The Association between Rural Residence and Return to Work in Workers' Compensation Claimants

by

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ABSTRACT

Objectives

The objectives of this study were (1) to determine the association between geographic location of residence and recovery from work-related MSK injury in workers' compensation claimants; and (2) to determine whether the association between geographic location of residence and recovery from work-related MSK injury in workers' compensation claimants is attenuated or becomes non-significant after controlling for other demographic, occupational, and health risk factors.

Methods

Secondary analysis of a dataset containing information on 7,843 workers' compensation claimants from across the province of Alberta who experienced MSK injury was performed. The dataset had information on several variables collected at time of comprehensive clinical/work assessment including location of residence, age, sex, level of education, type of work, injury diagnosis, and health care utilization, among other factors. The dataset also included compensation wage replacement outcomes up to 3 months after the clinical/work assessment. Multivariable risk factor modeling using logistic and cox regression was used to determine the association between rurality and work disability outcomes while controlling for potential confounders.

Results

Rural claimants were significantly different ($p<0.05$) from their urban counterparts on several variables. Rural claimants were less likely to be job attached (83.7% vs 85.6%), less likely to require an interpreter during assessment (0.4%vs 4.1%), more likely to not have a high school diploma (15.3% vs 12.8%) or university degree (2.4% vs 6.2%), more

likely to work in ‘blue-collar’ jobs (59.4% vs 55.0%), reported lower pain intensity (4.96 vs. 5.14/10), but had more visits to doctors (15.96 vs 13.92) and fewer visits to physiotherapists (18.11 vs 19.47). Univariable modeling found rural residence to be significantly associated with worse outcomes (OR 1.45, 95% Confidence Interval = 1.20-1.75). Multivariable modeling showed that rural residence remained significantly associated with worse outcomes while controlling for potential confounders (adjusted OR 1.57, 95% Confidence Interval = 1.20 – 2.04).

Conclusions

Rural residence was associated with prolonged work disability, even after controlling for age, job type, education level, health utilization and other potential confounders. Further research is required to explore why injured workers in rural settings experience difficulty with recovery from work-related injury.

PREFACE

This thesis is an original work by Callum Lavoie. The research project, of which this thesis is a part, received research ethics approval from the University of Alberta Research Ethics Board, Project Name "The Effect of Urban and Rural Living Status on Return-to-Work Outcomes for Alberta Workers' Compensation Board Musculoskeletal Injury Claimants", No. Pro00044728, April 2, 2014.

DEDICATION

I would like to dedicate this manuscript to my parents. Their love, guidance, support, and trust over the years, in the good times and the bad, have shaped me into the person I am today. They instilled in me the belief and resilience necessary to pursue my goals and taught me not to fear failure but to embrace the challenge, for which I am grateful.

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CHAPTER ONE

THE PROBLEM

A. Statement of the Problem

Workplace musculoskeletal (MSK) injuries pose serious, health, occupational, and socio-economic risks. They are a leading cause of worker disability alongside cardiovascular disease and cancer, not only in Alberta but also globally. [1,2] As a diagnosis that is relatively broad in scope and inclusive of a multitude of specific injuries, MSK injury serves as an umbrella term that includes fractures, dislocations, sprains/strains, lacerations, contusions, nerve damage, joint disorders, and other abnormalities and diseases. [3] Furthermore, MSK injuries can affect any anatomical body site with varied etiologies including both acute and chronic injuries.

In 2012, workplace injuries in Alberta totaled over $1.3 billion in injury claim costs for disability. [4] In 2011, workplace injuries accounted for 50,622 disability claims, over 607,000 workdays lost, a lost-time claim rate of 1.49 per 100 workers, and a disability claim rate of 2.82 per 100 workers. [5] Disability claims include both lost-time claims and partial disability (i.e. modified work) claims, all of which increased per capita from 2010 to 2011. In 2012, the Workers' Compensation Board (WCB) of Alberta had 27,745 accepted time-loss injury claims and Canada as a whole had 245,365 claims.[6]Not every occupational injury results in a disability or time-loss claim, however, and significantly more Canadians experience a workplace injury without receiving compensation. In 2003, it was estimated that 630,000 Canadians experienced at least one

occupational injury that resulted in some activity limitation. [7] For a broader perspective, in 2007 the total estimated cost of workplace injury in the USA was $186 billion US dollars. [1] Accounting for all injuries in Canada and not just occupational injuries, between 2009-2010 the Canadian Community Health Survey estimated that 4.27 million Canadians over 12 years of age had their normal activity ability limited by injury occurrence. [8] These population statistics serve to illustrate the broad effect MSK injuries have in the population and highlight the need for research to identify risk factors in order to best mitigate personal, social, and economic losses due to injury.

Males are more likely than females to injure themselves both at and away from work. [7,8] In support of these conclusions, WCB records indicate that in 2012, 17,321 and 10,386 time-loss injuries occurred to male and female Albertans respectively and that 154,521 and 90,727 time-loss injuries occurred to male and female Canadians respectively. [6] Research utilizing the Canadian Community Health Survey concluded that risk factors for sustaining an occupational injury include employment in a blue-collar field, male gender, heavy labour, income < $60,000, and self-reported job stress. [7] The general consensus regarding MSK injuries and disorders appears to be that "they have a multi-factorial etiology that includes not only physical stressors but also psychosocial risk factors, such as job strain, strain, social support at work, and job dissatisfaction" [9](p1), among others.

Return to Work (RTW) is a primary outcome measure used by the respective WCBs across Canada, which are the main insurers of workplace injury in each province.

[10] Serving as a comprehensive measure of physical, psychological, emotional, social, and economic recovery for both the individual and the population, research has shown RTW to be positively associated with improved health-related quality of life. [11] Summarizing Krause, Berecki-Gisolf et al stated the function of RTW outcome measures best as: "As an indicator of the overall burden of occupational injury on society; to determine the burden on specific groups such as injured workers, their families, employers, or industries; to evaluate the effectiveness and efficacy of intervention programs and policies to help injured workers RTW; and to measure the impact of interventions on societal costs of injuries and illnesses". [12](p1) RTW is influenced by a multitude of factors, including whether an individual resides in an urban or a rural community. This demographic factor is especially relevant to a large country such as Canada with a strong rural heritage. In the 2011 Canadian census, 17% of the Albertan population and 19% of the Canadian population was defined as rural. [13]

The focus of this study is on investigating injury claimants in the population recovering from a work-related MSK injury. While the majority of workers who suffer an occupational MSK injury RTW relatively quickly and without complication, there remains a subset that fails to do so and must undergo further assessment and rehabilitation. Furthermore, research in this field is especially relevant to Alberta as Western Canadian workers are at a greater risk of occupational injury when compared to Ontario and Quebec. [14] Consistent risk factors for unsuccessful RTW post-MSK injury include biophysical factors such as older age[10,15-21], greater pain, disability, and severity of injury[15-17,20-27], poorer health[15,20,21,28], less interdisciplinary rehabilitation[16,24,29-31], and

psychosocial factors such as blue-collar employment[7,10,22,32-34], lower education level[15,16,22,23,25,28,29,35], lower income[15,17,33,36], and psychological factors including greater depression, poorer emotional state, or lower self-efficacy.[1,9,15,16,22,23,27,37-40]

Geographic location of residence has also been found associated with recovery from work-related MSK injury, with rural workers being at risk of prolonged work disability. [41-44] Furthermore, research in the field has shown workers in rural settings typically have a higher prevalence of several of the aforementioned risk factors that may also be present in the Albertan population such as older age[45,46], less access to health care[47-51], blue-collar work[52], lower education[46,53-56], lower income[46,52-54,56], and poorer health[57-62], among others. In Canada specifically, census data and population analysis has identified rural populations as being older, having lower socio-economic status, being more poorly educated, having higher rates of high blood pressure and smoking, a poorer diet, a larger proportion of the population being overweight, and having higher overall mortality from injury, suicide, and disease. This research also indicated rural Canadian populations to have lower stress and prevalence of cancer, and greater ratings of Quality of Life. [63-67] However, research in the area is not conclusive as Young et al concluded that in the USA "claimants with higher rurality experienced less work disability than those with lower rurality" [68](p2).

While there is a thorough understanding of the association between many demographic, occupational, and health factors and RTW from MSK injury in the population as a whole, there remains insufficient research investigating both how the

distribution of these factors differs in urban and rural populations, and to what degree any difference can be explained by other risk factors. Furthermore, as no research focusing on this question has been performed in Alberta or Canada, and research from other regions has limited generalizability cross-regionally or cross-nationally, further research could provide insight on a relevant and under-researched topic.

Thus, the aim of this study was to: 1) Identify the relationship between geographic area of residence and recovery from compensated work-related MSK injury in Alberta; and 2) Investigate if the relationship between rural, or non-metropolitan, living status and recovery from work-related MSK injury is attenuated after controlling for other known risk factors.

B. Objectives of the Study

The objective of this study was two-fold:

1) To determine the association between geographic location of residence and recovery from work-related MSK injury in workers' compensation claimants.
2) To determine whether the association between geographic location of residence and recovery from work-related MSK injury in workers' compensation claimants is attenuated or becomes non-significant after controlling for other demographic, occupational, and health risk factors.

C. Research Question

What is the association between geographic location of residence and recovery from work-related MSK injury and to what degree is the association attenuated by controlling for other demographic, occupational, and health risk factors?

D. Ethical Considerations

Approval for this study was obtained from the University of Alberta Health Research Ethics Board. The database used in this study has also been used previously for research. [3] In adherence to WCB-Alberta protocol, the claimant data that was shared for the purposes of this research was de-identified to ensure that subject anonymity was maintained and no patient identifying information was available to the researchers. Furthermore, all data was stored electronically and secured by password lock and restricted access to the Common Spinal Disorders Lab or Rehabilitation Research Centre at the University of Alberta in Corbett Hall. As this study was a secondary analysis, there was no direct physical or mental risk posed to the claimants whose data was utilized. Lastly, no additional funding or resources were required or utilized for the purposes of this study, aside from the time and tuition of the graduate student.

CHAPTER TWO

LITERATURE REVIEW

General Factors Associated with Return-to-Work

Workplace MSK injury etiology, prevalence, and rehabilitation are affected by a multitude of biophysical, psychological, social, and economic factors. Knowing what factors influence or are associated with RTW may help guide the development of interventions aimed at facilitating RTW. It may also assist clinicians in identifying individual workers at risk of delayed recovery. This chapter provides an overview of the many factors that have been investigated for their association with RTW.

Among the biophysical predictors, female gender[24,33,69,70] and greater severity of injury[17,24,25,71] are associated with poorer RTW outcomes in a large majority of research performed. Clay et al[22], in a systematic review of RTW post-MSK injury, indicate that there is moderate evidence supporting female gender and greater severity of injury as predictors of RTW.[22] Conversely, Breslin et al concluded gender to not be independently associated with likelihood of a work disability absence. [32] While research suggests older age to be consistently correlated with poorer RTW outcomes, [10,12,15-21,71] Clay et al conclude the evidence to be inconsistent. [22] Greater reported ratings of pain and disability among subjects, [15,16,20,21,23,26,27,72] in addition to poorer general health[15,20,28,34,71,73,74] and increased physical workload[19,22,28,37] have consistently been known as predictors of poorer RTW outcomes.

Investigation of socioeconomic predictors of RTW provides several significant conclusions. Arguably two of the strongest and most consistent predictors of RTW are education level and blue-collar work. The term 'blue-collar' work is used to define manual work of a more physical nature, such as jobs in manufacturing, industry, construction, or maintenance, among others. Examples include electricians, plumbers, welders, mechanics, and miners. Conversely, white-collar work generally refers to jobs in an office environment and of a less-physical nature. A summary of research on the topic supports the rationale that both lesser education[15,16,23-25,28,29,32] and blue-collar work[7,10,12,32,33,75] are associated with a decreased probability of RTW among injured workers. Further, Clay et al reported that there is strong evidence linking both of these factors with greater time away from work. [22]

Greater time away from work, [20,23,29] lower income, [7,15,33,36,76,77] employment at a larger company, [10,29,78] and a lesser self-rated connection to the workforce[15,20,28] also consistently associate with a decreased probability of RTW. While often the most difficult to assess, psychological factors have been theorized to be the strongest predictors of RTW, with lower self-efficacy and job satisfaction, and greater fear, depression, stress, anxiety, distress, and negative affect correlating with poorer outcomes on measures of RTW. [1,9,15,16,23,27,37-39,79,80] Demonstrating support for these conclusions, Clay et al indicate that there is moderate evidence for measures of self-efficacy serving as predictors of successful rehabilitation and RTW. [22] Similarly, higher mental health SF-36 scores as well as more positive perceptions of RTW and perceived disability level also predicted successful recovery from workplace injury. [72,74,77] Lastly, at two weeks post-

traumatic orthopaedic injury, a study by Clay et al suggested claimants who reported high social functioning were 2.6 times more likely to RTW by 6 months than those reporting low social functioning.[34]

In an Albertan sample, slow suspension of time-loss benefits was associated with negative work-related recovery expectations in injury claimants with back pain but not other MSK conditions. [81] Collective research on the topic has indicated thorough vocational and interdisciplinary rehabilitation consisting of physical, educational, occupational, psychological, and social aspects to be notably more successful in achieving desirable RTW outcomes than simpler and less integrative programs. [16,17,24,29-31] While the aforementioned research provides a brief overview of research on MSK injury and RTW outcomes, it is important to investigate more fully the role urban and rural living status plays in predicting rehabilitation outcomes, and how differences between these two populations can affect RTW. In addition to having a greater prevalence of numerous risk factors for failed RTW, research has indicated rural populations to experience poorer RTW outcomes when compared to their urban counterparts. Studies on this topic are not decisive or conclusive, and thus, are in need of further investigation.

Demographic Comparison of Urban and Rural Populations

While technological advancements have allowed urban and rural populations to become more interconnected, they still remain separate autonomous communities in

many respects. Fuguitt et al concur, stating, "that rural America has become more heterogeneous and less differentiated from urban areas on some socio-cultural dimensions". [82](p5) In Canada, trends have shown that while high growth provinces like Alberta have an increasing rural population, rural areas still remain separate and distinguishable communities from urban areas, with a smaller relative population growth rate. [83] Notably, the association of biopsychosocial factors with RTW outcomes differs between the two communities, exemplifying the dynamic complexity of the relationships between factors. In order to effectively evaluate and measure factors that influence RTW, a general understanding of how rural populations demographically differ from urban populations must first be investigated. While the specific characterization of what qualifies as urban or rural can vary depending on the definition used, the standard definition of a rural community remains: "Rural consists of areas having small population size and low density". [82](p2)

The 2011 Canadian census identified the Rural and Small Town population (RST) population of Alberta as 707,646 people, or 19.4% of the population. [84] Rural and Small Town are defined as communities with a population less than 10,000 where less than 50% of the population commutes to Census Metropolitan Areas or Census Agglomerations. In Canada, census data has identified rural populations as being older, having lower socio-economic status, being more poorly educated, exhibiting less healthy behaviour, and having higher overall mortality. [63-67] Among other research, there is conclusive data indicating the average age in rural communities to be older than their urban counterparts both in Canada and internationally,[45,46,63]with the median age of rural

Canada being 42.1 years and the median age of urban Canada being 38.9 years. [65] This dynamic is a result of younger people migrating to cities and older individuals migrating to rural communities. Furthermore, these rates will likely only increase as the baby boomer population gets older and more seniors move to rural areas.[46]

Additionally, the level and degree of education attained by individuals residing in rural settings is, on average, less than those residing in urban areas. [46,53-56] A variety of other contrasting elements are also present including fewer full-time jobs per capita in rural areas, especially in occupations requiring skilled labour. [52] Due to this, unemployment rates in rural counties tend to be higher. [85,86] Expectedly, a greater proportion of jobs in rural areas are likely to be blue-collar and resource-based [52] whereas urban areas have a greater proportion of people employed in professional and managerial occupations. [87] This trend in employment types is expected to be very present in the province of Alberta, with the booming economy and abundance of oil-related heavy industry.

The average income of rural employees tends to be less than that of urban workers. [46,52-54,56,86] Research also suggests that rural counties that have higher rates of blue-collar employment are often characterized by fewer benefits and less opportunity for advancement. [88] The greater prevalence of small businesses per capita in rural areas [52] in addition to fewer benefits may serve to inhibit faster RTW outcomes, as indicated by past studies referenced; but the results regarding these aforementioned conclusions are inconsistent. To conclude, the lesser education, older age, and greater blue-collar work

present in rural settings have been found to consistently and strongly associate with poorer RTW outcomes. However, the potential greater connection to the workforce and commitment to the employer present in rural settings[68] may offset some of these effects.

Access to Health Care in Urban and Rural Populations

Injured workers living in rural settings often have few RTW services available to them, such as thorough and directed vocational rehabilitation. [47] This may contribute to the poorer outcomes of recovery and RTW found in numerous studies. Further investigation has also shown reduced access to health care professionals in rural areas, including mental health professionals. [48-51,89,90] While some believe this lack of access may contribute to poorer rehabilitation outcomes; there is a lack of consensus in the academic community on the topic, as some research has associated greater use of medical care with longer work disability. [91,92] In their research of workplace bone fractures, Young et al conclude that with less health care utilization, residents of more rural locations have less time off work compared to urban dwellers, but as health care is utilized to a greater degree, rural inhabitants tend to have more time off work. [93]

On average, people residing in rural areas have to travel substantially further than urban dwellers to reach a treatment facility, however, in their research of Iowa residents Miller et al conclude that no significant differences existed between rural and urban workers in rates of mortality, waiting time for surgery, or length of stay in hospital. [94] While lesser use of health care services among rural residents may be due to a lack of

available services, the use of different coping strategies and psychosocial characteristics among rural residents may also play a role as negative recovery outcomes have been associated with reliance on medical care and treatment. [95] It is also important to investigate the quality of care, not just the quantity, being received by each respective population. Khoong et al suggested that because rural inhabitants generally live further away from health care services, this reduces visit frequency, and this reduced visit frequency makes rural physicians less likely or able to adhere to clinical preventative service guidelines, which could result in poorer quality of care provision.[96]

Rural Hardiness

The net influx of people moving from rural to urban areas is in part likely out of a desire for greater amenities, more stimulus, and less-strenuous lifestyles. As rural life is widely viewed as being more demanding in many respects, the belief that individuals from rural backgrounds are tougher is not totally unfounded. Young et al suggest that "those in rural areas may have…increased hardiness and resilience and a stronger work ethic" [97](p6) and would be less likely to accept financial support. Further research affirms this, correlating hard work, determination, a high value placed on achievement, independence, self-determination, and dignity with rural populations. [98,99] Since greater use of litigation and legal services in urban areas has been associated with poorer RTW outcomes, [100,101] ease of access to these services in urban areas may contribute to worse outcomes. The explanation may also be found in rural workers greater commitment to their employer, [97] or a combination of the two theories.

Interestingly, Booth et al concluded that in Australia despite having poorer access to rehabilitative care, rural populations were more likely to decline utilizing a home-based multidisciplinary rehabilitation program.[102]This may illustrate greater hardiness or less of a perceived need for care. In working populations suffering from low back pain, rural workers are more likely to continue working and adopt a "can do" attitude towards work when compared to their urban counterparts, [42] further exemplifying the abstract concept of "rural hardiness".

Quality of Life in Urban and Rural Populations

Quality of life is an element that should be taken into consideration when studying characteristics of urban and rural populations. Rioux et al state that more people over 55 are satisfied with their dwelling when compared to younger individuals. They also found that women tend to have greater residential satisfaction. [103] While research indicates that gender and level of education have no effect on Satisfaction with Life (SWL) scores, it is also suggested that older people and those with higher household incomes have higher SWL ratings. [104] This indicates either that rural populations have higher SWL ratings because the average age is higher or that urban populations have higher ratings because their income is on average higher. However, investigation of Quality of Life (QOL) and well-being (WB) in urban and rural inhabitants having undergone leg amputations has proven to be inconclusive, with some studies suggesting amputees residing in an urban setting have greater QOL and WB scores, and others studies indicating rural inhabitants score more highly. [105] Successful RTW from

workplace injury has also been identified as a predictor or associating factor of greater health-related quality of life.[11]

Mental Health Perceptions in Urban and Rural Populations

Mental health and fatalistic beliefs are important considerations in assessing differences between urban and rural populations. Research by Befort et al studying treatment of cancer patients suggests rural residents are more likely than urban residents to have fatalistic beliefs regarding their conditions, which have been associated with poorer RTW outcomes. This may be attributable to lower levels of education and access to information, as physicians are more relied on as a primary source of information in rural populations. [55] Interestingly, other research on the topic states that rural respondents have higher depression stigma scores and are also less likely than urban respondents to agree with health professionals regarding treatments for depression. [53] This introduces an interesting dynamic, implying that while rural residents rely more heavily on their physician for information, they may be less likely to agree with them due, in part, to a greater stigma against mental health conditions. Jones et al suggest that the greater prevalence of stigmas in rural settings is largely due to lower levels of education. [53] Research in Australia has also identified a shortage of mental health professionals willing or able to live in and serve rural populations, which may contribute to poorer mental health in these populations as well as prolonging stigmatic views. [90] In North Carolina, Goode et al studied individuals suffering from chronic low back pain and concluded them

to have greater reported levels of depression and sadness, [106] identifying a need for greater ease of access to mental health professionals.

Injury in Urban and Rural Populations

Incidence of occupational injury among healthcare workers and risk of prolonged work absence is suggested to be greater in rural individuals. [44] Similarly, inhabitants of isolated rural areas and small towns are indicated to have greater durations and levels of disability. [106,107] For example, research suggests that rural dwellers are at greater risk of suffering a hip fracture, potentially due to more active and/or strenuous lifestyles. [108,109] Sanders et al indicate that poorer fracture recovery outcomes are more common in rural versus urban patients[43] and several studies investigating recovery and RTW outcomes in patients with spinal cord[110] and traumatic brain injury (TBI) [111,112] suggest poorer outcomes in rural patients. However, research by Mazurek et al on TBI and spinal cord injury failed to find significant differences in outcome measures one year post-injury between urban and rural groups. [113] Contrary to most research, Young et al state that in their study of occupational injury, "claimants with higher rurality experienced less work disability than those with lower rurality".[97](p2) Conversely, research measuring acute post-operative trauma recovery indicates rural patients have the worst functional outcomes at hospital discharge, followed by suburban patients, with urban patients having the best functional outcomes.[114]

Medical Illness in Urban and Rural Populations

Analysis of recovery from medical illness suggests that better health outcomes are generally more common in urban subjects when compared to rural ones. Research of cardiovascular disease and related illness also suggests that urban patients have lower coronary heart disease mortality, [62] greater probabilities of survival after suffering a stroke[57] and are able to RTW more quickly after suffering a myocardial infarction. [115] Lower life expectancy[61] and increased rates of mortality and morbidity are also more common in rural inhabitants[59,60,64] and research suggests that patients receiving home care in rural areas have poorer general health status and less favourable outcomes when compared to urban patients. [116,117] Conversely, in a comparison of citizens older than 55 in a rural and an urban area of Italy, Santangelo et al found that the urbanized area surveyed had higher rates of cardiovascular, respiratory, endocrine, infectious, osteo-articular, and connective diseases than the rural area.[109]

Physical Activity in Urban and Rural Populations

Measures of physical activity are important indicators of the health of a population since a physically inactive lifestyle has been suggested to be one of the most critical modifiable causes of chronic disease[118] and lesser physical activity has been associated with rural inhabitants. [54] Furthermore, lower income and education levels, which have both been associated with rural inhabitants, are also shown to serve as predictors of lower physical activity. [54,119] The effect of education appears more complex,

however, as greater education in older people correlates with more exercise but lower education in younger people correlates with more exercise. [120] Illustrating the lack of consistent research outcomes on the topic, a study in the USA by Kasehagen et al suggests that physical activity level differed among the seven categories of "Rural-Urban Commuting Areas", with more rural areas attaining higher levels of physical activity. [121] Future research in the area should strive to reduce the error associated with identifying *what* is physical activity, *how much is being performed*, and differences associated with the type of physical activity.

