

**British Columbia's outsourced hospital workers: an
occupational health and safety perspective**

by

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Abstract

Cleaners and Food Service Workers (CFSW) form a large yet understudied occupation group within the healthcare sector in terms of their occupational health and safety concerns. Four health regions in British Columbia (BC), Canada have outsourced these services. Evidence suggests an association between outsourced labor and higher risks of injury due to different standards of occupational health and safety.

The purpose of this study was to investigate the impact of outsourcing on the health and safety outcomes and experiences among outsourced healthcare CFSWs compared to non-outsourced healthcare CFSWs.

Two studies were conducted as part of this mixed-methods project. Study 1 was a quantitative assessment of injury rates, average days lost per claim and average costs per claim among CFSWs in hospitals that outsourced support services and those that did not, between two periods - pre (2001-2003) and post outsourcing (2005-2008). Study 2 was a qualitative study where twenty semi-structured telephone interviews with outsourced and non-outsourced CFSWs from five health authorities were conducted.

Results indicate a decrease in incidence rate ratios (IRR) of injury rates post outsourcing for CFSW at outsourced facilities (Cleaners IRR =0.79, CI=0.57, 1.09; FSW IRR = 0.65, CI=0.57, 1.10), although the 95% CI estimates include '1', indicating possibility of no difference between the two exposure periods. The IRR of average days lost per injury showed a decrease post outsourcing for CFSW at outsourced facilities (Cleaners IRR=0.81, CI=0.66, 0.99; FSW IRR=0.80, CI=0.50, 1.28), although the 95% CI estimates included '1' for FSWs. Average costs per claim for outsourced cleaners were shown to decrease significantly ($p<0.05$) post outsourcing. No differences were seen in emergent themes from the interviews between outsourced and non-outsourced workers except for injury reporting. Workers at outsourced

facilities indicated possible underreporting of injuries in their interviews.

The study outcomes suggest a change in claims outcomes and experiences among outsourced workers with decreases in IRR of injury rates and days lost per claim and costs per claim, possibly due to underreporting of injuries among outsourced workers. This study provides preliminary evidence of the association between outsourcing and occupational health and safety and future research is warranted.

Preface

This MSc. thesis had two components labeled as the quantitative component (Study 1) and the qualitative component (Study 2). The researcher used administrative data from WorkSafeBC and the Ministry of Health for academic research purposes as well as interviews with members of the Hospital Employees Union (HEU).

The Behavioural Research Ethics Board of the University of British Columbia has approved both components of this thesis. The quantitative component, (ethics submission number H09-01782) was approved on September 14, 2009 to September 14, 2010, with an extension up to August 16, 2012. The qualitative component of this project (ethics submission number H10 -01728) was approved on December 6, 2010 to December 6, 2011.

No personal identifiers such as name or date of birth were released to the researcher. The data were released to the researchers with anonymous study-specific identification codes.

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1. Introduction

Cleaners and Food Service Workers (FSWs) form a large group of workers who provide essential services to major industries including healthcare. The healthcare sector in British Columbia (BC) employs around 246,000 workers, translating to about 11% of the general workforce of the province (WorkSafeBC, 2009). Cleaners and FSWs are included in the 26% of the healthcare worker population that is related to sales and services (BC Work Futures, 2009).

The basic task of a cleaner is to deal with hospital waste removal. Waste generated from hospital sites is a mixture of biological (blood and body fluids, human tissue) and non-biological matter such as needles, wound dressings and packaging (Blenkharn & Odd, 2008). Workers such as cleaners and janitors are heavily relied on to ensure that the waste is disposed off in an appropriate and timely manner so that hospitals can stay as clean and sterile as possible, 24 hours a day, seven days a week. These workers are an integral part of infection control procedures that keep the patients and staff safe from any nosocomial infections.

Food Service Workers at a hospital also fill in an equally important role. Their primary task is to make and deliver the appropriate nourishment to the patients. Each patient is different and may require a certain specific type of diet. Their duties involve being aware of the complications of the various types of diets and to prepare meals accordingly. Over and above that, FSWs also cater to the patients' visitors as well as the medical and non-medical staff who work in the hospitals (Cohen, 2001).

In general, healthcare workers are a high-risk group for occupational injuries warranting an extensive amount of research on the occupational health and safety of direct care positions (Registered Nurses, Care Aides, Licensed Practical Nurses) in healthcare (Blenkharn & Odd, 2008; Yassi, Gilbert & Cvitkovitch, 2005; Health Canada, 2004; Yassi, Ostry, Spiegel, Walsh & de Boer, 2002). There is, however, a

scarcity of epidemiological studies on the cause, nature, severity and other risk factors for injury in hospital support workers such as cleaners and FSW. Nearly a decade ago, these healthcare support services were outsourced by four of the six health authorities in BC in an effort to focus their financial resources on core healthcare delivery activities, potentially further complicating their occupational health and safety (OH&S) environments due to the change in management, oversight and procedures.

The aim of this thesis is to examine the impact of outsourcing on the occupational health and safety outcomes and experiences of the hospital support services in British Columbia, with a focus on cleaners and food service workers.

1.1. BC's Healthcare System

BC's healthcare system is divided into six health authorities that deliver healthcare services to the province. These health authorities were formed at the end of 2001 amalgamating 52 separate smaller health care employers (Ministry of Health, n.d.). While five health authorities concentrate on five distinct geographical regions, one authority provides province wide specialized services such as cancer care or pediatrics. The six health authorities are: Northern Health, Interior Health, Vancouver Island Health Authority, Vancouver Coastal Health Authority, Fraser Health and Provincial Health Services Authority (Ministry of Health, n.d.).

1.2. Outsourcing of Healthcare Workers – Bill 29

Bill 29, known as the 'Health and Social Services Delivery Improvement Act' was passed in January of 2002 by the provincial government (Health and Social Services Delivery Improvement Act, 2002). Bill 29 removed the restriction to contracting out or privatization in the health care sector through suspension of the collective agreements with the unions representing these workers (Isitt & Moroz, 2007;

Kahnamoui, 2005). The province, at the time had to confront a financial crisis brought on by \$2.1 billion tax cuts (Moore, 2002). The purpose of this *Act* was to help the province save money by concentrating the tax payer dollars on more healthcare based services, (deemed to be a priority) over support services which constituted a large portion of their annual costs (Zuberi, 2011; Isitt & Moroz, 2007; Kahnamoui, 2005; Werb, 2005; Moore, 2002). Armstrong & Armstrong (2003) indicate that this practice has been a Canada wide practice for a long time with the understanding that privatization of support services would not only maintain the quality of healthcare but also reduce the direct cost burden on the healthcare system. By paying a one time annual cost, it was hoped that the delivery of the services would not change and would help the Ministry of Health achieve it's primary goal of providing quality healthcare to British Columbians in a financially sound manner. Werb (2005) estimated that the Ministry of Health for the province of BC would have saved about \$45-55 million annually by adopting this route.

Starting from late 2003 well into 2004, four of the six provincial health authorities outsourced or contracted out their (previously in house) support services, such as cleaning and food services to private multi-national companies such as ARAMARK, Sodexo, Inc. and Compass Group Canada (Stinson, Pollak & Coehn, 2005; S.Locke, personal communication, March 05, 2009) (See Table 1).

Table 1: List of health authorities and their contracted service providers

Health Authority	Cleaning Services Provider	Food Services Provider
Provincial Health Services Authority	Compass Group Canada	Compass Group Canada
Vancouver Coastal Health	ARAMARK	Sodexo, Inc
Fraser Health *	Sodexo, Inc.	Compass Group Canada
Vancouver Island Health Authority [#]	Compass Group Canada	Compass Group Canada
Northern Health	In-House	In-House
Interior Health	In-House	In-House

* Fraser Health Authority outsourced their retail food services only. Patient food services are still provided by in-house employees.

[#] Vancouver Island Health Authority has only outsourced their services on the South and Central Islands only.

1.3. WorkSafeBC and the Healthcare Sector

WorkSafeBC is an independent insurance-based provincial workers' compensation provider that was created in 1917 as a result of the Workers Compensation Act of 1902. The Act was created based on an accord that suspended the workers' right to sue the employer in lieu of compensation for that injury through a no-fault system (WorkSafeBC, 2011; Shannon & Lowe, 2002). Its mandate is to promote occupational health, provide back-to-work rehabilitation and compensate for lost wages during recovery from injuries as per the Workers Compensation Act (WorkSafeBC, 2011).

Employers pay a premium to WorkSafeBC based on rates calculated per every \$100 of payroll paid. Employers are assigned to an appropriate industry sector based on the services provided. This sector is further broken down into sub-sectors and finally narrowed down to classification units, which reflect the employers' primary business activity (WorkSafeBC, 2011).

A rate based on the annual historical compensation costs to WorkSafeBC for each particular industry group is calculated. Employers are grouped into similar rate groups, after which a base rate is calculated by dividing the total cost of accepted claims for each group divided by the total payroll for that group. This base rate is then used to calculate the annual premium for each employer (WorkSafeBC, 2011). The changes in the annual premium rates are reflective of the occupational health and safety risks associated with each of the industry groups.

The healthcare employers i.e. Health Authorities as well as the contracted companies are listed in the 'Service Sector' industry sector, but since not all the employers are strictly healthcare only providers, some of the contracted employers and their subsidiaries are listed under different sub-sectors which are further broken down into classification units (CU) as shown in Table 2.

Table 2: List of classification units per sector and sub-sector

Sub-Sector	Classification Unit Description (CU number)
Health Care and Social Assistance	Acute Care (766001)
Other Services (not elsewhere specified)	Commercial Cleaning or Janitorial Services (764014)
Accommodation, Food and Leisure Services	Industrial Catering (761018)
	Restaurant or Other Dining Establishment (761035)

The acute care subsector has had some of the highest number of time-loss claims reported from 1985-2009 as compared to long-term care or short-term care (WorkSafeBC, 2011). A total of 6,450 time-loss claims were accepted from 1985-2009 for the acute care subsector, resulting in 286,417 days lost costing \$46.2 million in compensation. In contrast, long-term care had one-third the claims with 76,550 days lost costing about \$9.5 million dollars. Short-term care, for the same

time period, had 360 time-loss claims with 17,767 days lost and costing \$2.6 million from 1985-2009 (WorkSafeBC, 2011). It is to be noted, that the rates of injury and days lost may differ, as acute care is a larger working group consisting of more facilities and workers than long-term care or short-term care.

1.4. Cleaners

Cleaners and janitorial staff constitute of a significant proportion of the work force in many countries worldwide (Zock, 2005). In Canada, approximately 30% of cleaning staff work in the healthcare sector (Alamgir & Yu, 2008). Cleaning is regarded as an unskilled job despite the importance of the role within hospital settings and the physical demands of the tasks (Alamgir & Yu, 2008; Zock, 2005; Gamperiene, Nygård, Brage, Bjerkedal & Bruugaard, 2003). Cleaners experience higher rates of disability pensions (1.4 per 1,000 person years) than other occupations (nursing assistants, kitchen assistant, seamstress and shop assistant) due to the risks associated with their tasks (Gamperiene et al., 2003).

The task of a cleaner in general involves three main objectives: to control exposure, to control infection and to make sure that surfaces are well maintained (Alamgir & Yu, 2008; Zock, 2005; Wolkoff et al., 1998). Cleaners are required to work closely with the hospital infection control protocols. One of the most important responsibilities of cleaners is to clean and disinfect the facilities (World Health Organisation, 2002). They are responsible for picking up garbage and appropriately disposing it from various parts of a hospital. In addition to that, they are also responsible for maintenance of the facilities by way of pest control and other miscellaneous tasks such as waxing of the floors in the hallways and dusting.

Comparisons between hospital cleaners and cleaners in other industries like hotels or schools or offices is not straightforward, because their (hospital cleaners') working environment is always changing. In spite of the fact that hospital cleaners

are exposed to a higher intensity work environment (in terms of workload and quick turn around periods) and the wide range of disinfection protocols they are required to follow, research about injuries and hazards specific to hospital cleaners is limited (Salwe, Kumar & Hood, 2011).

The range of occupational hazards for these workers is very wide. Since hospitals are cleaned constantly during the 24-hour period, risks of exposures to strong disinfecting chemicals, contaminated needles/sharps and biological wastes are high. Cleaners also suffer from various physical hazards such as physical exertion while using heavy-duty equipment, ergonomic stressors such as repetitive motions, colder temperatures and insufficient ventilation (Zock, 2005).

The most common type of injury reported by cleaners across multiple industries is musculoskeletal injuries, attributed to falls on wet floors (Alamgir & Yu, 2008; Zock, 2005, Krause, Scherzer & Rugulies, 2005). A study conducted by Salwe et al. (2011) noted that the mean total injury rates for slip/trip/ fall injuries in hospital cleaners were 4.39 injuries per 100 full time equivalents (FTE) as compared to other hospital employees (2.4 injuries/100 FTE). Janitors and cleaners are at risk of needle stick injuries (second and third in risk compared to other healthcare workers) as reported by Leigh, Wiatrowski, Gillen & Steenland (2008). Other types of injuries reported by cleaners are contusions, cuts, punctures, lacerations and allergic reactions (Alamgir & Yu, 2008).

Focusing on BC healthcare workers, cleaners monitored in two healthcare regions over a one-year period showed that of the 145 injuries recorded in that year, nearly 62% of those injuries were serious enough to result in at least a day lost from work (Alamgir & Yu, 2008). Majority of those injuries (86%) were related to acute care sites and musculoskeletal injuries formed the bulk of the injuries (59%) followed by contusions (13%), allergies (10%), cuts (9%) and punctures (5%). When compared to other healthcare workers, the risk of all injuries was two to three times higher in hospital cleaners (Alamgir & Yu, 2008).

1.5. Food Service Workers

FSWs are a relatively large group of employees in the healthcare sector (Alamgir, Swinkels, Yu & Yassi, 2007). One of the main tasks of FSWs is to prepare and deliver food for the patients who have specific dietary requirements, but also have to deliver the food. In addition, they also have to prepare food for the retail section that caters to the visitors and staff in that hospital. Compared to hospital cleaners, there is a severe lack of information on their occupational health and safety profile. It is difficult to draw parallels between other industries and the hospital FSWs because their working environment is unique- FSWs work in a faster paced environment, use a wider range of raw materials and cater to constantly fluctuating dietary needs (Alamgir et al.2007).

There is a wide range of injuries associated with food service workers, including cuts and bruises, scalds and burns, heat stress, musculoskeletal and eye injuries, and lacerations (Alamgir et al. 2007; Gleeson, 2001). Workers in this industry are also very susceptible to developing immune responses such as dermatitis (3 times more likely than workers in other industries), allergies and conjunctivitis (Alamgir et al. 2007; Gleeson, 2001). Working in confined environments such as kitchens can increase the risk of slips and falls associated with greasy or slippery floors, dishwashing overspray, or spills from food and fryer grease (Bell et al., 2008; Courtney et al., 2006). Bell et al. (2008) looked at injury data for three hospitals over a 10-year period and found that of the 2,263 injury claims filed, about 21% of them were caused by slips, trips and falls of which the highest rates were associated with food service workers (4 claims per 100 full time equivalents).

Focusing on the province of BC, injury rates for cooks and food service workers at two non-outsourced health authorities (Northern and Interior Health) for a one-year period indicated an annual rate of 38.1 injuries per 100 person years. Based on

each sector, injury rates for the same occupations in acute care were 42.4 injuries per 100 person years compared to community and long term care (29.9 injuries per 100 person years), indicating that food service workers may be at a higher risk of injuries at acute care sites within those two health authorities. Musculoskeletal injuries were the most prevalent (18.3 injuries per 100 person years) caused by slip trips and falls (19.3%) and ergonomics (72.3%). Other injuries included burns (4.6 injuries per 100 person years) majority caused by high temperatures, percutaneous injuries (6.2 injuries per 100 person years) and irritation and allergic reactions (3.1 injuries per 100 person years) due to chemical exposures.

1.6. Outsourcing

Outsourcing (or contracting out or privatization), has been defined as a business contract where an external provider is hired or 'contracted' to provide certain services. Under this term the contracting company will, in most cases, re-hire the employees that previously provided the services in-house (Belcourt, 2006). Outsourcing in the BC health care industry involved a long-term agreement between the health authorities and the contracting companies and not a temporary service delivery provided by an external provider.

An increasing trend in outsourcing of services across all industrial sectors has been observed over time (Quinlan & Bohle, 2009; Belcourt, 2006; Härenstam, Marklund, Berntson, Bolin & Ylander, 2006). Over the past 30 years, the labor market has undergone numerous organizational changes in the hopes to maximize on their output while controlling the input (Virtanen et al., 2010). There is a growing trend in outsourcing of health care workers worldwide including countries such as the United States, the United Kingdom, the Netherlands, Finland, Sweden, Canada, New Zealand and Australia (Vining & Globberman, 1999; Meads, 1993; Meads, 1994; White & Collyer, 1998).

1.6.1. Potential Benefits of Outsourcing

“Employers recognize that they cannot pursue excellence in all areas” (Belcourt, 2006, p.272). Hence, some employers choose to outsource their non-core activities so that they can concentrate on their ‘core competencies’ (Belcourt, 2006, p.272), which in our current case is the delivery of healthcare services to the BC residents. Apart from logistics, companies outsource to cut costs on services that yield low-profits (in our case, hospital support services). This gives the company the ability to re-direct their finances to other aspects direct health care services (Gochfeld & Mohr, 2007; Belcourt, 2006). Outsourcing of non-core activities to external companies is thought to increase efficiency in service delivery, where each party is focusing on their individual core competencies (Gochfield & Mohr, 2007). Additionally, the ability to procure specialized services from an outside source would help cover costly recurrent in-house costs such as recruitment, training and other resources, since specialized services are better equipped to cover the costs (Belcourt, 2006; Blumberg, 1998).

1.6.2. Potential Risks of Outsourcing

While outsourcing potentially offers a way out of difficult financial situations by promising the same expertise and services at a significantly lower one time annual cost, it might not be as simple as it seems.

Negative impacts on occupational health and safety have been found to be associated with downsizing and outsourcing (Quinlan & Bohle, 2009). It is important to realize that a working environment and organizational structures are interdependent (Härenstam et al., 2006). Structural disruptions may have negative effects on an organization as it creates a new working environment for the employees, with new and more complicated routes of communication (Härenstam et al., 2006; Blumberg, 1998).

Johnstone, Mayhew & Quinlan (2000) note that outsourcing, at least, from examples in Australia and the United States, may result in over-economizing and ignoring “the legal chain of responsibility” (Johnstone et al, 2000, p.354), by having multiple employers functioning at one worksite. Having multiple employers functioning at one site can make it very difficult to maintain a safe and healthy work environment for the workers as each company has its own internal standards and rules and regulations to follow (Gochfeld & Mohr, 2007). For instance, Cummings and Kreiss (2008) in an interview with the health and safety management of a factory (in the United States), discovered that factory workers were provided with provided personal protection equipment (PPE) but not the contract workers at the site because it was understood that the contract companies were to provide their workers with the PPE despite the contracting company thinking otherwise. Furthermore, Azari-Rad, Philips & Thompson-Dawson (2003) also noted that when there are multiple contractors at one site, different organizational practices too, could inadvertently introduce dangers to one and other’s workers.

Fortunately, for BC, a potential solution to the aforementioned issue can be found in the BC Workers Compensation Act (1996). Part 3, division 3, section 118 of the *Act*, consider the health authorities as the ‘prime contractors’, the people that own the worksites for the contracting operators. The *Act* states that the ‘prime contractor’ has to ensure that the occupational health and safety at the worksite meets the regulatory standards for all workers who work on their sites.

Although, beyond the scope of this project, outsourcing can also have many socioeconomic impacts that can affect occupational health and safety of outsourced workers (Virtanen et al., 2010). Workers, who transitioned from public to private sectors in BC, faced lower wages and more job insecurity (Zuberi, 2011). Gustafsson & Saksvik (2005) also argue that while most literature agrees that there is sufficient evidence to link outsourcing and negative effects on OHS in the short-term period, there is a paucity of literature that looks at the effects of long-term effects post outsourcing. They investigated the health status of refuse collectors in Norway who

had transitioned from public sector employees to private contractors and had found a higher risk of sick leave among the workers. Similarly, Virtanen et al. (2010) also found an increased risk (hazard ratio – 1.61) of worker injury for among private sector workers compared to public sector workers.

1.7. Study Rationale

Cleaners and food service workers form an essential, yet understudied set of support personnel in the healthcare sector. Preliminary research conducted by Stinson et al., (2005) on the outsourced cleaners and FSW in BC post outsourcing through interviews indicate that the outsourcing of these services has had a negative impact on the health and socioeconomic well being of these workers.

From the 70 interviews conducted by Zuberi (2011), it was seen that BC's hospital support service workers, were underpaid and overworked. Post outsourcing, when they were re-hired, their salaries were significantly reduced from \$18 per hour to about \$12 per hour. Zuberi & Ptashnick (2011) also found that the workers complained of a decline in workplace health and safety, understaffing and lack of sufficient training. Given this current situation, many workers are likely to work two or three jobs to make ends meet, leading to fatigue and exhaustion, increasing their risk of a workplace injury (Stinson et al., 2005).

Despite the amount of literature on worker health and impacts of outsourcing, few have compared the impacts of outsourcing on the same group of workers pre-outsourcing versus post-outsourcing. Zuberi (2011) and Kahnemouli (2005) have managed to capture the 'essence' of the impact of outsourcing in the wake of the events, laying the foundation for this project, but have not managed to quantify the 'risk of injury' amongst the interviewed workers. In addition to that, it is important to note that most of the information gathered from interviews with outsourced workers in BC hospitals was collected from the Greater Vancouver area as with the

cases of Zuberi (2011), Zuberi and Ptashnick (2011), Stinson et al. (2005) and Kahnemoui (2005). This limits our knowledge of the impacts of outsourcing to outsourced workers within this region only, as workers from other parts of the province and those who were not outsourced had not been interviewed.

Thus, there is a need to not only build upon the existing research but also to quantify the extent of the impact of outsourcing on the injury rates among this working population to highlight areas where prevention efforts can be appropriately targeted. Comparative interviews with outsourced and non-outsourced workers would further enhance the quantitative findings as they would not only highlight the changes that outsourcing has brought on worker health and safety at BC hospitals, but also offer a comparison group, that would further indicate whether the changes are a result of outsourcing or just general trends in the working environment.

1.8. Objectives

The project was divided into two studies. Study 1 was a quantitative analysis of the injury rates, average days lost per claim and average costs per claim associated with cleaners and food service workers in the healthcare industry from 2001 to 2008, comparing outcomes pre and post outsourcing periods and to workers who were not outsourced. Study 2 was a qualitative analysis of the same group of workers in relation to their perceptions and experiences regarding their health and safety. The research questions were as follows:

1. Is the outsourcing of healthcare support services associated with an increase in occupational injuries, days lost from work per injury and costs per injury compared to non-outsourced healthcare support services?
2. Are the opinions and shared experiences on occupational health and safety

different between non-outsourced and outsourced healthcare support service workers?

2. Methods

2.1. Study 1

Study 1 is a quantitative analysis of the rates of injury, average days lost per claim and average costs per claim for cleaners and food service workers in acute care hospitals from 2001 to 2008.

The study population consisted of cleaners and food service workers at Health Authorities from the period 2001 to 2008. Study outcomes of interest for healthcare support workers, defined separately as cleaners and food service workers (CFSW), were calculated per year for the period before outsourcing (2001-2003) and after outsourcing (2005-2008). This study design allows for the comparison of study outcomes pre and post outsourcing within health authorities that transitioned to outsourcing during the study period as well as with health authorities that did not transition to outsourcing during the same period. All analyses were carried out using statistical software STATA v.10 (College Station, Texas).

This study had three specific objectives:

1. To determine if outsourcing of healthcare support services workers is associated with an increase in occupational injuries compared to non-outsourcing;
2. To determine if outsourcing of healthcare support services workers is associated with an increase in days lost from work per injury compared to non-outsourcing.
3. To determine if outsourcing of healthcare support services staff is associated with an increase in claims costs from work per injury compared to non-outsourcing.

