this inconsistency may be related to this drop in reported mild disability. Pinpointing mild disability is imprecise. This study suggests that fewer farmers with mild disabilities in Canada were reporting their activity limitations in 2006 than in 2001. As PALS continues to be conducted in the years to

come, researchers may be able to determine whether farmers continue to experience a decline in the numbers of mild disabilities since 2006.

5.4. Increasingly Accessible Health Care and Social Services from 2001 to 2006

In 2001, farmers with disability indicated that they did not receive needed health care and social services since they did not realize where such assistance could be found—this is the main reason for not having access to health care and social services. However, in 2006, farmers with disabilities indicated that they failed to receive health care and social services due to high costs; this was the reason for not accessing the health care and social services for farmers with disabilities. High health care and social services costs may be due to provincial fee for services that are not directly covered by the Canada Health Act.

Canadian Farmers with Disabilities Registry (CFWDR), Manitoba Farmers with Disabilities (MFWD), Workers Compensation Boards (WCB), Agriculture Federations and Associations, Alberta Aids to Daily Living are all community organizations that promote coping strategies for people with disabilities in Canadian rural areas (Molyneaux-Smith, 2003). Presence of these community organizations may explain the small percentage of farmers with disability who self-reported needing health care and social services but did not receive them. These organizations provide important resources for farmers with disability. As small farming communities continue to be communal in nature, community organizations' programs can be influential and publicize appropriate health care and social services to farmers with disabilities. For example, MFWD provides peer counseling, newsletters, information on machinery modifications,

audio/visual library, useful government links, the Healthy Community Resource Kit, and the Assistive Tools Kit are available to disabled farmers in Manitoba (MFWD, 2010). In all, it would appear that these community organizations are proving to be successful as farmers with disabilities can access the care they need.

5.5. Limitations of Research

There are two main limitations in this study. Primarily, with the cross-sectional nature of the data, the researcher has not been able to distinguish occupational-related disabilities from non-occupational disabilities in the Canadian farming population.

Secondly, there are weaknesses in the measures of PALS, namely, PALS' limited characterization of farmworkers may have eliminated some respondents who may qualify under this occupational category. In the 2001 Agriculture Census, 40.5% of farm operators reported their main profession as non-agricultural related; this sizeable percentage increased in the 2006 Census as 46.1% of the farm operators reported their occupation as non-agricultural (Statistic Canada, 2008b). Many farmers have more than one off-farm occupation and the multiple roles of each farming family member are not well described by PALS. In other words, PALS' categorization did not evolve with the new trends in the farming community where farmers have multiple occupational roles. This may explain why only 3% of the Canadian general population is recognized as being farm operators (Statistics Canada, 2008b).

Many farming household members no longer work on the farm on a full-time basis and many family members of all ages may be employed in a non-agricultural vocation. In fact, 41.1% of men in the agricultural field reported their primary occupation as non-agricultural (Statistics Canada, 2008b). For example, most male farmworkers are also transportation equipment operators, mechanics, managers, construction workers, heavy equipment and crane operators, manufacturing machine operators. Furthermore, men may be in occupations unique to forestry, mining, oil and gas extraction, and fishery (Statistics Canada, 2008b).

Of the women who have off-farm employment, most women may fall under clerical occupations, sales and service occupations, financial or insurance administrative occupations, teaching professions, childcare occupations, and registered nursing (Statistics Canada, 2008b). Many female farmworkers may not have been included in this study and the prevalence of disability in both 2001 and 2006 may have been greater than what is reported. Slightly more than three quarters of the adult farming population with disabilities are men and less than one quarter of that population is represented by women. It is only logical to suspect that women are less likely to identify farming as their main occupation. According to the 2006 agriculture census, 59.2% of the female farm operators reported their main occupation as a non-agricultural related profession (Statistics Canada, 2006). The multiple roles may explain why women do not self-report their primary occupation as farm operators. As a result, this may skew the number of individuals who identified themselves as farmers and may have affected the prevalence of farmers with disabilities.

Finally, as PALS did not account for First Nations reserves, residents of institutional collectives, and the three northern territories, this study also excluded these locations accordingly. Also due to RDC regulations on small cell sizes, this study did not further analyze “health care and social services accessibility.”

5.6. Recommendations for Future Research

This descriptive study is a cross-sectional secondary data analysis that provides an understanding of the epidemiology of disability within the Canadian farming population. There are still many issues that are left unattended which are described below.