Plotnikoff et al conclude that younger age correlates with greater physical activity, from which it could be inferred that urban populations would have greater rates of physical activity because they are younger. Conversely, women in urban areas are also suggested to be less physically active than their rural counterparts, but no significant difference was found for men. [120] It is apparent that there are numerous factors associated with physical activity, all of which inter-relate and whose effects vary depending on the effects of other factors. These complex relationships indicate further research is required. For example, while a rural individual may pursue fewer leisure-time exercise opportunities, their job and lifestyle might require greater activity, making overall physical activity levels difficult to accurately assess.

Rehabilitation in Urban and Rural Populations

There is limited research comparing MSK rehabilitation program outcomes for workers of urban and rural populations. Investigation of comprehensive rehabilitation centres suggests that rural individuals are more likely to have worse vocational rehabilitation outcomes. [122] However, while Ipsen et al acknowledge "the barriers to rural employment, including fewer support services, less public transportation, and more limited job opportunities", [52](p5) they conclude that subjects undergoing comparable vocational rehabilitation treatment do not achieve statistically significant differences in outcome based on geographic location. [52] The lack of research on the topic may be due to there being fewer rural rehabilitation centres, rural patients commuting to urban centres for treatment, a lack of recorded and/or readily available demographic and rehabilitation information, or insufficient resources to undertake research.

In Alberta, the WCB provides standardized rehabilitation through various RTW assessment and treatment centres across the province. This may ensure that the same level of care is offered to all injured workers and, thus, rehabilitation would not be a factor influencing RTW outcomes. However, the need to commute for work and/or rehabilitation may lead to poorer rehabilitation outcomes. Thus, rural workers may still be at risk of delayed recovery as they travel to receive care. Several studies in the field have concluded that programs should strive to minimize the travel required by rural communities for physiotherapy care, [89] and that rural or community-based practitioners

can achieve results similar to those reported by metropolitan pain clinics through collaboration and integrative treatment programs.[123]

Please refer to the Appendix for Table Summaries of the Literature Review

CHAPTER 3

METHODS AND PROCEDURES

The objectives of this study were to: (1) Determine the association between geographic location of residence and recovery from work-related MSK injury; and (2) Investigate if this relationship is attenuated after controlling for other known risk factors.

A. Subjects

The study sample consisted of WCB-Alberta claimants with sub-acute or chronic MSK injuries who underwent clinical/RTW assessment in adherence with the WCB-Alberta soft tissue continuum of care protocol. [124] This study included all MSK injury claimants who met the inclusion criteria and underwent assessment between December 2009 and January 2011. The University of Alberta's Health Research Ethics Board approved this research.

B. Sample Size

This study utilized a sub-set of WCB-Alberta MSK injury claimants from the 9,389 total MSK injury claimants in the original database. After applying inclusion and exclusion criteria, 7,843 claimants remained and were analyzed for the purposes of this study. Since this is a population-based dataset and we used all claimants who met our inclusion criteria, no sample size estimates were calculated. However, our sample exceeded the recommendations of 10-20 subjects per independent variable for multivariable logistic and Cox regression.[125,126]

C. Inclusion Criteria

For the purposes of this study, the inclusion criteria were:

1. Male or Female claimants
2. Alberta residents
3. Workplace MSK injury
4. Claimants undergoing clinical/RTW rehabilitation assessment
5. Assessment between December 2009 and January 2011
6. First admission to RTW assessment

D. Exclusion Criteria

For the purposes of this study, the exclusion criteria were:

1. Surgery pending
2. Head injury
3. Traumatic psychological injury
4. Further medical investigation
5. Second or greater admission to RTW assessment

E. Research Design

This was a prospective cohort study using data obtained from a previous study aimed at developing a clinical decision support tool for selecting rehabilitation interventions. [3] Thus, this study was a secondary analysis utilizing a historical cohort design to analyze data collected by the WCB-Alberta. These claimant records were compiled by Dr. Douglas Gross' research team into a Musculoskeletal Injury Triage

Database and have been used previously to investigate population health and rehabilitation from workplace MSK injury. Health care professionals working for the WCB-Alberta, the largest provider of workplace injury insurance in the province, collected the information for the purposes of administrative records, patient care, and program evaluation/research. Data from across the province is systematically collected at time of clinical/RTW assessment by WCB-Alberta Health Care Services, who assisted in developing the original database. Further details on the clinical/RTW assessment are provided below.

After suffering workplace injury, WCB-Alberta claimants are given 4-6 weeks of 'acute' primary care to help them recover and RTW. During this time, they have medical care from a physician and may attend physiotherapy or chiropractic clinics. If they have not RTW in this time, they then undergo assessment in an authorized RTW assessment clinic, which is when the data in the Musculoskeletal Injury Triage Database was collected. After this clinical/RTW assessment, the injured worker may be recommended to return to work or be enrolled in another rehabilitation program directed specifically to his or her needs.

While most of the data elements collected are based on demographic measures (eg: level of education, marital status) or simple, consistent criteria (eg: geographic location, RTW, number of doctor visits, rehabilitation program), a number of the measured factors required a formal assessment tool/questionnaire. These factors are the

Pain Disability Index (PDI), Pain Visual Analog Scale (VAS), and Medical Outcomes Study Short-Form 36 Questionnaire (SF-36).

This database also included outcome information including each individual's compensation status up to 90 days after clinical/ RTW assessment, which serves as a surrogate indicator of RTW. This was measured at intervals of 7, 14, 21, 30, 60, and 90 days after assessment. For the purposes of this research study, day 0 for each claimant was defined as the day of discharge from the RTW assessment.

F. Research Variables

Primary Independent Variables

Geographic location of residence – This was collected by the WCB-Alberta and defined as Alberta communities with populations >50,000 people categorized as urban, or metropolitan, while communities with populations <50,000 people were categorized as rural, or non-metropolitan. While different from the coding criteria used by the Canadian and American government for censuses, this categorization is based on modified versions of the Beale coding system, a widely used and respected population classification tool. The Canadian and American governments as well as other entities use modified versions of the Beale coding system for demographic, health, and economic analysis. [127] Under this definition of urban/rural, cities in Alberta that qualify as urban are Edmonton, Calgary, Red Deer, Lethbridge, Medicine Hat, Grande Prairie, and Fort McMurray. A population of 50,000 has been used previously in research in Alberta as a cut-off for urban and rural populations, [81] while other health studies have similarly classified

Edmonton and Calgary as the two sole urban, or metropolitan, areas in the province. [47,53,128]

Potential Confounders

Other variables analyzed and controlled for in this study included demographic, occupational, health, social, and economic factors. In controlling for these factors, the goal was to assess how much the effect of urban/rural living status on RTW was attenuated.

Demographic

1. **Age –** This was collected at time of clinical/RTW assessment. It was collected in years and analyzed as a continuous variable.
2. **Gender –** Male or female.
3. **Level of Education –** Collected as a self-report measure and analyzed as a categorical variable. The groups used to describe the level of formal education attained by claimants were: 1) Less than grade 12 education; 2) High school diploma; 3) Partial technical school diploma or university degree; 4) Technical school diploma; 5) University degree; and 6) Not specified.
4. **Marital Status –** This was analyzed as a categorical variable. The different groups used to describe the marital status of claimants were: 1) Single; 2) Separated or Divorced; 3) Married, Common-Law, or Widowed; and 4) Not Specified.

5. **Interpreter Required –** Indicates whether or not an interpreter was required at the assessment in order to effectively communicate with a claimant whose English ability was insufficient; categorized as yes or no.
6. **Type of Work –** Type of work was sub-categorized into three groups from the ten categories of the Canadian National Occupational Classification (NOC) coding system. The NOC is a Canadian government-designed tool used to categorize occupations in accordance to standardized and consistent criteria. In addition to other more detailed categorizations, the tool classifies within ten occupational classifications. The ten broad occupational classifications are as follows: Management (1); Business, Finance, and Administration (2); Natural and Applied Sciences and Related Occupations (3); Health (4); Education, Law, and Social, Community, and Government Services (5); Art, Culture, Recreation, and Sport (6); Sales and Service (7); Trades, Transport and Equipment Operators and Related Occupations (8); Natural Resources, Agriculture, and Related Production Occupations (9); Manufacturing and Utilities (10). [129,130] These ten categories were sub-categorized into three groups for this project as white-collar, blue-collar and health care. White-collar work was identified as categories 1, 2, 4, 5, 6, and 7; Blue-collar work was identified as categories 8, 9, and 10; and employment in the Health Care field was identified as category 3. Jobs in the health field were analyzed separately because they comprised a large portion of the jobs and tend to have characteristics of both blue and white-collar employment.

Occupational

1. **Annual Pre-Accident Earnings –** This was collected as a continuous variable. Earnings were grouped into three categories for analysis purposes, with a low wage group being represented by earnings <$25,000, a medium wage group being represented by earnings between $25,000 and $77,000, and a high wage group being represented by earnings >$77,000. This cut-off was chosen because the MIE in Alberta in 2010 under WCB regulations was $77,000.[131]
2. **Admission Job Attached Status –** Indicative of whether or not a claimant had a job-attached status at the time of assessment, or if a position was not being held for them. Yes or no.
3. **Modified Work Available –** This was collected and analyzed as a categorical variable and indicated the degree of modified work the employer of an injured worker offered. The groups were 1) No modified work available; 2) Yes, full-time; 3) Yes, part-time; and 4) Unknown.
4. **Number of Prior Claims –** This was collected and analyzed as a continuous variable, representing the number of prior WCB injury claims an injured worker had made.
5. **TD01 Status at time of assessment -** Total Work Disability, or TD01, status is granted to injured workers who are on full work disability and unable to work in any capacity. The maximum insurable earnings (MIE) provided by the WCB-Alberta in 2010 when this data was collected was $77,000. [131] Yes or no.

6. **TD02 Status at time of assessment -** Partial Work Disability, or TD02, status is granted to injured workers who are on partial work disability and are able to work in a modified capacity. Yes or no.
7. **Any Wage Replacement Benefits at time of assessment –** Identified claimants on either TD01 or TD02, thus receiving monetary wage replacement compensation. Categorized as either receiving compensation or not. Yes or no.

Health

1. **Diagnosis group / Type of Injury –** This was collected at clinical/RTW assessment as a categorical variable. In accordance with IDC 9 coding, the possible diagnostic groups were: 1) Fracture; 2) Dislocation; 3) Sprain/Strain; 4) Laceration; 5) Contusion; 6) Nerve Damage; 7) Joint Disorder; and 8) Other.
2. **Anatomical Site of Injury –** Collected at time of assessment as a categorical variable. In accordance with IDC 9 coding but excluding head injuries, the possible anatomical sites of injury were 1) Neck; 2) Upper back; 3) Lower back; 4) Other torso; 5) Upper extremity; 6) Lower extremity; 7) Multiple site; and 8) Not specified.
3. **Type of Rehabilitation Program –** Represents the type of rehabilitation program the claimant was enrolled in after RTW assessment. The possible categories were 1) No rehabilitation; 2) Single Service Community Physical Therapy; 3) Complex Return-To-Work Services (RTWS); 4) Provider-based RTWS; 5) Work Site-based RTWS; and 6) Hybrid. WCB has previously published detailed reports describing these programs.[132,133]

4. **Number of Months from Accident to Admission –** Collected as a continuous variable in number of days from accident to admission and re-coded into months for the purpose of this research. This variable indicates the length of time from the date of injury until the injured worker underwent clinical/RTW assessment.
5. **Number of Doctor Visits –** Collected as a continuous variable and representing the number of doctor visits the claimant had prior to undergoing assessment and admission into a RTW rehabilitation program.
6. **Number of Physiotherapist Visits -** Collected as a continuous variable and represents the number of physiotherapy visits the claimant had prior to undergoing assessment and admission into a RTW rehabilitation program.
7. **Number of Chiropractor Visits -** Collected as a continuous variable and represented the number of chiropractor visits the claimant had prior to undergoing assessment and admission into a RTW rehabilitation program.
8. **Comorbidity -** Collected at the time of clinical/RTW assessment to identify the presence of any additional disorders or diseases in addition to the MSK injury. Yes or no.
9. **Pain Disability Index Total Score Percentage -** This tool records the subjects' perceived level of disability due to pain. It asked respondents to rate 7 items using scaling of 0-10 with 0 being no disability and 10 being maximum disability. [134] The seven items are family/home responsibility, recreation, social activity, occupation, sexual behaviour, self-care, and life-support activity. [135] It is a commonly used self-report measure that has been thoroughly tested in numerous populations and found to be internally consistent, concurrently valid with

numerous tools including the Roland Morris Disability Questionnaire, Rand-36 subscales, pain intensity, and dynamic physical tests among others (0.69-0.81), and test-retest reliable (intraclass correlation of 0.76). [134,136-141] Gross et al conclude that it has "good psychometric properties, such as test-retest reliability, concurrent validity with the aforementioned tools, and internal consistency".[3] (p6) PDI Data was measured during the clinical/RTW Assessment. The scale has seven separate sections, which are summed for a total score out of 70. For this research study, a total disability percentage (score out of 70 multiplied by 100) was calculated.

10. **Pain Visual Analog Scale Score -** This tool allows respondents to rate their average level of pain on a scale from 0-10, with 0 being no pain and 10 being extraordinary pain. Pain VAS was measured during the clinical/RTW Assessment. As an inexpensive, easy, and effective measure, it is heavily utilized and has been found to be consistently associated with RTW in addition to having sufficient levels of validity and reliability.[142]While the Numeric Pain Scale (NPS) is discontinuous and measures pain severity using only whole numbers, a strength of the VAS scale is that it is depicts a continuous range of values in the form of a line with "no pain" at one end and "most pain" at the other, allowing for more specific selection. However, if photocopying or other document duplication is being performed for data collection purposes, it is important the line is of a consistent length, usually 10cm.[143]
11. **SF-36 Scale Scores -** This tool is a widely used patient-reported measure of health outcomes with eight separate scaled categories, for which the scores are

calculated by adding the scores of each component. [144,145] SF-36 data were measured during the clinical/RTW Assessment. The categories are vitality, physical functioning, bodily pain, general health perceptions, physical role functioning, emotional role functioning, social role functioning, and mental health. [3] It has been indicated to have high internal consistency, reliability and construct validity, as well as moderate to large responsiveness, with values varying depending on the scale. [146] The scale has been used by similar research investigating musculoskeletal injuries and work disability and continues to be a commonly used measure.[146-150]

Dependent Variables / Outcome Measures

Return-to-Work, the outcome of interest, was investigated using multiple dependent variables. This is because the definition of what constitutes successful RTW for a claimant can vary, so multiple analyses were performed utilizing different definitions in order to attain a more thorough understanding of RTW rates. These outcomes are:

1. **TD01 status 90 days after discharge from RTW assessment –** Total Work Disability, or TD01, status is granted to injured workers who are on full work disability and unable to work in any capacity. The maximum insurable earnings (MIE) provided by the WCB-Alberta in 2010 when this data was collected was $77,000. [131] Yes or no.

2. **TD02 status 90 days after discharge from RTW assessment –** Partial Work Disability, or TD02, status is granted to injured workers who are on partial work disability and are able to work in a modified capacity. Yes or no.
3. **Any Wage Replacement 90 days after discharge from RTW assessment –** Claimants on either TD01 or TD02, thus receiving monetary compensation for their workplace injury. Wage replacement status was indicated as either receiving compensation or not. Yes or no.
4. **Days to TD01 suspension –** The length of time a claimant was on TD01 after the clinical/ RTW assessment using discrete time intervals of 7, 14, 21, 30, 60, and 90 days. At each of these time intervals, every claimant was categorized as being on TD01 (yes) or not (no). Since it cannot be known at what point between each interval the injured worker got off total disability, midpoints were used. These were 4, 11, 18, 25, 45, and 75 days. These intervals formed the survival time and censoring occurred at 75 days.
5. **Days to TD02 suspension –** The length of time a claimant was on TD02 after the clinical/ RTW assessment using discrete time intervals of 7, 14, 21, 30, 60, and 90 days. At each of these time intervals, every claimant was categorized as being on TD02 (yes) or not (no). Since it cannot be known at what point between each interval the injured worker got off partial disability, midpoints were used. These were 4, 11, 18, 25, 45, and 75 days. Again, these intervals formed the survival time and censoring occurred at 75 days. Claimants on TD01 were excluded.
6. **Days to suspension of any wage replacement benefits -** The length of time a claimant was receiving any wage replacement after the clinical/ RTW assessment

using discrete time intervals of 7, 14, 21, 30, 60, and 90 days. At each of these time intervals, every claimant was categorized as receiving compensation (yes) or not (no). Since it cannot be known at what point between each interval the injured worker stopped receiving compensation, midpoints were used. These were 4, 11, 18, 25, 45, and 75 days. These intervals formed the survival time and censoring occurred at 75 days.

7. **TD01 Recurrence –** Used to identify if claimants who were on TD01 at time of assessment recovered and had total disability benefits (TD01) suspended, but then had a recurrence of injury and were placed back on TD01 prior to 90 days post-assessment. Yes or no.
8. **TD02 Recurrence -** Used to identify if claimants who were on TD02 at time of assessment recovered and had partial work disability benefits (TD02) suspended, but then had a recurrence of injury and were placed back on TD02 prior to 90 days post-assessment. Yes or no.
9. **Any Wage Replacement Recurrence -** Used to identify if claimants who were receiving any compensation at time of assessment recovered and stopped receiving compensation, but then had a recurrence of injury and were placed back on compensation prior to 90 days post-assessment. Yes or no.

Along with the MIE cap for every workplace injury claimant in Alberta, the WCB also publishes thorough reports outlining how disability compensation rates are calculated for each unique claimant and providing more information about the outcomes described above. [151,152]

G. Statistical Analysis

i) Descriptive Statistics

Descriptive statistics were initially calculated for all variables to characterize: 1) The overall study population; 2) Urban and rural claimants; 3) Claimants with and without missing data; and 4) Claimants experiencing successful (TD01= No) and unsuccessful (TD01= Yes) RTW at 90 days post-assessment. Number of claimants and percentage of total claimants were reported for categorical variables (eg. gender, level of education), and mean and standard deviation were reported for continuous variables (eg: age, number of months from accident to admission).

ii) Association Between Urban/Rural Status and Outcomes

Risk-factor regression models were created using 9 different dependent variables to: i) Compare the adjusted and unadjusted associations of geographic location of residence across multiple measures of RTW and recovery in order to best explain the association in Albertan workers with MSK injury; and ii) Compare the adjusted and unadjusted associations of Urban/Rural status with the various measures of recovery to identify to what degree the associations were attenuated while controlling for other demographic, occupational, and health variables. The modeling strategy included a univariate screening and multivariable model build, which will be discussed below.

a) Univariate Screening

Univariate logistic and Cox regression models were performed to investigate the association between geographic location of residence and each of the respective

dependent variables. Logistic regression was used when the outcome was dichotomous and Cox regression was used for the time to event data. Variables that were significant at the 0.25 level were identified for inclusion in multivariable models.

b) Multivariable Risk-Factor Regression Models

Multivariable logistic and Cox multivariate regression models were then performed to determine the effect of urban/rural status while controlling for a multitude of demographic, occupational, and health variables that were identified as significant predictor in the univariate screen. This allowed us to assess to what degree the effect of geographic location of residence was attenuated when compared to its univariate association. Because our goal was not to best explain variance in the outcome parsimoniously but to descriptively illustrate the adjusted and non-adjusted associations across multiple variables, a consistent subset of variables was controlled for to best demonstrate what effect urban/rural status had on several RTW measures. It was important to control for the same subset of variables in order to reach a degree of comparability across models. Variables controlled for were important descriptive variables in the population (eg, age, gender) or found to be associated to a statistically significant degree with multiple dependent variables. We also examined the potential confounding effect of the other variables that were not significant in the univariate screen by adding them to the final multivariable regression model to determine if they changed the urban/rural regression coefficient by 10% or more.

We also created separate models that included two additional variables that were significantly associated with multiple RTW outcome measures but had a large amount of missing data. These two variables were PDI and pain VAS score. None of the SF-36 categories consistently associated with the RTW outcome measures and, as such, were not included in the final analysis. Furthermore, their inclusion did not significantly alter any of the odds ratios. Due to missing data, the inclusion of these self-report measures reduced the claimant sample size available for analysis.

iii) Parsimonious Regression Models

Lastly, two parsimonious regression models were developed. A multivariable logistic regression model explaining TD01 status 90 days post-assessment was developed investigating claimants who were on TD01 at time of assessment. Additionally, a multivariable Cox regression model was developed to explain time until TD01 suspension in claimants who were on TD01 at time of assessment. In both regression models, all covariates were tested for a significant interaction with the primary variable of interest, geographic location of residence. If the product variable was significantly associated with the dependent variable, TD01 status at 90 days post-assessment, further crosstab exploratory analysis was performed in order to identify the nature of the interactive effect. In cases where a significant interaction is present, the effect of one independent variable on the dependent variable depends on the value of a second independent variable. The strength of associations can be lessened and, in some cases, even reversed.

A purposeful selection of variables modelling strategy was utilized to create these parsimonious models, as outlined by Hosmer et al. [153] First, univariate analysis for each independent variable was performed and the significance of the associations with the dependent variable was assessed. Secondly, candidates for the first multivariate regression model were identified based on the univariate p-values. Since research has shown that using the traditional significance value cut-off of 0.05 often fails to identify important variables, the recommended cut-off value of 0.25 was chosen as the initial inclusion/exclusion cut-off. Thirdly, the first multivariate model was fit and variables that did not associate with the dependent variable at traditional levels of significance ($p<0.05$) were removed.[153]

Next, the removed variables were added back into the model one at a time and were retained in the model if their inclusion altered the regression coefficients by 10% or more. Fifthly, variables that did not meet the initial inclusion criteria of $p =< 0.25$ were fit into the model individually and their effect on the model was assessed and were also retained in the model if their inclusion altered it by 10% or more. Lastly, once the main effects model was complete the interaction between geographic location of residence and other significant variables were tested. The distribution of covariates with significant interactions were then further analyzed with crosstab descriptive statistics in order to more clearly illustrate and understand the interactive effect between urban/rural status and the covariate of interest.[153]

iv) Regression Model Assumptions

Logistic regression is a robust statistical analysis tool that, unlike linear regression, does not make assumptions about the distribution of any of the independent variables. Independent variables can be categorical or continuous, and do not have to be normally distributed, linearly related, or of equal variance within each group. [153,154] Binary logistic regression, however, requires the dependent variable to be dichotomous (only two categories), and the categories for all variables to be mutually exclusive and exhaustive. Furthermore, all our analyses maintained a sufficient number of cases per independent variable, and collinearity between independent variables was tested by examining the correlations between variables.