2.1.1. Data Sources

The outcomes for analysis were yearly injury (claim) rates at the hospital level, the average days lost per claim at the hospital level by year, and the average costs per claim at the hospital level by year. Two sets of data were available for calculating yearly injury rates for this study: injury claims data (numerator data) from WorkSafeBC (the provincial workers' compensation system) aggregate counts at the employer level and annual total bed counts (denominator data) from the Ministry of Health, aggregate counts at the hospital level. Days lost and costs were available from the claims data provided by WorkSafeBC.

2.1.1.1. WorkSafeBC Injury Claim Files

All accepted time-loss injury claims with an injury date between 2001 to 2008 (all inclusive) for workers who were classified as hospital cleaners and or food service workers using standardized occupational codes and industry classification codes for acute care hospitals and for hospital food and cleaning contractors for six health authorities and three contracting companies was requested from WorkSafeBC, through the Freedom of Information and Protection of Privacy Act (44) (FIPPA). A total of 8,525 claims for all included occupations and all employers were received. Claims were limited to short-term (or time-loss) disability (STD) claims, those associated with at least one day off work.

2.1.1.2. Ministry of Health Acute Care Bed Counts

The Ministry of Health does not maintain counts of employees at the hospital level, and as such total number of beds was used as a proxy denominator. Total number of all acute care beds staffed and in operation per acute care hospital per year for the years 2001 to 2008 for the entire province of BC were obtained from the Ministry of Health. Any sites that served as an interim acute care site or that were shut down in

between the study period were excluded for consistent follow-up over the non-outsourced and outsourced follow-up periods.

2.1.2. Data Preparation

All accepted injury claims relating to cleaners and food service workers working at acute care hospitals within the province of BC between the years 2001 and 2008 were requested for the purposes of this study. The process included categorizing all the injuries by nine distinct employers (six health authorities and three contracting employers) as well as collapsing the numerous categories for nature of injury, body parts and type of accidents into broader analytic categories for descriptive statistics. The claims data were examined for quality purposes and study variables constructed as follows:

2.1.2.1. Job Groups

Every occupation listed in the WorkSafeBC database followed a Statistics Canada job code along with its description (Statistics Canada, 1993) which were collapsed into two broad categories: Cleaners and Food Service Workers (Table 14, Appendix A)

2.1.2.2. Location of the Injury

Operating locations for all claims, were cross-referenced with the list of acute care sites provided by the BC Ministry of Health as part of the bed count data file. This was done to retain claims relating to acute care sites only and to be able to attribute all included claims to an included acute-care location during the study period. Claims with sites that were not listed as per the BC Ministry of Health list for acute care sites or those that did not indicate an address or a particular location (less than three percent of the total claims) as a result of missing data and error in data processing were excluded from the dataset.

2.1.2.3. Injury Year

Claims for the outsourced companies were restricted to the years 2005-2008 as it reflected the post-outsourcing period for the acute health care sector in BC.

Similarly, claims for the Health Authorities that had outsourced were restricted for years that reflected the period pre-outsourcing i.e. 2001- 2003. For the Health Authorities that did not outsource at all, claims from 2001-2008 were included.

All claims for 2004 were excluded from the analysis because outsourcing was a gradual process that occurred during this transition year making it difficult to calculate a yearly claim rate that was unique to the hospital or the contractor for hospitals that transitioned.

2.1.2.4. Duplicate Entries

Claims that were exact duplicates were excluded except for one entry of the multiple records. There were about less than nine percent (203) claims (cleaners and food service workers) that were shown to be exact duplicate records in the data extract provided by WorkSafeBC to the researchers with the exception of the classification unit field. It is possible administratively for the costs associated with a claim to be distributed across multiple CUs for workers whose employer spans multiple classification units. It was assumed that the duplicates were an administrative record and only one record was included in the analysis.

2.1.2.5. Fraser Health (FH) Food Services and Vancouver Island Health Authority (VIHA)

Fraser Health had not completely outsourced its food services i.e., retail food services had been outsourced, but inpatient food services were still provided by Health Authority employees. Given this situation, and the dataset at hand, FHA was excluded from the analysis for Food Service Workers only as we were unable to

accurately assign claims to outsourced and non-outsourced periods at the hospital level within this authority.

Vancouver Island Health Authority had outsourced its support services on the south and central islands to private contractors, but support services at facilities on the north island were still provided by in-house employees. This health authority was excluded entirely from our analysis, as we were unable to accurately assign claims to outsourced and non-outsourced periods at the hospital level within this Authority.

2.1.3. Assignment of Exposure Variables

Several fields within the injury files were re-categorized into broader encompassing categories for the purposes of data analysis as follows:

2.1.3.1. Type of Accidents

‘Type of accidents’ registered for each injury were re-categorized and collapsed into broader categories based on the categories provided in the annual statistical reports by WorkSafeBC (2009) listed below:

- Harmful substances and others – Animal bites and stings, exposures to caustic substances, workplace violence and other miscellaneous accidents.
- Overexertion, bodily motion – All motions that related to strains and repetitive motion or bending, climbing, crawling, reaching or twisting.
- Slips, trips and falls – All accidents that involved slips, trips and falls (to lower and same levels)
- Struck by or against – All accidents that involved being struck by against objects or people

2.1.3.2. Body Parts

'Body Parts' associated with each injury were re-categorized into broader categories using the "WorkSafeBC Body Parts Codes" provided to the health care provider by WorkSafeBC (2006) as a guideline, The categories are listed below:

- Abdomen
- Back
- Head and Shoulders
- Chest
- Body Systems
- Upper Extremities – Hands, arms
- Lower Extremities – Legs, feet
- Pelvis- hips, buttocks, groin and pelvic region
- Others – multiple body parts, unknown

2.1.3.3. Nature of Injury

All the 'nature of injury' categories associated with each injury were re-categorized into broader categories using the "WorkSafeBC Nature of Injury Codes" provided to the healthcare provider by WorkSafeBC (2006) as a guideline. The categories are listed below:

- Back Strain – All injuries for which 'back' was listed as a body part and injury was listed as 'sprains, strains or tear' and unless explicitly specified that it was a back pain or a disc disorder
- Burns and Bruises – All contusions, bruises, chemical and heat burns
- Cuts, Punctures and Lacerations – cuts, punctures as well as splinters
- Musculoskeletal Injuries – all other sprains, strains, tears that were not related to backs, bursitis, capsulitis, fractures and osteopathy

- Systemic Diseases, Disorders and Others – Allergic reactions, occupational diseases, infections, poisonings and toxic effects, anxiety, animal bites, heat syncope, electrocutions, hernia, traumatic complications, non-specific injuries and disorders.

2.1.3.4. Hospital Size

To control for the effects of the size of hospitals on the risk of injuries, days lost and claims costs, claims were assorted based on three groups relating to the sizes of each hospital facility based on the corresponding annual bed counts. Size of the hospitals can be reflective of the workload and the resources provided, which indirectly can affect the outcome measures. The three size categories are:

- Small: less than 25 beds per hospital
- Medium: 25 to 99 beds per hospital
- Large: Greater than 100 beds per hospital

2.1.3.5. Health Authority

All claims were categorized into five groups based on the health authorities that the facilities belonged to regardless of the employer, as a proxy variable to control for the influence of Health Authority working and or occupational health and safety culture.

2.1.3.6. Exposure Periods

Two periods were created based on injury years of each claim to identify the period that was prior to outsourcing and the period that was post outsourcing. The groups are as follows:

- Period 1: All claims from 2001-2003 (Pre-outsourcing)
- Period 2: All claims from 2005-2008 (Post outsourcing)

2.1.4. Study Groups

All injury claims records were further stratified into two groups to identify outsourced support services and non-outsourced services based on the information provided by WorkSafeBC (S. Locke, personal communication, March 05, 2009). The groups are as follows:

- Non-Outsourced: Injury claim records listed under the two health authorities (Northern and Interior Health) that had not outsourced their support services at all between 2001-2008 (except for records for 2004).
- Outsourced: Injury claim records listed under three health authorities (Vancouver Coastal Health, Fraser Health and Provincial Health Services Authority) from 2001-2003 and from 2005-2008 listed under three private contractors (ARAMARK, Sodexo and Compass).

2.1.5. Model Specification and Analysis

Three types of analyses were carried out for cleaners and food service workers separately. Incidence rate ratios (IRRs) were calculated for the rate of short-term disability claims per hospital per year and for average days lost per claim per hospital per year to investigate the effect of the post-outsourcing period on the rate of injury and on average days lost relative to the pre-outsourcing period. This analysis was stratified by study group as we hypothesized that the effect of the post-outsourcing period would be different among hospitals that had outsourced versus those that had not during the follow-up period.

Trends in average costs per short-term disability injury per hospital were calculated using multiple linear regression modeling using the same comparisons outlined above.

2.1.5.1. Model Specification and Estimation

2.1.5.1.1. Poisson Regression

All analyses for annual injury rates and days lost per injury at the hospital level were carried out using variants of the Poisson regression method. The number of short-term injury claims and days lost per claim are discrete positive counts with means greater than 0 and hence, a Poisson distribution was assumed for these data (Kleinbaum, Kupper, Nizam & Muller, 2008; Cameron & Trivedi, 1998). The Poisson probability distribution is:

$$\Pr[Y = y] = \frac{e^{-\mu t} (\mu t)^y}{y!}$$

Where 'Y' is a positive discrete variable – number of short-term injury claims or number of days lost per claim, 'μ' is the rate parameter that dictates the probability of Y and 't' is the offset variable.

The Poisson distribution has the following assumptions (Kleinbaum et al., 2008, Cameron & Trivedi, 1998; Vittinghoff et al., 2005):

- 1) The expected mean of the distribution equals the variance of the distribution known as equidispersion.
- 2) Observations are independent i.e. each injury claim and count of days lost is independent of the previous count.
- 3) Used for rare events such as injuries. In certain cases, the Poisson distribution can approximate the binomial distribution for rare events with a large population size.
- 4) The logarithm of the outcome variable is linearly related to the exposure variable as modeled by the following equation:

$$\begin{aligned}\log E[Y_i] &= \log t_i + \beta_0 + \beta_1 x_1 + \beta_2 x_2 \dots \beta_j x_j \\ Y_i &= \exp(\log t_i + \beta_0 + \beta_1 x_1 + \beta_2 x_2 \dots \beta_j x_j)\end{aligned}$$

Where $E[Y_i]$ is the expected mean of the outcome variable Y and $i=1$ or 0 , β_0 is the reference group rate, β_j are the coefficients of the covariates x_j where $j= 1, 2, 3\dots$ and $\log t_i$ is the offset variable for the corresponding Y_i . Since the data is analyzed for a

set period of time, bed counts corresponding to each count were used to standardize the rates as an offset variable. The offset variable accounts for the varying bed counts per hospital per injury count per year (Hilbe, 2011).

Based on derivations provided by Kleinbaum et al. (2008), incidence rate ratios (IRR) were estimated by exponentiation of the co-efficient of the exposure variables of the models.

Deviations from the above assumptions can reduce the eligibility of the use of Poisson regression for analysis. In the case with our data, the following deviations were identified:

Over dispersion: An instance where the conditional variance exceeds the conditional mean, can negatively bias the standard errors (Trivedi & Cameron, 1998; J.T. Grogger & Carson, 1991).

Lack of independence: The yearly injury rate in one hospital may not be independent of the injury rate in subsequent years.

Negative binomial regression, variant of the Poisson regression was used to conduct the analysis, as it accounted for over dispersion in the data and it is more flexible than the Poisson distribution regarding the independence of each injury event.

2.1.5.1.2. Multiple Linear Regression

The analysis for total cost was carried out using multiple linear regression. It was assumed that cost is linearly associated with the exposure period, type of accident, nature of injury and hospital size. Appendix B and C (figures 1-4) illustrate that the distributions did not follow a normal distribution and hence, the analysis was carried out on a lognormal distribution to accommodate the violation.

2.1.5.2. Analysis

2.1.5.2.1. Objective 1

Alternative Hypothesis: We hypothesized that there would be a difference in the injury rate in the post outsourcing period compared to the pre outsourcing period among hospitals that transitioned to outsourcing, but that we would not observe this difference among hospitals that had not transitioned to outsourcing.

Method and Analysis:

Forty hospitals from two health authorities represented acute care facilities that had not outsourced cleaners or food service workers. Twenty-four hospitals from three health authorities represented acute care facilities that had outsourced their cleaners, and, eleven hospitals from these three health authorities represented acute care facilities that had outsourced their food service workers. Incidence rate ratios (IRR) were calculated for average number of accepted short term disability (STD) injury claims per hospital per year for cleaners and for food service workers from 2001 to 2008 using a negative binomial regression offset by bed count and clustered standard errors by hospital. IRRs were compared for the two study groups between pre (2001-2003) and post (2005-2008) outsourcing within each group. Models were adjusted for predictor variables such as exposure periods (post versus pre outsourcing), health authority effect and size of hospitals.

2.1.5.2.2. Objective 2

Alternative Hypothesis: We hypothesized that there would be a difference in the average days lost per injury at the hospital level per year in the post outsourcing period compared to the pre outsourcing period among hospitals that transitioned to outsourcing, but that we would not observe this difference among hospitals that had not transitioned to outsourcing.

Method and Analysis:

The mean days lost per injury per hospital per year were tracked as an indicator of severity of injury and burden for all employers. IRRs were calculated for the days lost per injury per hospital per year using zero-truncated negative binomial regression i.e. hospitals with zero claims in a year (i.e. costs of '0') were not included in the analysis with clustered standard errors by injury id. Separate sets of analyses were conducted for cleaners and food service workers. IRRs were compared for the two study groups between pre (2001-2003) and post (2005-2008) outsourcing within each group. Models were constructed to investigate the effect of the exposure period (post versus pre outsourcing), adjusted for health authority effect and size of hospitals.

2.1.5.2.3. Objective 3

Alternative Hypothesis: We hypothesized that there would be a difference in the average costs per injury claim at the hospital level per year in the post outsourcing period compared to the pre outsourcing period among hospitals that transitioned to outsourcing, but that we would not observe this difference among hospitals that had not transitioned to outsourcing.

Method and Analysis:

The mean compensation costs per injury per hospital per year were analyzed for the years pre (2001-2003) and post (2005-2008) outsourcing for the two exposure groups using linear regression and clustered standard errors by injury id. Models were constructed to investigate the overall effect of the exposure period (post versus pre outsourcing), and were adjusted for health authority, size of hospital, type of accident and nature of injury.

2.2. Study 2

Study 2 was a qualitative analysis of the perceptions and experiences of the cleaners and food service workers in acute care facilities in BC from an occupational health and safety perspective.

Due to the complexity of research related to a broad industry change of outsourcing, it was important to explore the human behavioral component of this study to support the quantitative analysis. As stated above, outsourcing could result in a possible evasion of compensation regulations leading to an increased risk of injury and associated outcomes, or a possible underreporting of injuries leading to a decreased risk of injury and associated outcomes (Quinlan & Bohle, 2009; Quinlan & Mayhew, 1999). As a result, and in order to minimize the effects of such limitations and also to receive worker feedback on the overall safety environment and reporting patterns after an injury incident, a qualitative component was designed to follow and complement our quantitative data analysis component of the study.

2.2.1. Sampling Strategy

A definitive sample size in qualitative research is highly dependent on the research question (Sandelowski, 1986). A purposive sampling strategy consisting of outsourced and non-outsourced workers was applied (Guest, Bunce & Johnson, 2006; Patton, 2002). This strategy allowed us to focus on a certain group of workers that represent the population of interest, based on preset criteria (i.e. outsourced or non-outsourced). The study concentrates on cleaners and food service workers in acute care sites in BC. .

Interview participants were recruited from one large (with more than 200 beds from 2001-2008) acute care facility within each health authority, totaling to five acute care sites. These acute care facilities were chosen for recruitment purposes (i.e. potentially a larger population of cleaners and food service workers). Two

health authorities out of the five, had not outsourced their support services and hence, the study sample was stratified by outsourced workers and non-outsourced workers. We aimed to conduct 45 individual semi-structured telephone interviews distributed among five hospitals, each representing one health authority. In order to equally distribute the number of interviews between the two job categories, five of the interviews at each site were conducted with food service workers while the remaining five interviews were conducted with cleaners. We used definitions of 'Food Service Worker' or a 'Cleaner' as defined by Statistics Canada job code descriptions from the dataset (Table 14, Appendix A).

2.2.2. Recruitment

2.2.2.1. Communication

Meetings were arranged with the HEU shop stewards at each site to explain the purpose of the study, to request their cooperation in helping with study outreach, and to encourage their co-workers to participate in the study. Paper copies of posters along with copies of the informed consent forms (Appendix D) were made available to the union shop stewards at each of the sites and sent electronically or mailed. Shop stewards were requested to put up these posters on the union notice boards at their respective hospitals. The shop steward provided copies of the Informed Consent Forms to any worker who expressed interest in participating in the study.

2.2.2.2. Study Posters

Study posters, which outlined the study purpose, participant inclusion criteria, and other relevant information related to participant involvement, were displayed on the designated union notice board for the workers. Participants were offered a \$20 gift card at a grocery store of their choice – Safeway or Save-On-Foods in appreciation of their time, effort and willingness to participate. Participants were encouraged to contact the study coordinator by phone using a toll-free number (1-

888-XXX-XXX) or via the study email address (cleaners.foodservices@ubc.ca) if interested in participating in interviews. These two options were provided to maximize participation from sites that were not located with the Greater Vancouver Regional District i.e. reducing long distance telephone costs. Arrangements were made for potential participants to leave a voicemail and call back number with their preferred callback date and time on a study phone number.

2.2.3. Time and Space

Most workers are on rotational shifts, given that the facilities are 24-hour facilities so, interviews were held at a convenient time outside working hours.

Interviews were held over the phone in a secure room at the (then) School of Environmental Health, at the University of British Columbia to reduce travel time and costs for both participants and the researcher. In addition to saving participant travel time, the choice of interview location, which was close to but not at the workplace, allowed workers to feel comfortable speaking to the interviewer without any social pressure from the employers or their colleagues about participating in this study.

2.2.4. Informed Consent Process

A verbal informed consent was obtained from the subjects prior to any data collection. This process involved the study coordinator reading section 12 of the informed consent form out on the phone that briefly outlined the purpose of the study, the risks and benefits from their participation as well as clearly outlining the voluntary nature of their participation and their right to withdraw from the study at any time. Participants were also informed that a copy of the informed consent form signed by the Principal Investigator would be mailed out to them for their records along with their honorarium at the end of the study. Once the subjects verbally consented to participating in the study, the interview was conducted and audio recorded.

2.2.5. Interviews

A preliminary phone call determined participant eligibility based on study inclusion criteria. The inclusion criteria allowed workers who were members of the Hospital Employees' Union working either as cleaners and/or food service workers at the five acute care sites to participate in the study. The inclusion criteria also stated that the workers should have worked for a minimum of 18 months at a particular site. This was to make sure that the workers were well aware of the occupational health and safety environment of their workplace and that they had completed any temporary probationary employment period.

Once eligibility was confirmed, a follow-up telephone call was scheduled depending on participant convenience for the interview. There were several instances where the participants were comfortable with consenting after they had met the eligibility criteria and wished to proceed with the interviews. In cases like these, the entire study was explained to them in detail over the phone to ensure that the ethical guidelines as per the UBC Behavioral Research Ethics Board were met and they were given sufficient time to ask any questions that they had before the start of the interviews.

2.2.6. Recording

The interviews were recorded using an digital audio recording device called a telephone pick up by Olympus (TP7), and connected to a landline telephone. The interviews were then recorded using recording software GarageBand (developed by Apple Inc.) as a podcast. These were then transcribed verbatim. In order to protect the identities of the participants at all times, participants were requested not to mention any names and/or their employer names while the audio recording was turned on. In cases where the names or any identifiers were accidentally mentioned, the identifying information was omitted during the transcription process to protect

the identity of the workers. In addition to the recording, notes were also taken simultaneously which were later compared with the transcripts.

2.2.7. Data Collection

For this particular project we conducted semi-structured interviews with open-ended questions (DiCicco-Bloom & Crabtree, 2006; Britten, 2006). These interviews can be described as a conversation between two people where the topic of discussion is guided by the interviewer. The main discussion topics (though not limited to) were workplace training, availability of OH&S material, concerns for OH&S at work and their injury reporting experiences (see interview guide, Appendix D. The interview with each participant was divided into three sections:

Interviewer Introduction

At this point in the interview, the interviewer tried to make the participant comfortable by asking participants to introduce themselves, talk about their employment history and current job designations. This lasted about 5 minutes and then it proceeded on to the next segment of the interview.

Interview

Once the participant was comfortable, the researcher asked more job specific questions relating to the participants' daily job tasks, training for their jobs, any health and safety concerns that they might have and finally, their experiences with reporting any injuries under different employer management if that was the case.

Closing Remarks

At the end of the interview, the researcher thanked the participants for their time and participation in the study. Once the recording was turned off, the postal address and the choice of gift card (Safeway or Save-On-Foods) was noted. Participants were assured that once the informed consent form and the honorarium was mailed out, the records of the postal addresses would be destroyed.

2.2.8. Transcript Storage

The Principal Investigator for this study at the School of Environmental Health at UBC held all records as per the guidelines outlined by UBC. Each transcript had a unique 8-digit identifier that was randomly assigned. The transcripts do not include any identifiers such as the subject name or employer or location for the purpose of maintaining the anonymity of the participants.

2.2.9. Analysis

Analysis was carried out as a combination of procedures in parallel with the data collection. Using a thematic approach, data was analyzed through an iterative process that allowed for identification of new emerging themes (DiCicco-Bloom & Crabtree, 2006; Britten, 2006; Pope, Ziebland & Mays, 2000; Burnard, 1991). Saturation was achieved when no new themes emerged.

Data analysis was conducted as follows:

The first stage involved transcribing the material from the recordings and sorting based on the questions asked. Data was transcribed partly by the researcher to get 'immersed' in the data and partly by a professional transcription service. In addition, the transcribed notes were compared to the notes taken by the interviewer, highlighting any different opinions that might have been captured to paint a complete picture (Ryan & Bernard, 2003).

The second phase of this process involves the processing of the data. This entailed a closer examination of the transcripts. The first thing that was done is to outline any emerging themes. This was done in accordance with the guidelines provided by Britten (2006); Ryan & Bernard (2003); Pope, Ziebland & Mays, (2000) and Burnard (1991) as summarized below:

- a) Vocabulary and Context: Frequently used words by participants were flagged, to determine degrees of similarity within responses and between responses. Answers to each of the questions were also scrutinized and interpreted based on the triggering stimulus, so as to understand the underlying behaviors behind the responses. These were then compared to the field notes to get a better sense of the context.
- b) Consistency: Instances where the respondents changed their opinions based on a particular stimulus or, when there was a lack of a response or a choice to withhold opinion on a certain matter was also be noted down as these too lead to a creation of themes.

Repetitive or redundant themes were then collapsed, and covered under a more descriptive encompassing theme based on the selected topics covered by the questions in the interview guide. Each theme had a description that was outlined in the codebook (Rubin & Rubin, 1995).

A codebook was created to identify the overarching themes and their variations. Five main themes were identified and their variations were labeled accordingly. The transcripts were labeled based on the master codes.

2.2.10. Data Validation

Where possible, the transcripts are given to the co-investigators to read and to come up with their own categories, thus resulting a list of five main themes, which were then checked for agreement and if need be, combined to give one master list of codes and themes (Ryan & Bernard, 2003). This method helped minimize any biases that might have been brought in by the investigators and validated the categorization (Pope et al. 2000).

3. Results

3.1. Study 1

Comparison of all accepted short-term disability (STD) claims in cleaners and food service workers pre-outsourcing (2001-2003) and post outsourcing (2005-2008).

