OCCUPATIONAL INJURIES CAUSING PERMANENT PHYSICAL OR MENTAL **IMPAIRMENT:**

Highest-risk groups and risk-influencing variables

In 2012, work-related injuries causing permanent physical or mental impairment (PPMI) accounted for 12% of all traumatic accidents and musculoskeletal disorders (MSDs) accepted by the CNESST. An IRSST study reveals more about this type of injury and its risk factors.

That same year, injuries causing PPMI accounted for half the accepted days and CNESST disbursements for all traumatic accidents and MSDs. This is not surprising, since such injuries generally have serious consequences and involve quite lengthy absences from work. "Say a construction worker falls and fractures two vertebrae," explains Marc-Antoine Busque, demographer and co-author of the report *Analyzing the risk of injury with permanent physical or mental impairment in Québec*. "He could have to change jobs or even quit the construction industry entirely. In a case like that, vocational rehabilitation can take a long time and be very costly."

Asking the right questions

Who is most at risk of sustaining a PPMI due to a work-related injury? Women, men, younger, older? Is there a link between the frequency of these injuries and certain types of jobs or a certain industry? How has the situation changed over the last decade? These are some of the questions the authors had when they started their research. "We wanted to find out what characteristics had the strongest correlation with risk by studying four variables: age, gender, job type and industry," Marc-Antoine Busque says. "For our statistical model, industries were organized into nine categories covering the entire economy."

Age

For 2010–2012, workers aged 55 or older had twice the risk of a traumatic accident leading to PPMI, compared with workers aged 15 to 24. However, this correlation varies according to gender: the risk is three times higher for women aged 55 or older compared with women in the 15–24 age bracket, whereas for men the difference is a factor of less than 2 for the same age brackets.

For MSDs, too, risk increases with age, but the effect is amplified; in fact, it's six times higher for older workers than for 15-to-24-year-olds. In the case of MSDs, however, the difference between men and women is not statistically significant.

About the method and the terms used

In the analyses, frequency is measured in terms of the number of injuries per 1,000 full-time equivalent (FTE) workers. The frequency rates were analyzed using a statistical model that shows their correlation with age, gender, job type and industry category. For example, it can estimate the specific effect of age while controlling the other three variables. The ratio between the frequency estimated for each age bracket and the frequency estimated for the group designated as the control group is the adjusted relative risk.

In addition, the following abbreviations are used:

- **PPMI** Permanent physical or mental impairment
- **MSD** Musculoskeletal disorder

Gender

According to the researchers' gender-based analysis, for 2010–2012 women had 76% as much risk as men of sustaining a PPMI due to a traumatic accident. However, the gender effect varies depending on age, job type and industry.

Specifically, women in the 15–24 age bracket have half the risk of an accident resulting in PPMI, compared to men in the same age group, but no significant gender-based difference was noted in the 55-and-older group. Nor is there any significant gap between women and men in non-manual jobs and in most of the service industries. For other industries and job types, however, the risk is higher for men.

As for the risk of sustaining a PPMI due to a musculoskeletal disorder, the analysis found no significant difference between women and men, except in certain industries. In particular, women have a statistically lower risk than men in two goods-producing industries but a higher risk in two service industries.

The nine industry categories

- Primary industries and utilities
- Construction
- Manufacturing, repair and maintenance
- Trade
- Transportation, storage and waste management
- Production support
- Public administration and teaching
- Healthcare and social assistance
- Accomodation and food services for individuals and organizations, arts and entertainment

Job type

The authors observed that the factor with the strongest impact on the risk of sustaining PPMI—whether due to an accident or an MSD—was job type. Manual workers have nine times the risk of an accident compared to non-manual workers, while those in mixed occupations have four times the risk.

The difference is even greater when it comes to MSDs: the relative risk is 13 for manual jobs and 4 for in mixed jobs. As in the case of accidents, it varies according to industry. Nevertheless, in each industry, the risk is highest in manual jobs, followed by mixed jobs and non-manual jobs. "Our results show that the risk of sustaining PPMI is more strongly linked to the type of job you do than to the industry you work in or even your age," says Marc-Antoine Busque. "We suspected as much, but we wanted to confirm it with a model that lets us control the effects of the other variables."