In each of the Cox Regression models, the proportional hazards assumption was tested for urban and rural claimants. This assumption states that the odds ratio comparing these two groups for occurrence of the event of interest is proportional and constant over time. Generally, if the two hazard functions do not cross, the assumption is met. However, a log-log survival curve was also performed for verification to assess the two groups, in accordance with the method outlined by Kleinbaum. [155]

Statistical Package for Social Sciences (SPSS, version 21.0) was used to perform the statistical analysis. An alpha level was set at 0.05.

CHAPTER FOUR

RESULTS

A. Population Characteristics

The dataset included 7,843 unique injured workers with compensation claims for a wide variety of musculoskeletal disorders. Subjects were predominantly employed (85%) males (64%) living in an urban area (70.1%) with diagnoses of sprain/strain (45%). The average age of claimants was 42.7 years and the average length of time from accident occurrence until admission to a RTW program was 210 days. Further details on claimant characteristics can be seen in Table 1.

B. Comparison of Missing and Non-Missing Data

Of the 7,843 claimants, 10.3% (n=804) had missing data on the self-report PDI or VAS questionnaires. Similarly, the percent of claimants with missing data in each of the SF-36 categories was as follows: Physical Functioning (12.6%); Physical Role (13.5%); Pain Index (12.9%); General Health Perceptions (13.5%); Vitality (13.2%); Emotional Role (14.5%); Mental Health Index (13.3%); Social Functioning (12.9%). There was a significant difference in the percentage of urban/rural claimants that had missing PDI or Pain VAS data ($p=0.008$), with 25.9% of those with missing PDI or VAS data being rural compared to 30.4% of those without missing data on these variables. However, besides education level (14.9% with high school diploma in those with missing data vs. 17.5% with high school diploma in those completing the questionnaires, $p<0.001$), no other significant differences were found between those with and without missing data.

While no other variables had any missing data, several had unknown or unspecified cases including 43.7% (n=3,426) of claimants having an unspecified level of education, 11.4% (n=896) having an unspecified anatomical site of injury, 37.9% (n=2,974) having an unspecified marital status, 3.6% (n=285) having a diagnosis group/type of injured classified as 'other', 0.2% (n=17) having an unknown working status at time of assessment, and 5.5% (n=434) having an unknown availability of modified work. Factors with statistically significant differences between the unspecified and specified education groups include: time from accident to admission (6.3 months unspecified vs 7.5 months, $p<0.001$); PDI% (46.7% unspecified vs. 47.7%, $p=0.041$); Pain VAS (5.3 unspecified vs. 4.9, $p<0.001$); pre-accident total earnings (8.0% >$77,000 unspecified vs. 10.4%, $p<0.001$); type of work (55.0% blue-collar unspecified vs. 57.4%, $p=0.004$); admission job attached (88.5% unspecified vs. 82.4%, $p<0.001$); TD01 status at discharge (34.5% unspecified vs. 46.5%, $p<0.001$); wage replacement status at discharge (51.5% vs. 61.9%, $p<0.001$); TD01 status 90 days after discharge (5.4% unspecified vs. 7.1%, $p=0.002$); and wage replacement status 90 days after discharge (9.3% unspecified vs. 11.6%, $p=0.001$).

C. Descriptive Statistics for Urban and Rural Populations

i) Demographic Factors

Of the 7,843 claimants, 5,946 (70.1%) were classified as living in an urban area and 2,347 (29.9%) were classified as living in a rural area. The average age of urban and rural claimants was not significantly different ($p=0.10$), with the average ages being 42.5 years (SD=11.9) and 43.0 years (SD=11.9) for urban and rural claimant populations respectively. Regarding level of education, a greater proportion of urban claimants (6.2%,

n=341) had a university degree when compared to rural claimants (2.4%, n=57, p<0.001), and a greater proportion of rural claimants (15.3%, n=360) did not have a high school diploma when compared to urban claimants (12.8%, n=706) Furthermore, 4.1% (n=225) of urban claimants required an interpreter at their assessment, while only 0.4% (n=10) of rural claimants did, a significant difference (p<0.001). See Table 1.

ii) Occupational Factors

A larger proportion of urban claimants were employed in a white-collar profession (36.8%, n=2021 vs 32.5%, n=763) and a larger proportion of rural claimants were employed in a blue-collar profession (59.4%, n=1394 vs 55.0%, n=3025). Minimal differences were found between these two populations in total annual earnings prior to injury occurrence (p=0.054). A greater proportion of rural claimants earned less than $25,000 when compared to urban claimants (26.2%, n=614 vs 24.8%, n=1365) as well as more than $77,000 (10.3%, n=241 vs 9.0%, n=493). A larger percentage of rural injured workers (43.9%, n=1031) in Alberta were on full disability (TD01) at time of assessment than urban injured workers (40.1%, n=2206) upon discharge from RTW assessment (p=0.002). Conversely, a larger percentage of urban injured workers (16.9%, n=928) were on partial disability (TD02) than rural injured workers (14.4%, n=337) upon discharge from assessment (p=0.005).

iii) Health Factors

On average, rural claimants had a longer length of time from the date of the accident occurring until admission to clinical/RTW assessment than urban claimants (8.1 vs. 6.6 months, p<0.001). While injured rural workers visited a medical doctor more on average than injured urban workers prior to undergoing a RTW assessment (16.0 visits vs 13.92

visits; p<0.001), they visited physiotherapists fewer times on average than their urban counterparts (18.1 visits vs 19.5 visits, p=0.025). Interestingly, a greater percentage of rural claimants (22.4%, n=525) underwent no rehabilitation program than urban claimants (16.8%, n=923).

iv) Return to Work

A greater percentage of rural claimants were on TD01 at 90 days after assessment (8.0%, n=188) when compared to urban claimants (5.7%, n=311, p<0.001). By extension, a greater proportion of rural injury claimants were receiving wage replacement benefits (TD01 or TD02) at 90 days when compared to urban injury claimants (12.1%, n=285 vs 9.9%, n=546; p=0.004). With respect to injury recurrence in the first 90 days after RTW assessment, 3.4% (n=35) of rural claimants and 2.2% (n=48) of urban claimants had TD01 status recurrence (p=0.041), and 24.3% (n=332) of rural claimants and 27.3% (n=856) of urban claimants had any compensation (TD01 or TD02) recurrence (p=0.034).

Table 1: Descriptive Statistics According to Urban/Rural Status

Mean (SD) or Percentage (Frequency)	Entire Sample (n=7,843)	Urban (n=5,946) 70.1%	Rural (n=2,347) 29.9%	P-Value
Age (years)	42.68 (11.90)	42.54 (11.88)	43.02 (11.94)	0.10
Accident to Admission (days)	210.14 (421.04)	196.53 (402.06)	242.00 (460.96)	<0.001
Accident to Admission (months)	7.00 (14.03)	6.55 (13.40)	8.07 (15.37)	<0.001
Number of Previous Claims	4.17 (5.25)	4.07 (5.24)	4.40 (5.26)	0.01
Gender				0.32
Male	63.9% (n=5014)	63.6% (n=3494)	64.8% (n=1520)	
Female	36.1% (n=2829)	36.4% (n=2002)	35.2% (n=827)	
TD01 at Discharge from Assessment				0.002
Yes	41.3% (n=3237)	40.1% (n=2206)	43.9% (n=1031)	
No	58.7% (n=4606)	59.9% (n=3290)	56.1% (n=1316)	
TD01 at 90 Days After Assessment				<0.001
Yes	6.4% (n=499)	5.7% (n=311)	8.0% (n=188)	
No	93.6% (n=7344)	94.3% (n=5185)	92.0% (n=2159)	
TD02 at Discharge from Assessment				0.005
Yes	16.1% (n=1265)	16.9% (n=928)	14.4% (n=337)	
No	83.9% (n=6578)	83.1% (n=4568)	85.6% (n=2010)	
TD02 at 90 Days After Assessment				0.77
Yes	4.2% (n=332)	4.3% (n=235)	4.1% (n=97)	
No	95.8% (n=7511)	95.7% (n=5261)	95.9% (n=2250)	
Work Compensation at Discharge from Assessment				0.32
Yes	57.4% (n=4498)	57.0% (n=3132)	58.2% (n=1366)	
No	42.6% (n=3345)	43.0% (n=2364)	41.8% (n=981)	
Work Compensation at 90 Days after Assessment				0.004
Yes	10.6% (n=831)	9.9% (n=546)	12.1% (n=285)	
No	89.4% (n=7012)	90.1% (n=4950)	87.9% (n=2062)	
TD01 Recurrence (n=3237)	Claimants with TD01 at Discharge from Assessment Only			0.04

Yes	2.6% (n=83)	2.2% (n=48)	3.4% (n=35)	
No	97.4% (n=3154)	97.8% (n=2158)	96.6% (n=996)	
TD02 Recurrence (n=1176)	Claimants with TD02 at Discharge from Assessment Only			0.21
Yes	1.4% (n=16)	1.6% (n=14)	0.7% (n=2)	
No	98.6% (n=1160)	98.4% (n=855)	99.3% (n=305)	
Work Compensation Recurrence (n=4498)	Claimants on Work Compensation at Discharge from Assessment Only			0.03
Yes	26.4% (n=1188)	27.3% (n=856)	24.3% (n=332)	
No	73.6% (n=3310)	72.7% (n=2276)	75.7% (n=1034)	
Diagnosis Group				0.02
Fractures	11.6% (n=909)	11.3% (n=622)	12.2% (n=287)	Reference Category
Dislocations	2.2% (n=172)	1.9% (n=104)	2.9% (n=268)	0.04
Sprains/Strains	45.1% (n=3538)	45.2% (n=2484)	44.9% (n=1054)	0.30
Lacerations	2.5% (n=198)	2.6% (n=145)	2.3% (n=53)	0.19
Contusions	4.8% (n=374)	5.2% (n=285)	3.8% (n=89)	0.006
Nerve Damage	1.3% (n=101)	1.3% (n=72)	1.2% (n=29)	0.56
Joint Disorders	28.9% (n=2266)	28.9% (n=1586)	29.0% (n=680)	0.39
Other	3.6% (n=285)	3.6% (n=198)	3.7% (n=87)	0.74
Anatomical Site				0.003
Neck	11.4% (n=894)	12.0% (n=660)	10.0% (n=234)	Reference Category
Upper Back	1.0% (n=77)	1.2% (n=64)	0.6% (n=13)	0.08
Lower Back	8.7% (n=681)	8.1% (n=447)	10.0% (n=234)	<0.001
Other Torso	8.0% (n=628)	8.1% (n=445)	7.8% (n=183)	0.20
Upper Extremity	38.7% (n=3036)	38.3% (n=2105)	39.7% (n=931)	0.01
Lower Extremity	20.4% (n=1603)	20.2% (n=1110)	21.0% (n=493)	0.02
Multiple Site	0.3% (n=24)	0.3% (n=17)	0.3% (n=7)	0.74
Not Specified	11.4% (n=896)	11.7% (n=645)	10.7% (n=251)	0.38
Comorbidity				<0.001
Yes	29.0% (n=2275)	27.3% (n=1498)	33.1% (n=777)	
No	71.0% (n=5568)	72.7% (n=3998)	66.9% (n=1570)	
Job Attached at Admission				0.03
Yes	85.1% (n=6671)	85.6% (n=4706)	83.7% (n=1965)	

No	14.9% (n=1172)	14.4% (n=790)	16.3% (n=382)	
Interpreter Required				<0.001
Yes	3.0% (n=235)	4.1% (n=225)	0.4% (n=10)	
No	97.0% (n=7608)	95.9% (n=5271)	99.6% (n=2337)	
Education				<0.001
Less than High School Diploma	13.6% (n=1066)	12.8% (n=706)	15.3% (n=360)	Reference Category
High School Diploma	17.2% (n=1351)	16.7% (n=919)	18.4% (n=432)	0.35
Partial Technical School or University	7.6% (n=595)	7.8% (n=428)	7.1% (n=167)	0.02
Technical Diploma	12.8% (n=1007)	12.5% (n=685)	13.7% (n=322)	0.39
University Degree	5.1% (n=398)	6.2% (n=341)	2.4% (n=57)	<0.001
Not Specified	43.7% (n=3426)	44.0% (n=2417)	43.0% (n=1009)	0.01
Marital Status				0.001
Single	17.0% (n=1332)	17.6% (n=965)	15.6% (n=367)	Reference Category
Separated or Divorced	6.6% (n=515)	6.8% (n=374)	6.1% (n=142)	0.99
Married, Common-Law, or Widowed	38.5% (n=3021)	37.1% (n=2038)	41.9% (n=983)	0.001
Not-Specified	37.9% (n=2974)	38.6% (n=2119)	36.4% (n=855)	0.42
Type of Work				0.001
White-Collar	35.5% (n=2784)	36.8% (n=2021)	32.5% (n=763)	Reference Category
Blue-Collar	56.3% (n=4419)	55.0% (n=3025)	59.4% (n=1394)	<0.001
Health Care Field	8.2% (n=640)	8.2% (n=450)	8.1% (n=190)	0.25
Working at Time of Assessment				0.003
Yes	46.4% (n=3637)	47.6% (n=2618)	43.4% (n=1019)	0.001
No	53.4% (n=4189)	52.1% (n=2866)	56.4% (n=1323)	Reference Category
Unknown	0.2% (n=17)	0.2% (n=12)	0.2% (n=5)	0.85
Modified Work Available				<0.001
No	39.4% (n=3092)	37.8% (n=2078)	43.2% (n=1014)	Reference Category
Yes-Full Time	48.5% (n=3801)	50.1% (n=2751)	44.7% (n=1050)	<0.001
Yes-Part Time	6.6% (n=516)	6.8% (n=372)	6.1% (n=144)	0.03
Unknown	5.5% (n=434)	5.4% (n=295)	5.9% (n=139)	0.75
Number of Doctor Visits	14.53 (19.45)	13.92 (18.66)	15.96 (21.12)	<0.001
2.61% (n=205) of claimants had 0 visits				

Number of Physiotherapy Visits	19.06 (24.53)	19.47 (25.02)	18.11 (23.32)	0.03
	23.4% of claimants (n=1837) had 0 visits			
Number of Chiropractor Visits	1.02 (4.31)	1.06 (4.48)	0.94 (3.90)	0.27
	92.4% of claimants (n=7246) had 0 visits			
Rehabilitation Program Undertaken				<0.001
No Rehabilitation	18.5% (n=1448)	16.8% (n=923)	22.4% (n=525)	Reference Category
Single Service Community Physical Therapy	15.1% (n=1182)	14.0% (n=768)	17.6% (n=414)	0.51
Complex RTWS	3.4% (n=266)	3.3% (n=180)	3.7% (n=86)	0.22
Provider-Based RTWS	51.9% (n=4070)	54.0% (n=2970)	46.9% (n=1100)	<0.001
Work Site-Based RTWS	1.5% (n=121)	1.3% (n=71)	2.1% (n=50)	0.27
Hybrid	9.6% (n=756)	10.6% (n=584)	7.3% (n=172)	<0.001
SF-36 Scores				
Physical Functioning	54.39 (25.08)	54.00 (25.16)	55.25 (24.89)	0.06
Physical Role	30.54 (26.25)	30.60 (26.22)	30.40 (26.31)	0.78
Pain Index	26.49 (20.66)	26.27 (20.86)	26.98 (20.19)	0.19
General Health Perceptions	66.96 (19.47)	66.26 (19.61)	68.53 (19.08)	<0.001
Vitality	49.14 (20.97)	48.74 (20.93)	50.06 (21.04)	0.02
Emotional Role	57.45 (33.15)	56.47 (33.10)	59.65 (33.18)	<0.001
Mental Health Index	62.52 (21.23)	61.54 (21.34)	64.72 (20.83)	<0.001
Social Functioning	52.85 (27.33)	52.25 (27.35)	54.19 (27.25)	0.01
Total PDI Percentage Score	47.26 (22.25)	47.60 (22.37)	46.49 (21.96)	0.05
Pain VAS Score	5.08 (2.56)	5.14 (2.54)	4.96 (2.58)	0.01
Total Annual Earnings Prior to Injury ($)				0.05
<25,000	25.2% (n=1979)	24.8% (n=1365)	26.2% (n=614)	0.37
25,000 – 77,000	65.4% (n=5130)	66.2% (n=3638)	63.6% (n=1492)	0.04
>77,000	9.4% (n=734)	9.0% (n=493)	10.3% (n=241)	Reference Category

D. Descriptive Statistics for Claimants with Successful and Unsuccessful RTW

i) Demographic Factors

Of the 7,843 claimants, 7,344 (93.6%) were not receiving TD01 90 days after assessment and 499 (6.4%) were on TD01 90 days after assessment. Claimants not on TD01 at 90 days were 70.6% (n=5,185) urban and 29.4% (n=2159) rural, whereas only 62.3% (n=311) of claimants still on TD01 at 90 days were urban and 37.7% (n=188) were rural ($p<0.001$). The average age of claimants with successful RTW (no TD01) 90 days after assessment was 42.6 years and the average age of claimants with unsuccessful RTW (TD01) 90 days after assessment was 44.1 years ($p=0.005$). Claimants not on TD01 at 90 days were 63.5% (n=4,667) male and 36.5% (n=2,677) female, while claimants on TD01 at 90 days were 69.5% (n=347) male and 30.5% (n=347) female ($p=0.007$). More poorly educated claimants without a high school diploma were likely to still be receiving TD01 at 90 days post-assessment, with 16.2% (n=81) of the unsuccessful RTW claimants not having a high school diploma and only 13.4% (n=985) of the successful RTW claimants not having a high school diploma.

ii) Occupational Factors

The "TD01 at 90 days" group was comprised of 27.7% (n=138) white-collar employment and 8.4% (n=42) of claimants in the group had pre-accident earnings < $25,000, while the "No TD01 at 90 days" group was comprised of 36.0% (n=2646) white-collar employment ($p<0.001$) and 26.4% of claimants in the group had pre-accident earnings < $25,000 ($p<0.001$). The "TD01 at 90 Days" group consisted of 73.1% (n=365) claimants who were on TD01 at discharge and 26.9% (n=134) claimants who were not on TD01 at

discharge, whereas the “No TD01 at 90 Days” group was only 39.1% (n=2872) claimants on TD01 at discharge and 60.9% (n=4472) claimants not on TD01 at discharge.

iii) Health Factors

Successful RTW claimants (no TD01) had significantly shorter intervals from accident until admission to a RTW assessment when compared to unsuccessful RTW claimants (6.9 months vs 9.0 months; $p<0.001$). The average number of doctor and physiotherapy visits prior to RTW assessment in the unsuccessful RTW group was significantly greater than the successful RTW group ($p<0.001$), with an average of 29.6 doctor visits and 37.4 physiotherapy visits far exceeding that of 13.5 doctor visits and 17.8 physiotherapy visits. Investigation of the RTW programs indicated a greater proportion of the “TD01 at 90 days” group (33.3%, n=166) to have undergone single service community physical therapy when compared to the “No TD01 at 90 days” group (13.8%, n=1,016) and a smaller proportion of the “TD01 at 90 days” group (2.0%, n=10) to have undergone the hybrid treatment program when compared to the “No TD01 at 90 days” group (10.2%, n=746).