3.1.1. Study Population

The study population involved claims records between 2001 and 2008 for cleaners and food service workers at 40 hospitals that did not outsource their support services, 24 hospitals that outsourced their cleaners and 11 hospitals that outsourced their food services. A grand total of 2,323 accepted workers' compensation claims for STD injuries were recorded within the acute care health care sector between the years 2001 and 2008 for both, cleaners and food service workers. A total of 1,548 claims related to cleaners of which 434 claims related to workers who worked at acute care sites that had never outsourced their support services while about 1,114 related to cleaners working at acute care sites who had outsourced their services. A total of 775 accepted STD claims were registered for FSWs at acute care sites in the study time period of which 380 STD injuries were reported for non-outsourced acute care sites while outsourced sites reported 395 injuries over the duration of our study period.

Table 3: Number of accepted STD claims per employment group and occupation.

Occupation	Non-Outsourced	Outsourced	Total Claims
Cleaners	N= 40 hospitals 434	N=24 hospitals 1,114	1,548
Food Service Workers	N= 40 hospitals 380	N= 11 hospitals 395	775

3.1.2. Comparison of Injury Rates Pre-Outsourcing to Post Outsourcing.

Table 4: Annual average rate of STD injuries per hospital per 100 beds for acute care facilities who did not outsource and those that outsourced their cleaners and FSW.

Exposure Period [!]	Year	Average injury rate per hospital per 100 beds (min, max rate)			
		Cleaners		Food Service Workers	
		Non-Outsourced	Outsourced	Non-Outsourced	Outsourced
		(N=40 hospitals)	(N=24 hospitals)	(N=40 hospitals)	(N=11 hospitals)
Period 1 (Pre-Outsourcing)	2001	3.20 (0,15)	6.09 (0, 33)	3.03(0,30)	3.58 (0,13)
	2002	2.51 (0,17)	4.04 (0, 15)	4.87 (0,50)	2.37(0,8)
	2003	2.64 (0,20)	3.10(0, 11)	2.06 (0,16)	3.00(0,6)
	2004	<i>Transition</i>			
Period 2 (Post Outsourcing)	2005	4.10 (0,33)	4.11 (0, 11)	3.12(0,17)	2.06(0,6)
	2006	3.21(0,38)	4.25 (0, 25)	2.99 (0,33)	2.37(0,7)
	2007	4.01 (0,17)	3.68 (0, 15)	3.18(0,33)	1.97(0,5)
	2008	3.29 (0, 18)	3.37 (0, 15)	3.32(0,23)	2.41(0,8)

[!] Period 1 = 2001-2003, Period 2 = 2005-2008

Table 4 shows average injury rates among cleaners and food service workers across acute care facilities that had outsourced and non-outsourced their support services during the study period. Injury rates ranged from a low of 0 claims per hospital per 100 beds in at least one hospital during each year of follow-up to a high of 38 claims per hospital per 100 beds for a cleaner at a non-outsourced hospital in 2006. The average annual hospital injury rate ranged from approximately 2 to 4 claims per hospital per 100 beds, although the average rate did rise up to 5 and 6 claims per hospital per 100 beds in the few follow-up years. Overall, table 4 above shows that the average rate of injury fluctuated every year for each period, with no particular trend in the rate by year.

Table 5: Incidence rate ratios (IRR) of STD injuries for cleaners in acute care facilities pre-outsourcing (2001-2003) and post outsourcing (2005-2008).

Exposure Period [!]	Facilities that did not outsource (N= 40 hospitals)			Facilities that outsourced (N=24 hospitals)		
	Total Number of Injuries	Incidence Rate Ratios (95% CI)		Total Number of Injuries	Incidence Rate Ratios (95% CI)	
		Unadjusted [^]	Multivariate Adjusted [#]		Unadjusted [^]	Multivariate Adjusted [#]
Period 1	192	1.0 (Reference)	1.0 (Reference)	547	1.0 (Reference)	1.0 (Reference)
Period 2	242	1.16 (0.87-1.55)	1.14 (0.88-1.49)	567	0.88 (0.65-1.18)	0.79 (0.57-1.09)
Total	434			1,114		

CI: 95% Confidence Intervals

p<0.10*, p<0.05**, p<0.001***

[^] Number of injuries were adjusted only for exposure period i.e. Pre-Outsourcing versus Post Outsourcing.

[#] Multivariate adjusted IRRS were adjusted for exposure period (Pre-Outsourcing, Post Outsourcing) hospital size (small, medium and large) and health authority influence (2 health authorities for those that did not outsource and 3 health authorities for those that did)

[!] Period 1 = 2001-2003, Period 2 = 2005-2008

The IRRs of STD injuries for cleaners in both types of study groups (non-outsourced versus outsourced) were calculated using the negative binomial regression due to the following reasons:

- a) Over dispersion: The conditional variances exceeded the conditional means for each exposure variable in relation to the outcome variable (Tables 17 and 18, Appendix B). 'Alpha', the over dispersion parameter was greater than 0.
- b) Visual inspection: Figures 1 and 2 (Appendix B) show that the negative binomial distribution fitted the data better than the Poisson distribution.
- c) Goodness-of-fit Test: Chi² value of the goodness-of-fit test carried out (Tables 17 and 18, Appendix B) was statistically significant ($p < 0.05$), confirming the ineligibility of a Poisson distribution.

Incidence rate ratios for STD injuries were calculated for cleaners (Table 5) who worked for facilities that moved from no outsourcing (Period 1) to outsourcing (Period 2). These were then compared to IRRs for cleaners who worked for facilities that did not outsource their support services during the two exposure periods (1 and 2). The IRRs for each comparison group were adjusted for effects of exposure period, hospital size and health authority culture (Tables 17 and 18, Appendix B).

The IRRs of STD injuries showed an increase for cleaners among non-outsourced facilities in period 2 (2005-2008), although 95% confidence interval (CI) for estimates include '1' (IRR = 1.14, CI=0.88-1.49), indicating the possibility of no difference in the rates between the two exposure periods. This was not observed among cleaners in facilities that outsourced as the IRRs of STD injuries at these facilities decreased during the period post outsourcing (2005-2008), although the 95% CI for estimates include '1' (IRR=0.79, CI=0.57, 1.09) as well, indicating a possibility of no difference in rates between the two exposure periods.

Table 6: Incidence rate ratios (IRR) of STD injuries for Food Service Workers in acute care facilities pre-outsourcing (2001-2003) and post outsourcing (2005-2008).

Exposure Period [!]	Facilities that did not outsource (N=40 hospitals)			Facilities that outsourced (N=11 hospitals)		
	Total Number of Injuries	Incidence Rate Ratio (95% CI)		Total Number of Injuries	Incidence Rate Ratio (95% CI)	
		Unadjusted [^]	Multivariate Adjusted [#]		Unadjusted [^]	Multivariate Adjusted [#]
Period 1	150	1.0 (Reference)	1.0 (Reference)	238	1.0 (Reference)	1.0 (Reference)
Period 2	230	1.12 (0.84-1.49)	1.10 (0.82-1.47)	157	0.61** (0.36-1.05)	0.65* (0.38-1.10)
Total	380			395		

CI: 95% Confidence Intervals

p<0.10*, p<0.05**, p<0.001***

[^] Number of injuries were adjusted only for exposure period i.e. Pre-Outsourcing versus Post Outsourcing.

[#] Multivariate adjusted IRRs were adjusted for exposure period (Pre-Outsourcing, Post Outsourcing) hospital size (small, medium and large) and health authority influence (2 health authorities for those that did not outsource and 3 health authorities for those that did)

[!] Period 1 = 2001-2003, Period 2 = 2005-2008

The IRR of STD injuries for FSWs in both types of exposure groups (Non-Outsourced versus Outsourced) was calculated using the negative binomial regression due to the following reasons:

- a) Over dispersion: The conditional variances exceeded the conditional means for each exposure variable in relation to the outcome variable (Table 24 and 25, Appendix C). 'Alpha' the over dispersion parameter was greater than 0.
- b) Visual inspection: Figures 13 and 14 (Appendix C) show that the negative binomial distribution fitted the data better than the Poisson distribution.
- c) Goodness-of-fit Test: Chi² value of the goodness-of-fit test carried out (Table 26 and 27, Appendix C) was statistically significant ($p < 0.05$), confirming the ineligibility of the use of a Poisson distribution.

Incidence rate ratios for STD injuries were calculated for FSW (Table 6) who worked for facilities that moved from no outsourcing (Period 1) to outsourcing (Period 2). These were compared to IRRs for FSW who worked for facilities that did not outsource their support services during the two exposure periods (1 and 2). The IRRs for each comparison group were adjusted for effects of exposure period, hospital size and health authority culture (Tables 26 and 27, Appendix C).

The IRRs of STD injuries showed an increase for FSW among non-outsourced facilities in period 2 (2005-2008), although 95% CI for estimates include '1' (IRR = 1.10, CI=0.82-1.47), indicating the possibility of no difference in the rates between the two exposure periods. This was not observed among FSW in facilities that outsourced as the IRRs of STD injuries at these facilities decreased during the period post outsourcing (2005-2008), although the 95% CI for estimates include '1' (IRR=0.65, CI=0.57, 1.10) as well, indicating a possibility of no difference in rates between the two exposure periods.

3.1.3. Comparison of Average Days Lost per Injury Pre-Outsourcing to Post Outsourcing.

Table 7: Average days lost per injury claim per hospital per year for acute care facilities that did not outsource and those that did outsource their cleaners and food service workers

Exposure Period [!]	Year	Average days lost per injury claim per hospital (min, max)*			
		Cleaners		Food Service Workers	
		Non- Outsourced	Outsourced	Non- Outsourced	Outsourced
		(N=40 hospitals)	(N=24 hospitals)	(N=40 hospitals)	(N=11 hospitals)
Period 1 (Pre- Outsourcing)	2001	48 (2, 276)	37 (11, 81)	18 (1,126)	24 (5, 46)
	2002	49 (1, 251)	36 (2, 89)	41 (4, 235)	14 (3, 34)
	2003	11 (1, 35)	40 (9, 139)	30 (1, 205)	36 (1, 138)
	2004	<i>Transition</i>			
Period 2 (Post Outsourcing)	2005	25 (1,102)	23 (2, 54)	19 (1, 61)	23 (5, 51)
	2006	29 (1,135)	25 (6, 60)	21 (1, 67)	22 (1, 51)
	2007	27 (1,142)	33 (3, 76)	23 (2, 71)	35 (2, 178)
	2008	22 (3, 78)	27 (2, 52)	24 (2, 127)	20 (1, 47)

* rounded up to the nearest whole number.

! Period 1 = 2001-2003, Period 2 = 2005-2008

Table 7 shows average days lost per injury claim per hospital among cleaners and food service workers across acute care facilities that had outsourced and non-outsourced their support services during the study period. Average days lost ranged from a minimum of at least 1 day lost per claim in at least one hospital during each year of follow-up to a maximum of 276 days per claim per hospital for a cleaner at a non-outsourced hospital in 2001. Hospitals with zero claims were not included in this analysis. The average annual days lost per injury ranged from approximately

11 to 30 days lost per claims per hospital, although the average days lost did go up to 35 and 49 days lost per injury per hospital per year in the few years pre-outsourcing. Overall, the table above shows that the average number of days lost per injury fluctuated every year for each period, with no particular trend by year.

Table 8: Incidence rate ratio (IRR) of average days lost per STD injury per hospital for cleaners in acute care facilities pre-outsourcing (2001-2003) and post outsourcing (2005-2008)

Exposure Period [!]	Facilities that did not outsource (N=40 hospitals)		Facilities that outsourced (N=24 hospitals)	
	Total Number of Injuries		Total Number of Injuries	
	Total Number of Days Lost	Incidence Rate Ratio (95% CI)	Total Number of Days Lost	Incidence Rate Ratio (95% CI)
		Unadjusted [^]		Unadjusted ^{\$}
		Multivariate Adjusted [#]		Multivariate Adjusted [#]
Period 1	192	5,885	1.0 (Reference)	1.0 (Reference)
Period 2	242	7,372	0.99 (0.68-1.46)	0.83** (0.69-1.00)
Total	434	13,257	0.98 (0.68-1.40)	0.81** (0.66-0.99)
			1,114	39,409

CI: 95% Confidence Intervals

p<0.10*, p≤0.05**, p<0.001***

[^] Number of days lost were adjusted only for time period i.e. Pre-Outsourcing versus Post Outsourcing.

[#] Multivariate adjusted IRRs were adjusted for time period (Pre-Outsourcing, Post Outsourcing) hospital size (small, medium and large) and health authority influence (2 health authorities for those that did not outsource and 3 health authorities for those that did)

[!] Period 1 = 2001-2003, Period 2 = 2005-2008

The IRRs of average days lost per STD injury per hospital for cleaners in both types of exposure groups (Non-Outsourced versus Outsourced) (table 8) was calculated using a zero-truncated negative binomial regression due to the following reasons:

- a) Over dispersion: The conditional variances exceeded the conditional means for each exposure variable in relation to the outcome variable (Appendix B, tables 19 and 20). 'Alpha' the over dispersion parameter was also greater than 0.
- b) Visual inspection: Figures 3 and 4 (Appendix B) show that the negative binomial distribution fitted the data better than the Poisson distribution.
- c) Goodness-of-fit Test: Chi² value of the goodness-of-fit test carried out (table 21 and 22, Appendix B) was statistically significant ($p < 0.05$), confirming the ineligibility of the use of a Poisson distribution.

Incidence rate ratios (IRRs) for days lost per injury were calculated for cleaners (Table 8) who worked for facilities that moved from no outsourcing (Period 1) to outsourcing (Period 2). These were compared to IRRs for cleaners who worked for facilities that did not outsource their support services during the two exposure periods (1 and 2). The IRRs for each comparison group were adjusted for effects of exposure period, hospital size and health authority culture (Tables 21 and 22, Appendix B).

The IRRs of days lost per injury showed minimal or no change for cleaners among non-outsourced facilities (IRR = 0.98, CI=0.68-1.40) in period 2, indicating the possibility of no difference in the average days lost per claim between the two exposure periods. This was not observed among cleaners in facilities that outsourced as the IRRs of average days lost per injury at these facilities decreased during the period post outsourcing (2005-2008). The 95% CI for estimates do not include '1' in this case, indicating a possibility that the days lost per claim in period 2 might be lower compared to period 1 (IRR=0.81, CI=0.66, 0.99).

Table 9: Incidence rate ratio of average days lost per STD injury per hospital for Food Service Workers in acute care facilities pre-outsourcing (2001-2003) and post outsourcing (2005-2008).

Exposure Period [!]	Total Number of Injuries		Facilities that did not outsource (N=40 hospitals)		Total Number of Injuries		Facilities that outsourced (N=11 hospitals)	
		Total Number of Days Lost	Incidence Rate Ratio (95% CI)			Total Number of Days Lost	Incidence Rate Ratio (95% CI)	
			Unadjusted^	Multivariate Adjusted#			Unadjusted^	Multivariate Adjusted#
Period 1	150	4,226	1.0 (Reference)	1.0 (Reference)	238	6,973	1.0 (Reference)	1.0 (Reference)
Period 2	230	5,709	0.86 (1.47-3.88)	0.90 (0.59-1.37)	157	3,648	0.76 (0.48-1.20)	0.80 (0.50-1.28)
Total	380	9,935			395	10,621		

CI: 95% Confidence Intervals

p<0.10*, p≤0.05**, p<0.001***

[^] Number of days lost were adjusted only for time period i.e. Pre-Outsourcing versus Post Outsourcing.

[#] Multivariate adjusted IRRs were adjusted for time period (Pre-Outsourcing, Post Outsourcing) hospital size (small, medium and large) and health authority influence (2 health authorities for those that did not outsource and 3 health authorities for those that did)

[!] Period 1= 2001-2003, Period 2 = 2005-2008

The IRR of average days lost per STD injury per hospital per year for FSW in both types of exposure groups (Non-Outsourced versus Outsourced)(table 9) was calculated using a zero-truncated negative binomial regression due to the following reasons:

- a) Over dispersion: The conditional variances exceeded the conditional means for each exposure variable in relation to the outcome variable (Appendix C, tables 28 and 29). 'Alpha' the over dispersion parameter was also greater than 0.
- b) Visual inspection: Figures 15 and 16 (Appendix C) show that the negative binomial distribution fitted the data better than the Poisson distribution.
- c) Goodness-of-fit Test: Chi² value of the goodness-of-fit test carried out (table 30 and 31, Appendix C) was statistically significant ($p < 0.05$), confirming the ineligibility of the use of a Poisson distribution.

Incidence rate ratios for average days lost per injury were calculated for FSW (Table 9) who worked for facilities that moved from no outsourcing (Period 1) to outsourcing (Period 2). These were compared to IRRs for FSW who worked for facilities that did not outsource their support services during the two exposure periods (1 and 2). The IRRs for each comparison group were adjusted for effects of exposure period, hospital size and health authority culture (Tables 30 and 31, Appendix C).

The IRRs of days lost per injury showed a decrease for FSWs among non-outsourced facilities (IRR = 0.90, CI=0.59-1.37) in period 2, although the 95% CI for estimates include '1', indicating the possibility of no difference in the days lost per claim between the two exposure periods. The same effect was also observed with FSWs in outsourced facilities as the IRRs of days lost per injury decreased during the period post outsourcing (2005-2008). Like the previous group, the 95% CI for estimates include '1' (IRR=0.80, CI=0.50, 1.28), indicating a possibility that there may be no difference in the days lost per claim in period 2 compared to period 1.

3.1.4. Comparison of Cost (\$) per Injury per Hospital Pre-Outsourcing to Post Outsourcing.

Table 10: Annual rates of mean cost (\$) per injury claim per hospital for acute care facilities that did not outsource and those that did outsource their cleaners and food service workers.

Exposure Period [!]	Year	Mean cost (\$) per injury claim per hospital (min-max) [^]			
		Cleaners		Food Service Workers	
		Non-Outsourced	Outsourced	Non-Outsourced	Outsourced
Period 1 (Pre-Outsourcing)	2001	293.31	290.34	105.12	180.21
		(8-1,529)	(28-816)	(4- 721)	(6- 583)
	2002	367.29	183.40	356.96	72.15
		(7- 3,088)	(11-743)	(3-2,035)	(13- 241)
	2003	64.40	174.54	291.40	186.61
		(3- 248)	(24-481)	(3-2,326)	(8- 909)
	2004	<i>Transition</i>			
Period 2 (Post Outsourcing)	2005	180.61	106.30	168.17	83.43
		(7-799)	(11-228)	(1- 1,214)	(7- 275)
	2006	287.58	131.30	224.16	124.13
		(5-2,193)	(16-422)	(10- 1,372)	(1-357)
	2007	198.22	186.75	189.69	197.80
		(16-1,390)	(4-875)	(13- 660)	(7- 1,334)
	2008	172.46	126.44	196.84	58.03
		(3- 1,179)	(6- 324)	(11- 1,377)	(6- 124)

[!] Period 1 = 2001-2003, Period 2 = 2005-2008

Table 10 shows the average annual cost rates per injury per hospital for the period 2001 to 2008 among cleaners and food service workers across acute care facilities that had outsourced and not outsourced their support services during the study period. The range of costs per injury ranged from a low of \$1 for an outsourced FSW

in 2006 to a high of \$3,088 for a non-outsourced cleaner in 2001. The annual average costs per injury ranged from approximately \$58 to about \$290 per injury per hospital in the period post outsourcing, while, the average costs in the period prior to outsourcing range from \$64 to around \$370 per injury per hospital per year. Overall, the table above shows that the average costs per injury per hospital fluctuated every year for each period regardless of the study group, with no particular trend per year.

Table 11: Multivariate analysis of average cost per injury per hospital per year in each exposure period for all acute care facilities for cleaners.

Exposure Variables	Non-Outsourced		Outsourced	
	Coefficient [^]	Std. Error	Coefficient [^]	Std. Error
Exposure Period ^{! #}				
Period 1	Reference category		Reference category	
Period 2	0.20	0.12	-0.25**	0.09
Constant	7.28***	0.13	7.7***	0.09
Total claims (N)	434		1114	
Adjusted R ²	0.065		0.116	

p≤0.10*, p≤0.05**, p≤0.001***

! Period 1 = 2001-2003, Period 2 = 2005-2008

Adjusted for nature of injury, type of accident, health authority effect and hospital size

[^] ln (total cost paid till Dec 31, 2008)

Multivariate analysis was carried out for annual average costs per injury per hospitals for cleaners who worked at facilities that did not outsource for two exposure periods – non-outsourcing (Period 1) to outsourcing (Period 2). The results were compared to the analysis carried for cleaners who worked at facilities that outsourced their services for the same exposure periods. The analyses were adjusted for covariates such as nature of injury, type of accident, health authority culture and hospital size (Table 23, Appendix B).

Table 11 shows that the positive coefficient (0.20) for average costs per injury claim for the acute care facilities that did not outsource (cleaners) in the period 2

indicates an increase in the average claims costs per hospital, though not statistically significant ($p\text{-value} > 0.05$) as compared to period 1, suggesting that there is no difference in average costs per claim per hospitals in the period post outsourcing as we fail to reject the null hypothesis. The same effect, was not observed for average costs per claim per hospital associated with cleaners at acute care facilities that outsourced their cleaning services as the negative coefficient (-0.25) indicates a decrease in the period post outsourcing and is statistically significant ($p\text{-value} < 0.05$).

Table 12: Multivariate analysis of average cost per injury per hospital per year in each exposure period for all acute care facilities for food service workers

Exposure Variables	Non-Outsourced		Outsourced	
	Coefficient [^]	Std. Error	Coefficient [^]	Std. Error
Exposure Period ^{! #}				
Period 1	Reference category		Reference category	
Period 2	0.04	0.13	-0.14	0.14
Constant	7.415***	0.18	7.594***	0.14
Total claims (N)	380		395	
Adjusted R ²	0.18		0.24	

$p \leq 0.10^*$, $p \leq 0.05^{**}$, $p \leq 0.001^{***}$

[!] Period 1 = 2001-2003, Period 2 = 2005-2008

[#] Adjusted for nature of injury, type of accident, health authority effect and hospital size

[^] ln (total cost paid till Dec 31, 2008)

Multivariate analysis was carried out for annual average costs per injury per hospitals for food service workers who worked at facilities that did not outsource for two exposure periods – non-outsourcing (Period 1) to outsourcing (Period 2). The results were compared to the analysis carried for food service workers who worked at facilities that outsourced their services for the same exposure periods. The analyses were adjusted for covariates such as nature of injury, type of accident, health authority culture and hospital size (Table 32, Appendix C).

Table 12 shows that the positive coefficient (0.04) for average costs per injury claim for the acute care facilities that did not outsource food service workers in period 2 indicates an increase in the average claims costs per hospital, as compared to period 1. The same effect, was not observed for average costs per claim per hospital associated with food service workers at acute care facilities that outsourced their services as the negative coefficient (-0.14) indicates a decrease in the period post outsourcing. In both study groups, the p-value is greater than 0.05 for the model, suggesting that there is potentially no change in the average costs per claim per hospitals in the period post outsourcing.

3.2. Study 2

A total of 20 participants agreed to share their experiences and perceptions through telephone interviews conducted from February 2011 to April 2011. Eight of these participants worked for employers who had not outsourced their support services at all and the remaining twelve worked for private contractors. We had a wide range of worker experience ranging from two to thirty years with the same employer. While we had hoped to include workers who had worked for both, the Health Authorities and the private contractors post outsourcing; we were only able to interview one participant that met this description. Additionally, we also interviewed an outsourced worker who worked two full-time positions-as a cleaner and as a food service worker.

The structure of the interviews revolved around themes that were common to both job types (cleaners and food service workers) regardless of their job specific activities, which allowed us to compare and contrast between the two employment groups (non-outsourced and outsourced). In most cases, the key points were common to both groups but where applicable, the differences are discussed separately.