Due to regulations on small sample sizes, male and female frequency of disability, severity of disability, and type of disability cannot be extracted on a provincial level. Thus, the justification behind the significant increase in the prevalence of disability in Canadian farming population represented in New Brunswick, Quebec, Ontario, Manitoba, Saskatchewan, Alberta and British Columbia is difficult to explain between 2001 and 2006. If the sample size is sufficient in the future, RDC may release their information to forthcoming researchers and the disability dynamics of each province can be further examined.

A future study could address the issues surrounding the loss of income once a farm operator acquires a disability. In Ireland, they have already disclosed Irish farming households' losses of income in their literature. The preliminary investigation of the impact of disability on Irish farms showed a severe drop in income; farmers indicated that disability in the household affected the farm business in 75% of cases (McNamara, Ruane, Whelan, and Connolly, 2007). Compared to non-disabled operators farms in Ireland, Irish farming households with disabilities dropped to €24/ha (McNamara, Ruane, Whelan, and Connolly, 2007). Irish farmers with disabilities had the poorest financial performance compared to other occupational groups in Ireland (McNamara, Ruane, Whelan, and Connolly, 2007). There is reason to believe that Canadian farmers with disabilities parallel another developed nation, and Canadian farming families with disabilities may experience similar financial woes. To truly grasp the loss in income within a Canadian farming household with disabilities, future research must calculate the farming business income and the off-farm employment income per household.

After reviewing the respondents' direct expenses for health care and social services, it may seem like an insignificant amount of expenses are spent. However, assuming that farmers with disabilities have no other out-of-pocket expenses is misleading. Since the Canada Health Act provides universal coverage to its residents who need medical services, farmers with disabilities do not generally pay for their professional health care services. This may explain why such a small fraction of farmers with disability had out-of-pocket expenses (Health Canada, 2009).

Nevertheless, farmers with disability still need a substantial amount of financial support as they continue to cope with their disabilities on agricultural fields. Equipment modifications and essential equipment purchases for farmers with disabilities costs up to \$100,000 (Molyneaux-Smith et.al., 2003). Private insurance companies provide expensive insurance plans, bank loans are not readily available, having access to the Workers Compensation Boards (WCB) is not traditional, and hiring assistants to complete work duties make it extremely hard to fiscally stay afloat (Molyneaux-Smith et. al., 2003). According to Molyneaux-Smith et.al. (2003), many farmers commonly criticize how the benefits from insurance companies did not warrant the high costs. The cost of farming with a disability is underestimated and the lack of financial recognition proves to be fiscally overwhelming (Molyneaux-Smith et. al., 2003).

Although this study provided a profile of Canadian farmers with disabilities which also captures some of their accessibility issues surrounding health care and social services, a study of this nature is only useful in revealing facts about this underrepresented segment of the population. The findings of this study can be used and built upon by academic researchers, policy makers, and health professionals. However,

this study alone cannot directly conclude how health professionals and policy makers should improve and implement cost-effective outreach programs within Canada.

6.0. CONCLUSIONS

Disability issues within the rural Canadian farming household are a growing concern as this study reveals how the prevalence of disability among Canadian farmers with disabilities significantly increased from 2001 to 2006. The prevalence of disability doubled in numbers in both genders over a five year period. Physical disability is the most frequently identified type of disability among farm operators. An increasingly older farm population is a trend which impacts the growing numbers of farmers with disabilities. Although this study provides a profile of disability in the Canadian farming population, numerous areas remain to be studied. As technology is advancing and becoming more affordable and reliable, farmers with disabilities should have the capability to continue farming. The results of this study should help raise awareness of issues among Canadian farmers reporting disability. Further research should be directed towards disability in the Canadian agricultural community to facilitate educational and prevention programs that minimize the occurrence and impact of disability among Canadian agricultural workers.

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AUTHOR NOTE

Faisal Albagmi, School of Medical Rehabilitation, University of Manitoba.

This manuscript will be submitted in partial fulfillment for the requirements for the degree of Master Science in Rehabilitation under the supervision of Dr. Friesen.