Table 2: Descriptive Statistics According to Total Work Disability Benefit Status

Mean (SD) or Percentage (Frequency)	Entire Sample (n=7,843)	No Benefits at 90 Days (n=7,344) 93.6%	Receiving Benefits at 90 Days (n=499) 6.4%	P-Value
Age (years)	42.68 (11.90)	42.59 (11.91)	44.14 (11.61)	0.005
Geographic Location				<0.001
Urban	70.1% (n=5946)	70.6% (n=5185)	62.3% (n=311)	
Rural	29.9% (n=2347)	29.4% (n=2159)	37.7% (n=188)	
Accident to Admission (Days)	210.52 (417.39)	206.13 (417.36)	269.13 (468.04)	0.001
Accident to Admission (Months)	7.00 (14.03)	6.87 (13.91)	8.97 (15.60)	0.001
Number of Previous Claims	4.19 (5.26)	4.13 (5.27)	4.65 (4.95)	0.04
Gender				0.007
Male	63.9% (n=5014)	63.5% (n=4667)	69.5% (n=347)	
Female	36.1% (n=2829)	36.5% (n=2677)	30.5% (n=152)	
TD01 at Discharge from Assessment				<0.001
Yes	41.3% (n=3237)	39.1% (n=2872)	73.1% (n=365)	
No	58.7% (n=4606)	60.9% (n=4472)	26.9% (n=134)	
TD02 at Discharge from Assessment				<0.001
Yes	16.1% (n=1265)	16.5% (n=1214)	10.2% (n=51)	
No	83.9% (n=6578)	83.5% (n=6130)	89.8% (n=448)	
Work Compensation at Discharge from Assessment				<0.001
Yes	57.4% (n=4498)	55.6% (n=4082)	83.4% (n=416)	
No	42.6% (n=3345)	44.4% (n=3262)	16.6% (n=83)	
Diagnosis Group				0.02
Fractures	11.6% (n=909)	11.7% (n=856)	10.6% (n=53)	Reference Category
Dislocations	2.2% (n=172)	2.1% (n=152)	4.0% (n=20)	0.006
Sprains/Strains	45.1% (n=3538)	45.2% (n=3319)	43.9% (n=219)	0.69
Lacerations	2.5% (n=198)	2.5% (n=183)	3.0% (n=15)	0.36
Contusions	4.8% (n=374)	4.8% (n=355)	3.8% (n=19)	0.60
Nerve Damage	1.3% (n=101)	1.2% (n=90)	2.2% (n=11)	0.05
Joint Disorders	28.9% (n=2266)	29.0% (n=2129)	27.5% (n=137)	0.82

Other	3.6% (n=285)	3.5% (n=260)	5.0% (n=25)	0.08
Anatomical Site				0.48
Neck	11.4% (n=894)	11.4% (n=840)	10.8% (n=54)	Reference Category
Upper Back	1.0% (n=77)	1.0% (n=74)	0.6% (n=3)	0.45
Lower Back	8.7% (n=681)	8.7% (n=642)	7.8% (n=39)	0.79
Other Torso	8.0% (n=628)	8.1% (n=597)	6.2% (n=31)	0.36
Upper Extremity	38.7% (n=3036)	38.6% (n=2830)	41.3% (n=206)	0.43
Lower Extremity	20.4% (n=1603)	20.4% (n=1494)	21.8% (n=109)	0.46
Multiple Site	0.3% (n=24)	0.3% (n=21)	0.6% (n=3)	0.21
Not Specified	11.4% (n=896)	11.5% (n=842)	10.8% (n=54)	0.99
Comorbidity				<0.001
Yes	29.0% (n=2275)	28.5% (n=2092)	36.7% (n=183)	
No	71.0% (n=5568)	71.5% (n=5252)	63.3% (n=316)	
Job Attached at Admission				<0.001
Yes	85.1% (n=6671)	85.4% (n=6274)	79.6% (n=397)	
No	14.9% (n=1172)	14.6% (n=1070)	20.4% (n=102)	
Interpreter Required				0.60
Yes	3.0% (n=235)	3.0% (n=222)	2.6% (n=13)	
No	97.0% (n=7608)	97.0% (n=7122)	97.4% (n=486)	
Education				0.02
Less than High School Diploma	13.6% (n=1066)	13.4% (n=985)	16.2% (n=81)	Reference Category
High School Diploma	17.2% (n=1351)	17.3% (n=1267)	16.8% (n=84)	0.18
Partial Technical School or University	7.6% (n=595)	7.4% (n=546)	9.8% (n=49)	0.64
Technical Diploma	12.8% (n=1077)	12.7% (n=935)	14.4% (n=72)	0.70
University Degree	5.1% (n=398)	5.0% (n=369)	5.8% (n=29)	0.84
Not Specified	43.7% (n=3426)	44.1% (n=3242)	36.9% (n=184)	0.01
Marital Status				0.001
Single	17.0% (n=1332)	16.8% (n=1236)	19.2% (n=96)	Reference Category
Separated or Divorced	6.6% (n=516)	6.5% (n=477)	7.8% (n=39)	0.80
Married, Common-Law, or Widowed	38.5% (n=3021)	38.2% (n=2803)	43.7% (n=218)	0.99
Not Specified	37.9% (n=2974)	38.5% (n=2828)	29.3% (n=146)	0.003
Type of Work				0.001
White-Collar	35.5% (n=2784)	36.0% (n=2646)	27.7% (n=138)	Reference Category

Blue-Collar	56.3% (n=4419)	56.0% (n=4109)	62.1% (n=310)	<0.001
Health Care Field	8.2% (n=640)	8.0% (n=589)	10.2% (n=51)	0.003
Working at Time of Assessment				<0.001
Yes	46.4% (n=3637)	48.1% (n=3533)	20.8% (n=104)	<0.001
No	53.4% (n=4189)	51.7% (n=3797)	78.6% (n=392)	Reference Category
Unknown	0.2% (n=17)	0.2% (n=14)	0.6% (n=3)	0.25
Modified Work Available				<0.001
No	39.4% (n=3092)	38.3% (n=2812)	56.1% (n=280)	Reference Category
Yes-Full Time	48.5% (n=3801)	49.4% (n=3629)	34.5% (n=172)	<0.001
Yes-Part Time	6.6% (n=515)	6.6% (n=488)	5.6% (n=28)	0.007
Unknown	5.5% (n=434)	5.7% (n=415)	3.8% (n=19)	0.001
Number of Doctor Visits	14.53 (19.45)	13.51 (18.18)	29.55 (29.05)	<0.001
	N = 205 (2.6% of Population) with 0 visits			
Number of PT Visits	19.06 (24.53)	17.82 (22.66)	37.40 (39.32)	<0.001
	N = 1837 (23.4% of Population) with 0 visits			
Number of Chiro Visits	1.02 (4.31)	1.03 (4.33)	0.97 (4.11)	0.76
	N = 7246 (92.4% of Population) with 0 visits			
Rehabilitation Program Undertaken				<0.001
No Rehabilitation	18.5% (n=1448)	18.9% (n=1387)	12.2% (n=61)	Reference Category
Single Service Community Physical Therapy	15.1% (n=1182)	13.8% (n=1016)	33.3% (n=166)	<0.001
Complex RTWS	3.4% (n=266)	2.8% (n=209)	11.4% (n=57)	<0.001
Provider-Based RTWS	51.9% (n=4070)	52.7% (n=3867)	40.7% (n=203)	0.24
Work Site-Based RTWS	1.5% (n=121)	1.6% (n=119)	0.4% (n=2)	0.19
Hybrid	9.6% (n=756)	10.2% (n=746)	2.0% (n=10)	0.001
SF-36 Scores				
Physical Functioning	54.39 (25.08)	55.15 (24.90)	43.15 (25.09)	<0.001
Physical Role	30.54 (26.25)	31.36 (26.36)	18.59 (21.20)	<0.001
Pain Index	26.49 (20.66)	27.01 (20.72)	18.84 (18.04)	<0.001
General Health Perceptions	66.96 (19.47)	67.26 (19.40)	62.64 (19.95)	<0.001
Vitality	49.14 (20.97)	49.52 (20.93)	43.66 (20.82)	<0.001
Emotional Role	57.45 (33.15)	58.35 (32.91)	44.20 (33.90)	<0.001
Mental Health Index	62.52	62.99	55.65	<0.001

	(21.23)	(21.06)	(22.45)	
Social Functioning	52.85 (27.33)	53.74 (27.21)	39.91 (25.84)	<0.001
PDI Total Percentage Score	47.26 (22.25)	46.36 (22.09)	60.53 (20.24)	<0.001
Pain VAS Score	5.08 (2.06)	5.01 (2.06)	6.15 (2.28)	<0.001
Total Annual Earnings Prior to Injury ($)				<0.001
<25,000	25.2% (n=1979)	26.4% (n=1937)	8.4% (n=42)	<0.001
25,000 – 77,000	65.4% (n=5130)	64.8% (n=4758)	74.5% (n=372)	<0.001
>77,000	9.4% (n=734)	8.8% (n=649)	17.0% (n=85)	Reference Category

E. Univariate Screen for "TD01 Status at 90 Days" Outcome

Univariate logistic regression was used to measure the association between TD01 status at 90 days post-assessment and the demographic, occupational, and health variables independently in all 7,843 claimants. Geographic location of residence (urban=0, rural=1) was significantly associated with TD01 status at 90 days ($p<0.001$) with an Odds Ratio (OR) = 1.45 and 95% Confidence Interval (C.I.) of 1.20-1.75. Thus, the odds of rural claimants being on TD01 (full disability) 90 days after having their RTW assessment was 1.45 times greater than their urban counterparts.

The odds of male claimants being on TD01 at 90 days was 1.31 (CI 1.08-1.59) times greater than females ($p=0.007$) and for every one year increase in age, the odds of a claimant not returning to work and being on TD01 became 1.01 times greater (CI 1.00-1.02; $p=0.005$). Thus, every 10-year increase in age resulted in the odds of claimants being on TD01 increasing by 1.10 times. Claimants on TD01 at time of assessment (0=no, yes=1) had an OR=4.24 (CI 3.46-5.20), indicating that the odds of a claimant being on

TD01 at 90 days was 4.24 times greater in claimants who were on TD01 on the first day ($p<0.001$), when compared to other claimants.

The type of rehabilitation program a claimant was assigned to and provided was a strong predictor of future work status. Claimants from the "Complex Return-To-Work Services (RTWS)" program had 6.20 (CI 4.20-9.15; $p<0.001$) times greater odds of being on TD01 at 90 days when compared to the "No rehabilitation" group. Conversely, claimants in the "Hybrid" program had decreased odds of being on TD01 at 90 days, and were thus more likely to have returned to work (OR=0.31; CI 0.16-0.60; $p<0.001$). Being job attached (0=no, 1=yes) reduced the odds of being on TD01 at 90 days by a factor of 0.66 (0.53-0.83; $p<0.001$) and, thus, increased the likelihood of RTW.

Furthermore, blue-collar workers and health care field workers had decreased odds of RTW by 90 days when compared to white-collar workers, with OR 1.45 (CI 1.18-1.78; $p<0.001$) and OR 1.66 (CI 1.19-2.32; $p<0.001$). Lastly, total annual earnings prior to injury of < $25,000 and $25,000 - $77,000 decreased odds of being on TD01 and thus increased odds of RTW (OR 0.17 (CI 0.11-0.24; $p<0.001$) and OR 0.60 (CI 0.47-0.77; $p<0.001$) respectively, using earnings > $77,000 as a reference group.

Table 3: Univariate Screen for TD01 Status at 90 Days

Factor		P-Value	Odds Ratio (OR)	Confidence Interval (95%)
****Geographic Location**	Urban=0, Rural=1	<0.001	1.45	1.20 – 1.75
****Age**	Per 1 Year Increase/Decrease	0.005	1.01	1.00 – 1.02
****Number of Days Accident to Admission**	Per 1 Day Increase/Decrease	0.001	1.00	1.00 – 1.00
****Number of Months Accident to Admission**	Per 1 Month (30 Day) Increase/Decrease	0.001	1.01	1.00 – 1.01
****Gender**	Female=1, Male=2	0.007	1.31	1.08 – 1.59
****Number of Prior Claims**	Per 1 Claim Increase/Decrease	0.04	1.02	1.00 – 1.03
****TD01 at Discharge From Assessment**	No=0, Yes=1	<0.001	4.24	3.46 – 5.20
****TD02 at Discharge From Assessment**	No=0, Yes=1	<0.001	0.58	0.43 – 0.77
****Diagnosis Group**		0.02		
	Fracture=1	-	Reference Category	
	**Dislocations=2	0.006	2.13	1.24 – 3.66
	Sprains/Strains=3	0.69	1.07	0.78 – 1.45
	Lacerations=4	0.36	1.32	0.73 – 2.40
	Contusion=5	0.60	0.86	0.50 – 1.48
	*Nerve Damage=6	0.05	1.97	1.00 – 3.92
	Joint Disorder=7	0.82	1.04	0.75 – 1.44
	*Other=8	0.08	1.55	0.95 – 2.55
Anatomical Site		0.48		
	Neck=1	-	Reference Category	
	Upper Back=2	0.45	0.63	0.19 – 2.07
	Lower Back=3	0.79	0.95	0.62 – 1.45
	Other Torso=4	0.36	0.81	0.51 – 1.27
	Upper Extremity=5	0.43	1.13	0.83 – 1.54
	Lower Extremity=6	0.46	1.14	0.81 – 1.59
	*Multiple Site=7	0.21	2.22	0.64 – 7.68
	Not Specified=8	0.99	1.00	0.68 – 1.47
****Comorbidity**	No=0, Yes=1	<0.001	1.45	1.20 – 1.76
****Admission Job Attached**	No=0, Yes=1	<0.001	0.66	0.53 – 0.83
Interpreter Required	No=0, Yes=1	0.60	0.86	0.49 – 1.51
****Level of Education**		0.02		
	Less than High School Diploma=1	-	Reference Category	
	*High School Diploma=2	0.18	0.81	0.59 – 1.11
	Partial Technical School or University=3	0.64	1.09	0.75 – 1.58
	Technical Diploma=4	0.70	0.94	0.67 – 1.30
	University Degree=5	0.84	0.96	0.62 – 1.49
	**Not Specified=6	0.007	0.69	0.53 – 0.91
****Marital Status**		0.001		
	Single=1	-	Reference Category	
	Separated or Divorced=2	0.80	1.05	0.72 – 1.55
	Married, Common-Law, or Widowed=3	0.99	1.00	0.78 – 1.29
	**Not Specified=4	0.003	0.67	0.51 – 0.87
****Type of Work**		0.001		
	White-Collar=1	-	Reference Category	

	**Blue-Collar=2	<0.001	1.45	1.18 – 1.78
	**Health Field=3	0.003	1.66	1.19 – 2.32
**Working at Time of Assessment		<0.001		
	No=0	-	Reference Category	
	**Yes=1	<0.001	0.29	0.23 – 0.36
	Unknown=2	0.25	2.08	0.59 – 7.25
**Modified Work Available		<0.001		
	No=0	-	Reference Category	
	**Yes-Full-Time=1	<0.001	0.48	0.39 – 0.58
	**Yes-Part-Time=2	0.007	0.58	0.39 – 0.86
	**Unknown=3	0.001	0.46	0.29 – 0.74
**Number of Doctor Visits	Per 1 Visit Increase/Decrease	<0.001	1.02	1.02 – 1.03
**Number of Physiotherapy Visits	Per 1 Visit Increase/Decrease	<0.001	1.02	1.02 – 1.02
Number of Chiropractor Visits	Per 1 Visit Increase/Decrease	0.76	1.00	0.98 – 1.02
**Rehabilitation Program Undertaken		<0.001		
	No Rehabilitation=0	-	Reference Category	
	**Single Service Community Physical Therapy=1	<0.001	3.72	2.74 – 5.04
	**Complex RTWS=2	<0.001	6.20	4.20 – 9.15
	Provider-Based RTWS=3	0.24	1.19	0.89 – 1.60
	*Work Site-Based RTWS=4	0.19	0.38	0.09 – 1.58
	**Hybrid=5	0.001	0.31	0.16 – 0.60
**SF-36 Physical Functioning	Per 1 Unit Score Increase/Decrease	<0.001	0.98	0.98 – 0.99
**SF-36 Role-Physical	"	<0.001	0.98	0.97 – 0.98
**SF-36 Pain Index	"	<0.001	0.98	0.97 – 0.98
**SF-36 General Health	"	<0.001	0.99	0.98 – 0.99
**SF-36 Vitality	"	<0.001	0.99	0.98 – 0.99
**SF-36 Role-Emotional	"	<0.001	0.99	0.98 – 0.99
**SF-36 Mental Health	"	<0.001	0.98	0.98 – 0.99
**SF-36 Social Functioning	"	<0.001	0.98	0.98 – 0.98
**PDI Total Percentage Score	"	<0.001	1.03	1.03 – 1.04
**Pain VAS	"	<0.001	1.20	1.16 – 1.25
**Annual Pre-Accident Earnings		<0.001		
	>$77,000 = 0	-	Reference Category	
	**< $25,000 = 1	<0.001	0.17	0.11 – 0.24
	**$25,000 - $77,000 = 2	<0.001	0.60	0.47 – 0.77

* Indicates p<0.25

** Indicates p<0.05

F. Univariate Screen for Any Wage Replacement Benefits at 90 Days

Univariate logistic regression was used to predict reception of any wage replacement benefits (TD01 or TD02) at 90 days post-assessment (no=0, yes=1) and measure its association with the demographic, occupational, and health variables independently in all 7,843 claimants. Geographic location of residence (urban=0, rural=1) was significantly associated with wage replacement status (OR 1.25, C.I.= 1.08-1.46, p=0.004). Thus, the odds of a rural claimant being on some form of work disability and compensation (TD01 or TD02) 90 days after RTW assessment was 1.25 times greater than their urban counterparts.

The odds of male claimants receiving wage replacement benefits at 90 days were 0.99 (CI 0.86-1.15) times smaller than females, which was not significant (p=0.92). For every one-year increase in age, the odds of a claimant being on wage replacement benefits was 1.02 times greater (1.01-1.02; p<0.001). Thus, every 10-year increase in age increased the odds of being on TD01 by 1.20 times. Claimants on wage replacement benefits at time of assessment (0=no, yes=1) had an OR=5.26 (CI 4.30-6.44), indicating that the odds of a claimant receiving wage replacement benefits at 90 days was 5.26 times greater in claimants who were receiving wage replacement benefits on the first day (p<0.001), when compared to claimants who were not.

The type of rehabilitation program a claimant was assigned to and provided was a strong predictor of future work status. Claimants from the “Complex Return-To-Work Services (RTWS)” program had a 4.86 (CI 3.46-6.81; p<0.001) times greater odds of being on wage replacement benefits at 90 days when compared to the “No rehabilitation” group.

Conversely, claimants in the "Work-Site Based RTWS" and "Hybrid" programs had decreased odds of receiving wage replacement benefits at 90 days, and were thus more likely to have returned to work (OR=0.22 (CI 0.06-0.92); p=0.04 and OR=0.36 (CI 0.22-0.59); p<0.001 respectively). Unlike with full disability status, being job attached (0=no, 1=yes) did not have a significant association with wage replacement status.

While blue-collar work was not significantly associated with wage replacement benefit status at 90 days compared to white-collar work (OR=1.13 (CI 0.97-1.32); p=0.13), claimants employed in the health care field were more likely to still be receiving benefits when compared to white-collar workers (OR=1.50 (CI 1.16-1.94); p=0.002). Similar to investigations of TD01 status at 90 days, total annual earnings prior to injury of < $25,000 and $25,000 - $77,000 decreased odds of receiving wage replacement benefits with OR 0.20 (CI 0.15-0.27; p<0.001) and OR 0.71 (CI 0.58-0.88; p=0.002) respectively, using earnings > $77,000 as a reference group.

Table 4: Univariate Screen for any Wage Replacement Benefits

Factor		P-Value	Odds Ratio (OR)	Confidence Interval (95%)
****Geographic Location**	Urban=0, Rural=1	0.004	1.25	1.08 – 1.46
****Age**	Per 1 Year Increase/Decrease	<0.001	1.02	1.01 – 1.02
****Number of Days Accident to Admission**	Per 1 Day Increase/Decrease	0.001	1.00	1.00 – 1.00
****Number of Months Accident to Admission**	Per 1 Month (30 Day) Increase/Decrease	0.001	1.01	1.00 – 1.01
Gender	Female=1, Male=2	0.92	0.99	0.86 – 1.15
***Number of Prior Claims**	Per 1 Claim Increase/Decrease	0.06	1.01	1.00 – 1.03
****TD01 at Discharge From Assessment**	No=0, Yes=1	<0.001	2.90	2.50 – 3.37
****TD02 at Discharge From Assessment**	No=0, Yes=1	<0.001	1.51	1.27 – 1.80
****Work Compensation at Discharge From Assessment**	No=0, Yes=1	<0.001	5.26	4.30 – 6.44
****Diagnosis Group**		0.001		

	Fracture=1	-	Reference Category	
	**Dislocations=2	0.004	1.90	1.23 – 2.93
	Sprains/Strains=3	0.28	0.88	0.70 – 1.11
	Lacerations=4	0.68	1.10	0.69 – 1.77
	Contusion=5	0.43	0.85	0.57 – 1.27
	*Nerve Damage=6	0.05	1.74	1.00 – 3.01
	Joint Disorder=7	0.40	0.90	0.70 – 1.15
	*Other=8	0.18	1.31	0.88 – 1.94
***Anatomical Site**		0.10		
	Neck=1	-	Reference Category	
	*Upper Back=2	0.20	0.51	0.18 – 1.42
	Lower Back=3	0.75	0.95	0.67 – 1.33
	Other Torso=4	0.33	0.84	0.58 – 1.20
	*Upper Extremity=5	0.25	1.16	0.90 – 1.43
	*Lower Extremity=6	0.09	1.26	0.97 – 1.65
	Multiple Site=7	0.65	1.33	0.39 – 4.53
	Not Specified=8	0.67	1.07	0.79 – 1.46
****Comorbidity**	No=0, Yes=1	<0.001	1.56	1.34 – 1.81
Admission Job Attached	No=0, Yes=1	0.46	1.08	0.88 – 1.33
Interpreter Required	No=0, Yes=1	0.68	0.91	0.59 – 1.41
****Level of Education**		0.001		
	Less than High School Diploma=1	-	Reference Category	
	High School Diploma=2	0.79	0.97	0.74 – 1.25
	**Partial Technical School or University=3	0.04	1.37	1.02 – 1.86
	Technical Diploma=4	0.42	1.12	0.85 – 1.47
	*University Degree=5	0.10	1.34	0.95 – 1.89
	*Not Specified=6	0.18	0.86	0.68 – 1.08
****Marital Status**		<0.001		
	Single=1	-	Reference Category	
	*Separated or Divorced=2	0.18	1.24	0.91 – 1.69
	*Married, Common-Law, or Widowed=3	0.11	1.18	0.96 – 1.45
	**Not Specified=4	0.03	0.79	0.63 – 0.98
****Type of Work**		0.009		
	White-Collar=1	-	Reference Category	
	*Blue-Collar=2	0.13	1.13	0.97 – 1.32
	**Health Field=3	0.002	1.50	1.16 – 1.94
****Working at Time of Assessment**		<0.001		
	No=0	-	Reference Category	
	**Yes=1	<0.001	0.43	0.37 – 0.50
	Unknown=2	0.68	1.31	0.38 – 4.56
****Modified Work Available**		<0.001		
	No=0	-	Reference Category	
	**Yes-Full-Time=1	<0.001	0.60	0.52 – 0.71
	Yes-Part-Time=2	0.86	0.98	0.74 – 1.29
	*Unknown=3	0.12	0.77	0.56 – 1.07
****Number of Doctor Visits**	Per 1 Visit Increase/Decrease	<0.001	1.02	1.02 – 1.03
****Number of Physiotherapy Visits**	Per 1 Visit Increase/Decrease	<0.001	1.02	1.02 – 1.02
Number of Chiropractor Visits	Per 1 Visit Increase/Decrease	0.34	1.01	0.99 – 1.02

****Rehabilitation Program Undertaken**	No Rehabilitation=0	<0.001	Reference Category	
	**Single Service Community Physical Therapy=1	<0.001	3.49	2.73 – 4.46
	**Complex RTWS=2	<0.001	4.86	3.46 – 6.81
	**Provider-Based RTWS=3	0.002	1.42	1.13 – 1.78
	**Work Site-Based RTWS=4	0.04	0.22	0.06 – 0.92
	**Hybrid=5	<0.001	0.36	0.22 – 0.59
****SF-36 Physical Functioning**	Per 1 Unit Score Increase/Decrease	<0.001	0.98	0.98 – 0.99
****SF-36 Role-Physical**	"	<0.001	0.98	0.97 – 0.98
****SF-36 Pain Index**	"	<0.001	0.98	0.98 – 0.98
****SF-36 General Health**	"	<0.001	0.99	0.98 – 1.00
****SF-36 Vitality**	"	<0.001	0.99	0.98 – 0.99
****SF-36 Role-Emotional**	"	<0.001	0.99	0.99 – 0.99
****SF-36 Mental Health**	"	<0.001	0.99	0.98 – 0.99
****SF-36 Social Functioning**	"	<0.001	0.98	0.98 – 0.99
****PDI Total Percentage Score**	"	<0.001	1.03	1.02 – 1.03
****Pain VAS**	"	<0.001	1.18	1.15 – 1.22
****Annual Pre-Accident Earnings**	>$77,000 = 0	<0.001	Reference Category	
	**< $25,000 = 1	<0.001	0.20	0.15 – 0.27
	**$25,000 - $77,000 = 2	0.002	0.71	0.58 – 0.88

* Indicates p<0.25

** Indicates p<0.05

G. Univariate Screen for Time Until Suspension of TD01 Benefits in Claimants on TD01 at Discharge From Assessment

Univariate cox regression was used to measure the association between time until suspension of TD01 benefits and the demographic, occupational, and health variables independently in all 3,237 claimants who were on TD01 at discharge from their RTW assessment. Geographic location of residence (urban=0, rural=1) was significantly associated with suspension of TD01 benefits (p=0.043) with an Odds Ratio (OR) = 0.92 and 95% Confidence Interval (C.I.) of 0.85-1.00. Thus, the odds of rural claimants experiencing a suspension of TD01 benefits (full disability) within 90 days of their RTW assessment were 0.92 times less than their urban counterparts.