The narratives that emerged from the interviews were classified into five main themes as follows: injury experience, workplace training, occupational health and safety awareness, employer support and work overload.

3.2.1. Injury Experience

Workers were asked to describe their injury experiences in terms of having had any injuries and if they felt comfortable reporting them. A positive experience was indicated when the injury was reported and compensated. A negative experience was indicated when the injury either resulted in a workers' compensation claim denial or the participant had trouble reporting the injury itself.

Overall, every worker who was interviewed felt that they were actively encouraged to report injuries regardless of the magnitude. There were some workers, who did face challenges with management in regards to their injuries, which in some cases might influence future injury reporting.

3.2.1.1. Positive Experience

All of the non-outsourced participants reported a positive experience when they felt actively encouraged to report their workplace injuries, as described by this one worker who said:

[...] my experience in that whole situation [injury] was well addressed; it was actually a good experience for me. I talked to my supervisor as soon as I got out of the emergency when a doctor took a look at it and gave me the results. And so, with my supervisor, we filed a complaint, not a complaint, but a file towards, to, workers' comp[ensation board]. And then I got a claim there and then so from that then I had a doctor's appointment and stuff and so they assessed the situation, reimbursed me loss of wages as a result ...

There was one participant who was injured at work but the injury claim was denied. The participant points out that in spite of the injury claim denial, a return to work program helped the participant's recovery from the injury as described below:

Yes, yes, there is always a back to work program. Where you start out with less hours, lighter duties. Sometimes up and back to regular day with regular duties. And it's usually you start off, sometimes depending on the injury with 2 hours a day, sometimes they start you off with 4 hours a day for 2 weeks, then you go for 6 hours for 2 weeks, then you'll go to your full hours after that but it depends on the type of injuries that has occurred.

3.2.1.2. Negative Experience

On the other hand, the participants who were outsourced workers reported mixed feelings. While most had positive experiences with their injuries and felt encouraged to report (eight out of ten who reported being injured at work), there were two participants who did not have a positive experience despite feeling encouraged to report their injuries. One participant recalled that despite being encouraged to report their injuries, "some people are too scared to file or say anything [...]" suggesting that there might be remote incidences of underreporting. Another outsourced participant who has always felt encouraged to report injuries also suggests that:

[...] the severity to which people will report it is different. As in, if it's a small thing, people in the hospital [direct care staff] will quickly report it to the supervisor, I find, but I find for housekeeping some people will kinda tough it out and say, 'Oh no, it's not a big thing, so I'm not going to tell my supervisor,' and they'll just leave it at that.

This indicates a potential for underreporting of minor injuries that may not result in time-loss claims.

Another participant suggests that, “Sometime some worker have very difficult time to do the claim because the employer do not accept the claim right?” This point was reiterated in the case of a worker who was threatened by a manager for an injury that was reported. According to this participant:

My experience with that is, you know, my manager before; he been threat me, like, ‘I will contest the WorkSafeBC for your injury’. The manager is kind of mean sometimes. I don’t know why, but when I have that injury, he leave me a message at home and then, ‘I will contest your claim’, would even say that. He want[ed] me to go to work and then with my injury.

There is also a possibility that workers may face difficulties while reporting injuries due to their historical disputes with the employer. One outsourced worker claimed being wrongfully suspended in relation to a workplace injury. The participant took no action against this, fearing job loss.

3.2.2. Workplace Training

Three types of responses were discovered under this theme. Participants felt adequately trained, some felt inadequately trained, and others felt that new hires were not adequately trained.

3.2.2.1. Feels Adequately Trained

Overall, the workers who identified feeling sufficiently trained attributed to three main reasons: a) they had spent a number of years in that position or b) their training was adequate or c) received training (e.g. certification) prior to starting their current job.

For instance, one participant felt adequately trained because they had spent a number of years in their position, as certain jobs required one to “start at the bottom and work your way up”. Another participant says:

Myself, I have training. Yes. [...]I find that we are fortunate at this particular health site. [*Interviewer asked for an explanation*]. I just find that they are a bit more, sometimes it feel like trial by fire, they toss you into a ward but they do give you, I think sufficient training for working on a floor. Yes, but my particular job, my waste [collection] job, I picked it up pretty fast and I’ve been in the job for about six years now. So, but, I’ve kept this job and I like it.

Some workers felt that the orientation training was adequate such as a participant who worked for a contractor with more than 5 years of work experience states:

When I’m start here, they give us first training, like different, different places, because, I’m starting on call, so they give me proper training [in] each area almost, so when I’m [working], because after my training’s over, anywhere I’m comfortable to work.

A small proportion of the participants, felt that their perceived adequacy in training was a combination of both, on-the-job training and training prior to their current employment. They also recalled that it was prior training that enabled them to fill in key gaps and train themselves to be confident enough to carry out their tasks independently as shared by this participant:

When I first came on the job, they didn’t really give me adequate training, but because I have 10-years training in janitorial work prior to being hired by employer [X], I had a good... well... understanding of what the job entails and what to do. I just had you know, people, kind

of pointing out different things that they would do different in the hospital than you would do in the general population for cleaning.

3.2.2.2. Feels Inadequately Trained

Workers who felt inadequately trained pointed out that they either did not have enough time to get trained and had to train themselves due to inadequate resources, as this participant recalls:

You know, they just basically, they just gave us a... One day, they just trained us. One day they went, ... it was a three-day training but one day they just spent on filling out forms and talking and the next day they just showed us what they actually wanted us to do. And the third day they just issued us uniforms and a flu shot and everything like that, but basically, we just trained each other –‘this way you do that and that is the[...]' There was no basic training about anything.

Another participant indicated that the transition from in-house services to private contractors created more challenges for workplace training as evidenced by:

[...] We had to almost self train ourselves at the beginning. Because ... nothing was left for the new company [x] in the way of format, and so they basically had to start from scratch. And there were just a few that stayed on. [...] No, no managers or supervisors had any idea of how the job descriptions ran. So they had to basically, rely on the few individuals who stayed on.

3.2.2.3. New Workers Inadequately Trained

A few of the participants strongly felt that the incoming newer recruits were not sufficiently trained:

Well you know what, I kinda trained myself. The housekeepers, the new ones that get hired, no, they don't have enough cleaning [training] and that's where I run into an awful lot of problems with[...]

3.2.3. Occupational Health and Safety (OH&S) Resources

Participants were asked if they were aware of, and the purpose of the Joint Occupational Health and Safety (JOSH) committee for their section, and resources provided by them. They were also asked if they had a particular point of contact in cases where they had a query regarding OH&S.

Overall, there was a mixture of sentiment regarding OH&S awareness, with no obvious differences in themes emerging among outsourced and non-outsourced workers. Most workers in both groups were aware of their JOSH committees and its purposes and most workers in both groups knew whom to contact in an OH&S situation.

3.2.3.1. Joint Occupational Health and Safety Committee

Most participants were aware of the joint occupational health and safety (JOSH) committee for their sections, and its purposes. A very small fraction (two out of the twelve outsourced workers and two out of the eight non-outsourced workers) was completely unaware, possibly because it may not be well advertised as explained below by a participant:

People talk about it but they never tell you what it's all about. Oh you know, they'll talk about the joint occupational health and safety people, and I'm like, 'Well, that's good, but what is it? Oh, I don't know. Well, OK, good.' That doesn't help us at all. You just hear about it through word of mouth but you don't get any details on what it's all about.

3.2.3.2. OH&S Resources

Most of the participants pointed out that they were satisfied with the resources provided and expressed appreciation of any extra training that was given. The evidence provided by some who received periodic training information and resources solidified this point, as indicated by these quotes:

Yes, every [safety training] refreshment is useful. Why not? I always try to pick any points, any new points they concern about it ... yeah... it's useful for me.

[...] we do get umm... safety readings and safety reminders from our supervisors[...]It is useful 'cause it is the basics. But... umm for people who are already doing the job, it's just reminder of what we're already doing.

[...] I do have to give the company credit that, they have always pushed that, that, umm... , 'Here are the books, and when you have spare time to read them'. I have picked it up here and there, little bit.

3.2.3.3. OH&S Contact

All the participants pointed out that their main point of contact regarding occupational health and safety was their supervisor, a co-worker, a manager or a union representative. Some have also indicated that in case none of these people are available, "We have the books. If she's (co-worker) is not around, there are books."

3.2.4. Workplace Support

Participants recognized the importance of employee morale and management support. Regardless of their employment status, participants often felt that they got little to no support from the management by way of any encouragement or any concern for employee well being. Participants indicated that they would appreciate more support, particularly by way of more workplace training and safety awareness

and finally, a few others indicated that they felt satisfied with the current workplace support.

3.2.4.1. Feels Supported

Feelings of support were demonstrated by the fact that the participants felt that 'their voices' were heard when management implemented positive changes into their workplace. For example:

Actually, they're starting to make, making improvements over the last year and a half or so to our work environment and the equipment that we're working with. They're bringing in more up-to-date equipment to make our jobs easier. These are all things we told our boss we feel need to be done for our own safety.

3.2.4.2. Feels Unsupported

Some participants felt that the employer did not care enough about them and did not verbally encourage them or show any sort of empathy or concern as indicated by this non-outsourced worker who said:

I wish that the employer would take more time to check up on the workers, just to see how they are doing, you know, and to make sure that, 'Oh, hey, you don't need help' or 'you do need help' instead of going another direction and say, 'Oh, no, you're ok. Oh, and I want you to do all that too'. I want, you know, it would be nice that they'd come in and see us and say, 'Oh, what a good job you're doing', or, 'Oh, can I help you?' and actually help.

Another area where participants felt unsupported, was when there was a lack of action towards OH&S. Workers felt that the employer did not care as much for their health, safety and well being, compared to the direct care health workers as demonstrated by this statement:

I absolutely get very frustrated. Right now, I am working the different department, but when I was working in the X-Ray department, like, if there was some very sick person that some ambulance people had boarded right? And right away they would test out that this person has got, well, sickness or something. Right away they would give the ambulance people [vaccination] shots, the nurses who had handled it, the x-ray people, they were all treated or given some type of [vaccination] shots; something to help them. But the poor housekeeper was always left out because we are private company. We were there, we were cleaning up behind. We were cleaning up all this mess, there were no, no shots, no tests, no nothing for us. And that's really weird; makes me very upset about it, like we are second-class citizens.

In terms of comparing the environment pre and post outsourcing, a worker who had the chance to work for both types of employers described the changes through this statement:

uh... just the morale, just the support, just the umm [*sic*]... we used to be looked at and respected as a housekeeper on the floors, we were very respected. Our management really respected us. When I first started, after with, with, when it wasn't private, a week into my job, he (the manager) said, '[employee name]! Oh! What a great job I was doing, and keep up the good work. And talking about machinery, we were, we were, taken aside separately, and you were trained how to use a machine, not in a group form and I think you need to touch a machine to actually understand how it works. You're not just shown how a car runs, and go here's the key get in and go. You know ? [...] So much more respected. We were, before this private[isation], and we were respected by everyone in the hospital whereas now there is just little respect .

3.2.5. Work Overload

Every worker interviewed regardless of their employment status (outsourced or non outsourced) indicated that they had felt overworked. They felt that more tasks were added to their daily job list and less people were assigned to certain areas thereby increasing their daily workload, which they were expected to finish. Workers also indicated that though the hospitals may have expanded in capacity, the number of workers servicing each site had not grown in proportion leading to understaffing as evidenced by this non-outsourced worker, who explicitly states:

[...] Our workload has increased by ... it's ridiculous. [...] It's getting worse. [...] they are expecting a lot of stuff out of us . Way more than they used to. There are less jobs and we get paid less on top of it.

The same worker goes on to acknowledge that with less people to work, they are “scrambling” to accomplish all their tasks and finds that they were, “ making more mistakes. ‘Cause, you know, it takes much more to concentrate on the (tray) lines to have so many extra things to do”.

Workers also suggest that work overload also creates a stressful work environment as evidenced by:

Well, we are concerned about our health and safety, because we do much workload there. And it's too much a stressful environment there. I don't think that's really healthy. *[Interviewer clarifies]* Unhealthy mean like, this is overload and employees are always being shouted and employees always with too much pressure. If everybody stressed there, how could that be health environment?

Overall, there was no distinction found between the sentiments shared by the outsourced workers and the non-outsourced workers in regards to workplace training, employer support, occupational health and safety resources and work overload. A difference in opinion was seen for the theme regarding injury reporting between outsourced and non-outsourced. While both sets of workers felt encouraged to report their injuries, outsourced workers alluded to potential incidents of underreporting.

4. Discussion

4.1. Summary of Results

4.1.1. Study 1

The main aim of Study 1 was to evaluate the effect of outsourcing on three commonly used outcome measures of occupational health and safety at the hospital level: rate of injuries, average days lost per claim and average cost of claims.

The incidence rate ratios (IRRs) of the rate of injuries for facilities that outsourced cleaners and food service workers (CFSWs) showed a decrease in the period post outsourcing compared to the period pre-outsourcing. The same effect, however, was not seen for facilities that did not outsource their CFSWs as the IRRs showed an increase in the period post outsourcing relative to pre-outsourcing.

In regards to the IRR for average days lost per injury, minimal or no difference was seen for cleaners at non-outsourced facilities, while a decrease in the estimates of IRRs was seen in cleaners who worked at outsourced facilities and food service workers at both (non-outsourced and outsourced) types of facilities in the period post outsourcing relative to pre-outsourcing.

For both outcomes (injury rates and average days lost per injury), with the exception of IRRs for average days lost per injury per hospital for outsourced cleaners, the 95% CI included '1', indicating a possibility that there may be no difference between the two exposure periods, which makes us fail to reject our null hypotheses that there will be no difference in the injury rates and days lost per injuries.

In terms of costs, for both CFSWs, average costs of claims were shown to decrease in the period post outsourcing for the outsourced facilities (significantly for cleaners), while an increase was shown for cleaners and FSWs in the period post outsourcing for facilities that did not outsource. As the p-value was greater than 0.05 for all cases except for outsourced cleaners, we fail to reject the null hypotheses that there is no

difference in the average costs per claims per hospital in the period post outsourcing.

While a decrease in the injury rates , average time lost from work per injury and subsequent costs may suggest a decrease in the rate of incidence and severity of the injuries, interpretation of the results from study 2 suggest otherwise.

The decrease in the rate ratios of injuries, average days lost as well as trends in costs post outsourcing for outsourced groups can be attributed to several reasons. Results from study 2 suggest possible incidences of injury underreporting (see Study 2) with outsourced workers and other literature (Quinlan & Bohle, 2009; Alamgir & Yu, 2008; Blenkarn & Odd, 2008; Alamgir, et al., 2007; O'Brien-Pallas et al. 2004).

Underreporting of injuries can be subject to various factors that can change from facility to facility. Some of the possible reasons are:

a) Fear of job loss

Outsourced workers may be disinclined to take a lot of time off work due to fear of job loss. Not taking sufficient time off work to recover from an injury can potentially increase the risk of a more severe injury later (O'Brien-Pallas et al. 2004). Non-outsourced workers may enjoy more job security and better organizational support, which might make them more comfortable reporting their injuries.

b) Management pressure

Pressures from management to maintain a certain level of their experience rating (a factor that affects the employers' workers' compensation premiums) could also be a possible reason for underreporting (Shannon & Lowe, 2002).

c) Multiple jobs

Stinson et al. (2005) noted that around 21% of the outsourced workers they interviewed (n=24), worked more than one job in healthcare. As such, it can be

plausible that chronic workplace injuries such as musculoskeletal injuries may be hard to trace back to the correct employer and hence, workers may choose to not report these injuries.

d) High employee turnover

Studies by Zuberi (2011) and Zuberi & Ptashnick (2011) report a high employee turnover at outsourced facilities. Increased attrition rates might also contribute to a lower injury rate in this population (outsourced workers), as workers may not be employed with the company long enough to make an injury claim. It can also be speculated that the non-outsourced facilities may have a lower employee turnover rates. Lower turnover rates may have maintained the same ageing workforce whose risk of injury may be increasing with age or that the workers may feel more confident and secure enough to report their injuries with increasing tenure. Additionally, wage differences between non-outsourced and outsourced workers could also be a reason for an increase in costs associated with the injuries in the period post outsourcing in spite of minimal changes in the IRRs of average days lost per injury for both occupational groups. Outsourced facilities employee population, on the other hand might be made up of a younger population (age and tenure wise), who may be more physically fit, reporting lesser injuries, with lower incomes.

e) Sick leave

Azaroff, Levenstein & Wegman. (2002) also suggest that there may be some workers who might use their sick leave (which might be limited) for time off work to recover from an injury instead of reporting it. This might be due to a lack of employee education on their rights and responsibilities regarding injury reporting.

f) Training, knowledge transfer and cross-cultural barriers

There may be instances where workers may not be able to see a relation between an injury and previous exposures, thus leading to non-reporting of the injury. It could also be possible that some workers may not be aware of their rights and responsibilities towards injury reporting. Of the 70 outsourced workers Zuberi

(2011) interviewed, 88% of the total were immigrants to Canada. Stinson et al. (2005) suggest that for majority of the outsourced workers, English may not be their first language. Assuming that all training and resources are provided in English, there could be a possibility of worker training and education failing to effectively bridge cross-cultural and language barriers.

g) Facility locations

Majority of the facilities that had outsourced their services are larger in size (as evidenced by their annual bed counts) and are located in and around the Greater Vancouver Regional District (GVRD) as compared to the facilities that did not outsource their services. Lutfiyya et al. (2006) suggests that larger hospitals in urban areas are more likely to have better funding, structural design and hence more resources given the diversity of their services and the number of patients they serve. It is plausible that the facilities outside of the GVRD (non-outsourced and some outsourced) may be smaller, with limited services provided and as a consequence, limited resources may be provided to the CFSWs, perhaps increasing the risk of injuries and days lost per claim and costs per claim.

4.1.2. Study 2

Twenty telephone interviews were conducted with cleaners and FSWs who worked at five acute care sites within the province of BC comprising of outsourced and non-outsourced workers. The main goal for this study was to gain a perspective on the effects of outsourcing on the occupational health and safety of workers, in an effort to support, and help explain the findings of Study 1. As the data was analyzed based on emergent themes, there was no *a priori* hypothesis.

Overall, of the five main themes that emerged, the study did not find a distinct difference in views or opinions between the groups of outsourced and non-outsourced workers with the exception of injury reporting.

In regards to injury reporting, none of the participants volunteered that they felt actively discouraged to report injuries- everyone who sustained an injury, reported it. It is possible that since these were unionized workers, they may have felt secure enough by union representation in filing an injury claim (Shannon & Lowe, 2002). While most non-outsourced workers had no trouble reporting their injuries, outsourced workers did express mixed perspectives highlighting possible injury underreporting. Based on the results from Study 1 and the increasing median days lost in the period post outsourcing (Table 23, Appendix B and Table 33, Appendix C), it can be speculated that there might be a reluctance among outsourced workers to report minor injuries that require minimal time off work, as they may be perceived to be easier to manage. Injuries severe enough that necessitate time off work are harder to endure and may be more likely to be reported since the workers can't "tough it out". It could also be possible that since the workers expressed being overworked in the interviews, they might not want to take that time off because of the backlog of work their leave would create. Long wait periods for minor injuries due to triaging at the hospital emergency department that workers are sent to after an injury might also be a potential deterrent to reporting minor injuries as well.

4.1.2.1. Other Themes

The remaining four themes (workplace training, employer support, OH&S resources and work overload) were consistent with the results found by Zuberi & Ptashnick (2011) and Zuberi (2011), and were not unique to employment status of the participants. One explanation for this could be that several years have past outsourcing and that the shared experiences may no longer be affected by employer status.

The most consistent theme throughout every interview was that of feeling over worked and understaffed. Zuberi & Ptashnick (2011) indicate that this is probably a result of the private sector model, which relies heavily on not wasting resources on extra staff. In a very competitive industry, the pressure to complete as many tasks possible in the shortest amount of time gives the company a competitive edge in the

business (Mayhew et al., 1997). This might have a negative impact on the working conditions of direct care workers such as nurses and care-aides as the support services workers are rushed to complete their tasks increasing the risk of infection within the hospitals through incomplete work (Zuberi & Ptashnick, 2011).

Workers also called for more employer support, which may improve the safety climate at the workplace through active communications between workers and management (DeJoy, Schaffer, Wilson, Vandenberg, & Butts, 2004; Mark et al. 2007). Workers also stated that more training time and OH&S awareness, particularly regarding JOSH committees would be beneficial towards their abilities to carry out their work.

4.2. Strengths

4.2.1. Study 1

One of the strengths of this study was the opportunity to analyze continuous monitoring data through seven years of workers' compensation data. More objective measures such as claims outcomes were something that was found to be lacking in other studies that have attempted to assess the impacts of outsourcing on OH&S outcomes (Virtanen et al. 2010; Cummings & Kreiss, 2008; Gochfeld & Mohr, 2007; Gustafsson & Saksvik, 2005; Shannon & Lowe, 2002). We were able to look at retrospective trends for all employers that served the healthcare sector at least three years prior to the introduced management change and then follow the same population four years after, accounting for any transition period data losses that might have otherwise skewed our interpretations and comparing data pre and post outsourcing.

Tracking outsourced workers injury claims can be difficult, as they are no longer listed under the healthcare sub-sector since their employers are listed under other CUs. The advantage of using the workers' compensation data is that we were able to identify these workers using specific fields identifying where exactly an injury took place and what employer was related to it. Using the location of the injury field and

the classification units, we were also able to track down exactly which sub-sector the claim fell under and further cross-tabulated it with the information from the Ministry of Health, ensuring that the data analyzed related to the sites in the acute care sub-sector only, thus reducing any confounding effect from claims related to non-acute care support service workers.

Moreover we were able to use bed counts at each acute care hospital over the same time period, which still gave us a robust surrogate measure of the workload at each site per year.

4.2.2. Study 2

This qualitative interviews based study has a few strengths in spite of the challenges associated with conducting interviews over the telephone.

A one-on-one interview over the phone as opposed to a focus group or a separate face-to-face interview was the preferred option as it assured the participants of confidentiality, given that outsourcing of support services can be a sensitive topic. Ensuring confidentiality can potentially increase our data quality and richness (Sturges & Hanrahan, 2004). Telephone interviews also reduced the negative effects from geographical and temporal factors on the recruitment of participants. Telephone interviews allowed us to reach participants who were located outside the city of Vancouver and given that the workers are generally very busy and rushed while at work, telephone interviews gave them a chance to participate on their own accord at a time mutually convenient for all parties (Smith, 2005).

Conducting telephone interviews over paper-based surveys encouraged those employees to participate, who perhaps did not have the time to fill out a paper-based survey. Additionally, the interview format was not as structured or restrictive as surveys and questionnaires, giving the participants a chance at expressing themselves freely. This gave the researcher a broader perspective on the behaviors and attitudes that might have influenced the occupational health and

safety environment. It also gave the researcher more freedom to probe into areas that may have been restricted in a traditional interview/survey (DiCicco-Bloom & Crabtree, 2006; Appleton, 1995; Barriball & While, 1994).

Since some of the topics discussed in our interviews may be sensitive, one on one telephone interviews gave workers the chance to participate in a positive, open and respectful environment and reduced any intimidation factors that might be present in focus groups. It also may have reduced the interviewer bias by putting the participant at ease with the absence of the interviewer (Novick, 2008; Carr & Worth, 2001; Burnard, 1994).

The risk of incomplete responses is high with conducting self-administered surveys, which, in personal interviews was minimized- our response rate was nearly 45% (20 out of 45). Conducting telephone interviews also reduced costs associated with printing and mailing questionnaires. The investigators also had the opportunity to clarify ambiguity that may have arisen from the discussions. And finally, due to the short time span attached to conducting interviews, the data collection was complete in about less than two hours as opposed to possibly weeks that would take with individual interviews and surveys (Novick, 2008; Appleton, 1995; Barriball & While, 1994).