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Appendix A

Appendix B

Appendix C



UNIVERSITY
OF MANITOBA

BANNATYNE CAMPUS
Research Ethics Boards

P126-770 Bannatyne Avenue
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Tel: (204) 789-3255
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APPROVAL FORM

Principal Investigator: Mr. F. Albagmi/
Supervisor Dr. M. Friesen

Ethics Reference Number: H2009:039
Date of Approval: February 11, 2009
Date of Expiry: February 11, 2010

Protocol Title: An Epidemiology of Disability Among Adults in the Canadian Farming Population

The following is/are approved for use:

- Research Proposal, submitted January 29, 2009

The above underwent expedited review and was approved as submitted on February 11, 2009 by Dr. John Arnett, Ph.D., C. Psych., Health Research Ethics Board, Bannatyne Campus, University of Manitoba on behalf of the committee per your submission received January 29, 2009. The Research Ethics Board is organized and operates according to Health Canada/ICH Good Clinical Practices, Tri-Council Policy Statement, and the applicable laws and regulations of Manitoba. The membership of this Research Ethics Board complies with the membership requirements for Research Ethics Boards defined in Division 5 of the *Food and Drug Regulations of Canada*.

This approval is valid for one year only. A study status report must be submitted annually and must accompany your request for re-approval. Any significant changes of the protocol and informed consent form should be reported to the Chair for consideration in advance of implementation of such changes. The REB must be notified regarding discontinuation or study closure.

This approval is for the ethics of human use only. For the logistics of performing the study, approval must be sought from the relevant institution, if required.

Sincerely yours,

John Arnett, Ph.D., C. Psych.
Chair, Health Research Ethics Board
Bannatyne Campus

Please quote the above Ethics Reference Number on all correspondence.

Inquiries should be directed to REB Secretary
Telephone: (204) 789-3255 / Fax: (204) 789-3414

Appendix D

January 6, 2009

Mr. Faisal M. ALbagmi
School of Medical Rehabilitation
University of Manitoba
R106-771 McDermot Avenue
WINNIPEG MB R3E 0T6

FILE: CISS-RDC-ALBAGMI/ 439029

Dear Mr. ALbagmi:

Thank you for submitting an application to the *CISS-Access to the RDC Program*, a joint initiative between Statistics Canada, the Social Sciences and Humanities Research Council and the Canadian Institutes of Health Research. The RDC-Access Granting Committee has now completed the review of your proposal and has approved it. We will now notify Statistics Canada so that it can do the required security check.

We also ask that you contact the RDC analyst and make an appointment to begin the administrative processes to gain access to the centre. Your centre can be found at the following website:
<http://www.statcan.ca/english/rdc/network.htm>.

You have 1 year from the date of approval of your proposal in order to initiate access to the RDC. If you are unable to commence your research projects within the first 12 months after your project has been approved for RDC access, please contact the RDC analyst to make special arrangements.

If you have not contacted your RDC analyst within the first 12 months after your proposal has been approved, you will need to re-apply to SSHRC in order to re-gain access to the RDC. The reviews of the applications were based on SSHRC peer review procedures. Each proposal was evaluated on the basis of four main criteria: scientific merit and viability of the proposed research; the viability of the methods to be applied given the data on which the analysis will be performed; a demonstrated need for access to detailed micro data; and, the expertise and ability of the researchers to carry out the work.

You will find enclosed an evaluation submitted to SSHRC. Should you have further questions, please feel free to contact the officer responsible for the administration of the *CISS-Access to the RDC Program*, Mika Oehling, at (613) 992-4227 or by email at zresearchdata@sshrc.ca.

Sincerely,

Murielle Wagnon
Director
Strategic Programs and Joint Initiatives

cc: Beverley Hunt, Research Data Centres Headquarters Operations

Encl.





Applicant family name, given name ALbagmi, Faisal	RDC Access Granting Committee Member Member No.3
---	--

Data Access

Can the information required for the project be obtained from public sources such as public use of micro data files and existing publications?

Yes No Unable to assess

Comments:

[Empty comment box]

Quality of Project

Are the project's objectives clearly defined?

Yes No

Comments:

? There is some concern with the sample size so the researchers will need to be careful when conducting their analysis. It is essential that the researchers use the information provided by the cvs to ensure good data quality. They should also use small cell suppression.

Is the information in the requested dataset necessary to achieve the proposed research objectives?

Yes No

Comments:

[Empty comment box]



Are the proposed statistical and analytical methods suitable for this project?

Yes No

Comments:

Will this project contribute to the advancement of knowledge (i.e. is the research project original and will it have an impact on the discipline or field)?

Yes No

Comments:

Applicant and Team Members Qualifications

Do the applicant and team members (if applicable) have experience, qualifications and expertise to successfully complete the proposed project?

Yes No

Comments:



Overall Assessment

Based on the previous questions, should the applicant and team be granted access to a RDC?

Yes No

Comments:

It is important that the researchers use the cvs and small cell suppression to ensure good sound data quality. Because there is a concern about the sample size, these techniques are crucial to ensure good data quality.