Industry

According to the estimates obtained with the statistical model, the relative risk linked to industry ranges from about 1 to 2, depending on the industry category, for both accidents and MSDs.

The highest-risk industry categories are the manufacturing, repair and maintenance sector for accidents and the healthcare and social assistance job type industry for MSDs.

Frequency

The authors also identified target groups by applying an industry breakdown more detailed than the nine categories. They identified 23 job type/industry combinations for men and 22 for women where, between 2010 and 2012, the frequency of accidents resulting in PPMI was twice the average rate (men: 3.8‰; women: 1.5‰). For men, these groups account for just 17% of FTE workers but 48% of accidents resulting in PPMI; for women, they make up only 12% of workers but 39% of accidents with PPMI.

In the case of MSDs, 18 job type industry combinations were identified for men and 9 for women where, between 2010 and 2012, the frequency was double the average (men: 1.4‰; women: 0.9‰). For men, these groups account for just 16% of FTE workers but 45% of MSDs resulting in PPMI; for women, they make up only 8% of workers but 37% of MSDs with PPMI.

Job types

- **Manual:** Occupations where the work is mostly physical (construction trades, labourers, skilled workers, nurse's aide/or derly, sewing machine operator, etc.).
- **Mixed:** Occupations that require performing some light physical tasks on a continual basis, or heavier physical work on occasion (registered nurse, hairdresser, technician, cashier, police officer, etc.).
- **Non-manual:** Occupations where physical work plays a minor role (administrative staff, teacher, lawyer, etc.).

FTE frequency rate of accepted traumatic accidents resulting in PPMI, by job type/industry combination – Men, 2010–2012 (annual average), in decreasing order

NAICS 3*	Industry	Job type	No. of PPMI cases due to accident	FTE	Frequency (‰)
115	Support activities for agriculture and forestry	Manual	36	1,061	33.6
412	Petroleum and petroleum products merchant wholesalers	Manual	11	546	20.1
484	Truck transportation	Mixed	15	831	18.0
212	Mining and quarrying (except oil and gas)	Manual	81	5,949	13.6
238	Specialty trade contractors	Manual	742	56,283	13.2
562	Waste management and remediation services	Manual	40	3,174	12.5
326	Plastics and rubber products manufacturing	Mixed	12	992	12.4
331	Primary metal manufacturing	Manual	144	11,999	12.0
321; 337	Wood product manufacturing; Furniture and related product manufacturing	Manual	305	26,029	11.7
327	Non-metallic mineral product manufacturing	Manual	75	6,052	11.5

* First three digits of the 2007 North American Industry Classification System (NAICS) code.

Caption: The risk of traumatic accident is highest in the manufacturing, repair and maintenance sector, while the risk of musculoskeletal disorder is highest in healthcare and social assistance.

FTE frequency rates of accepted traumatic accidents resulting in PPMI, by job type/industry combination – Women, 2010–2012 (annual average), in decreasing order

NAICS 3*	Industry	Job type	No. of PPMI cases due to accident	FTE	Frequency (‰)
713; 711; 512; 712	Amusement, gambling and recreation industries; Performing arts, spectator sports and related industries; Motion picture and sound recording industries; Heritage institutions	Manual	15	952	15.8
321; 337	Wood product manufacturing; Furniture and related product manufacturing	Manual	42	3,991	10.4
913	Local, municipal and regional public administration	Manual	13	1,305	9.7
314; 313	Textile product mills; Textile mills	Manual	11	1,346	7.9
311; 312	Food manufacturing; Beverage and tobacco product manufacturing	Manual	69	8,961	7.7
813	Religious, grant-making, civic, and professional and similar organizations	Manual	15	2,003	7.7
721	Accommodation services	Manual	27	3,764	7.3
611	Educational services	Manual	13	1,857	6.8
326	Plastics and rubber products manufacturing	Manual	22	3,434	6.3
336	Transportation equipment manufacturing	Manual	11	1,930	5.5

* First three digits of the 2007 North American Industry Classification System (NAICS) code.

To find out more
BUSQUE, Marc-Antoine, Patrice DUGUAY
Analyzing the risk of injury with permanent physical or mental impairment in Québec, **R-976, 91 pages.**