4.3. Limitations

4.3.1. Study 1

The rates of injury and incidence rate ratios for injuries were calculated using bed counts as a denominator instead of other more intuitive measures such as employee counts or hours of work provided by employee payroll data as the researchers were unable to gain access to employer payroll information. The Ministry of Health does not collect any payroll data and although WorkSafeBC does collect payroll data, to calculate annual premium rates, their information is limited to the firm level, non-distinguishable by occupations.

The annual number of occupied beds at a hospital gives us an idea of the size of a hospital and the workforce to support them as they track each other in a linear manner. While bed counts at a hospital may also provide a measure of workload at each hospital as it excludes unoccupied beds (Jagger, 2002), they are not as accurate as using hours of work or full time equivalents, a derivative from payroll productive hours. Payroll productive hours data records all the hours spent by a worker at work at risk of an injury, as it does not account for time spent in sick leave or vacation (Alamgir, Yu, Chavoshi & Ngan, 2008). The use of bed counts reduces the comparability of our results to other studies as commonly rates are based off payroll data as opposed to bed counts. Moreover, using bed counts as a denominator underestimates our results from study 1 as it gives us an estimate of the workforce, but not the actual size or the amount of hours spent at work (full time equivalents). Additionally, Jagger (2002) also mentions that the rates based off annual bed counts can be subject to many other factors such as type of services provided by the hospital and underreporting of injuries, which will differ with each facility.

Bed counts within the acute care hospitals have been relatively stable from 2001-2008. Though bed counts do fluctuate for certain sites, the overall fluctuation rate is minimal on an annual basis. It can be speculated that the population of workers at outsourced sites post outsourcing may be smaller. Due to the reduction in post-outsourcing wages (Stinson et al., 2005; Zuberi 2011; Zuberi & Ptashnick, 2011), many of the workers from the pre-outsourcing period might have chosen to find employment elsewhere. In contrast, the hospital sizes have not changed drastically between pre and post outsourcing i.e. number of beds at each facility is more or less the same. Based on this, the reduction in injury outcomes reported post outsourcing could be attributed to smaller working population reporting fewer injuries at hospitals (numerator), over bed counts (denominator) at hospitals that do not change drastically over time. Fewer number of injuries may also result in fewer average days lost per injury and reduced costs associated.

The study was also limited by injury claims that were accepted and paid by the workers' compensation system for short-term disability (that require health care

and one day away from work). This excluded injuries that were reported and not accepted for compensation, as well as those injuries that were never reported. This would underestimate the current calculated risk of injury, their severity as well as the trends in costs.

The analysis was restricted to workers working in the acute care sector as previous studies (Alamgir & Yu, 2008; Alamgir et al., 2007) on support services in BC's hospitals indicated that the acute care sub-sector had the highest injury rates. This limits the generalizability of our results to the acute care sector. It is also possible that the effects of outsourcing may be different in the long-term care or community care settings because the nature of the tasks might be different from those in acute care.

Data quality is also another issue that can potentially (although marginally) affect the analysis results. Due to the transition from one employer to another, there were a few instances (less than 10% of the total number of injuries) of misclassification in the dataset that resulted in the exclusion of those records for quality control purposes. These could have been valid injuries that were reported and compensated, but because it was difficult to assign them to right study groups by outsourcing status.

4.3.2. Study 2

The results from study could have been limited by interviewer skill since the basis of a semi-structured interview is an open-ended discussion, where there may have been instances where the interviewer may have not been able to control the direction of the discussion. It could also be possible that the interviewer may have prompted certain types of answers due to an interviewer bias (Appleton, 1995).

As these interviews were conducted over the phone, the lack of visual cues could have lead to a loss of context decreasing the richness of the data. Also, lack of a physical presence may have also contributed towards difficulty in building rapport between the interviewer and interviewee and hence, it was challenging to probe

into sensitive areas of questioning as well as build trust (Novick, 2008; Rubin & Rubin, 1995; Burnard, 1994).

This study restricted the recruitment of workers who could comfortably communicate in English. Majority of the population under consideration consists of new immigrants to Canada (Stinson et al., 2005). There may have been a possibility where the worker, though able to converse in English, may not have been very proficient at expressing his or herself, further compromising the accurate interpretation of the transcripts.

Similar to studies by Zuberi (2011) and Zuberi & Ptashnick (2011), the interviewees in our project were also approached as members of the Hospital Employees' Union through the union shop stewards at the various sites. Potentially, a selection bias might have been introduced, as the recruitment was dependent on who the shop stewards were able to approach and where they were allowed to place the advertisement poster. Majority of the workers who participated were people who were actively engaged or were well aware of the workings of the JOSH committee.

With the exception of one worker, none of the outsourced workers recruited for the interviews had worked for the Health Authorities previously i.e. they were new recruits who had joined the outsourcing companies after outsourcing. Hence, it was difficult to compare effects of changes in policies and regulations between pre outsourcing and post outsourcing. Alternatively, it could also be possible that the old workers may have been promoted to managerial and non-unionized positions and thus, may have been excluded from participation in the interviews. There may also have been instances where workers may not have been able to remember or recall incidents clearly (recall bias) to the interview data, which could affect the accuracy and detail of the events recalled in the interviews.

The recruitment poster, aimed at increasing recruitment of participants, was put up only on the union notice board, a place that some workers may not have had the time to stop by and look at.

Finally, the recruitment strategy was passive and given a short period of time, we were able to interview only twenty people out of the proposed forty-five interviews. Despite having reached data saturation, on most themes, there is a possibility that we might have under-sampled from our population, which could reduce the data richness.

4.4. Policy Implications

The outcomes of this project indicate that outsourcing may have an impact on the occupational health and safety of the outsourced workers (cleaners and food service workers) in both exposure groups. It is plausible that the observed decrease in the rate of injuries, average days lost per injury and average costs per injury among outsourced hospitals suggest lower risks in the work environments. On the other hand, qualitative results do not support these findings with both outsourced and non-outsourced workers reporting the need for improvements in management support, occupational health and safety training as well reductions of workloads. Rather the combination of the qualitative and quantitative results suggests an effect of outsourcing on possibilities of underreporting.

It is suggested that the policy makers be more cognizant of the impacts of a change in management on worker health and safety when considering organizational restructuring in particular on injury reporting issues.

Avenues for policy implications may be:

- a) Improved surveillance measures: It is suggested that employers as well as unions channel efforts towards implementing a tracking system that not only records the number of employees, broken down by their employment status (full-time, part-time, casual, temporary etc) but also records reported injuries and near misses, regardless of the workers' compensation system outcome. Additional details such as age and tenure would also be useful information to record. This would help identify key causes of certain trends

in the injury rates, which will help guide effective intervention strategies as well as aid future research. A tracking system such as this exists as indicated in the research by Alamgir & Yu (2008) and Alamgir et al., (2007). However, this system is limited to employees of the health authorities and does not extend over to doctors and contracted out support services.

- b) Injury Reporting Education: It is suggested that employers provide resources that not only highlight the importance of injury reporting (which is the current case as evidenced by results from Study 2), but also educate the workers on the ability to recognize a workplace injury regardless of the severities under a positive, open and free workplace environment considering all cross-cultural and language barriers.
- c) Training: It is suggested that employers implement a uniform regular re-fresher training workshops for workers to attend on a periodic basis, as part of their injury prevention efforts.
- d) Work Overload: Failure to meet compliance with optimum health standards can have serious ramifications adding to the costs of an already cash-strapped healthcare system. It is suggested that the policy makers find appropriate economically sound solutions to create a balance between healthcare demands and ensuring appropriate staffing levels are maintained at all times.

4.5. Future Research

Studies conducted on outsourced workers have shown that organizational aspects often affect workplace health and safety (Zuberi, 2011; Zuberi & Ptashnick 2011; Quinlan & Bohle, 2009; Alamgir & Yu, 2008 and Alamgir et al., 2007). Building up on the current research, the following recommendations are made for future studies:

4.5.1. Quantitative Monitoring

A longitudinal study would be a prudent way to monitor the ongoing and long-term effects of outsourcing on worker health, at the individual level as opposed to the hospital level. Continuous monitoring of outcome measures such as average injury rates, days lost per injury and claims costs can help identify root causes of change as well as identify the period of change, using the onset of outsourcing as the baseline exposure.

It is also important to have appropriate comparison groups to draw meaningful conclusions. For the province of BC, it is seen that majority of the urban locations had outsourced their support services while most of the rural locations had not. Comparisons of rural healthcare sites to urban healthcare sites may not accurately assess the impacts of outsourcing on OH&S, due to the difference in services provided and changing nature of the workers' tasks. Hence it is suggested that comparisons take place within similarly exposed groups.

Future studies should also consider certain demographic details such as age, gender, duration of tenure and number of jobs in addition to all types of injury claims i.e. healthcare only and time loss injuries, which might help, explain certain trends. Rates calculated using productive hours would give a more accurate estimate of the risk of injury as they would give a more precise measure of the intensity of work and will make the results more comparable to similar research conducted globally.

The effectiveness of injury prevention intervention strategies can also be enhanced if details of each injury in terms of nature of injury, type of accident, body part and source of injury were also analyzed, as it would help narrow down exactly where intervention is needed.

4.5.2. Qualitative Assessments

Assessing worker wellbeing solely based on numerical factors such as injury rates and costs associated, would prevent us from understanding the influences that

organizational and management changes have on worker occupational health and safety as well as the determinants of the safety climate (DeJoy et al., 2004; Shannon et al., 1997).

Semi-structured interviews may be beneficial in gaining an insight into the lives of the support service workers with this project. It is suggested that the interviews be conducted in person, (by an experienced interviewer), which would support the building of rapport between the interviewee and the interviewer. Compared to other avenues such as focus groups and telephone interviews, face-to-face interviews in an open, safe and respectable environment would encourage the participants to share more freely as opposed to group setting like focus groups or a telephone interview where some participants may not feel entirely comfortable sharing their experiences.

Advertising and recruitment drives for the interviews can also be improved upon by increasing the avenues of advertisement i.e. put up recruitment posters in more than one location of the hospital such as the kitchens where the workers work, walls surrounding the tray lines, the break or a lunch room where workers gather, union bulletins (Gillen, Kools, Sum, McCall & Moulden, 2004).

In addition to interviewing the workers themselves, it is recommended that interviews be expanded to include the supervisors and managers. Interview data should also be verified against the industry standard operating procedures as outlined by the employers. This method would not only give the researcher a better understanding of current practices that might influence the occupational health and safety of the workers, but would also identify key gaps in the system.

4.6. Conclusion.

“Safety must be viewed as an asset, not just as a cost”

(Gochfeld & Mohr, 2007, p.1612).

The working environment of an individual is influenced not only by the job tasks, but also by the social and organizational factors.

Outsourcing, has many benefits as well as risks associated with it. While cost savings is a huge benefit, it is also seen to be associated with several negative impacts on worker health and wellbeing. Hospital support service workers are an understudied yet vital population to the healthcare sector. Their actions or inactions impact other healthcare professionals’ ability to deliver quality healthcare.

The study outcomes indicate that there is a change in the occupational health and safety profile of the workers in the period post outsourcing relative to the period prior to outsourcing. The results of our studies provide preliminary evidence of outsourcing’s impact on occupational health and safety. Future research is warranted to narrow down the determinants of this change, leading to focused and effective intervention strategies.

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Appendix A

Table 13: List of classification units (CU) that were included and excluded

Classification Unit Identification Number	Classification Unit Description
Included	
766001	Acute Care
764014	Commercial Cleaning or Janitorial Services
761018	Industrial Catering
761035	Restaurant or Other Dining Establishment
Excluded	
766002	Alcohol or Drug Treatment Centre
764013	Daycare, Preschool, Playschool
764030	Home Support Services
766010	Life and Job Skills Training
766011	Long Term Care
766015	Medical Clinic or Medical Practice
766017	Residential Social Service Facility
763030	Scientific Research Laboratory
766019	Short Term Care

Table 14: List of occupations that were re-categorized based on the StatsCan job codes provided in the dataset.

StatsCan Job Code	New Occupational Category
Food Service Workers	
G41	Chefs and Cooks
G412	Cooks
G513	Food and Beverage Servers
G512	Bartenders
G96	Food Counter Attendants, Kitchen Helpers and Related Occupations
G961	Food Counter Attendants, Kitchen Helpers and Related Occupations
G962	Kitchen and Food Service Helpers
Cleaners	
G93	Cleaners
G931	Light Duty Cleaners
G933	Janitors, Caretakers and Building Superintendents

Appendix B

Summary Statistics for Cleaners

B.1. Total Number of Accepted STD Injury Claims

Table 15: Summary statistics (mean, variance and total) for STD injuries in facilities that did not outsource cleaners by health authority, hospital size and exposure period.

Exposure Variables	Mean	Variance	Total Number (N)
Health Authority (HA)			
HA 1	2.17	16.59	154
HA 2	0.79	1.93	126
Hospital Size ^{\$}			
Small	0.39	0.54	155
Medium	1.56	3.71	90
Large	6.66	40.47	35
Exposure Period [!]			
Period 1	1.60	13.35	120
Period 2	1.51	8.30	160

^{\$} Small = less than 25 beds per hospital, medium = 25 to 99 beds per hospital, large = greater than 100 beds per hospital

[!] Period 1 = 2001-2003, Period 2 = 2005-2008

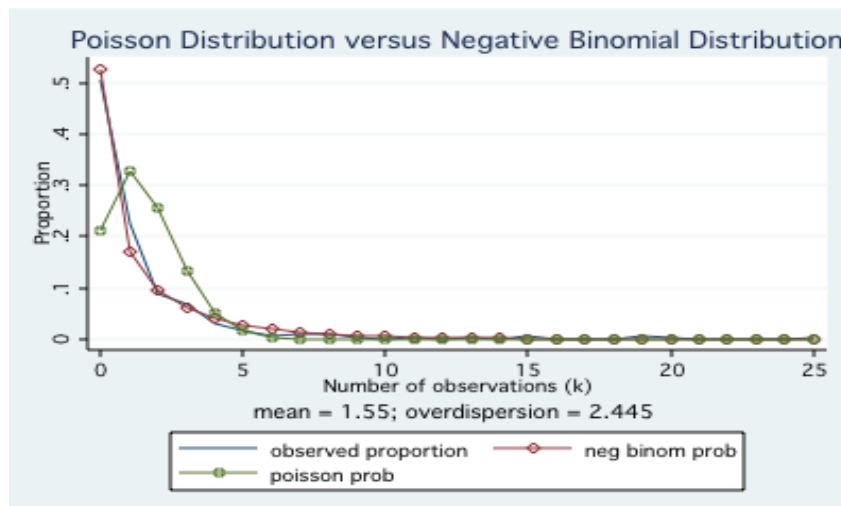


Figure 1: Graphical comparison of Poisson distribution versus negative binomial distribution for STD injuries in facilities that did not outsource cleaners.

Table 16: Summary statistics (mean, variance and total) for number of STD injuries in facilities that outsourced cleaners by health authority, hospital size and exposure period.

Exposure Variables	Mean	Variance	Total Number (N)
Health Authority (HA)			
HA 1	7.16	42.58	91
HA 2	10.79	135.10	14
HA 3	4.94	163.71	63
Hospital Size ^{\$}			
Small	0.77	1.59	35
Medium	1.45	2.34	47
Large	11.85	131.99	86
Exposure Period %			
Pre-Outsourcing	7.60	157.26	72
Post Outsourcing	5.91	51.62	96

^{\$} Small = less than 25 beds per hospital, medium = 25 to 99 beds per hospital, large = greater than 100 beds per hospital

% Pre-Outsourcing = 2001-2003, Post Outsourcing = 2005-2008

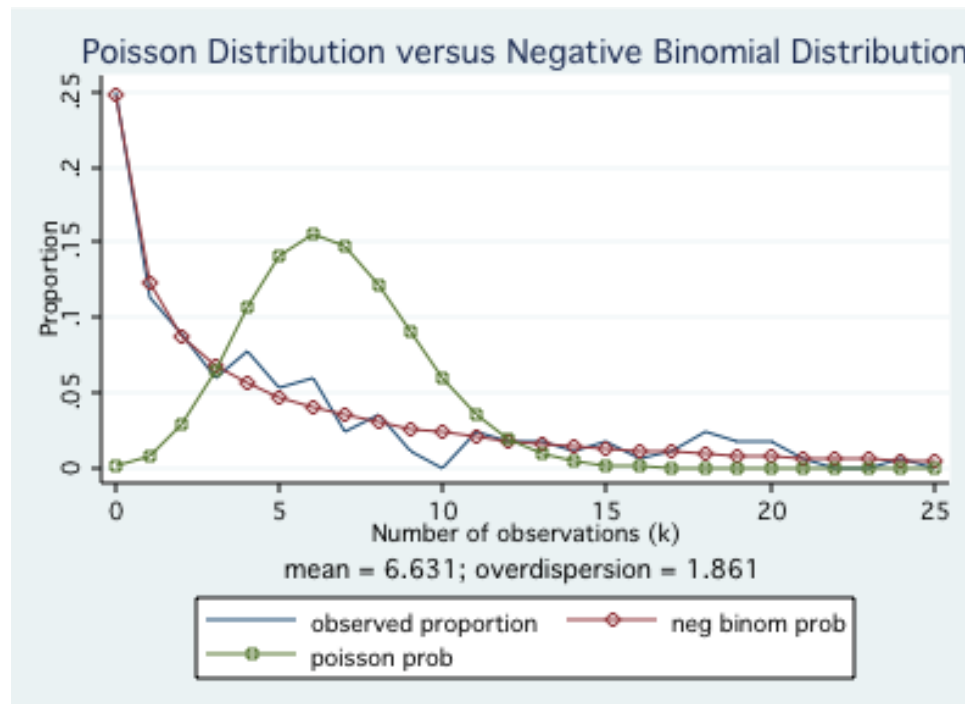


Figure 2: Graphical comparison of Poisson distribution versus negative binomial distribution for STD injuries in facilities that outsourced cleaners.

Table 17: Incidence rate ratios (IRR) of STD injuries in facilities that did not outsource cleaners.

Exposure Variables	IRR	95% Conf. Interval	P-Value
Health Authority (HA)			
HA 1	1.0 (Reference)		
HA 2	0.61	0.40-0.93	0.02**
Hospital Size ^{\$}			
Small	1.26	0.76 - 2.07	0.38
Medium	1.36	0.84 - 2.22	0.21
Large	1.0 (Reference)		
Exposure Period [!]			
Period 1	1.0 (Reference)		
Period 2	1.14	0.87-1.49	0.33
Total number of observations (N)	280		
Wald Chi ²	9.45		0.05**
Alpha (over-dispersion parameter)	0.25		
Poisson model goodness-of-fit Chi ²	356.21		0.00***

p≤0.10*, p≤0.05**, p≤0.001***

^{\$} Small = less than 25 beds per hospital, medium = 25 to 99 beds per hospital, large =greater than 100 beds per hospital

[!] Period 1 = 2001-2003, Period 2 = 2005-2008

Table 18: Incidence rate ratios (IRR) of STD injuries in facilities that outsourced cleaners.

Exposure Variables	IRR	95% Conf. Interval	P-Value
Health Authority (HA)			
HA 1	1.0 (Reference)		
HA 2	2.15	1.46 - 3.16	0**
HA 3	2.96	2.06 - 4.25	0**
Hospital Size ^{\$}			
Small	1.41	0.76 - 2.59	0.27
Medium	0.67	0.50 - 0.88	0.01***
Large	1.0 (Reference)		
Exposure Period [!]			
Period 1	1.0 (Reference)		
Period 2	0.79	0.57 - 1.09	0.146
Total number of observations (N)	168		
Wald Chi ²	65.45		0.00***
Alpha (over-dispersion parameter)	0.21		
Poisson model goodness-of-fit Chi ²	400.277		0.00***

p≤0.10*, p≤0.05**, p≤0.001***

^{\$} Small = less than 25 beds per hospital, medium = 25 to 99 beds per hospital, large =greater than 100 beds per hospital

[!] Period 1= 2001-2003, Period 2 = 2005-2008

B.2. Total Number of Days Lost per Accepted STD Injury Claim

Table 19: Summary statistics (mean, variance and total) for number of days lost per STD injury in facilities that did not outsource cleaners by health authority, hospital size and exposure period.

Exposure Variables	Mean	Variance	Total Number (N)
Health Authority (HA)			
HA 1	32.07	2,352.35	334.00
HA 2	25.46	4,134.19	100.00
Hospital Size^{\$}			
Small	31.70	3,613.01	61.00
Medium	39.39	5,145.74	140.00
Large	24.93	1,058.51	233.00
Exposure Period [!]			
Period 1	30.65	3,892.46	192.00
Period 2	30.46	1,877.66	242.00

^{\$} Small = less than 25 beds per hospital, medium = 25 to 99 beds per hospital, large = greater than 100 beds per hospital

[!] Pre-Outsourcing = 2001-2003, Post Outsourcing = 2005-2008

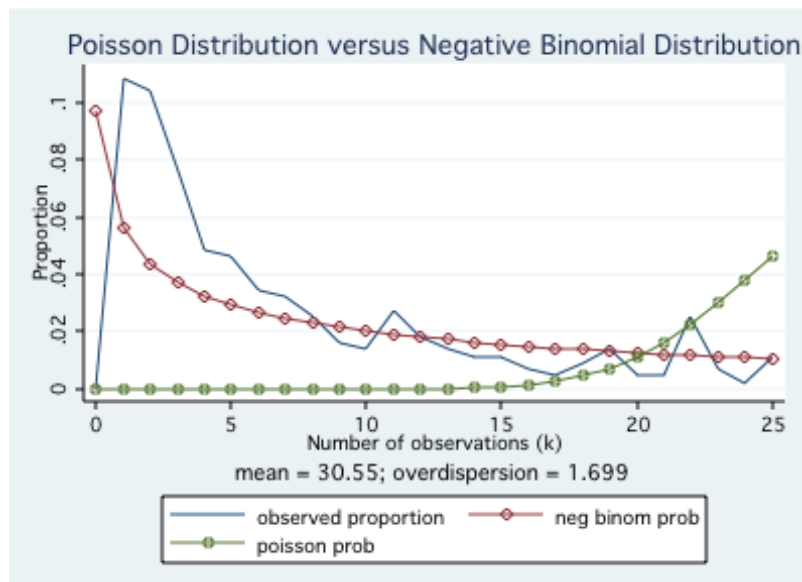


Figure 3: Graphical comparison of Poisson distribution versus negative binomial distribution for days lost per STD injuries in facilities that did not outsource cleaners.

Table 20: Summary statistics (mean, variance and total) for number of days lost per STD injury in facilities that outsourced cleaners by health authority, hospital size and exposure period.

Exposure Variables	Mean	Variance	Total Number (N)
Health Authority (HA)			
HA 1	35.47	2,445.61	652.00
HA 2	44.16	3,473.79	151.00
HA 3	30.91	2,014.61	311.00
Hospital Size ^{\$}			
Small	22.78	577.87	27.00
Medium	30.68	1,915.71	76.00
Large	36.07	2,564.76	1011.00
Exposure Period!			
Period 1	38.44	2,493.41	547.00
Period 2	32.42	2,445.37	567.00

^{\$} Small = less than 25 beds per hospital, medium = 25 to 99 beds per hospital, large = greater than 100 beds per hospital

! Pre-Outsourcing = 2001-2003, Post Outsourcing = 2005-2008

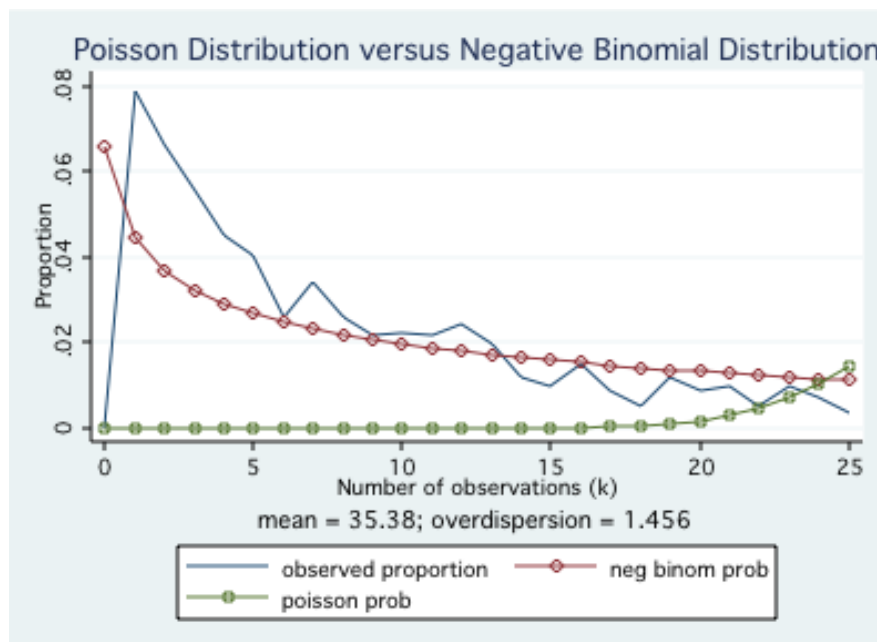


Figure 4: Graphical comparison of Poisson distribution versus negative binomial distribution for days lost per STD injuries in facilities that outsourced cleaners.