The odds of male claimants experiencing a suspension of TD01 benefits was 0.82 (CI 0.76-0.88) times less than females (p<0.0001). Claimants employed in a blue-collar profession were 0.87 (CI 0.l80-0.94) times less likely than claimants employed in a white-collar profession to have their TD01 benefits suspended (p<0.001). Furthermore, the type of rehabilitation program a claimant was assigned to and provided was also a strong predictor of suspension of benefits. Claimants enrolled in a worksite-based RTWS functional restoration program were 3.99 (CI 2.47-6.44) times more likely than claimants enrolled in no rehabilitation program to undergo a suspension of TD01 benefits within 90 days of RTW assessment. Conversely, claimants enrolled in Physical Therapy or Complex RTWS Pain Rehabilitation were 0.69 (CI 0.59-0.80) and 0.53 (CI 0.44-0.64) times less likely than claimants enrolled in no rehabilitation program to under a suspension of TD01 benefits, respectively.

Table 5: Univariate Screen for Time Until Suspension of TD01 Benefits in Claimants on TD01 at Discharge from RTW Assessment Using Cox Regression Analysis

Factor		P-Value	Odds Ratio (OR)	Confidence Interval (95%)
****Geographic Location**	Urban=0, Rural=1	0.04	0.92	0.85 – 1.00
****Age**	Per 1 Year Increase/Decrease	<0.001	0.99	0.99 – 1.00
****Number of Days Accident to Admission**	Per 1 Day Increase/Decrease	<0.001	1.00	1.00 – 1.00
****Number of Months Accident to Admission**	Per 1 Month (30 Day) Increase/Decrease	<0.001	0.99	0.99 – 0.99
****Gender**	Female=1, Male=2	<0.001	0.82	0.76 – 0.88
****Number of Prior Claims**	Per 1 Claim Increase/Decrease	0.002	0.99	0.98 – 1.00
****Diagnosis Group**		0.005		
	Fracture=1	-	Reference Category	
	*Dislocations=2	0.09	0.80	0.62 – 1.04
	*Sprains/Strains=3	0.06	1.11	1.00 – 1.24
	Lacerations=4	0.47	0.91	0.72 – 1.16
	**Contusion=5	0.002	1.34	1.11 – 1.60
	Nerve Damage=6	0.96	1.01	0.71 – 1.44
	Joint Disorder=7	0.38	1.05	0.94 – 1.19
	Other=8	0.84	0.98	0.80 – 1.20
****Anatomical Site**		0.02		

	Neck=1	-	Reference Category	
	*Upper Back=2	0.11	1.34	0.93 – 1.94
	Lower Back=3	0.75	0.98	0.84 – 1.14
	Other Torso=4	0.27	1.09	0.93 – 1.27
	*Upper Extremity=5	0.15	0.92	0.82 – 1.03
	*Lower Extremity=6	0.16	0.91	0.80 – 1.04
	*Multiple Site=7	0.22	0.70	0.39 – 1.24
	*Not Specified=8	0.06	0.87	0.75 – 1.01
**Comorbidity	No=0, Yes=1	0.001	0.87	0.81 – 0.94
**Admission Job Attached	No=0, Yes=1	<0.001	1.24	1.14 – 1.36
Interpreter Required	No=0, Yes=1	0.67	0.95	0.77 – 1.18
Level of Education		0.89		
	Less than High School Diploma=1	-	Reference Category	
	High School Diploma=2	0.86	1.01	0.90 – 1.14
	Partial Technical School or University=3	0.44	0.94	0.80 – 1.10
	Technical Diploma=4	0.89	0.99	0.87 – 1.13
	University Degree=5	0.76	0.97	0.81 – 1.17
	Not Specified=6	0.62	1.03	0.93 – 1.14
Marital Status		0.41		
	Single=1	-	Reference Category	
	Separated or Divorced=2	0.75	0.98	0.84 – 1.14
	Married, Common-Law, or Widowed=3	0.30	0.95	0.86 – 1.05
	Not Specified=4	0.71	1.02	0.92 – 1.13
**Type of Work		<0.001		
	White-Collar=1	-	Reference Category	
	**Blue-Collar=2	<0.001	0.87	0.80 – 0.94
	Health Field=3	0.74	1.02	0.89 – 1.17
**Working at Time of Assessment		0.001		
	No=0	-	Reference Category	
	**Yes=1	<0.001	1.32	1.14 – 1.54
	Unknown=2	0.58	0.83	0.43 – 1.60
**Modified Work Available		<0.001		
	No=0	-	Reference Category	
	**Yes-Full-Time=1	<0.001	1.43	1.32 – 1.55
	**Yes-Part-Time=2	<0.001	1.42	1.20 – 1.69
	*Unknown=3	0.11	1.18	0.97 – 1.44
**Number of Doctor Visits	Per 1 Visit Increase/Decrease	<0.001	0.99	0.98 – 0.99
**Number of Physiotherapy Visits	Per 1 Visit Increase/Decrease	<0.001	0.99	0.99 – 0.99
Number of Chiropractor Visits	Per 1 Visit Increase/Decrease	0.82	1.00	0.99 – 1.01
**Rehabilitation Program Undertaken		<0.001		
	No Rehabilitation=0	-	Reference Category	
	**Single Service Community Physical Therapy=1	<0.001	0.69	0.59 – 0.80
	**Complex RTWS=2	<0.001	0.53	0.44 – 0.64
	*Provider-Based RTWS=3	0.100	0.90	0.80 – 1.02
	**Work Site-Based RTWS=4	<0.001	3.99	2.47 – 6.44

	**Hybrid=5	<0.001	2.35	1.78 – 3.11
**SF-36 Physical Functioning	Per 1 Unit Score Increase/Decrease	<0.001	1.01	1.00 – 1.01
**SF-36 Role-Physical	"	<0.001	1.01	1.00 – 1.01
**SF-36 Pain Index	"	<0.001	1.00	1.00 – 1.01
**SF-36 General Health	"	<0.001	1.00	1.00 – 1.01
**SF-36 Vitality	"	<0.001	1.01	1.00 – 1.01
**SF-36 Role-Emotional	"	<0.001	1.00	1.00 – 1.00
**SF-36 Mental Health	"	<0.001	1.01	1.00 – 1.01
**SF-36 Social Functioning	"	<0.001	1.01	1.00 – 1.01
**PDI Total Percentage Score	"	<0.001	0.99	0.99 – 0.99
**Pain VAS	"	<0.001	0.95	0.94 – 0.97
**Annual Pre-Accident Earnings		0.004		
	>$77,000 = 0	-	Reference Category	
	**< $25,000 = 1	0.001	1.28	1.11 – 1.49
	**$25,000 - $77,000 = 2	0.04	1.14	1.01 – 1.28

* Indicates p<0.25
** Indicates p<0.05

H. Geographic Location of Residence Crude and Adjusted Odds Ratios for Predicting RTW

Findings indicated rural claimants had greater odds of being on TD01 at 90 days post-assessment when compared to urban populations in a variety of models (see Table 5). However, rural populations were less likely to be on TD02 at 90 days post-assessment. Survival analysis of claimants on TD01 at discharge from their assessment showed them to be slightly less likely to recover and be taken off TD01 within 90 days, but more likely to have an injury recurrence in that same time frame. Conversely, while there was an insufficient number of claimants to accurately analyze TD02 recurrence separately, rural claimants on TD02 at discharge from their assessment were more likely to be taken off TD02 compensation by 90 days but less likely to have a recurrence of any benefits (TD01 or TD02).

Minimal differences were found between any of the adjusted and non-adjusted regression models in the statistical analysis performed. This indicates that the effect of geographic location of residence was consistent across all RTW outcomes and was not confounded by any of the covariates controlled for in the multivariate models.

Table 6: Urban/Rural Return-To-Work Prediction Models

Outcome Variable	Claimant Inclusion Criteria	Crude Odds Ratio (with 95% Confidence Interval)	Adjusted Odds Ratio with 95% Confidence Interval
TD01 at 90 Days (No=0/Yes=1)	All Claimants (n=7,843)	1.45 (1.20 – 1.75)	1.39 (1.13 – 1.71)
TD01 at 90 Days (No=0/Yes=1)	TD01 at Day 0 (n=3,237)	1.48 (1.18 – 1.85)	1.43 (1.12 – 1.84)
TD02 at 90 Days (No=0/Yes=1)	All Claimants (Excluding TD01 at Day 0) (n=4,606)	0.74 (0.51 – 1.07)	0.75 (0.50 – 1.11)
TD02 at 90 Days (No=0/Yes=1)	TD02 at Day 0 (Excluding TD01 at Day 0) (n=1,261)	0.68 (0.43 – 1.07)	0.63 (0.38 – 1.05)
TD01 or TD02 at 90 Days (No=0/Yes=1)	All Claimants (n=7,843)	1.25 (1.08 – 1.46)	1.24 (1.05 – 1.47)
TD01 or TD02 at 90 Days (No=0/Yes=1)	TD01/TD02 at Day 0 (n=4,498)	1.25 (1.05 – 1.48)	1.22 (1.01 – 1.48)
Survival Analysis: Event = Expiration of TD01 Status (No=0, Yes=1)	TD01 at Day 0 (n=3,237)	0.92 (0.85 – 1.00)	0.92 (0.85 – 1.00)
Survival Analysis: Event = Expiration of TD02 Status (No=0, Yes=1)	TD02 at Day 0 (Excluding TD01 at Day 0) (n=1,261)	1.11 (0.97 – 1.27)	1.05 (0.91 – 1.21)
Survival Analysis: Event = Expiration of All Work Compensation (No=0, Yes=1)	TD01/TD02 at Day 0 (n=4,498)	0.95 (0.88 – 1.01)	0.94 (0.88 – 1.01)
TD01 Recurrence (No=0/Yes=1)	TD01 at Day 0 (n=3,237)	1.58 (1.02 – 2.46)	1.68 (1.06 – 2.67)
TD02 Recurrence (No=0/Yes=1)	TD02 at Day 0 (Excluding TD01) (n=1,261)	**Insufficient Sample Size (n=16 for No Recurrence Group)**	
Work Compensation (TD01/TD02)	TD01/TD02 at	0.88	0.95

Recurrence (No=0/Yes=1)	Day 0 (n=4,498)	(0.76 – 1.03)	(0.80 – 1.13)

Variables Included in All Models: Urban/Rural, Age, Gender, Diagnosis Group/Type of Injury, Rehabilitation Program, Income, Education Level, Type of Work, Number of Months Accident to Admission, Number of Doctor Visits, Number of Physiotherapy Visits, Admission Job Attached, Modified Work Available

I. Geographic Location of Residence Crude and Adjusted Odds Ratios Predicting RTW While Including PDI and Pain VAS

When adding PDI and pain VAS scores to multivariable regression models, none of the regression models varied substantially from their counterparts that did not include PDI % and Pain VAS scores and there were minimal differences between crude and adjusted odds ratios (See Table 6).

Table 7: Urban/Rural Return-To-Work Prediction Models (PDI and VAS Included)

Outcome Variable	Claimant Inclusion Criteria	Crude Odds Ratio (with 95% Confidence Interval)	Adjusted Odds Ratio with 95% Confidence Interval
TD01 at 90 Days (No=0, Yes=1)	All Claimants (n=7,039)	1.45 (1.20 – 1.75)	1.53 (1.23 – 1.90)
TD01 at 90 Days (No=0, Yes=1)	TD01 at Day 0 (n=2,902)	1.48 (1.18 – 1.85)	1.59 (1.22 – 2.07)
TD02 at 90 Days (No=0, Yes=1)	All Claimants (Excluding TD01 at Day 0) (n=4,137)	0.74 (0.51 – 1.07)	0.75 (0.49 – 1.15)
TD02 at 90 Days (No=0, Yes=1)	TD02 at Day 0 (Excluding TD01 at Day 0) (n=1,141)	0.68 (0.43 – 1.07)	0.68 (0.40 – 1.16)
TD01 or TD02 at 90 Days (No=0, Yes=1)	All Claimants (n=7,039)	1.25 (1.08 – 1.46)	1.30 (1.09 – 1.55)
TD01 or TD02 at 90 Days (No=0, Yes=1)	TD01/TD02 at Day 0 (n=4,043)	1.25 (1.05 – 1.48)	1.28 (1.05 – 1.57)
Survival Analysis: Event = Expiration of TD01 Status (No=0, Yes=1)	TD01 at Day 0 (n=2,902)	0.92 (0.85 – 1.00)	0.91 (0.83 – 0.99)
Survival Analysis: Event = Expiration of TD02 Status (No=0, Yes=1)	TD02 at Day 0 (Excluding TD01 at Day 0) (n=1,065)	1.11 (0.97 – 1.27)	1.02 (0.88 – 1.19)

Survival Analysis: Event = Expiration of All Work Compensation (No=0, Yes=1)	TD01/TD02 at Day 0 (n=4,043)	0.95 (0.88 – 1.01)	0.93 (0.87 – 1.00)
TD01 Recurrence (No=0, Yes=1)	TD01 at Day 0 (n=2,902)	1.58 (1.02 – 2.46)	1.75 (1.07 – 2.85)
TD02 Recurrence (No=0, Yes=1)	TD02 at Day 0 (Excluding TD01) (n=1,065)	**Insufficient Sample Size (n=14 for No Recurrence Group)**	
Work Compensation (TD01/TD02) Recurrence (No=0, Yes=1)	TD01/TD02 at Day 0 (n=4,043)	0.88 (0.76 – 1.03)	0.90 (0.75 – 1.08)

Variables Included in All Models: Urban/Rural, Age, Gender, Diagnosis Group/Type of Injury, Rehabilitation Program, Income, Education Level, Type of Work, Number of Months Accident to Admission, Number of Doctor Visits, Number of Physiotherapy Visits, Admission Job Attached, Modified Work Available, Pain Disability Index, Pain Visual Analog Scale

J. Parsimonious Logistic Regression Model Predicting TD01 Status at 90 Days in Claimants on TD01 at Assessment

i) Multivariate Logistic Regression Model

A parsimonious logistic regression model was created. The outcome measure/dependent variable used was TD01 status at 90 days after RTW assessment (0=No TD01, 1=Yes TD01). All claimants included in this regression model were on TD01 full disability status at discharge from their assessment. Also, self-report variables for which some claimants had missing data were included, reducing the total number of subjects for analysis from 7,843 to 2,902.

In addition to urban/rural status, other covariates with large effects included admission job status [OR for non-job attached compared to job attached 1.77 (CI 1.23-2.54)], total pre-accident annual earnings [OR for <$25,000 earnings compared to >$77,000 earnings 0.30 (CI 0.17-0.52)], and level of education [OR for university degree compared to less than a high school diploma 2.19 (CI 1.18-4.08)]. Additionally, 3 variables were found to

have significant interaction effects with urban/rural status. These variables were i) Modified Work Available (p=0.04), ii) Total pre-accident annual earnings (p=0.01), and iii) Number of months from accident to admission (p=0.01).

Table 8: Parsimonious Logistic Regression Model Explaining TD01 Benefit Status at 90 days Post-Assessment

n = 2,902

Variable	B	S.E.	p	Coefficient (95% CI)
Rural Residence	0.45	0.14	0.001	1.57 (1.20-2.04)
Age (years)	0.01	0.01	0.02	1.01 (1.00-1.03)
Injury Duration	-0.26	0.01	<0.001	0.97 (0.96-0.99)
Education Level			0.03	
<High School Diploma				1.0
High School Diploma	0.35	0.22	0.12	1.42 (0.91-2.19)
Partial Diploma/Degree	0.83	0.26	0.002	2.28 (1.37-3.81)
Technical Diploma	0.28	0.24	0.25	1.32 (0.83-2.10)
University Degree	0.78	0.32	0.01	2.19 (1.18-4.08)
Not Specified	0.33	0.12	0.10	1.39 (0.94-2.05)
Rehabilitation Program			<0.001	
No rehab				1.0
Physical Therapy	0.42	0.23	0.07	1.52 (0.98-2.36)
Complex Pain Rehab	-0.63	0.28	0.02	0.53 (0.31-0.92)
Provider Based RTWS	-0.98	0.20	<0.001	0.38 (0.25-0.56)
Work Site Based RTWS	Insufficient Sample Size			
Hybrid	-1.89	1.03	0.07	0.15 (0.02-1.14)
Salary			<0.001	
>$77,000				1.0
$25,000-$77,000	-0.66	0.19	<0.001	0.52 (0.36-0.74)
$<25,000	-1.21	0.28	<0.001	0.30 (0.17-0.52)
Previous MD Visits	0.03	0.003	<0.001	1.03 (1.02-1.03)
Previous PT Visits	0.01	0.002	<0.001	1.01 (1.01-1.02)
Percent Pain Disability Index	0.02	0.004	<0.001	1.02 (1.01-1.03)
Pain Visual Analogue Scale	0.08	0.04	0.03	1.09 (1.01-1.17)
Job Attached	0.57	0.19	0.002	1.77 (1.23-2.54)
Modified Work Available			0.01	
No				1.0
Yes – Full Time	-0.51	0.16	0.002	0.60 (0.44 – 0.82)
Yes – Part Time	-0.14	0.31	0.66	0.87 (0.47 – 1.61)
Unknown	-0.49	0.35	0.17	0.62 (0.31 – 1.22)

Adjusted Nagelkerke $R^2 = 0.25$

***Variables:** Injury Duration = Time from Accident to Admission; Complex Pain Rehab = Complex RTWS; Provider-Based & Worksite-Based RTWS = Functional Restoration; Salary = Annual Pre-Accident Earnings

ii) Exploratory Analysis of Significant Interaction Variables

Three covariates were found to interact significant with geographic location of residence. The covariates were pre-accident salary, availability of modified work, and injury duration. The presence of a significant interaction signifies that the association of one independent variable with the dependent variable depends on the classification or value of a second independent variable.

a) Pre-Accident Salary x Geographic Location of Residence

In both the >$77,000 earnings group and the <$25,000 earnings group, the association between geographic location of residence (urban=1, rural=2) and TD01 status at 90 days (0=Not on TD01, 1=Yes on TD01) was not significant ($p>0.05$). However, in the $25,000 - $77,000 earnings group, the association between geographic location and TD01 status at 90 days (0=Not on TD01, 1=Yes on TD01) was significant ($p<0.001$). Of the 2,455 claimants in this group, only 9.5% (n=161) of urban claimants were still receiving TD01 at 90 days compared to 14.8% (n=113) of rural claimants.

Table 9: Crosstabulation of Geographic Location of Residence and TD01 Benefit Status Stratified by Pre-Accident Earnings

Pre-Accident Earnings < $25,000 (n=436)

	No TD01	**TD01**
Urban	91.8% (n=259)	8.2% (n=23)

Rural	95.5% (n=147)	4.5% (n=7)
Significance	0.16	

Pre-Accident Earnings $25,000-$77,000 (n=2,455)

	No TD01	**TD01**
Urban	90.5% (n=1,531)	9.5% (n=161)
Rural	85.2% (n=650)	14.8% (n=113)
Significance	<0.001	

Pre-Accident Earnings > $77,000 (n=346)

	No TD01	**TD01**
Urban	84.5% (n=196)	15.5% (n=36)
Rural	78.1% (n=89)	21.9% (n=25)
Significance	0.14	

b) [Availability of Modified Work] x [Geographic Location of Residence]

In both the Part-Time Modified Work group and the Unknown Modified Work group, the association between geographic location of residence (urban=1, rural=2) and TD01 status at 90 days (0=Not on TD01, 1=Yes on TD01) was not significant ($p>0.05$). However, in both the No Modified Work group ($p=0.009$) and the Full-Time Modified Work Group ($p=0.001$), the association between geographic location and TD01 status at 90 days (0=Not on TD01, 1=Yes on TD01) was significant.

Of the 2,107 claimants in the No Modified Work group, only 10.6% (n=152) of urban claimants were still receiving TD01 work disability compensation at 90 days compared to

14.6% (n=98) of rural claimants. Similarly, of the 870 claimants in the Full-Time Modified Work Group, only 7.6% (n=46) of urban claimants were still receiving TD01 work disability compensation at 90 days compared to 15.0% (n=40) of rural claimants.

Table 10: Crosstabulation Analysis of Geographic Location of Residence and TD01 Benefit Status Stratified by Modified Work

No Modified Work Available

	No TD01	TD01
Urban	89.4% (n=1282)	10.6% (n=152)
Rural	85.4% (n=575)	14.6% (n=98)
Significance	0.009	

Full-Time Modified Work Available

	No TD01	TD01
Urban	92.4% (n=558)	7.6% (n=46)
Rural	85.0% (n=226)	15.0% (n=40)
Significance	0.001	

Part-Time Modified Work Available

	No TD01	TD01
Urban	87.3% (n=89)	12.7% (n=13)
Rural	91.8% (n=45)	8.2% (n=4)
Significance	0.40	

Unknown Modified Work Available

	No TD01	TD01
Urban	86.4% (n=57)	13.6% (n=9)
Rural	93.0% (n=40)	7.0% (n=3)
Significance	0.278	

c) [Length of Time Accident to Admission] x [Geographic Location of Residence]

Number of months from accident to admission was coded as a continuous variable. For the purposes of this exploratory analysis, claimants were dichotomized into groups above and below the median time from accident to admission. In the "Greater than 2.1 Months from Accident to Admission" group, the association between geographic location of residence (urban=1, rural=2) and TD01 status at 90 days (0=Not on TD01, 1=Yes on TD01) was not significant ($p>0.05$). However, in the "2.1 Months or Less from Accident to Admission" group, the association between geographic location and TD01 status at 90 days was significant ($p=0.002$). Of the 1,633 claimants in this group, only 8.1% (n=93) of urban claimants were still receiving TD01 at 90 days compared to 13.0% (n=62) of rural.

Table 11: Crosstabulation of Geographic Location of Residence and TD01 Benefit Status Stratified by Time from Accident to Admission

2.1 Months or Less from Accident to Admission

	No TD01	**TD01**
Urban	91.9% (n=1062)	8.1% (n=93)
Rural	87.0% (n=416)	13.0% (n=62)
Significance	0.002	

Greater Than 2.10 Months from Accident to Admission

	No TD01	**TD01**
Urban	87.9% (n=924)	12.1% (n=127)
Rural	85.0% (n=470)	15.0% (n=83)
Significance	0.10	

K. Parsimonious Survival Analysis Cox Regression Model Predicting Time Until Suspension of TD01 in Claimants on TD01 at Discharge from Assessment

A parsimonious multivariable cox regression model was created. The outcome measure/dependent variable used was a cessation of TD01 status, measured at regular intervals for 90 days after discharge from assessment (7, 14, 21, 30, 60, 90 days). All claimants included in this regression model were on TD01 full disability at discharge from assessment. Also, self-report variables for which some claimants had missing data were included, reducing the total number of subjects for analysis from 7,843 to 2,752.

In addition to urban/rural status, other covariates with large effects included gender [OR for males compared to females 0.85 (CI 0.78-0.92)], modified work available [OR for full-time modified work compared to no modified work 1.45 (CI 1.33-1.59)], and rehabilitation program prescribed [OR for work-site based RTWS compared to no rehabilitation 3.08 (CI 1.89-5.00)]. Furthermore, no variables were found to have significant interaction effects with urban/rural status. Survival curves graphically displaying the effect of urban/rural status are shown in Figures 1 and 2.