Table 21: Incidence rate ratios (IRR) of days lost per STD injury in facilities that did not outsource cleaners.

Exposure Variables	IRR	95% Conf. Interval	P-Value
Health Authority (HA)			
HA 1	1.0 (Reference)		
HA 2	0.61	0.38-0.99	0.05**
Hospital Size ^{\$}			
Small	1.31	0.76-2.26	0.332
Medium	1.93	1.25-2.97	0.00***
Large	1.0 (Reference)		
Exposure Period [!]			
Period 1	1.0 (Reference)		
Period 2	0.98	0.68-1.40	0.897
Total number of observations (N)	434		
Wald Chi ²	12.96		0.01*
Alpha (over-dispersion parameter)	4.86		
Poisson model goodness-of-fit Chi ²	22014.04		0.00***

p≤0.10*, p≤0.05**, p≤0.001***

^{\$} Small = less than 25 beds per hospital, medium = 25 to 99 beds per hospital, large = greater than 100 beds per hospital

[!] Period 1= 2001-2003, Period 2 = 2005-2008

Table 22: Incidence rate ratios of days lost for STD injuries in facilities that outsourced cleaners.

Exposure Variables	IRR	95% Conf. Interval	P-Value
Health Authority (HA)			
HA 1	1.0 (Reference)		
HA 2	1.25	0.98-1.61	0.08
HA 3	1.46	1.08-1.97	0.01***
Hospital Size ^{\$}			
Small	0.62	0.41-0.93	0.02**
Medium	0.78	0.54-1.14	0.19
Large	1.0 (Reference)		
Exposure Period [!]			
Period 1	1.0 (Reference)		
Period 2	0.81	0.66-0.99	0.04**
Total number of observations (N)	1114		
Wald Chi ²	17.37		0.004**
Alpha (over-dispersion parameter)	2.59		
Poisson model goodness-of-fit Chi ²	53,425.6		0.00***

p≤0.10*, p≤0.05**, p≤0.001***

^{\$} Small = less than 25 beds per hospital, medium = 25 to 99 beds per hospital, large = greater than 100 beds per hospital

[!] Period 1 = 2001-2003, Period 2 = 2005-2008

Table 23: Median days lost per injury per facility per year for cleaners (non-outsourced and outsourced acute care facilities)

Exposure Period ¹	Year	Median days lost per injury claim per hospital	
		Non-Outsourced (N=40 hospitals)	Outsourced (N=24 hospitals)
Period 1 (Pre- Outsourcing)	2001	20	33
	2002	17	27
	2003	6	34
	2004	<i>Transition</i>	
Period 2 (Post Outsourcing)	2005	16	20
	2006	13	21
	2007	17	28
	2008	12	33

B.3. Total Cost Paid for Days Lost per Accepted STD Injury Claim

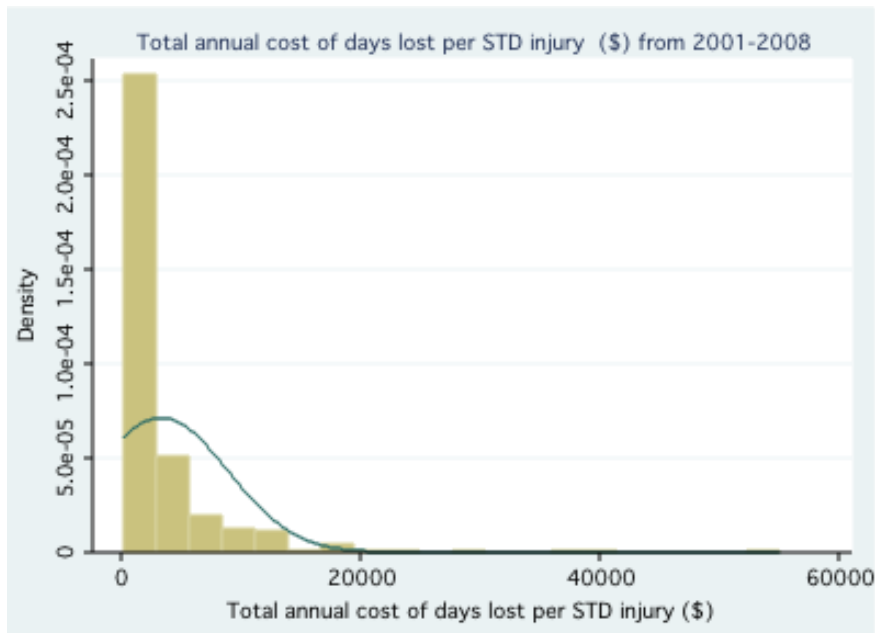


Figure 5 : Histogram of untransformed total annual cost of days lost per STD injury from 2001-2008 in facilities that did not outsource cleaners.

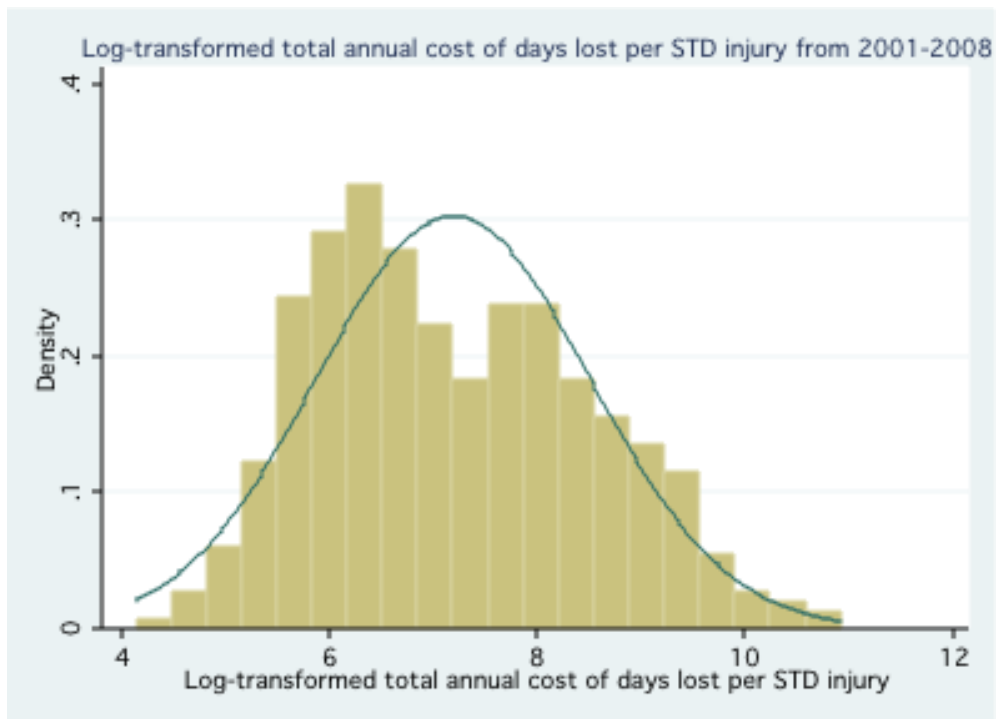


Figure 6: Histogram of log-transformed total annual cost of days lost per STD injury from 2001-2008 in facilities that did not outsource cleaners.

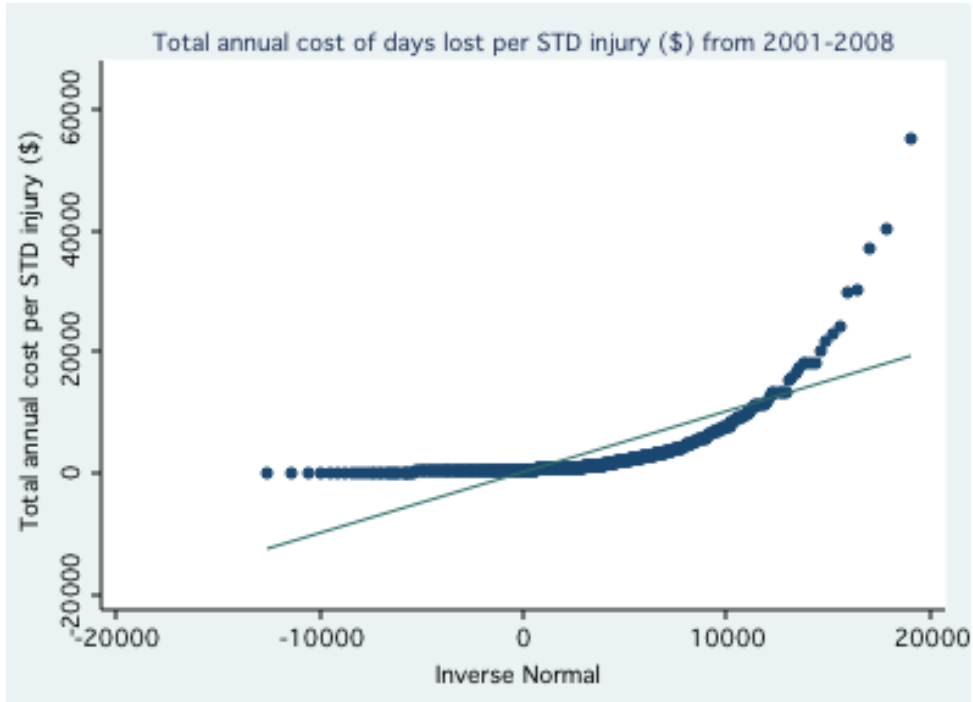


Figure 7: Quantile plot of untransformed total annual cost of days lost per STD injury from 2001-2008 in facilities that did not outsource cleaners.

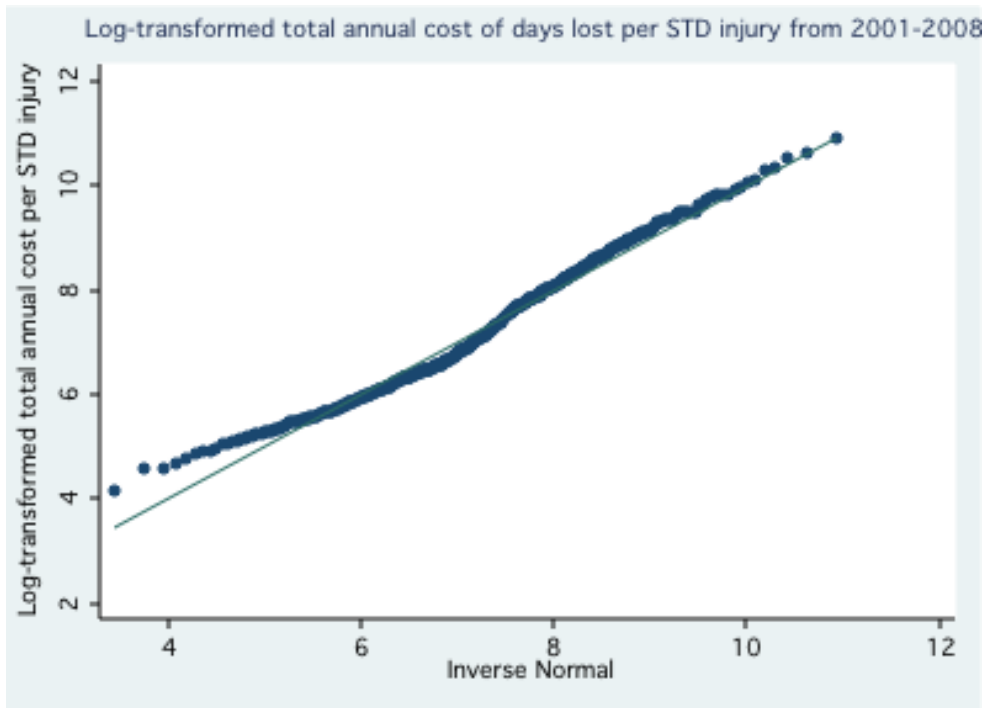


Figure 8: Quantile plot of log-transformed total annual cost of days lost per STD injury from 2001-2008 in facilities that did not outsource cleaners.

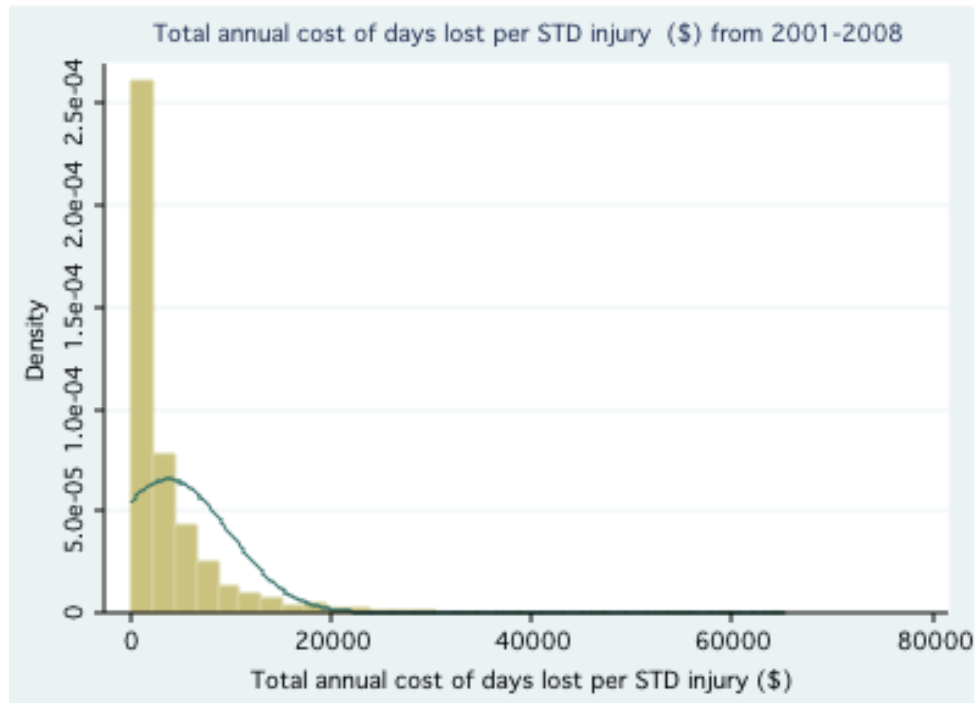


Figure 9: Histogram of untransformed total annual costs of days lost per STD injury from 2001-2008 in facilities that outsourced cleaners.

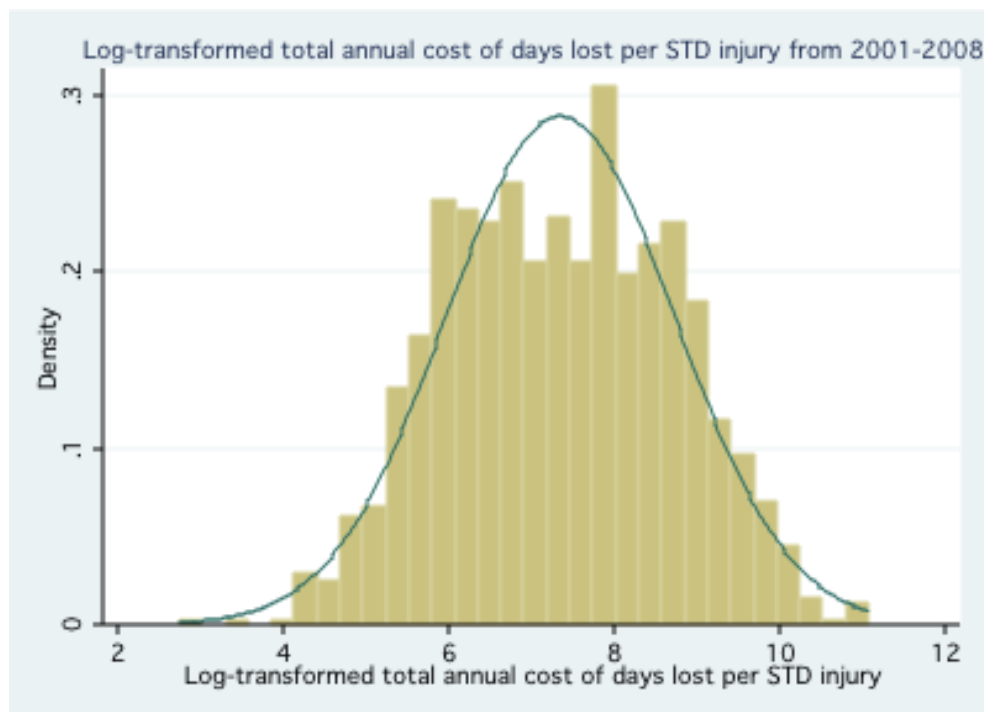


Figure 10: Histogram of log-transformed total annual cost of days lost per STD injury from 2001-2008 in facilities that outsourced cleaners.

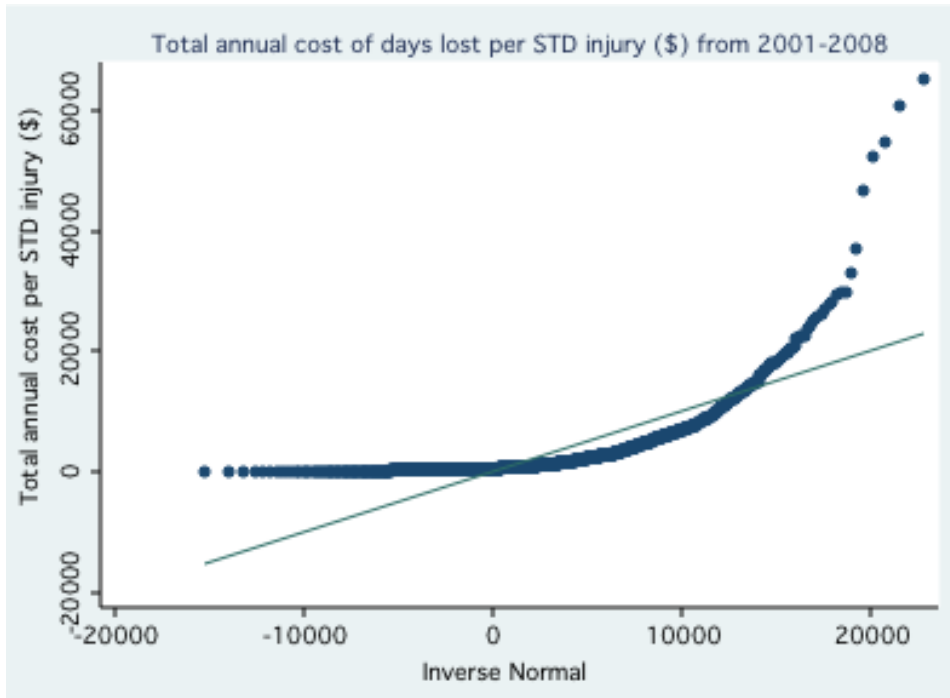


Figure 11: Quantile plot of untransformed total annual costs of days lost per STD injury from 2001-2008 in facilities that outsourced cleaners.

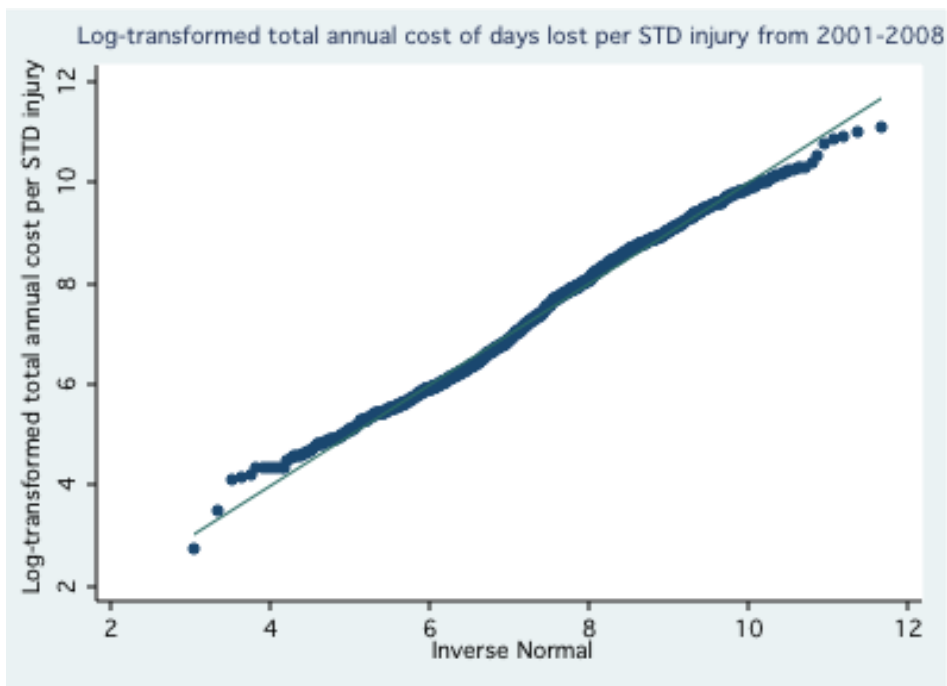


Figure 12: Quantile plot of log-transformed total annual costs of days lost per STD injury from 2001-2008 in facilities that outsourced cleaners.

Table 24: Multivariate analysis of average costs per injury per hospital in each exposure period for acute care facilities that outsourced and those that did not outsource their cleaners.

Exposure Variables	Non-Outsourced		Outsourced	
	Coefficient^	Std. Error	Coefficient^	Std. Error
Nature of Injury				
Back Strain	-0.12	0.16	0.04	0.10
Burns and Bruises	-0.57**	0.22	-1.04***	0.14
Cuts, Punctures and Lacerations	-0.49	0.25	-0.90***	0.22
Musculoskeletal Injuries	Reference category		Reference category	
Systemic Diseases and Others	-0.16	0.27	-0.18	0.25
Type of Accident				
Harmful Substances and Others	-0.54*	0.23	-0.22	0.18
Overexertion, bodily motion				
Slips, Trips and Falls	0.02	0.21	0.08	0.12
Struck By/Against	-0.38	0.25	-0.11	0.14
Health Authority (HA)				
HA 1	N/A		0.01	0.10
HA 2	Reference category		N/A	
HA 3	-0.15	0.15	N/A	
HA 4	N/A		0.22	0.14
HA 5	N/A		Reference category	
Hospital Size\$				
Small	-0.01	0.19	-0.17	0.18
Medium	0.27	0.15	-0.21	0.16
Large	Reference category		Reference category	
Exposure Period!				
Period 1	Reference category		Reference category	
Period 2	0.20	0.12	-0.25**	0.09
Constant	7.28***	0.13	7.7***	0.09
Total claims (N)	434		1114	
Adjusted R ²	0.065		0.116	

p≤0.10*, p≤0.05**, p≤0.001***

^{\$} Small = less than 25 beds per hospital, medium = 25 to 99 beds per hospital, large = greater than 100 beds per hospital

[!] Period 1 = 2001-2003, Period 2 = 2005-2008

[^] ln (total cost paid till Dec 31, 2008)

Appendix C

Summary Statistics for Food Service Workers

C.1. Total Number of Accepted STD Injury Claims

Table 25: Summary statistics (mean, variance and total) for number of STD injuries in facilities that did not outsource food service workers by health authority, hospital size and exposure period.