Table 12: Parsimonious Cox Regression Model Explaining Suspension of Compensation Benefits

n = 2,752

Variable	B	S.E.	p	Coefficient (95% CI)
Rural Residence (unadjusted)	-0.08	0.04	0.04	0.92 (0.85-1.00)
Rural Residence (adjusted)	-0.10	0.04	0.03	0.91 (0.84-0.99)
Gender	-0.17	0.04	<0.001	0.85 (0.78-0.92)
Injury Duration	0.01	0.00	0.002	1.01 (1.00-1.01)
Anatomical Site of Injury			0.001	
Neck				1.0
Upper Back	0.23	0.20	0.25	1.25 (0.86-1.83)
Lower Back	0.08	0.09	0.34	1.09 (0.92-1.29)
Other Torso	0.17	0.09	0.05	1.19 (1.00-1.41)
Upper Extremity	-0.13	0.07	0.07	0.88 (0.77-1.01)
Lower Extremity	0.03	0.07	0.72	1.03 (0.89-1.19)
Multiple Sites	-0.19	0.31	0.55	0.83 (0.45-1.52)
Not Specified	-0.17	0.09	0.04	0.84 (0.71-1.00)
Rehabilitation Program			<0.001	
No Rehab				1.0
Physical Therapy	-0.31	0.09	<0.001	0.73 (0.61-0.87)
Complex Pain Rehab	-0.36	0.11	0.001	0.70 (0.57-0.87)
Provider Based RTWS	-0.15	0.07	0.03	0.86 (0.75-0.99)
Work Site Based RTWS	1.15	0.25	<0.001	3.15 (1.94-5.12)
Hybrid	0.48	0.16	0.002	1.62 (1.20-2.20)
Previous MD Visits	-0.01	0.00	<0.001	0.99 (0.99-1.00)
Previous PT Visits	-0.00	0.00	<0.001	1.00 (0.99-1.00)
Percent Pain Disability Index	-0.01	0.00	<0.001	1.00 (0.99-1.00)
SF-36 Physical Functioning Score	0.00	0.00	0.007	1.00 (1.00-1.01)
Modified Work Available			<0.001	
No				1.0
Yes – Full Time	0.36	0.05	<0.001	1.43 (1.30-1.56)
Yes – Part Time	0.37	0.10	<0.001	1.44 (1.20-1.73)
Unknown	0.16	0.11	0.13	1.18 (0.96-1.45)

Number of Claimants with a Cessation of TD01 Benefits Event = 2511
Number of Claimants with No Cessation of TD01 Benefits Event = 241

***Variables:** Injury Duration = Time from Accident to Admission; Complex Pain Rehab = Complex RTWS; Provider-Based & Worksite-Based RTWS = Functional Restoration

Figure 1: Unadjusted Urban/Rural Group Survival Function Graph

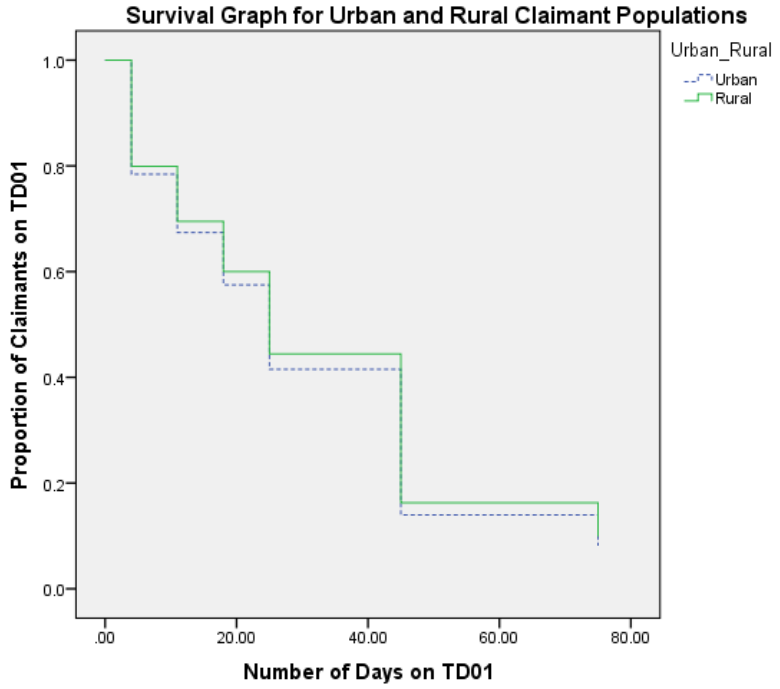
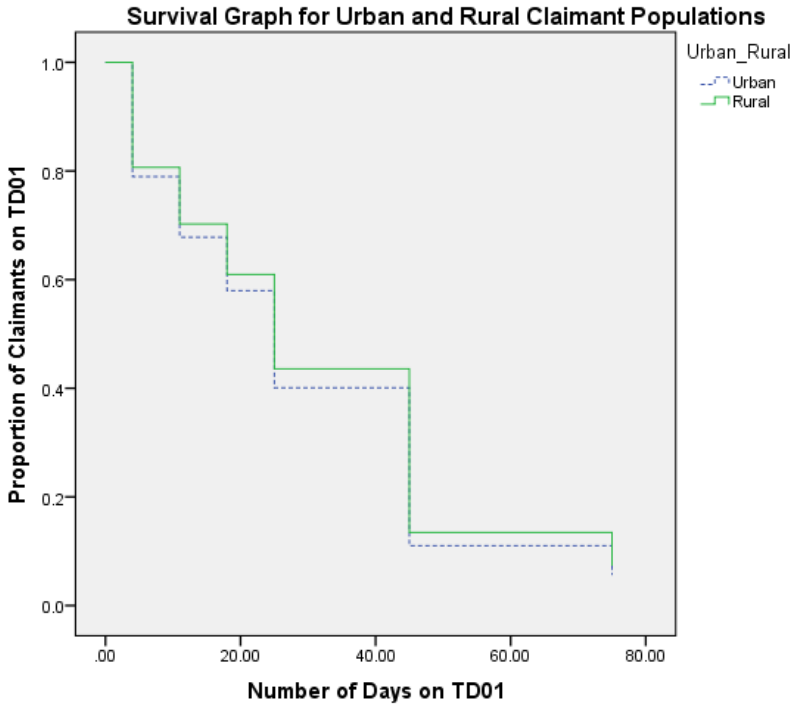


Figure 2: Adjusted Urban/Rural Group Survival Function Graph



CHAPTER FIVE

DISCUSSION

The purpose of this study was to: 1) Identify the relationship between geographic area of residence and recovery from compensated work-related MSK injury in Alberta; and 2) Investigate if the relationship between rural, or non-metropolitan, living status and recovery from work-related MSK injury is attenuated after controlling for other known demographic, occupational, and health risk factors. The 2011 Canadian Census identified that 19.4% of the Albertan population, or 707,646 people, resided in either rural areas or small towns, exceeding the statistic of 18.0% for the Canadian population as a whole.[84] Additionally, workplace injury rates are higher in Alberta than much of Canada,[14] with WCB-Alberta claim costs totaling $1.3 billion dollars in 2012. [4] Our research using WCB data indicated that the Alberta rural population is at greater risk of prolonged work absence and reception of injury benefits. These findings were consistent across multiple measures and definitions of RTW. Unexpectedly, after controlling for demographic, occupational, and health factors, the relationship between geographic location of residence and recovery from MSK injury was not attenuated to any meaningful degree (OR Δ10%) in *any* of our measures of RTW. This implies that other unexplained factors must exist that explain the association between geographic location and RTW.

A. Discussion of the Association between Geographic Location of Residence and Return-To-Work

Investigating all 7,843 claimants, univariate screening indicated that rural claimants were 1.45 (1.20-1.75) and 1.25 (1.08-1.46) times more likely than urban claimants to be

receiving TD01 benefits or any Wage Replacement Benefits (TD01 or TD02), respectively, 90 days after their RTW assessment. Likewise, analysis of the 3,237 claimants who were on TD01 at discharge from their RTW assessment found rural claimants to be 0.92 (0.85-1.00) times less likely to experience a suspension of TD01 benefits at measured intervals up to and including 90 days and 1.48 (1.18-1.85) times more likely to be on TD01 at 90 days when compared to urban claimants.

These unadjusted associations were expected, as a review of previous research on the topic demonstrated that compared to urban populations, rural populations tend to be at greater risk of prolonged work absence, [44] to have greater durations and levels of disability, [106,156] poorer fracture recovery outcomes, [43] and worse functional outcomes at hospital discharge after acute traumatic injury. [114] Conversely, only one high quality published study found less work disability in claimants with higher rurality scores. [68] Similarly, research of medical illness generally has found that rurality is associated with greater coronary heart disease,[62] stroke mortality, [57] poorer RTW outcomes after myocardial infarction, [115] lower life expectancy, [60] increased mortality and morbidity, [59,60,64] and poorer general health status. [116,117] Furthermore, other research has associated rural populations as having greater prevalence of various risk factors for poor MSK recovery, such as older age, [45,46,63,65] more blue-collar work, [52,87] lower education levels, [46,53-56] lower income, [46,52-54,56,86] and worse access to health care, [48-51,89,90] among others.

Unexpectedly, however, the association between urban/rural status and RTW was *not* attenuated in either the risk factor models or the parsimonious logistic and Cox regression

models after controlling for the effects of all demographic, occupational, and health factors available in this study. In analyzing the 3,237 claimants on TD01 at discharge from their RTW assessment, univariate logistic regression predicted rural claimants to be 1.48 (1.18-1.85) times more likely than urban claimants to be on TD01 at 90 days, while multivariate regression controlling for the effects of other factors predicted rural claimants to be 1.57 (1.20-2.04) times more likely to be on TD01 at 90 days. Thus, no attenuation occurred. In fact, the OR experienced a minor increase of 6%. Similarly, univariate Cox regression predicted rural claimants to be 0.92 (0.85-1.00) times less likely to experience a suspension of TD01 benefits within the 90 day time frame, while multivariate regression controlling for the effects of other factors predicted rural claimants to be 0.91 (0.84-0.99) times less likely to experience a suspension of TD01 benefits. Thus, there was again no attenuation and only a minute difference of 1% between the adjusted and unadjusted OR.

These findings indicate either that there is something intrinsically different between urban and rural populations that accounts for the worse outcomes or, more likely, that the variables that *do* explain the differences in RTW between these two populations were not analyzed or controlled for in this study. It is very probable that multiple significant explanatory covariates remained unmeasured because the significantly associated variables controlled for in our final model only explained ~25% of the variance in RTW outcomes (TD01 status at 90 days). Thus, ~75% of the variance remained unexplained and attributable to a multitude of unmeasured factors. Many of these variables could have an attenuating effect on the urban/rural association with RTW. Potential factors or

unmeasured information that could attenuate the association between rurality and RTW are more specific occupational, health, or lifestyle information.

B. Return-To-Work

While RTW has been shown to be positively associated with health-related quality of life[11] and is a widely used measure of physical, psychosocial, and economic recovery not only among injured workers but also in the population as a whole, it remains relatively ill-defined. Various outcomes have been used to classify RTW. The definition of what qualifies as successful RTW in one study may differ from other research, with neither definition necessarily being "right" or "wrong". Thus, in order to most effectively identify relationships and measure associations among predictive factors and RTW, multiple definitions of RTW and sustained RTW were utilized in this study. Separate analysis using different definitions of RTW allowed for a thorough and comprehensive understanding of the relationships between covariates, strengthened our understanding of the consistency of study findings, and provided a wider foundation for future studies to build upon and improve.

As mentioned above, rural claimants were more likely than urban claimants to be receiving TD01 benefits 90 days after their RTW assessment in all our regression models. Conversely, rural claimants were consistently less likely than urban claimants to be receiving TD02 partial disability benefits at 90 days. These results indicate that in Alberta, MSK injury claimants from rural areas were more likely to still be on full disability at 90 days, but less likely to be on partial disability benefits (TD02 payments indicating they

are working modified duties). However, controlling for the availability of modified duties had no attenuating effect on the association between geographic location of residence and RTW despite the availability of modified duties being an independent predictor of RTW outcomes, and despite a significantly smaller proportion of rural claimants having modified duties available. The abstract quality of "rural hardiness" [97-99] may also lead to more rural claimants working through 'minor' pains and discomfort, but not more serious injuries, thus resulting in a lower proportion of them receiving partial disability benefits. Across all our models, the associations between urban/rural status and varying measures of RTW were highly consistent, with no odds ratios varying by >10% between univariate and multivariate models and similar findings observed across RTW definitions.

Survival analysis of the time until suspension of disability benefits provided further affirmation to these findings, illustrating that rural claimants were less likely to experience a suspension of their TD01 benefits within 90 days, but more likely to experience a suspension of their TD02 benefits. Thus, it is possible that rural claimants placed on TD01 full disability benefits on day 0 may have been, on average, in poorer physical or mental condition than their urban counterparts and in need of greater rehabilitation before being able to RTW. However, the associations remained significant after controlling for self-reported health status on the PDI, VAS and SF-36 scales.

Alternatively, it is possible that the treatment rural claimants received while receiving disability benefits was not as effective as the treatment their urban counterparts received. Since some rural claimants on full disability are required to stay in a hotel away

from home while receiving their treatment in urban centres, the greater stress invoked by having to be away from family, friends, and/or certain amenities and comforts may negate the effectiveness of rehabilitation treatment overall. Regarding TD02 partial disability benefits, the greater probability of a suspension of benefits may also be due to a desire to return home full time, a greater ability to endure hardship and work full-time while partially injured, a lesser desire for the involvement of lawyers and litigation, or greater commitment to their employer, all of which are supported by other research. [97-101]

While there were too few claimants to analyze recurrence of TD02 benefits and accurate or meaningful conclusions cannot be made, analysis of TD01 recurrence or any work compensation recurrence provided valuable insights. Rural claimants who were on TD01 upon discharge from assessment and then recovered were more likely than urban claimants to experience recurrence within 90 days defined as receiving TD01 full disability benefits again. Conversely, rural claimants were found to be slightly less likely to have a recurrence of any compensation benefits when compared to their urban counterparts. The greater likelihood of TD01 full disability recurrence is an important finding, as injury recurrence has not been as thoroughly investigated in research of RTW post-MSK injury. Finding that rural claimants are not only more likely to be on TD01 90 days after their assessment, but also that those that *do* recover are more likely to have an injury recurrence, adds significant weight to the conclusions of this research.

While no other research has investigated as expansive a set of RTW definitions as this study, and a proportion of referenced research did not specify what qualified as RTW,

[19,23,29,36,38,75,157-159] the definitions of RTW used in this study were still consistent with others in the field. Similar to this research, numerous studies have defined an injured worker as having RTW when he or she is no longer receiving any work compensation benefits, [79,81,160-162] or when they are classified by the WCB as "Fit to RTW".[17] Comparatively, the number of hours worked or activities being performed in the workplace were also relevant measures. Both Hogelund and Feurestein defined RTW as a return to regular working hours, [26,163] while Gallagher and Watson identified 30 hours and 16 hours of work per week as the minimum amount required to be worked before being classified as successful RTW, respectively. [30,39] These aforementioned definitions fail to account for the type or quality of work being performed, however, Rusch et al classified successful RTW as the time at which an injured worker is able to perform the same activities in the workplace as they were prior to the injury. [164] Finally, successful RTW has also been classified as a return to full time duties and hours, returning part-time, or returning to modified duties. [10,15,16,21,34,165,166]

These varied definitions illustrate the lack of consensus not only in the academic community but also among employers, insurance providers, and workers themselves regarding the definition of RTW. This does not stem from a lack of understanding, but rather because RTW is a dynamic construct that is difficult to define as there is no "right" or "wrong" definition, only definitions that account for different perspectives and considerations, each with their own strengths and weaknesses. For this reason, the research team for this study deemed it a valued and necessary task to investigate multiple definitions not only to gain the most comprehensive understanding of the data possible,

but also to communicate the information most effectively and facilitate greater comparability with other research.

C. Urban and Rural Classification

Similar to RTW, rurality has been defined differently by different research groups. In 2011, the Canadian census defined areas with a population less than 1,000 and a population density below 400 people per square kilometer as rural, and anything greater as urban, with sub-categorizations to define small, medium, and large centres. [84] Similarly, another utilized classification system defined Rural and Small Town (RST) communities as areas with populations less than 10,000, in which less than 50% of employed individuals commute to a Census Metropolitan Area (CMA) or a Census Agglomeration (CA), as rural. [84] Meanwhile, the 2010 American census defined Urbanized Areas (UAs) as having populations of 50,000 or more people, Urban Clusters (UCs) as having populations between 2,500-50,000 people, and rural areas as having populations less than 2,500.[167] The classification criteria implemented by the WCB-Alberta and used for this research defined regions with a population >50,000 as urban and <50,000 as rural. While distinct from both Canadian and American census definitions of urban and rural residence, it is not without its own support and precedence of use.

As the rural population of Canada can be classified as low as 22% and as high as 38% depending on the rural definition being applied, there is great variance. [67] Mitura et al summarized it well, stating that "*Several alternative definitions of rural are used in Canada for national and provincial level policy analysis. The policy issue and the*

geographical focus being addressed leads an analyst to choose one definition over another" (p5). [67] Among these various definitions of rural, the Beale coding system (and its subsets) is highly respected and widely used for population classification and research. The "Modified Beale Codes" for Canadian Non-Metropolitan Analysis define Metropolitan Regions as census divisions (CDs) containing settlements with a population greater than 50,000 and Non-Metropolitan Regions as CDs containing settlements with a population less than 50,000, with further sub-categorizations within each of these two broader groups and "predominantly rural zones" ultimately being classified as CDs with no settlements with more than 2,500 people.[127]

Subsets of the Beale coding system are commonly used, and the WCB-Alberta is one such entity that uses 50,000 as its cut-off for urban and rural residence status for both administrative records and population research. Using this classification criteria, the regions in Alberta that were classified as urban were Edmonton, Calgary, Red Deer, Lethbridge, Grande Prarie, Fort McMurray, and Medicine Hat, with all other regions being classified as rural. Specific to Alberta, this population cut-off makes logical and pragmatic sense as those regions are the true population centres in the province and are more distinct from other areas.

In research of MSK injuries in urban and rural Albertan populations, the cut-off of 50,000 has been used previously. [81,106] Similarly, three other studies have classified Edmonton and Calgary as the sole "urban" areas. [47,53,128] While one study referenced in this research failed to specify its criteria for urban and rural classification, [120] three others

used very region-specific pre-determined criteria and classifications. [103,104,109] Census definitions, which designate a smaller proportion of the population as residing in rural communities, have also been used in academic research. [14,45,46,54,55,105,113] While each criteria has its own strengths and weaknesses, one previous study utilized a novel classification system that distinguished itself and strengthened its findings. In research based in the USA, Young et al. devised a rurality % classification system that attempted to define urban and rural status as a continuous variable instead of a dichotomized one, in hopes of maximizing the accuracy and representativeness of the conclusions being made from it. The rurality % was calculated using census data, with the number of people living in a rural area of a region being divided by the total population of that region, and then multiplying this value by 100. [68]

Despite limitations inherent within a dichotomized definition, significant results were still consistently achieved, validating the conclusions made from this study. Furthermore, a dichotomized classification of living location allowed for interpretable research and direct comparison to be made between groups. Many factors aside from population count or density distinguish urban and rural communities, however, and it is not possible to establish a definition or criteria capable of accounting for everything. There are abstract qualities inherent to each community that cannot be quantified within the confines of a definition or strict classification criteria. As such, the goal should be to *strive* to better define the two populations in order to understand the distinct qualities of each population to the greatest degree possible.

The 2011 Census of Canada identified 19% of the Canadian population and 17% of the Albertan population as living in a rural residence. [84] Similarly, 18.0% of Canadians and 19.4% of Albertans have been categorized as living outside of urban areas, defined as CMAs (population >100,000) and CAs (population >10,000). [84] These statistics are in contrast to the data of this study, which found 29.9% of the claimant population to be rural and 70.1% to be urban. Differences between census data and the WCB data utilized in this study may be attributable in large part to contrasting definitions of rural, as the WCB classified rural as communities or regions with a population < 50,000. Alternatively, rural workers may be more at risk not only of prolonged recovery and RTW, but also of experiencing work injury. A higher risk of work injury would lead to a higher proportion of rural workers in the WCB-Alberta database from which this data was originally extracted.

Due to the contrasting definitions of urban and rural, comparison of findings from different classifications can allow for valuable insights to be gained. The database utilized for this research indicated the average age of urban and rural claimants to not be significantly different ($p<0.101$), with the average ages being 42.5 years (SD=11.9) and 43.0 years (SD=11.9) for urban and rural claimant populations respectively. There was a slightly larger discrepancy in median age between the two populations, however, with the median age of urban claimants being 43.0 years and rural claimants being 44.0 years. These findings differ from the 2011 census data that concluded the median age of urban and rural Canadians to be 38.9 years and 42.1 years, respectively, with the median age of Canadians and Albertans as a whole being 40.6 years and 36.5 years. [84] The younger age

of Albertans is most likely attributable to the heavy growth occurring in the province attracting younger families and workers seeking employment in oil-related industry that drives the booming economy.

D. Discussion of Associations between Demographic, Occupational, and Health Covariates with Return-To-Work and Comparison with other Research

While the expansive set of RTW measures analyzed in this study provides a more comprehensive understanding of rehabilitation post-MSK injury in urban and rural populations, it is also important to investigate the strength and consistency of associations of other demographic, occupational, and health factors across the RTW outcomes. This will help achieve a better understanding of factors influencing RTW and provide a foundation for future research. Much previous research has investigated factors associated with RTW, and we will discuss our findings within this context.

Univariate models investigating reception of TD01 benefits at 90 days, reception of any work compensation benefits at 90 days, and time until suspension of TD01 benefits proved to be relatively consistent across all demographic, occupational, and health variables measured in this study. Age, number of months from accident to admission, number of prior claims, comorbidity, number of doctor and physiotherapy visits, PDI %, pain VAS, and SF-36 scores all maintained consistent significant associations across the three models, while the interpreter required and number of chiropractor visits variables were consistently unassociated with the outcomes of interest. Similarly, the diagnosis group, marital status, type of work, rehabilitation program, and

annual pre-accident earnings variables maintained a significant main effects association in each RTW measure, albeit with some differences in category comparisons. Conversely, the anatomical site of injury and level of education variables did not maintain a significant main effects association across all three models.

Three variables that displayed notable differences across univariate models were gender, job attached at admission, and type of work. Gender proved to be a significant predictor of both TD01 status at 90 days (OR 1.31; 1.08-1.59) and time until suspension of TD01 benefits (OR 0.82; 0.76-0.88) with females being more likely to RTW, however, it had no significant predictive ability of work compensation status at 90 days. Similarly, the association between admission job attached and TD01 status at 90 days was 0.66 (0.53-0.83), while its association with work compensation status at 90 days was insignificant. Thus, male injury claimants and those without an admission job attached were more likely to still be receiving full disability benefits 90 days after their assessments, but not more likely to be receiving *any* work compensation at 90 days.