Exposure Variables	Mean	Variance	Total Number (N)
Health Authority (HA)			
HA 1	1.71	8.89	263.00
HA 2	0.93	3.75	117.00
Hospital Size ^{\$}			
Small	0.46	0.90	71.00
Medium	1.08	2.01	97.00
Large	6.06	19.06	212.00
Exposure Period [!]			
Period 1	1.25	4.49	150.00
Period 2	1.44	8.39	230.00

^{\$} Small = less than 25 beds per hospital, medium = 25 to 99 beds per hospital, large = greater than 100 beds per hospital

[!] Period 1 = 2001-2003, Period 2 = 2005-2008

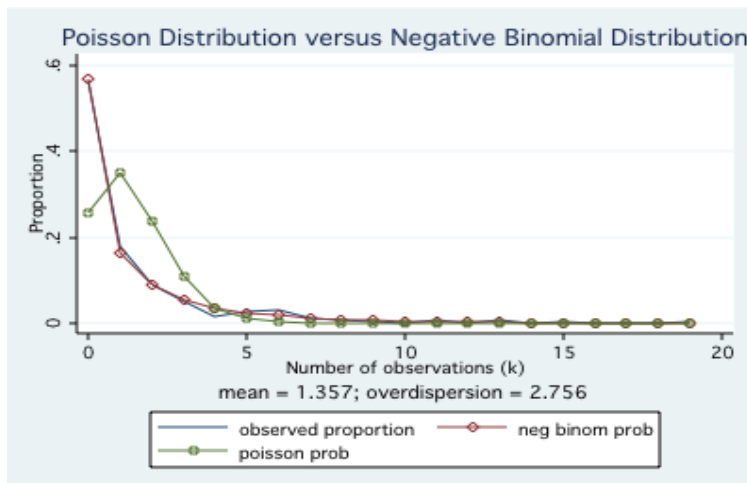


Figure 13: Graphical comparison of Poisson distribution versus negative binomial distribution for STD injuries in facilities that did not outsource food service workers.

Table 26: Summary statistics (mean, variance and total) for number of STD injuries in facilities that outsourced food service workers per health authority, hospital size and exposure period.

Exposure Variables	Mean	Variance	Total Number (N)
Health Authority (HA)			
HA 1	6.93	112.69	97
HA 2	4.73	77.17	298
Hospital Size ^{\$}			
Small	0.20	0.17	4
Medium	1.11	0.87	30
Large	12.03	135.41	361
Exposure Period [!]			
Period 1	7.21	147.17	238
Period 2	3.57	31.27	157

^{\$} Small = less than 25 beds per hospital, medium = 25 to 99 beds per hospital, large = greater than 100 beds per hospital

[!] Period 1 = 2001-2003, Period 2 = 2005-2008

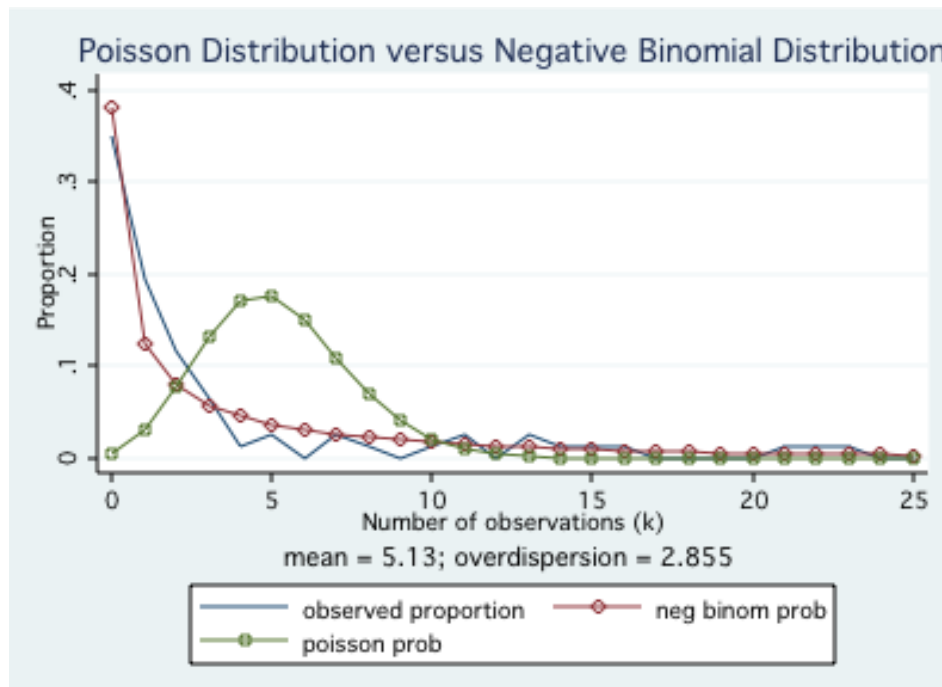


Figure 14: Graphical comparison of Poisson distribution versus negative binomial distribution for STD injuries in facilities that outsourced food service workers.

Table 27: Incidence rate ratio (IRR) of STD injuries in facilities that did not outsource food service workers.

Exposure Variables	IRR	95% Conf. Interval	P-Value
Health Authority (HA)			
HA 1	1.0 (Reference)		
HA 2	0.95	0.54-1.65	0.85
Hospital Size ^{\$}			
Small	1.40	0.89-2.19	0.14
Medium	0.92	0.57-1.47	0.72
Large	1.0 (Reference)		
Exposure Period [!]			
Period 1	1.0 (Reference)		
Period 2	1.10	0.82-1.47	0.52
Total number of observations (N)	280		
Wald Chi ²	4.81		0.31
Alpha (over-dispersion parameter)	0.37		
Poisson model goodness-of-fit Chi ²	382.70		0.00***

p≤0.10*, p≤0.05**, p≤0.001***

^{\$} Small = less than 25 beds per hospital, medium = 25 to 99 beds per hospital, large =greater than 100 beds per hospital

[!] Period 1 = 2001-2003, Period 2 = 2005-2008

Table 28: Incidence rate ratio (IRR) of STD injuries in facilities that outsourced food service workers.

Exposure Variables	IRR	95% Conf. Interval	P-Value
Health Authority (HA)			
HA 1	1.0 (Reference)		
HA 2	1.47	0.98-2.20	0.06*
Hospital Size ^{\$}			
Small	0.50	0.11-2.18	0.35
Medium	0.86	0.45-1.63	0.64
Large	1.0 (Reference)		
Exposure Period [!]			
Period 1	1.0 (Reference)		
Period 2	0.65	0.38-1.10	0.10*
Total number of observations (N)	77		
Wald Chi ²	15.28		0.00***
Alpha (over-dispersion parameter)	0.30		
Poisson model goodness-of-fit Chi ²	153.56		0.00***

p≤0.10*, p≤0.05**, p≤0.001***

^{\$} Small = less than 25 beds per hospital, medium = 25 to 99 beds per hospital, large =greater than 100 beds per hospital

[!] Period 1 = 2001-2003, Period 2 = 2005-2008

C.2. Total Number of Days Lost per Accepted STD Injury Claim

Table 29: Summary statistics (mean, variance and total) for number of days lost per STD injury in facilities that did not outsource food service workers by health authority, hospital size and exposure period.

Exposure Variables	Mean	Variance	Total Number (N)
Health Authority (HA)			
HA 1	24.87	2,108.77	263
HA 2	29.00	2,159.14	117
Hospital Size ^{\$}			
Small	33.86	4,095.24	71
Medium	27.21	1,830.69	97
Large	23.08	1,590.49	212
Exposure Period [!]			
Period 1	28.17	2,621.23	150
Period 2	24.82	1,802.42	230

^{\$} Small = less than 25 beds per hospital, medium = 25 to 99 beds per hospital, large = greater than 100 beds per hospital

[!] Period 1 = 2001-2003, Period 2 = 2005-2008

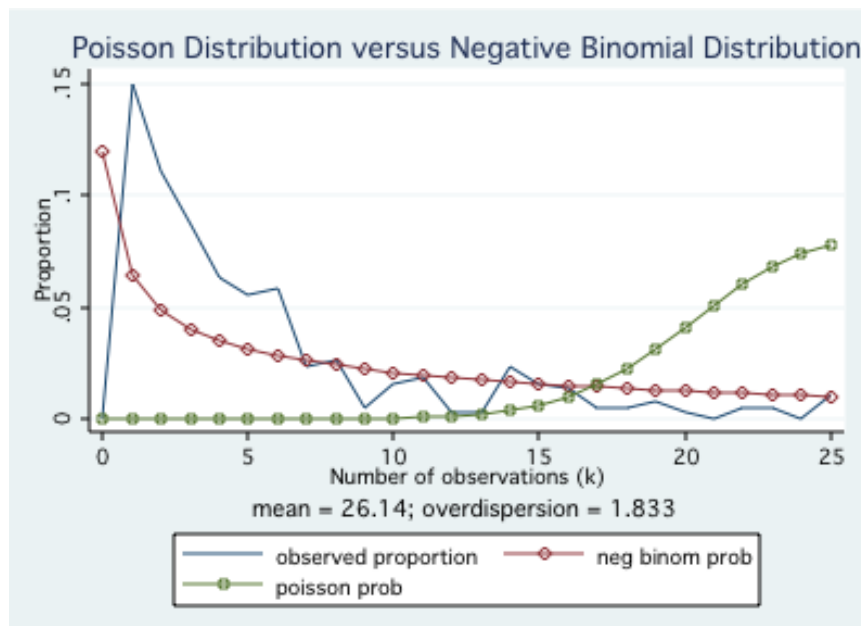


Figure 15: Graphical comparison of Poisson distribution versus negative binomial distribution for days lost per STD injury in facilities that did not outsource food service workers.

Table 30: Summary statistics (mean, variance and total) for number of days lost per STD injury in facilities that outsourced food service workers by health authority, hospital size and exposure period.

Exposure Variables	Mean	Variance	Total Number (N)
Health Authority (HA)			
HA 1	35.63	2,411.63	97
HA 2	24.04	2,216.48	298
Hospital Size ^{\$}			
Small	50.50	7,251.00	4
Medium	21.67	2,573.06	30
Large	27.06	2,222.79	361
Exposure Period [!]			
Period 1	29.30	2,316.13	238
Period 2	23.24	2,225.85	157

^{\$} Small = less than 25 beds per hospital, medium = 25 to 99 beds per hospital, large = greater than 100 beds per hospital

[!] Period 1 = 2001-2003, Period 2 = 2005-2008

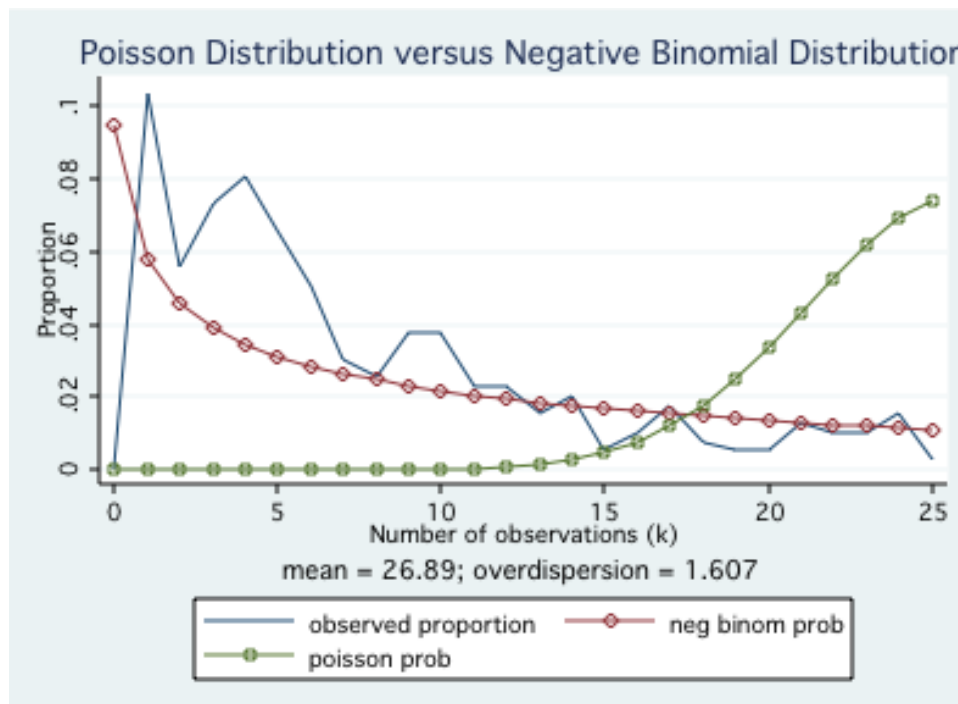


Figure 16: Graphical comparison of Poisson distribution versus negative binomial distribution for days lost per STD injuries in facilities that outsourced food service workers.

Table 31: Incidence rate ratio (IRR) of days lost per STD injury in facilities that did not outsource food service workers.

Exposure Variables	IRR	95% Conf. Interval	P-Value
Health Authority (HA)			
HA 1	1.0 (Reference)		
HA 2	1.11	0.68-1.80	0.68
Hospital Size ^{\$}			
Small	1.51	0.84-2.72	0.17
Medium	1.11	0.68-1.80	0.69
Large	1.0 (Reference)		
Exposure Period [!]			
Period 1	1.0 (Reference)		
Period 2	0.90	0.59-1.37	0.62
Total number of observations (N)	380		
Wald Chi ²	2.76		0.60
Alpha (over-dispersion parameter)	13.48		
Poisson model goodness-of-fit Chi ²	18,279.67		0.00***

p≤0.10*, p≤0.05**, p≤0.001***

^{\$} Small = less than 25 beds per hospital, medium = 25 to 99 beds per hospital, large =greater than 100 beds per hospital

[!] Period 1 = 2001-2003, Period 2 = 2005-2008

Table 32: Incidence rate ratios (IRR) of days lost for STD injury in facilities that outsourced food service workers.

Exposure Variables	IRR	95% Conf. Interval	P-Value
Health Authority (HA)			
HA 1	1.0 (Reference)		
HA 2	1.52	1.0-2.32	0.05**
Hospital Size ^{\$}			
Small	2.67	0.51-14.04	0.25
Medium	0.80	0.29-2.21	0.67
Large	1.0 (Reference)		
Exposure Period [!]			
Period 1	1.0 (Reference)		
Period 2	0.80	0.50-1.28	0.35
Total number of observations (N)	395		
Wald Chi ²	5.62		0.23
Alpha (over-dispersion parameter)	4.36		
Poisson model goodness-of-fit Chi ²	18,203.46		0.00***

p≤0.10*, p≤0.05**, p≤0.001***

^{\$} Small = less than 25 beds per hospital, medium = 25 to 99 beds per hospital, large =greater than 100 beds per hospital

[!] Period 1 = 2001-2003, Period 2 = 2005-2008

Table 33: Median days lost per injury per facility per year for food service workers (non-outsourced and outsourced acute care facilities)

Exposure Period ¹	Year	Median days lost per injury claim per hospital	
		Non-Outsourced (N=40 hospitals)	Outsourced (N=11 hospitals)
Period 1 (Pre- Outsourcing)	2001	10	24
	2002	16	11
	2003	14	20
	2004	<i>Transition</i>	
Period 2 (Post Outsourcing)	2005	15	17
	2006	18	13
	2007	16	17
	2008	13	15

C.3. Total Cost Paid for Days Lost per Accepted STD Injury Claim

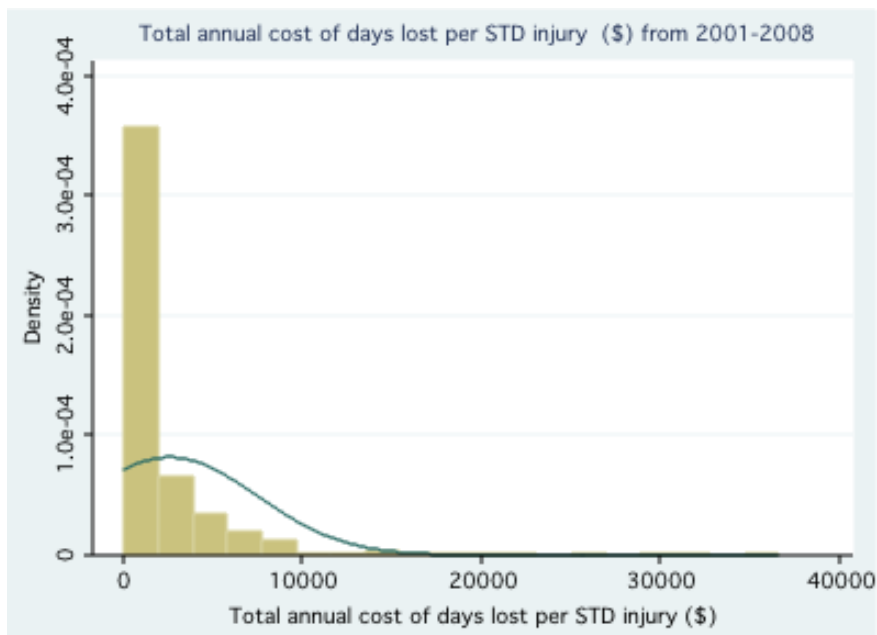


Figure 17: Histogram of untransformed total annual cost of days lost per STD injury from 2001-2008 in facilities that did not outsource food service workers.

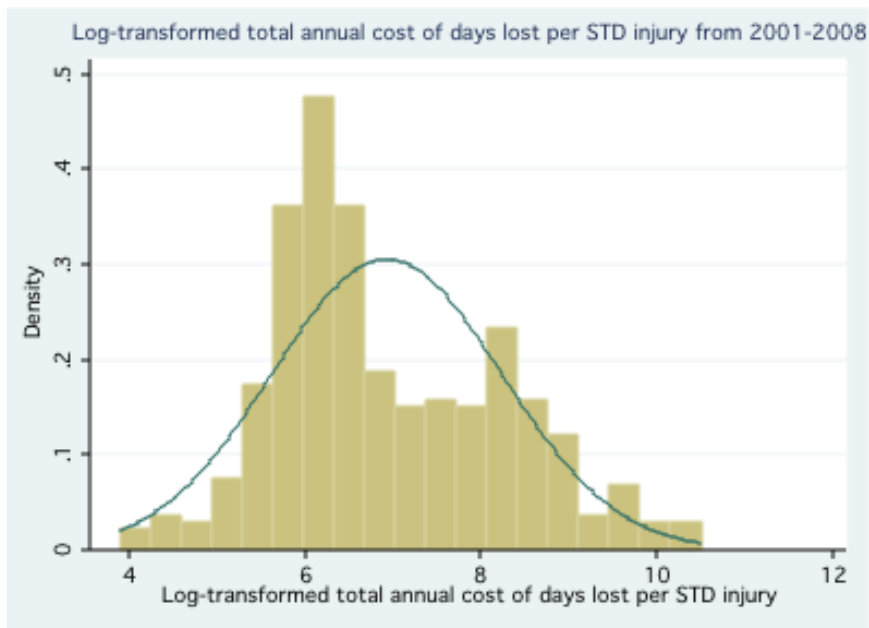


Figure 18: Histogram of log-transformed total annual cost of days lost per STD injury from 2001-2008 in facilities that did not outsource food service workers.

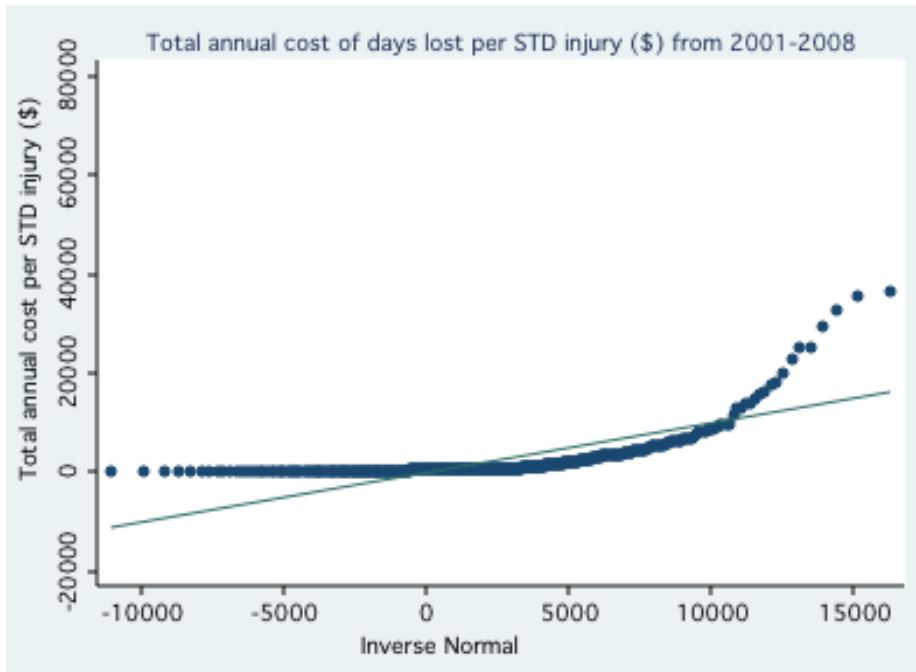


Figure 19: Quantile plot of untransformed total annual cost of days lost per STD injury from 2001-2008 in facilities that did not outsource food service workers.

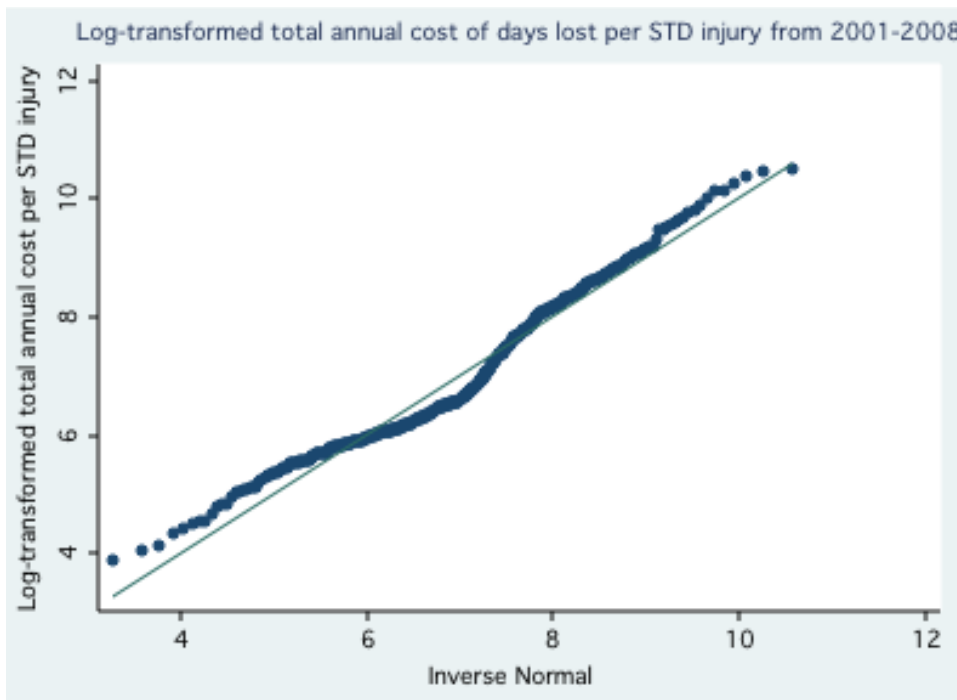


Figure 20: Quantile plot of log-transformed total annual cost of days lost per STD injury from 2001-2008 in facilities that did not outsource food service workers.