Blue-collar workers were significantly more likely to be on TD01 at 90 days (1.45; 1.18-1.78) and less likely to undergo a suspension of TD01 benefits (0.87; 0.80-0.94) when compared to white-collar workers, but no significant difference was present for predicting work compensation status at 90 days. Conversely, health field workers were more likely than white-collar workers to be on TD01 or any Work Compensation at 90 days (1.66 and 1.50), but not any more or less likely to have their TD01 benefits

suspended within 90 days. This anomaly is most likely due to different claimant groups being analyzed in the univariate cox and logistic regression models being discussed.

Factors that remained significant in both the parsimonious logistic regression model predicting TD01 status at 90 days and the parsimonious cox regression model predicting time until suspension of TD01 benefits include: injury duration; rehabilitation program; number of doctor and PT visits; PDI %; and modified work availability. Factors that remained significant while controlling for the effects of other variables *only* in the logistic model were age, level of education, pre-accident earnings, pain VAS, and job attached status, whereas factors that were significant *only* in the cox model were gender, anatomical site of injury, and SF-36 Physical Functioning score.

Two variables that underwent the most significant changes from univariate to multivariate models were injury duration and job attached status. Unadjusted modelling associated greater duration of time from accident to admission with *poorer* RTW outcomes, whereas upon controlling for the effects of other significant factors, greater duration of time from accident to admission predicted *better* RTW outcomes. Job attached status displayed a complex relationship with RTW outcomes. Analyzing all 7,843 claimants univariately found those that were job attached were *less* likely to be receiving TD01 benefits at 90 days (0.66; 0.53-0.83). This association became insignificant upon analyzing only those claimants who were receiving TD01 benefits at discharge (0.99; 0.76-1.29). Further multivariate analysis of the same claimant population illustrated even greater change. Controlling for the effects of other factors resulted in a

reversal of association, with job attached claimants being *more* likely to be receiving TD01 benefits at 90 days (1.77; 1.23-2.54).

In their systematic review of orthopedic trauma injuries, Clay et al concluded there to be moderate evidence associating female gender with greater time lost from work, [22] while Breslin et al found gender not to be associated with work disability absence. [32] Contrary to Clay et al, this study indicated the association between gender and RTW to be inconsistent, with female gender being associated with *better* outcomes in some models. The majority of research of RTW from work disability associates greater levels of education with improved RTW outcomes. [15,16,23-25,28,29,32] These findings were further validated by Clay et al, who concluded there to be strong evidence for this association. [22] However, univariate models in this study failed to discern any strong predictive value of RTW from level of education, and the parsimonious logistic regression model actually found claimants with a university degree to be significantly more likely to be receiving TD01 benefits 90 days after assessment when compared to claimants without a high school diploma. These findings are likely a reflection of regional differences in demographics, policy, economics, lifestyle, and other factors, between the Albertan population and other study populations.

Similarly, while the majority of research in the field has found lower income to be associated with poorer RTW outcomes, [7,15,33,36,76,77] this research indicates the contrary. Claimants with lower annual pre-accident earnings were associated with a greater likelihood of RTW when compared to the higher earnings group in univariate models as

well as in the parsimonious logistic regression model. This may also be attributable to the strong economy in Alberta and higher earnings compared to most other regions, potentially altering the relationship between these factors. These results all illustrate the need for region-specific research investigating RTW, as studies very often have limited generalizability due to countless differences across regions and populations, and the findings cannot be assumed to be universal.

Much of the data from this study *did* mirror the general consensus in the academic community, however. Similar to past research, Blue-collar work, [7,10,12,32-34,75] older age, [10,12,15-21,34,71] and greater reported pain and disability[15,16,20,21,23,26,27,34,72] all proved to be predictive of poorer RTW outcomes in Albertan MSK injury claimants. Furthermore, Clay et al concluded marital status to have no predictive ability of RTW in their systematic review, and data analyzed in this study supported this conclusion.[22]

E. Discussion of Self-Report Health Measures

i) Pain VAS

Pain VAS was found to be significantly associated with numerous measures of RTW in both univariate and multivariate models. However, while the average pain VAS scores for urban and rural populations were 5.14 and 4.96, respectively ($p=0.01$), and the average pain VAS scores for claimants receiving TD01 benefits and not receiving TD01 benefits at 90 days were 6.15 and 5.01, respectively ($p<0.001$), these differences lacked clinical significance. Previous research of the pain VAS tool has reported differences ranging from 1.5-3.2 to be clinically important for subjects suffering from chronic pain.

[168-172] Thus, pain VAS scores observed in this study, while associated with RTW were not meaningfully different between urban and rural populations.

ii) Pain Disability Index

Similar to the pain VAS scale, the PDI was significantly associated with numerous measures of RTW in both univariate and multivariate models. However, Soer et al concluded that the minimum clinically important difference on the PDI was between 8.5-9.5 points, [173] and the difference between urban (47.6) and rural (46.5) was much smaller despite being statistically significant. Conversely, descriptive statistical analysis found claimants who were still receiving TD01 benefits 90 days after their assessment had an average score of 60.5, while those who were not receiving TD01 benefits had an average score of 46.4. This difference was both statistically significant ($p<0.001$), and exceeded the clinically meaningful criteria of 9.5 points. Thus, although urban and rural MSK injury claimant populations did not have meaningfully different PDI scores, there is some indication that there was a clinically meaningfully difference between successful and unsuccessful RTW claimants, supporting the PDI's role as a predictor of recovery and rehabilitation.

F. Discussion of Interaction Effects in Parsimonious Models

There were no significant interaction effects between any covariates and geographic location of residence predicting days to suspension of TD01 Benefits in the parsimonious cox regression model. Conversely, in the parsimonious logistic regression model predicting TD01 status at 90 days post-assessment, three covariates had significant

interaction effects with geographic location of residence. These variables were: i) Salary; ii) Availability of Modified Work; and iii) Number of Months from Accident to Admission. These interactions indicate that the association between geographic location of residence and RTW was dependent on the value or classification of the other aforementioned explanatory variables. Further research and investigation is necessary to better understand and test these interactions, however, because limited sample size in several of the groups could have potentially skewed the data and resulted in inaccurate and unrepresentative findings being reported.

G. Study Strengths

While there are certainly some limitations and shortcomings present in this research, there are also many strengths that validate and add weight to our conclusions. The information analyzed in this study was collected by the WCB-Alberta's network of health care professionals. Consistent measures, guidelines and criteria were adhered to ensuring both accuracy and quality was maintained. The Musculoskeletal Injury Triage Database, compiled by Dr. Doug Gross, has been previously used in research to develop clinical decision support tool for selecting rehabilitation interventions as well as other studies of population health and RTW. The use of this database for previous research further confirms its accuracy and quality. Furthermore, the large number of claimants from across the province maximizes the strength and applicability of the research conclusions. With no sampling being performed and including every subject, the 7,843 claimants comprise *every* MSK injury claimant in a defined time frame under a particular inclusion and exclusion criteria. Thus, there was no sampling error or bias.

The database has an expansive set of demographic, occupational, and health variables that accurately and thoroughly describe both the population and individual claimants. Controlling for all other significantly associated variables allowed for more accurate conclusions to be made regarding coefficient effect size, independent of other factors. Additionally, the assessment tools utilized are widely used, valid, and reliable and the chosen classification and categorization criteria for variables were logical, consistent, and transparent. Specifically, the urban and rural classification criterion made pragmatic sense for the population of Alberta, was defensible with theory and previous research supporting it, and ensured sufficient cohort sample sizes for comparison.

The development of the database and focus of the research was clear and directed, with sub-acute and chronic MSK injuries being the topic of interest. In accordance with this focus, extraneous injuries or conditions that could confound research were excluded. These included head injuries, having surgery pending, and severe psychological trauma. Furthermore, this research study was specific and relevant to workplace injury claimants in Alberta, maximizing its applicability in furthering understanding and reducing the impact of MSK injuries provincially. As Alberta has both some of the highest rates of workplace MSK injuries in Canada and a large rural population, the importance of increased research in the field cannot be understated.

With very limited research in the field investigating the association of geographic location of residence and RTW or recovery from MSK injury, this research study can serve to establish a baseline level of understanding and increase awareness of the issue in

Canada. Also, investigating multiple measures and definitions of RTW as well as different claimant pools separately allowed for a thorough understanding of MSK injury rehabilitation to be gained, with the consistent results affirming our findings.

H. Study Limitations

In order to properly evaluate the conclusions of this study, it is of paramount importance to also recognize the limitations. Recognition of a study's shortcomings and communicating them effectively will serve to best enable more improved and directed research to be performed in the future. A notable limitation of this study is that it was a retrospective/historical cohort secondary analysis. There are shortcomings inherent to having the data collection and research analysis be performed by separate and independent entities. The variables collected and the manner in which they were coded may not be best modeled to answer a particular research question and may limit the questions capable of being asked or answered effectively. Also, it is important to be wary of the fact that because this was not a controlled experimental analysis, causation cannot be inferred, only association.

While numerous statistically significant associations were identified in this study, many of them were smaller and may lack meaningful clinical significance. Additionally, some of the calculated associations may have been skewed by the presence of missing or unspecified data for some factors as well as small group sample sizes in some of the regression models. This may limit the accuracy and generalizability of the findings to the population. Similarly, self-report bias, measurement error, classification/categorization

error, and unmeasured confounding could have also influenced results and limit the strength of conclusions. In any situation that variables are categorized, a degree of information is always lost in order to gain improved interpretability of findings and allow for distinct comparisons between groups.

The data analyzed in this study was collected by the WCB four years ago in the year 2010. In this time, WCB protocol, the population of Alberta, and the rates or types of risk factors may have changed. Furthermore, it is of critical importance to recognize that the population investigated is *not* generalizable to the population of Alberta as a whole. It is generalizable to workers in Alberta who suffered a workplace MSK injury and made an injury claim for lost earnings with the WCB and who are undergoing clinical/RTW assessment in the sub-acute phase of recovery. Regional variation among communities similarly categorized as urban or rural could also confound conclusions of this study and, similarly, differences between provinces and countries in demographic, occupational, and health care factors, among others, may limit the generalizability of the research to jurisdictions outside of Alberta. Lastly, due to the booming economy and heavy industry based out of Northern Alberta, transient workers are commonplace in the province. These individuals reside in different communities from which they work, potentially confounding research findings regarding associations of RTW outcomes with location of residence.

I. Future Research

Future population research in the field should strive to implement a multitude of improvements that would strengthen the conclusions and maximize understanding on the topic of RTW in urban and rural populations. Separate baseline research akin to this study should be performed in distinct regions outside of Alberta to ensure generalizability. Also, research should focus on improving the quality of the primary investigative variable, geographic location of residence. These improvements should potentially include: (i) Categorizing populations into more than two groups in order to ascertain more specific associations and trends while still maintaining sufficient sample sizes for comparison and analysis; (ii) Recording and classifying the location of claimants' primary residences in order for regional differences within the province to be investigated. For example, Cold Lake and Canmore are two towns in Alberta of equivalent size both categorized as rural in this research, but are two vastly different and distinct towns; and (iii) Similarly including the distance a town is from a major urban centre in the analysis, as this can have a large influence on the lifestyle and amenities available. For example, Tofield and High Level are two towns of equivalent size, but are found in geographically distinct areas with High Level being *much* more secluded. Lastly, in addition to other improvements, claimants should ideally be monitored for more than 90 days, be assessed at more regular intervals, and have multiple health measurements performed instead of only one at baseline. Also, improved collaboration and communication between the WCB and independent researchers should be sought to better bridge the gap between data collection and research, and there should be a lesser reliance on solely self-report measures for indication of health status.

J. Conclusions

The findings from this study indicate that rural residence is a significant and consistent predictor of delayed RTW in MSK workplace injury compensation claimants. Furthermore, this association remained significant and was not meaningfully attenuated in numerous regression models while controlling for the effect of other factors. Thus, no other demographic, occupational, or health measures utilized in this study explained the association between geographic location of residence and RTW. While limited research has been performed on the topic, these findings have potentially important implications for the claims management and rehabilitation of injured workers in urban and rural settings. However, further research is first required to better identify and understand if there are underlying risk factors prevalent in rural Alberta populations that explain the poorer RTW outcomes, and what these risk factors might be, or if there are abstract and inherent differences in urban and rural claimant populations not attributable to other factors that influence these RTW outcomes. Only once the true explanatory and predictive factors of delayed RTW within these populations have been identified can they begin to be addressed and mitigated through services designated to address the risk factors of specific populations.

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APPENDICES

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APPENDIX A

Research Ethics Approval

Health Research Ethics Board

308 Campus Tower
University of Alberta, Edmonton, AB T6G 1K8
p. 780.492.9724 (Biomedical Panel)
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Approval Form

Date:	April 2, 2014
Study ID:	Pro00044728
Principal Investigator:	Douglas Gross
Study Title:	The Effect of Urban and Rural Living Status on Return-to-Work Outcomes for Alberta Workers' Compensation Board Musculoskeletal Injury Claimants
Approval Expiry Date:	April 1, 2015

Thank you for submitting the above study to the Health Research Ethics Board - Health Panel. Your application has been reviewed and approved on behalf of the committee.

- This study involves the secondary analysis of anonymized data.

A renewal report must be submitted next year prior to the expiry of this approval if your study still requires ethics approval. If you do not renew on or before the renewal expiry date, you will have to re-submit an ethics application.

Approval by the Health Research Ethics Board does not encompass authorization to access the patients, staff or resources of Alberta Health Services or other local health care institutions for the purposes of the research. Enquiries regarding Alberta Health Services approvals should be directed to (780) 407-6041. Enquiries regarding Covenant Health should be directed to (780) 735-2274.

Sincerely,

Anthony S. Joyce, Ph.D.
Chair, Health Research Ethics Board - Health Panel

Note: This correspondence includes an electronic signature (validation and approval via an online system).

UNIVERSITY OF ALBERTA Alberta Health Services Covenant Health

APPENDIX B

Literature Review Table Summaries

Predictors of Return-to-Work

Variable	Direction of Association	Number of Studies
Biophysical		
Age	↓ age = ↑ RTW, ↓ chronic MSD	11
	No association	3
	↑ age = ↑ RTW	1
Gender	Male=↑ RTW, Female=↓ RTW	8
	No association	3
Injury Severity	↑ severity = ↓ RTW	6
	No association	2
Pain Severity	↑ pain = ↓ RTW	7
	↑ pain = ↑ CLBP	1
General Health	↑ health = ↑ RTW, ↓ CLBP	4
Physical Workload	↑ workload = ↓ RTW	4
	↑ workload = ↑ CLBP	2
Amount of Treatment	↑ health care visits = ↑ RTW	1
	↑ health care visits = ↓ RTW	1
Socioeconomic		
Level of Education	↑ education = ↑ RTW	11
Income	↑ income = ↑ RTW	5
	No association	1
Sole Income Earner	Sole income earner = ↑ RTW	1
	Sole income earner = ↓ RTW	1
Cost of Treatment	↑ health care dollars = ↑ disability	2
Time Away From Work	↑ time away = ↓ RTW	3
Type of Work	Blue-Collar=↓ RTW,(White=↑)	7
Connection to Workforce	↑ connection = ↑ RTW	3
	↑ connection = ↓ CLBP	1
	↑ connection = ↓ RTW	1
Job Tenure	↑ job tenure = ↑ RTW	2
	No association	1
Employer Size	↑ employer size = ↑ RTW	3
Compensation/Benefits	↑ compensation = ↓ RTW	2
	↑ compensation = ↑ CLBP	1
	Highly contextual	4
Pension	Pension earned = ↓ RTW	1
	No association	1
Job Involvement	↑ job involvement = ↑ RTW	3
Control of Work	↑ control of work = ↑ RTW	2
Lawyer Involvement	Litigation = ↓ health	1
Psychological		
Self-Efficacy	↑ self-efficacy = ↑ RTW	4
	↓ self-efficacy = ↑ pain medication	1
Anxiety, Distress, Fear,	↑ emotional distress = ↓ RTW	7
Depression, Stress, Negative	↑ emotional distress = ↑ disability	2
Affect	↑ emotional distress = ↑CLBP	5
Rehabilitation		
Vocational	Vocational rehab = ↑ RTW	3
Interdisciplinary	Interdisciplinary rehab = ↑ RTW	8
Exercise	↑ exercise = ↑ RTW	3
	↑ exercise = ↓ CLBP	1

Urban/Rural Factor Comparison

Variable	Rural (Compared to Urban)	Number of Studies
Age	Rural = ↑ age	3
Level of Education	Rural = ↓ education	6
Income	Rural = ↓ income	5
Blue-Collar Work	Rural = ↑ blue-collar work	2
Full-Time Jobs	Rural = ↓ full-time jobs	1
Unemployment Rates	Rural = ↑ unemployment rates	1
Benefits	Rural = ↓ benefits	1
Fatalistic Beliefs	Rural = ↑ fatalistic beliefs	1
Depression Stigma	Rural = ↑ depression stigma	1
Agreement with Health Care Professionals	Rural = ↓ agreement	1
QOL/SWL	↑ age = ↑ QOL/SWL	1
	Contextual/Inconclusive	4
Occupational Injury	Rural = ↑ occupational injury	1
	Rural = ↑ duration of disability	1
	Rural = ↓ recovery outcome	4
	No association	1
	Rural = ↑ work disability	1
	Rural = ↑ functional disability	1
Medical Illness	Rural = ↓ illness	1
Mortality and Morbidity	Rural = ↑ mort. and morb.	1
Rate of Favourable Home Recovery Outcome	Rural = ↓ outcome	2
Hip Fracture	Rural = ↑ hip fracture	2
Stroke Recovery	Rural = ↓ survival	1
Heart Attack Recovery	Rural = ↑ RTW	1
Access to Health Care	Rural = ↓ access	6
Access/Utilization of Health Care	↓ access = ↑ disability	2
	↑ utilization = ↓ RTW	2
	Contextual	1
Litigation	Rural = ↓ litigation	1
Commitment to Employer	Rural ↑ commitment to employer	2
Employed by Smaller Company	Rural = ↑ smaller companies	2
Physical Activity	Rural = ↓ physical activity	2
	↓ income = ↓ activity	2
	↓ education = ↓ activity	2
	Contextual - education	1
	↓ age = ↑ physical activity	1
	Contextual - age	1
Vocational Rehab Outcomes	Rural = ↓ RTW	1
	No association	1
Determination/Hard Work	Rural = ↑ determination	2

APPENDIX C

National Occupational Classification Scale

Ten Occupational Categories

First Digit	Classification
0	Management Occupations
1	Business, Finance, and Administrative Occupations
2	Natural and Applied Sciences and Related Occupations
3	Health Occupations
4	Occupations in Education, Law, and Social Community and Government Services
5	Occupations in Art, Culture, Recreation, and Sport
6	Sales and Service Occupations
7	Trades, Transport, and Equipment Operators and Related Occupations
8	Natural Resources, Agriculture, and Related Production Occupations
9	Occupations in Manufacturing and Utilities

More detailed coding information can be found at:

http://www5.hrsdc.gc.ca/NOC/English/NOC/2011/Welcome.aspx

APPENDIX D

Pain Disability Index

The following rating scales measure the impact of chronic pain in your everyday life. We want to know how much your pain is preventing you from doing your normal activities. For each of the seven categories of life activity mentioned, circle the one number that best reflects the level of disability you typically experience. A score of 0 means no disability at all. A score of 10 means that all the activities which you would normally do have been disrupted or prevented by your pain. Your rating should reflect the overall impact of pain in your life, not just when the pain is at its worst. Make a rating for every category. If you think a category does not apply to you, circle "0".

Family/ Home Responsibilities. This category refers to activities related to the home or family. It includes chores and duties performed around the house (e.g. yard work) and errands or favours for other family members (e.g. driving the children to school).

0 1 2 3 4 5 6 7 8 9 10

No disability Mild Moderate Severe Total Disability

Recreation. This category includes hobbies, sports, and other similar leisure time activities.

0 1 2 3 4 5 6 7 8 9 10

No disability Mild Moderate Severe Total Disability

Social Activity. This category refers to activities that involve participation with friends and acquaintances other than family members. It includes parties, theatre, concerts, dining out, and other social functions.

0 1 2 3 4 5 6 7 8 9 10

No disability Mild Moderate Severe Total Disability

Occupation. This category refers to activities that are a part of or directly related to one's job. This includes non-paying jobs as well, such as that of a housewife or volunteer worker.

0 1 2 3 4 5 6 7 8 9 10

No disability Mild Moderate Severe Total Disability

Sexual Behaviour. This category refers to the frequency and quality of one's sex life.

0 1 2 3 4 5 6 7 8 9 10

No disability Mild Moderate Severe Total Disability

Self Care. This category includes activities which involve personal maintenance and independent daily living (e.g. taking a shower, driving, getting dressed, etc.)

0 1 2 3 4 5 6 7 8 9 10

No disability Mild Moderate Severe Total Disability

Life-Support Activity. This category refers to basic life supporting behaviours such as eating, sleeping, and breathing.)

0 1 2 3 4 5 6 7 8 9 10

No disability Mild Moderate Severe Total Disability

APPENDIX E

Visual Analog Scale

VISUAL ANALOGUE SCALE

On a scale of 0-10 (where 0 is no pain and 10 is unbearable pain, the worst pain you can imagine), mark where your pain is most of the time.

0 1 2 3 4 5 6 7 8 9 10

No Pain **Unbearable Pain**

APPENDIX F

SF-36 Health Survey

SF-36(tm) Health Survey

Instructions for completing the questionnaire: Please answer every question. Some questions may look like others, but each one is different. Please take the time to read and answer each question carefully by filling in the bubble that best represents your response.

Patient Name: _____

SSN#: _____ Date: _____

Person heling to complete this form: _____

1. In general, would you say your health is:

- ❑ Excellent
- ❑ Very good
- ❑ Good
- ❑ Fair
- ❑ Poor

2. Compared to one year ago, how would you rate your health in general now?

- ❑ Much better now than a year ago
- ❑ Somewhat better now than a year ago
- ❑ About the same as one year ago
- ❑ Somewhat worse now than one year ago
- ❑ Much worse now than one year ago

3. The following items are about activities you might do during a typical day. Does your health now limit you in these activities? If so, how much?

a. Vigorous activities, such as running, lifting heavy objects, participating in strenuous sports.
- ❑ Yes, limited a lot.
- ❑ Yes, limited a little.
- ❑ No, not limited at all.

b. Moderate activities, such as moving a table, pushing a vacuum cleaner, bowling, or playing golf?
- ❑ Yes, limited a lot.
- ❑ Yes, limited a little.
- ❑ No, not limited at all.

c. Lifting or carrying groceries.
- ❑ Yes, limited a lot.
- ❑ Yes, limited a little.
- ❑ No, not limited at all.

d. Climbing several flights of stairs.
- ❑ Yes, limited a lot.
- ❑ Yes, limited a little.
- ❑ No, not limited at all.

e. Climbing one flight of stairs.
- ❑ Yes, limited a lot.
- ❑ Yes, limited a little.
- ❑ No, not limited at all.

f. Bending, kneeling or stooping.
- ❑ Yes, limited a lot.
- ❑ Yes, limited a little.
- ❑ No, not limited at all.

g. Walking more than one mile.
- ❑ Yes, limited a lot.
- ❑ Yes, limited a little.
- ❑ No, not limited at all.

h. Walking several blocks.
- ❑ Yes, limited a lot.
- ❑ Yes, limited a little.
- ❑ No, not limited at all.

i. Walking one block.
- ❑ Yes, limited a lot.
- ❑ Yes, limited a little.
- ❑ No, not limited at all.

j. Bathing or dressing yourself.
- ❑ Yes, limited a lot.
- ❑ Yes, limited a little.
- ❑ No, not limited at all.