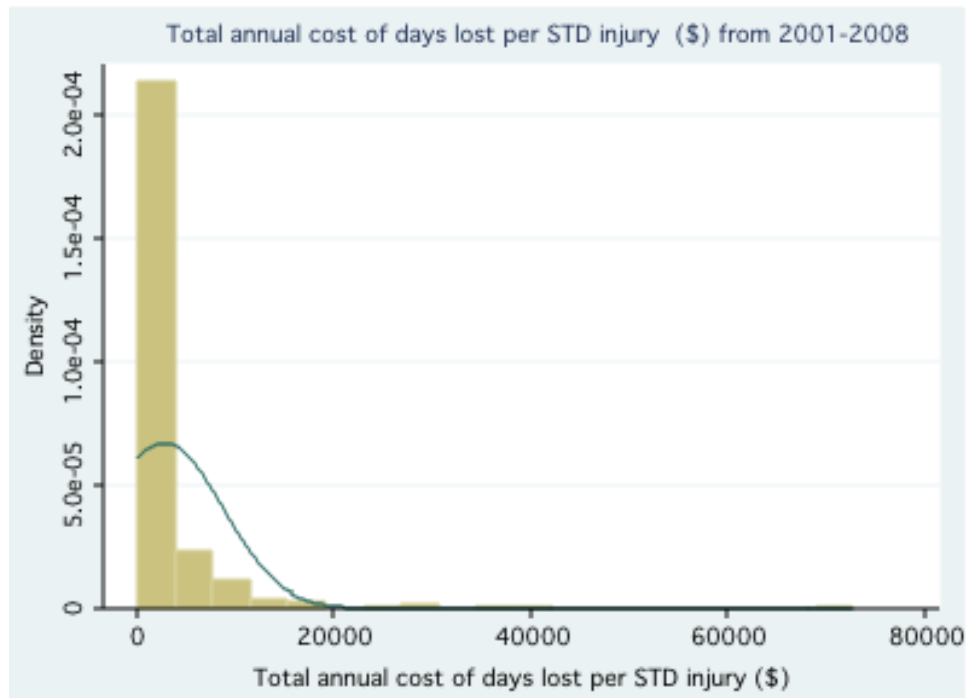


Figure 21: Histogram of untransformed total annual cost of days lost per STD injury from 2001-2008 in facilities that outsourced food service workers.

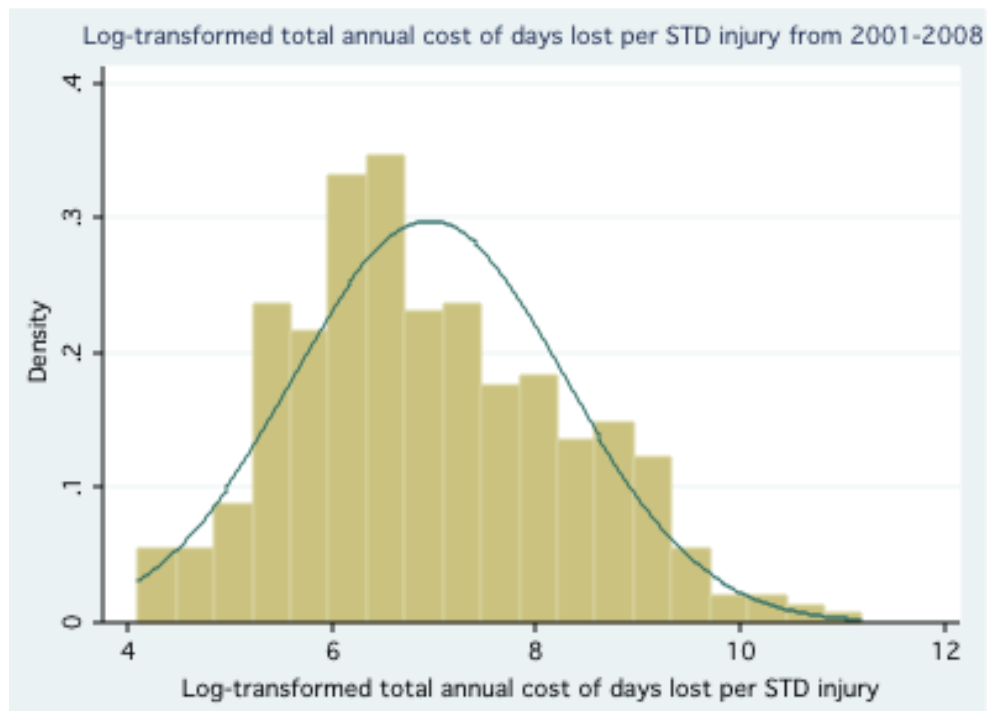


Figure 22 : Histogram of log-transformed total annual cost of days lost per STD injury from 2001-2008 in facilities that outsourced food service workers.

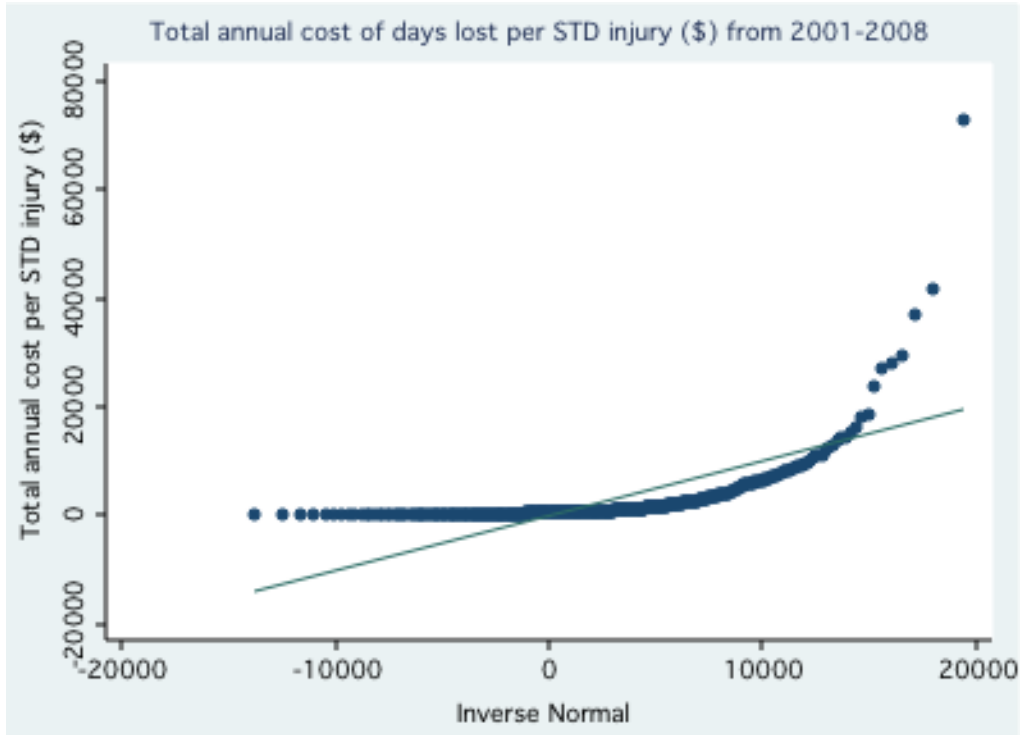


Figure 23: Quantile plot of untransformed total annual cost of days lost per STD injury from 2001-2008 in facilities that outsourced food service workers.

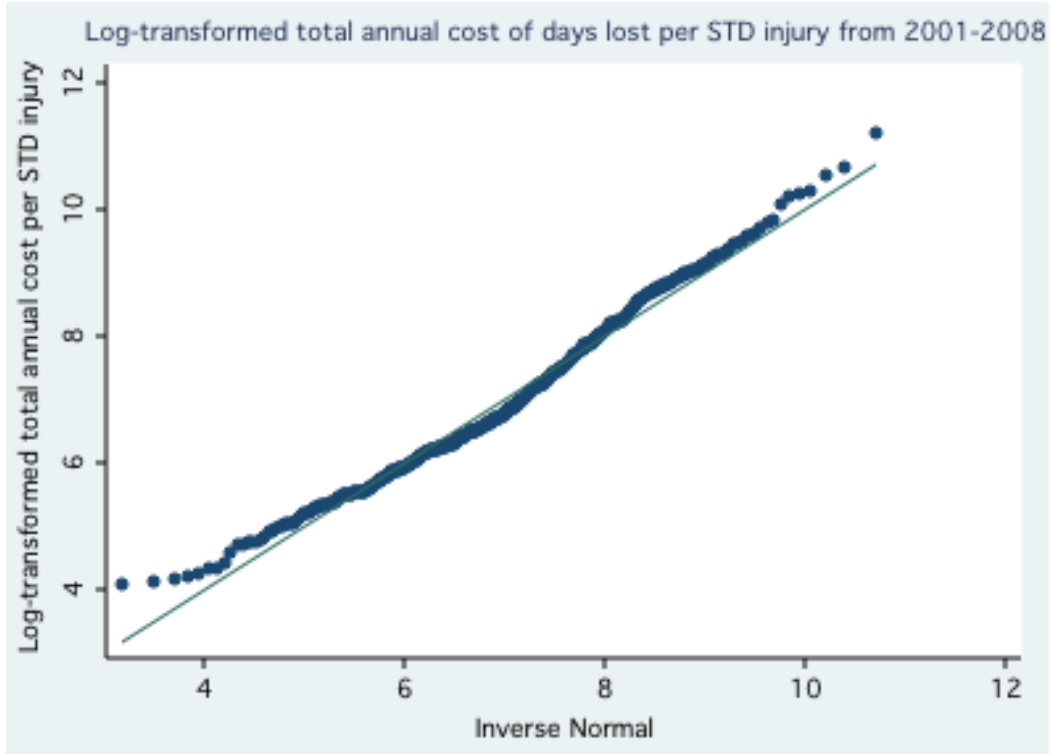


Figure 24: Quantile plot of log-transformed total annual cost of days lost per STD injury from 2001-2008 in facilities that outsourced food service workers.

Table 34: Multivariate analysis of average costs per injury per hospital in each exposure period for acute care facilities that did not outsource food service workers and for those facilities that did.

Exposure Variables	Non-Outsourced		Outsourced	
	Coefficient^	Std. Error	Coefficient^	Std. Error
Nature of Injury				
Back Strain	-0.21	-0.18	-0.15	-0.19
Burns and Bruises	-0.845***	-0.21	-1.026***	-0.18
Cuts, Punctures and Lacerations	-0.796**	-0.24	-0.974***	-0.22
Musculoskeletal Injuries	Reference category		Reference category	
Systemic Diseases and Others	-0.21	-0.32	-0.23	-0.38
Type of Accident				
Harmful Substances and Others	-0.44	-0.26	-0.642**	-0.22
Overexertion, bodily motion	Reference category		Reference category	
Slips, Trips and Falls	-0.22	-0.19	-0.26	-0.21
Struck By/Against	-0.751**	-0.26	-0.26	-0.18
Health Authority (HA)				
HA 1	Reference category		N/A	
HA 2	0.10	-0.13	N/A	
HA 3	N/A		0.450**	-0.15
HA 4	N/A		Reference category	
Hospital Size ^{\$}				
Small	0.29	-0.17	0.62	-0.77
Medium	0.315*	-0.15	-0.21	-0.24
Large	Reference category		Reference category	
Exposure Period [!]				
Period 1	Reference category		Reference category	
Period 2	0.04	-0.13	-0.14	-0.14
Constant	7.415***	-0.18	7.594***	-0.14
Total claims (N)	380		395	
Adjusted R ²	0.18		0.24	

p≤0.10*, p≤0.05**, p≤0.001***

^{\$} Small = less than 25 beds per hospital, medium = 25 to 99 beds per hospital, large = greater than 100 beds per hospital

[!] Period 1 = 2001-2003, Period 2 = 2005-2008

[^] ln (total cost paid till Dec 31, 2008)

Appendix D: Interview Support Documents

D.1. Subject Information and Consent Form

Printed on UBC Letterhead

SUBJECT INFORMATION AND CONSENT FORM

BC's outsourced hospital workers: an occupational health and safety perspective

Principal Investigator:

Dr. George Astrakianakis,
School of Environmental Health
University of British Columbia

[REDACTED]

[REDACTED]

Study Coordinator/MSc student:

Pearl Siganporia,
School of Environmental Health,
University of British Columbia

[REDACTED]

[REDACTED]

Co-Investigator(s):

Dr. Hasanat Alamgir	Institute of Asian Research	University of British Columbia
Dr. Mieke Koehoorn	School of Environmental Health	University of British Columbia
Dr. Anne Marie Nicol	School of Environmental Health	University of British Columbia
Dr. Aleck Ostry	Faculty of Social Sciences	University of Victoria

Sponsor: Hospital Employees Union and WorkSafeBC Research and Training Award

1. Invitation to participate

We are inviting you to participate in a research study, that is part of a Masters thesis in the School of Environmental Health at the University of British Columbia. The services that you provide as part of your occupation (food services and cleaning) are key to the delivery of health care services. As a valued member of the healthcare team, we invite you to participate in our study. The study will help us to better understand occupational health and safety (OHS) issues in your work environment. We are interested in the experiences of cleaners and food service workers prior to contracting out and after, as well as workers who have not been contracted out at all. This consent form is to give you information to help you decide whether or not you want to participate. You may ask questions about what we will ask you to do, the risks, the benefits, your rights, or anything else about the research or this form that is not clear. When all of your questions have been answered, you can decide if you want to be in this study or not. This process is called "informed consent."

2. Your participation is voluntary

Your participation is entirely voluntary. You may choose to decline or withdraw participation from this study at any point in time without providing any reason for your decision. Participation or non-participation will have no effect on your employment status. Signing this consent form in no way limits your legal rights against the sponsor, investigators, or anyone else.

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3. Who is conducting the study?

This study is part of a Master's thesis in the School of Environmental Health at the University of British Columbia. The study is being funded by WorkSafeBC, the provincial workers' compensation system (student training award) and is supported by the Hospital Employees' Union.

The principal investigator has no conflict of interest in undertaking this study.

4. Study purpose

The purpose of this study is to capture information on occupational health and safety issues in your work environment and your experiences prior to contracting out and after, where food services and cleaning services in the industry moved from Health Authority management to contractor management.

5. What does this study involve?

You will be asked to participate in a one-on-one interview in a free, safe and supportive environment for about 30-60 minutes. The research coordinator will ask you questions about occupational health and safety issues in your work environment including questions on your daily work tasks, your occupational health and safety training, and occupational health and safety incident reporting procedures. The research coordinator will also ask you questions about your occupational health and safety experiences under Health Authority management and/or contractor management. The research coordinator will take written notes and tape record your responses. Tape-recorded transcripts will be transcribed for analysis of consistent themes related to occupational health and safety issues by type of management experiences. The interviews will take place at your convenience, **over the phone**. You will be provided with a toll free number to call into at no cost to you. Notes and tape-recorded responses will be stored using an anonymous study number only, and will not be linked to your name, hospital or employer.

5. Who can participate in the study?

If you are a worker that provides cleaning or food services in acute care hospitals in British Columbia, **and** are hired either by the health authorities or contractors **and** are a registered member of the Hospital Employees Union (HEU), you are eligible to participate in the study and can speak conversational English.

6. Who cannot participate in the study?

If you do not provide support services such as housekeeping and cleaning or food services to the healthcare sector in British Columbia via a Health Authority or an employer, and are not a registered member of the Hospital Employees Union (HEU) and cannot speak conversational English, you cannot participate in the study.

7. What are the possible harms and side effects of participating?

There are no known physical harms or side effects of participating in the study. One possible harm is associated with the unlikely release of information that you provided to the study. However, we have taken every precaution to maintain confidentiality and anonymity, in order to minimize this risk. During the interview recording, your name will not be recorded or linked to your responses. Interview responses will be assigned an anonymous study number that is not associated with your name, hospital or employer.

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8. What are the benefits of participating in this study?

Participants will receive a \$20 gift card to a grocery store of your choice (Safeway or Save-On-Foods) as an honorarium for completing the interview. We hope that the information you provide through the interview will contribute to a better understanding of the occupational health and safety of people working in your occupation, and inform the development of policies or procedures to improve the work environment where necessary.

9. What will the study cost me?

This study will not incur any personal expenses. For your time and contribution, you will be provided an honorarium of \$20 in the form of a gift card to a grocery store of your choice (Safeway or Save-On-Foods) that shall be mailed to you.

10. Confidentiality and access to data

Your confidentiality will be respected at all times. No information that discloses your identity will be released or published without your specific consent to the disclosure. Your recorded responses will be coded with an anonymous study number, not your name. We will keep a record of the number we assign to you. We will not release that record to anyone else. Only the researchers and the research coordinator will have access to information about you. Study information identifying you will not be revealed to co-workers, employers, or other individuals or organizations. Your mailing address which shall be requested for to send you your honorarium and your copy of the informed consent form shall not be recorded or stored and shall be destroyed after this. Research records identifying you may be inspected in the presence of the investigator and the UBC Research Ethics Board for the purpose of monitoring the research.

All published reports will include aggregated data only, and **will not include** your name or your employment affiliation. Your name will not be used in any published reports nor will your responses be linked to your hospital or employer. No records that identify you by name or initials will be allowed to leave the Investigator's offices.

11. Who do I contact if I have questions about the study during my participation?

If you have any questions, or desire further information with respect to this study, you may contact Dr. George Astrakianakis at (604) 827-5189 or Pearl Siganporia at, [REDACTED].

If you have any concerns about your treatment or rights as a research subject, you may contact the Research Subject Information Line in the UBC Office of Research Services at 604-822-8598 or if long distance e-mail to RSIL@ors.ubc.ca.

12. Subject consent to participate

Your signature below indicates that you have read this consent and agree to participate in this study.

- I have read and understood the subject information and consent form.
- I have had sufficient time to consider the information provided and to ask for advice if necessary.

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- I have had the opportunity to ask questions and have had satisfactory responses to my questions.
- I understand that all of the information collected will be kept confidential and that the result will only be used for scientific objectives.
- I understand that my participation in this study is voluntary and that I am completely free to refuse to participate or to withdraw from this study at any time without changing in any way the quality of care that I receive.
- I understand that I am not waiving any of my legal rights as a result of signing this consent form.
- I have read this form and I freely consent to participate in this study.
- I have been told that I will receive a dated and signed copy of this form.

SIGNATURES

Printed name of subject	Signature	Date
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Printed name of principal investigator/ Designated representative	Signature	Date
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D.2. Recruitment Poster

Printed on UBC Letter head

VOLUNTEERS NEEDED FOR RESEARCH ON CLEANERS AND FOOD SERVICE WORKERS

We are looking for volunteers to take part in a study of
cleaners and food service workers in hospitals in British Columbia.

Your participation would involve 1 session, for approximately 30-60 minutes.

As a participant in this study, you would take part in a telephone interview
to talk about your work experience and your health and safety at work.

Your participation in this study will be confidential.

In appreciation for your time, you will receive a

\$20 Grocery store Gift Card of your choice (Safeway, Save-On-Foods).

For more information, or to volunteer, please contact:

Pearl Siganporia, MSc student, School of Environmental Health, UBC

Phone: 1-888- [REDACTED] (toll-free) or
Email: cleaners.foodservices@ubc.ca

10/2010

1-888- [REDACTED]
cleaners.foodservices@ubc.ca

1-888- [REDACTED]
cleaners.foodservices@ubc.ca

1-888- [REDACTED]
cleaners.foodservices@ubc.ca

1-888- [REDACTED]
cleaners.foodservices@ubc.ca

1-888- [REDACTED]
cleaners.foodservices@ubc.ca

1-888- [REDACTED]
cleaners.foodservices@ubc.ca

1-888- [REDACTED]
cleaners.foodservices@ubc.ca

1-888- [REDACTED]
cleaners.foodservices@ubc.ca

1-888- [REDACTED]
cleaners.foodservices@ubc.ca

1-888- [REDACTED]
cleaners.foodservices@ubc.ca

D.3. Interview Guide

I. Welcome and Introduction

a) Introduction

- i. Hello and welcome to the interview.
- ii. If you have any concerns about this interview being recorded, please let me know now (wait for the interviewee to raise any concerns).
- iii. My name is Pearl Siganporia and I am a graduate student with the School of Environmental Health at the University of British Columbia.
- iv. Today's session will be held primarily to get some feedback on how contracting out of your jobs has affected you from a work place health and safety perspective. If you have not been outsourced, then that's perfectly fine as well; we will just stick to talking about your work place health and safety environment.
- v. I will be taking notes to record information that is discussed to help with our study. I will also be audio recording the conversations.
- vi. Your presence is important to this study and we thank you for your participation.
- vii. Ok, so first things first, how does the interview work:
 - a. I am here to learn from your experiences.
 - b. Please be aware that this is a free and open discussion and I encourage you to share your ideas openly.
 - c. Please bear in mind that there are no wrong or right answers.
 - d. Please note that everything you say here is confidential and anonymous- your identity will not be disclosed and any report of this information will not have anyone's name associated with it.
 - e. In addition to that I will not be recording your name at all.
- viii. At the end of the session, please do not forget to provide me with an address so that I can mail your 20\$ honorarium. Once this is mailed, I will destroy your address data as it is not required for the research. We will have a few minutes at the end to wrap up any additional thoughts you might have.
- ix. **Inform the participant that you are going to start recording.**

Turn on recording device

- x. In our previous phone call, I had read out the consent form to you – do

- you have any questions or concerns at all?
- xi. If not, then in that case, can I request for a verbal consent for your participation in the study (if yes, read out the part of the consent form that needs to be tick marked – sign and date the consent form in the witness section –record time as well).
- xii. Thank you for your consent, I will post a copy to you for you to keep as well.
- xiii. Let's start.
- xiv. If the interviewee sounds relatively relaxed, start interview immediately.
 - a. If the interviewee does not sound relaxed, ask a few general questions about how his/her day was etc, to put the person at ease – when the interviewee is ready, start the interview
- xv. Ok, if you are ready now, we will start with the interview.

II. Self-Introductions (5 minutes)

- a) Ask the participants to introduce his/herself.
 - i. Perhaps you can start with your job title and then talk a bit about your employment history with health authorities and with contractors, and how long you've worked in your job.

III. Question round (20 minutes) (text in *italics* are comments for the interviewer)

1) Can you please describe to me a typical day at work, how many hours on average do you work and what does your job entail.

2) Lets talk about your training for this job (*if the interviewee voluntarily talks about the below points, let him/her, if not, probe*)

Do you feel like you have enough training for this job?

Are you aware of the Joint Occupational Health and Safety (JOSH) committee for your section? Do you know why it exists and what you can expect out of them?

Where would you go to find information regarding occupational health and safety, supervisor, health authorities occupational health and safety, a co-worker, JOSH? (For instance, if you had a question about gloves or about wearing the right kind of shoes for a particular job, who would you go to).

Has this changed as a result of contracting out? (*If the interviewee was an outsourced worker*)

Have you ever received information from your JOSH committee regarding an OH&S issue? Was it helpful?

3) Do you have concerns for your health and safety on the job and if so, can you describe in what way?

Have you ever been injured at work and if so, can you describe your experience if possible – what is the procedure? Was it different prior to outsourcing? Has anything changed in the recent years?

If so – explain

If not- why not

5) *If the participant doesn't talk about reporting an injury- probe* – were you encouraged to report your injury to the respective authorities?

Did you? If not, why not?

Is there a difference in the procedures between now and prior to contracting out ?

IV. Closing remarks (10 minutes)

Well, I think we have covered all the bases so far. Thank you so much for participating. We're running out of time now, however your input was very much appreciated and helpful. Once I turn off the recording, you can give me your postal address to which I can post your honorarium and your informed consent form copy and the results will be submitted in a report to WorkSafeBC as well as HEU. I hope this session was as helpful to you as much as it was to me. Do you have any questions or concerns before I turn off the recording?

Turn off the recording

Note down address and choice of gift card – SafeWay or Save-On-Foods