4. During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of your physical health?

a. Cut down the amount of time you spent on work or other activities?
☐ Yes ☐ No

b. Accomplished less than you would like?
☐ Yes ☐ No

c. Were limited in the kind of work or other activities
☐ Yes ☐ No

d. Had difficulty performing the work or other activities (for example, it took extra time)
☐ Yes ☐ No

5. During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems (such as feeling depressed or anxious)?

a. Cut down the amount of time you spent on work or other activities?
☐ Yes ☐ No

b. Accomplished less than you would like
☐ Yes ☐ No

c. Didn't do work or other activities as carefully as usual
☐ Yes ☐ No

6. During the past 4 weeks, to what extent has your physical health or emotional problems interfered with your normal social activities with family, friends, neighbors, or groups?
- ❑ Not at all
- ❑ Slightly
- ❑ Moderately
- ❑ Quite a bit
- ❑ Extremely

7. How much bodily pain have you had during the past 4 weeks?
- ❑ Not at all
- ❑ Slightly
- ❑ Moderately
- ❑ Quite a bit
- ❑ Extremely

8. During the past 4 weeks, how much did pain interfere with your normal work (including both work outside the home and housework)?

- ❑ Not at all
- ❑ Slightly
- ❑ Moderately
- ❑ Quite a bit
- ❑ Extremely

9. These questions are about how you feel and how things have been with you during the past 4 weeks. For each question, please give the one answer that comes closest to the way you have been feeling. How much of the time during the past 4 weeks.

a. did you feel full of pep?

- ❑ All of the time
- ❑ Most of the time
- ❑ A good bit of the time
- ❑ Some of the time
- ❑ A little of the time
- ❑ None of the time

b. have you been a very nervous person?

- ❑ All of the time
- ❑ Most of the time
- ❑ A good bit of the time
- ❑ Some of the time
- ❑ A little of the time
- ❑ None of the time

c. have you felt so down in the dumps nothing could cheer you up?

- ❑ All of the time
- ❑ Most of the time
- ❑ A good bit of the time
- ❑ Some of the time
- ❑ A little of the time
- ❑ None of the time

d. have you felt calm and peaceful?

- ❑ All of the time
- ❑ Most of the time
- ❑ A good bit of the time
- ❑ Some of the time
- ❑ A little of the time
- ❑ None of the time

e. did you have a lot of energy?

- ❑ All of the time
- ❑ Most of the time
- ❑ A good bit of the time
- ❑ Some of the time
- ❑ A little of the time
- ❑ None of the time

f. have you felt downhearted and blue?

- ❑ All of the time
- ❑ Most of the time
- ❑ A good bit of the time
- ❑ Some of the time
- ❑ A little of the time
- ❑ None of the time

g. did you feel worn out?
- ❑ All of the time
- ❑ Most of the time
- ❑ A good bit of the time
- ❑ Some of the time
- ❑ A little of the time
- ❑ None of the time

h. have you been a happy person?
- ❑ All of the time
- ❑ Most of the time
- ❑ A good bit of the time
- ❑ Some of the time
- ❑ A little of the time
- ❑ None of the time

i. did you feel tired?
- ❑ All of the time
- ❑ Most of the time
- ❑ A good bit of the time
- ❑ Some of the time
- ❑ A little of the time
- ❑ None of the time

10. During the past 4 weeks, how much of the time has your physical health or emotional problems interfered with your social activities (like visiting friends, relatives, etc.)?
- ❑ All of the time
- ❑ Most of the time
- ❑ Some of the time
- ❑ A little of the time
- ❑ None of the time

11. How TRUE or FALSE is each of the following statements for you?

a. I seem to get sick a little easier than other people
- ❑ Definitely true
- ❑ Mostly true
- ❑ Don't know
- ❑ Mostly false
- ❑ Definitely false

b. I am as healthy as anybody I know
- ❑ Definitely true
- ❑ Mostly true
- ❑ Don't know
- ❑ Mostly false
- ❑ Definitely false

c. I expect my health to get worse
- ❑ Definitely true
- ❑ Mostly true
- ❑ Don't know
- ❑ Mostly false
- ❑ Definitely false

d. My health is excellent
- ❑ Definitely true
- ❑ Mostly true
- ❑ Don't know
- ❑ Mostly false
- ❑ Definitely false

APPENDIX G

Musculoskeletal Injury Database Variable Summary

(Credit to Fahad Algarni)

	Variable	Description
	Diagnosis Group (8 categories)	Diagnosis Group at RTW assessment based on ICD9 codes: - Fractures (Bone fractures) - Dislocations (Dislocation of joints) - Sprains/strains (all sprains and strains of joints, muscles, tendons, ligaments, and capsules excluding complete ruptures) - Lacerations (open wounds) - Contusions (eg., contusion with intact skin surface, crushing injuries) - Nerve Damage (eg., inflammatory, hereditary and degenerative diseases of the central nervous system) - Joint Disorders (eg., osteoarthritis, injury to peripheral nerves to: shoulder girdle and upper limbs, or pelvic girdle and lower limbs) - Other (eg., osteopathies, chondropathies, and acquired MSK deformities)
	The sprain diagnosis (2 categories)	Whether the diagnosis is sprain or others (sprain or other)
	Anatomical Site Group (8 categories)	Anatomical Site Group at RTW assessment based on ICD9 coding: - head, - neck, - upper back, - lower back, - other torso, - upper extremity, - lower extremity, - Other (multiple site and not specified).
	PRIOR CLAIMS	The number of Prior Claims Count for the claimants
	Comorbidity	Whether the claimant has comorbidity or not. (Comorbidity as indicated by secondary diagnosis) (Yes/No)
	SF-36 Physical Functioning	"A high score indicates the respondent's ability to perform all types of physical activities without limitations due to health." [130]
	SF-36 ROLE-PHYSICAL	"A high score indicates little or no problems with work or other activities due to physical health" [130]
	SF-36 GENERAL HEALTH	"A high score indicates positive perceptions of general health" [130]

	SF-36 Vitality	"A high score indicates more vitality" [130]
	SF-36 Bodily Pain	"A high score indicates little or no pain or limitations due to pain" [130]
	VISUAL ANALOG SCALE (VAS) pain	Pain measurement
	Doctor Visit	Number of Doctor visits
	PT visit	Number of Physiotherapy Visits
	Overall PDI (%)	Overall **PDI**, Pain Disability Index, in 100% based on the Half-scale Rule
	Rehabilitation Program (6 categories)	Rehabilitation program undertaken for the claimants after the injury : - "No rehabilitation" - "Single Service Community Physical Therapy" - "Complex RTWS" - "Provider - Based RTWS" - "Work Site-based RTWS" - "Hybrid"
	Amount of health care	Amount ($$) of health care spent to treat and rehabilitate the claimants
	Gender	(Male/Female)
	Accident to admission	The time from accident to admission of RTW assessment (Calendar Days)
	Return to Work Level (2 categories)	The Return to Work Level of the claimants Following RTW Assessment: - Pre-accident - Modified
	Return to Work Restrictions (2 categories)	The Return to Work Restrictions of the claimant Following RTW Assessment: - Temporary Restrictions - Permanent Restrictions
	Return to Work Duration	Return to Work Duration of Restrictions (weeks)

	SF-36 ROLE-EMOTIONAL	"A high score indicates little or no problems with social activities due to emotional problems"
	SF-36 MENTAL HEALTH	"A high score indicates little or no feelings of depression or nervousness"
	Marital Status (7 categories)	The Marital Status at time of admission to RTW assessment.
	Education Level (8 categories)	The Education Level at time of RTW assessment.
	Geographic region	Geographic region of the claimants (Urban/Rural)
	PDI Family and Home	Pain Disability Index-Family and home –Assessment It indicates the level of disability due to pain in the family and home activities
	PDI Social	Pain Disability Index-Social It indicates the level of disability due to pain in the social activities
	PDI Life support	Pain Disability Index-Life-support It indicates the level of disability due to pain in the basic life support behaviors such as eating, sleeping and breathing.
	PDI Recreation	Pain Disability Index-Recreation It indicates the level of disability due to pain in the recreation activities (eg., hobbies, sports)
	PDI Sexual Relation	Pain Disability Index-Sexual-relation It indicates the level of disability due to pain in the sexual relation
	PDI Self-care	Pain Disability Index-Self-care It indicates the level of disability due to pain in the self-care
	SF-36 Social Functioning	"A high score indicates better social functioning"
	PDI Occupation	Pain Disability Index-Occupation It indicates the level of disability due to pain in the paying and nonpaying jobs' activities
	Admission job	Whether the claimants have admission job attached at time of RTW assessment (Yes/No)
	Pre-Accident National Occupation (9 categories)	Pre-Accident National Occupational Code The initial source of the pre-accidental NOC (national occupational classification) comes from the claim Owner. The

		occupation is characterized by the type and the required level of skill for that occupation on the date of the accident.
	Working status (2 categories)	It indicates whether the claimant is working at the time of RTW assessment: (Yes or No)
	Modified Work Availability (3 categories)	Whether the claimant modified work available at time of RTW assessment: - No - Yes-(Full or Part time) - Unknown
	Modified work availability_p (2 categories)	Whether the claimants have Modified work available at the end of rehabilitation program (Yes/No)
	If Modified, Indicate the Nature of the Modification (3 categories)	Whether modified duties for work are available, the Nature of the Modification for the claimants are: - Modified duties - Modified hours - Modified duties and hours
	Outcome (Primary Discharge Information following RTW Assessment) (3 categories)	The Primary Discharge Information of the claimant Following RTW Assessment: - RTW - FTW - Not FTW
	Outcomep (Primary Discharge Information Following Discharge from the rehabilitation program) (2 categories)	The Primary Discharge Information of the claimant Following Discharge from the rehabilitation program (after the enrolment in a rehab program) - Return To Work - Fit To Work & - Not Fit To Work
	Total temporary Disability (TD01)	Whether the claimant is on TD01 Status at time of RTW Assessment (No, or yes)
	Partial temporary Disability (TD02)	Whether the claimant is on TD02 Status at time of RTW Assessment (It also means Partial RTW) (No, or yes)
	Total temporary Disability (TD01+7 days)	Whether the claimant is on TD01 Status 7 days after the admission of RTW. (No, or yes)
	Total temporary Disability (TD01+14 days)	Whether the claimant is on TD01 Status 14 days after the admission of RTW (No, or yes)
	Partial temporary	Whether the claimant is on TD02 Status 7 days after the

	Disability (TD02+7 days)	admission of RTW (It also means Partial RTW) (No, or yes)
	Partial temporary Disability (TD02+14 days)	Whether the claimant is on TD02 Status 14 days after the admission of RTW (It also means Partial RTW) (No, or yes)
	Three Age Categories (3 categories)	The factor of three age categories includes: - Young age group (25-54) - Old age group (55-64) - Very old age group (≥65)

APPENDIX H

Variable Coding Summary

Variable	Value
Geographic Location of Residence	1: Urban 2: Rural
Gender	1: Female 2: Male
TD01/TD02/Work Compensation Status	0: No 1: Yes
TD01/TD02/Work Compensation Recurrence	0: No 1: Yes
Diagnosis Group	1: Fracture 2: Dislocation 3: Sprain/Strain 4: Laceration 5: Contusion 6: Nerve Damage 7: Joint Disorder 8: Other
Anatomical Site	1: Neck 2: Upper Back 3: Lower Back 4: Other Torso 5: Upper Extremity 6: Lower Extremity 7: Multiple Site 8: Not Specified
Comorbidity	0: No 1: Yes
Admission Job Attached	0: No 1: Yes
Interpreter Required	0: No 1: Yes
Level of Education	1: Less than High School Diploma 2: High School Diploma 3: Partial Technical School or University 4: Technical Diploma 5: University Degree 6: Not Specified
Marital Status	1: Single 2: Separated or Divorced 3: Married, Common-Law, or Widowed 4: Not Specified
Type of Work	1: White-Collar 2: Blue-Collar 3: Health Care Field
Working at Time of Assessment	0: No

	1: Yes 2: Unknown
Modified Work Available	0: No 1: Yes (Full-Time) 2: Yes (Part-Time) 3: Unknown
Rehabilitation Program	0: No Rehabilitation 1: Single Service Community Physical Therapy 2: Complex RTWS 3: Provider-Based RTWS 4: Work Site-Based RTWS 5: Hybrid
Annual Pre-Accident Earnings	0: >$77,000 1: <$25,000 2: $25,000-$77,000
Age	Number (Years)
Number of Days/Months Accident to Admission	Number (Days/Months)
Number of Prior Claims	Number (Claims)
Number of Doctor/Physiotherapy/Chiropractor Visits	Number (Visits)
SF-36 Health Survey (8 categories)	Number (0-100)
Pain Disability Index	Number (0-100 Percentage)
Pain Visual Analog Scale	Number (0-10)

APPENDIX I

Complex Return-To-Work Services Program Description

and

Provider-Based, Work Site-Based, and Hybrid Return-To-Work Services Program Descriptions

To view a full Complex Return-To-Work Services Program Description by the Workers' Compensation Board of Alberta, please visit:

http://www.wcb.ab.ca/pdfs/providers/RTW/Complex_services.pdf

To view full Provider-Based, Work Site-Based, and Hybrid Return-To-Work Services Program Descriptions by the Workers' Compensation Board of Alberta, please visit:

http://www.wcb.ab.ca/pdfs/providers/RTW/RTW_programs.pdf

APPENDIX J

Workers' Compensation Board of Alberta

Determining Compensation Rates

Determining compensation rates

Your compensation rate is based on the amount of money you were earning at the time of your accident. This is usually determined by considering your:

- Taxable employment earnings (taxable earnings from second jobs can be considered when setting your compensation rate)
- Holiday pay (if it is paid out on a regular basis, like on every paycheque)
- Statutory holidays (if they are part of your regularly scheduled work week)
- Overtime pay (if it is worked on a consistent basis)

Employment insurance benefits are not considered earnings.

Your compensation rate is set on 90 per cent of your estimated date of accident net earnings based on a maximum of $92,300 in gross earnings in 2014 (subject to an annual review). This is based on Section 56 of the *Alberta Workers' Compensation Act.*

You can reference the *Workers' Compensation Act* at:
http://www.wcb.ab.ca/public/policy/legislation.asp

Net earnings are calculated by deducting probable income tax, employment insurance premiums and Canada Pension Plan contributions from your gross employment earnings amount. The deductions are based on tables that are produced by the Government of Canada. The 90 per cent of net earnings is 90 per cent of your gross income minus the estimated deductions based on the government tables. We do not make any deductions for, or submit any money to the federal government.

Permanent status and non-permanent status

Your employer is asked to confirm whether your job would have lasted for one year or more, without interruption. If so, for WCB-Alberta purposes, you have permanent employment. If your job was subject to seasonal breaks, job shutdowns or lack of work layoffs, you would be considered a non-permanent employee. As a non-permanent employee, your compensation rate would normally change on the date your job would have ended. This new rate is called the Base Rate.

Temporary Total Disability (TTD) benefits

While you are unable to work, you may be entitled to TTD benefits. TTD replaces the income you would normally earn while working. Depending on the level of your recovery and the nature of your work duties, you may be able to return to modified duties. If you are earning less money working modified duties than you were before your injury/illness, temporary partial disability benefits are a possibility.

Vacation Time

Your vacation time should remain the same as it was before the accident. Vacation time cannot be used as a substitute for disability benefit entitlement when you are disabled from work due to a compensable (acceptable work-related) accident or illness. If this happens, you should talk to your employer and WCB-Alberta.

Other Factors

Off Work Again—If you become disabled again under the same claim, your compensation rate cannot be lower than the Section 56/Base rate that was determined on your claim. Under certain conditions, your rate may be increased to reflect higher earnings. You should contact your adjudicator or case manager to see if you qualify.

Permanent Partial Disability (PPD) award—If your injury date was prior to January 1, 1995, and you are off work again under the same claim, the PPD award on your claim will continue to be paid if you receive your PPD award monthly.

The PPD award is deducted from your compensation rate effective the PPD award date. If your PPD award was given as a lump sum, a monthly rate is still deducted. The reduced compensation rate is used to calculate temporary benefits paid for periods after the PPD award effective date.

The PPD award and the reduced compensation rate will equal 100 per cent of your disability entitlement on your claim. In most cases, your PPD award will not affect the rate on a different claim.

Non-Economic Loss Payments (NELP)—If your injury date was on or after January 1, 1995, you would receive a one-time NELP award to recognize a permanent clinical impairment. A NELP award will not affect your compensation rate. The maximum NELP for 2014 is $86,588.79.

Income Taxes

Revenue Canada requires you to report WCB-Alberta benefits as income, but they are not taxed. The WCB-Alberta will mail a T5007 form to you for income tax purposes. This form will provide the total disability compensation money you received up to the 31st day of December in that calendar year. For more information, refer to the T5007 Statement of benefits fact sheet.

APPENDIX K

Workers' Compensation Board of Alberta

Calculating Permanent Disability Compensation and Pensions

Permanent disability compensation and pensions

For workers with an injury/illness that occurred on, or after, January 1, 1995, WCB-Alberta compensates for any remaining permanent clinical (measurable) impairment, as well as any on-going disability as a result of the workplace injury/illness.

Defining permanent disabilities

Permanent clinical impairment is the loss (amputation), loss of use (nerve damage), or derangement (burn) of any body part, system or function. The degree of permanent clinical impairment may be measured through a permanent clinical impairment examination by an independent physician at the point of maximum medical recovery.

Disability is a person's decreased capacity or loss of ability to meet the demands of the job. This is measured as a loss of earnings ability resulting from the workplace injury.

Determining permanent clinical impairment

Permanent clinical impairment is determined either through a medical examination by an independent medical examiner or through a review of the medical reporting on the file. The objective (measurable) clinical information related to the impairment is gathered from the review and converted to a percentage of permanent clinical impairment using the Alberta Permanent Clinical Impairment Guide http://www.wcb.ab.ca/pdfs/public/policy/manual/a_d.pdf.

Some injuries or conditions, which are on a scheduled (pre-selected) list, can be assessed for permanent clinical impairment through a review of the medical reporting on the file. The scheduled list, taken from the Alberta Permanent Clinical Impairment Guide, includes standard injuries or conditions such as the partial removal of a disc in the back or an amputation. These injuries or conditions do not require a medical examination to assess basic impairment.

Permanent impairment examination

An examination is arranged when enough time has passed to allow for maximum medical recovery. The time frame varies depending on the type of injury/illness, but could take up to two years or more to arrive at a level considered permanent. The time period is based on guidelines of standardized healing times. For example, it generally takes two years for nerve regeneration, so WCB-Alberta will wait, as a guideline, for two years before the injury is assessed.

Your adjudicator or case manager will discuss this process with you. If your injury/illness is likely to result in permanent impairment, your file will be processed at the recommended review time.

A number of specialized staff are involved in determining permanent impairment. At the recommended review time, an examination by an independent medical examiner provides objective clinical data; a WCB-Alberta medical advisor assesses the impairment percentage based on the Alberta Permanent Clinical Impairment Guidelines; and the case manager or adjudicator issues the award.

Compensation for permanent impairment or disability

The following apply to payments when the date of accident is on or after January 1, 1995.

Non-economic loss payments (NELPs)

NELPS are paid for permanent clinical impairment. The permanent clinical impairment percentage is used to determine the NELP amount. The amount is a one-time cash payment.

Example: If your back injury required surgery and this resulted in a permanent restriction in your range of back movement, the impairment may be assessed at 10% of full body function. The 10% clinical assessment results in a one-time cash payment of $8,384.38 (amount is based on 2014 maximum payment which is subject to annual legislative review).

10% (clinical impairment)	X	$86,588.79 maximum (2014)	=	$8,658.88 lump sum payment

Economic loss payments (ELP)

ELP are paid for disability or the impact a compensable injury/illness has on a worker's capacity to earn wages. ELP are considered when both the work restrictions and the loss of earnings capacity are considered permanent. A review of your compensation amount will be made periodically and again at the age of 65.

Temporary economic loss (TEL)

TEL benefits are paid when work restrictions are permanent and loss of earnings capacity is only temporary (the pre-accident earnings can be reached within 60 months). A review of your compensation amount will be made yearly.

Temporary partial disability (TPD)

TPD benefits are payable to workers with temporary work restrictions and a temporary loss of earnings capacity that are not normally expected to last longer than six months.

Example: In 2013 you were working as an auto mechanic earning $60,000 annually ($44,945.30 net). Your back injury required corrective surgery and you now have permanent work restrictions that prevent you from returning to work as a mechanic. Through your return-to-work plan you returned to work as a parts distributor at an annual wage of $55,000 ($41,596.48 net) and this salary represents your maximum earning capacity. A monthly ELP, TEL or TPD payment is payable in the amount of $251.16 per month.

$44,945.30 pre-accident net (in year 2013)	-	$41,596.48 post-accident Net (in year 2014)	x	.9 90%	/12 divided by 12 months	=	$251.16 monthly amount

**The amount may vary due to the Cost of Living Adjustment (COLA) established for the year of the accident and the COLA established for the year the ELP is assessed. Please contact your case manager for details.*

Calculating Compensation post age 65

To recognize loss of pension income caused by decreased opportunity to contribute to pension plans, WCB-Alberta will continue the ELP on a monthly basis post age 65, for the life of the injured worker. This payment is based on the following formula: ELP65 = A × B × 2% where:

A = average annual Economic Loss Payment (last 5 years or lesser actual period of time)
B = number of years compensation payments have been paid (maximum 35 years)

Example: You were 55 years of age when you were injured in 2001. After your return to work, you received a monthly Economic Loss Payment of $262.43 ($3,149.16/year). After retirement (age 65 is normal retirement age), the Economic Loss Payment is adjusted and the amount payable represents lost retirement income due to reduced employment earnings. The adjusted yearly total is $629.83/year, which amounts to a monthly total of $52.49/month.

$262.43	X12	X10	X0.02	=	$629.83
average monthly compensation	multiplied by 12 months	number of years of compensation	multiplied by 2%		adjusted yearly amount or $52.49/ month

The following apply to payments when the date of accident is before January 1, 1995.

Permanent partial disability payments (PPD)

When you return to work, your adjudicator or case manager will discuss your eligibility for a PPD award. The percentage of permanent clinical impairment (PCI) is determined as explained on page one. The final value of the award considers the PCI percentage and the earnings at the time of the accident.

A monthly pension is payable for your lifetime. If the pension is being paid out all at once (a lump sum) then the amount is based on the value of your monthly pension and your age using forecast tables.