HIGH RATES OF MALE INJURIES IN THE WORKPLACE

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Abstract

It is widely recognised that males work in occupations with the greatest risk of injury. The number of claims for work related injuries by males made up nearly three-quarters of all claims in 2003 (Injury Statistics – Work-related Claims 2003).

When occupation categories are broken down into more defined areas of the workforce, the comparative difference between males and females can be narrowed and in some occupations there is no statistical difference in the incidence rate. The majority of occupations, however, are still dominated by male injuries.

This paper provides information on the breakdown of males and females in the workforce and how their risk of injury differs. The exploratory analysis undertaken provides limited support for the idea that sex is a factor in workplace injury. However, there are clearly many other factors influencing the injury rate (as measured by workplace claims), and many of these cannot be easily measured or separated from other factors.

Introduction

Higher rates of work-related injury among men can be due to many factors (more dangerous tasks being performed, hours worked, type of work, age in certain occupations). However, evidence suggests that males are more likely to show risk-taking behaviour (Patience, 1992), and therefore 'maleness' may be a factor in injury.

In 2002 and 2003 there were 176,000 and 183,000 claims for work-related injuries by males, compared with 61,000 and 65,000 by females, respectively.

The rates of claims made by males in 2002 and 2003 were 183 and 186 per 1,000 full-time equivalents (FTEs), respectively. For female workers, the rates for 2002 and 2003 were 89 and 91 per 1,000 FTEs, respectively (Injury Statistics – Work-related Claims 2003).

Are there other structural factors or immeasurable elements involved that would help explain the difference between injury rates for men and women in the workforce?

This paper will analyse work-related claims data, on the assumption that this is a reasonable proxy for rates of injury.

The Data

The Accident Compensation Corporation (ACC) provides information on the work-related claims reported by people in full- and part-time work.

Claims that did not specify any occupation or age or were undefined in these areas were left out of the analysis. The data are as reported three months after the end of each calendar year.

To consider how the risk of workplace accidents varies between males and females, it is necessary to calculate an incidence rate by compounding the aggregate ACC injury data with estimates of the working population obtained in the Household Labour Force Survey (HLFS).

The HLFS provides quarterly estimates of the current numbers of people in full- and part-time employment. It does not include information on unpaid family workers as they are not covered by ACC.

The analysis focused on work-related claims for people over the age of 15, so younger workers were excluded from the analysis.

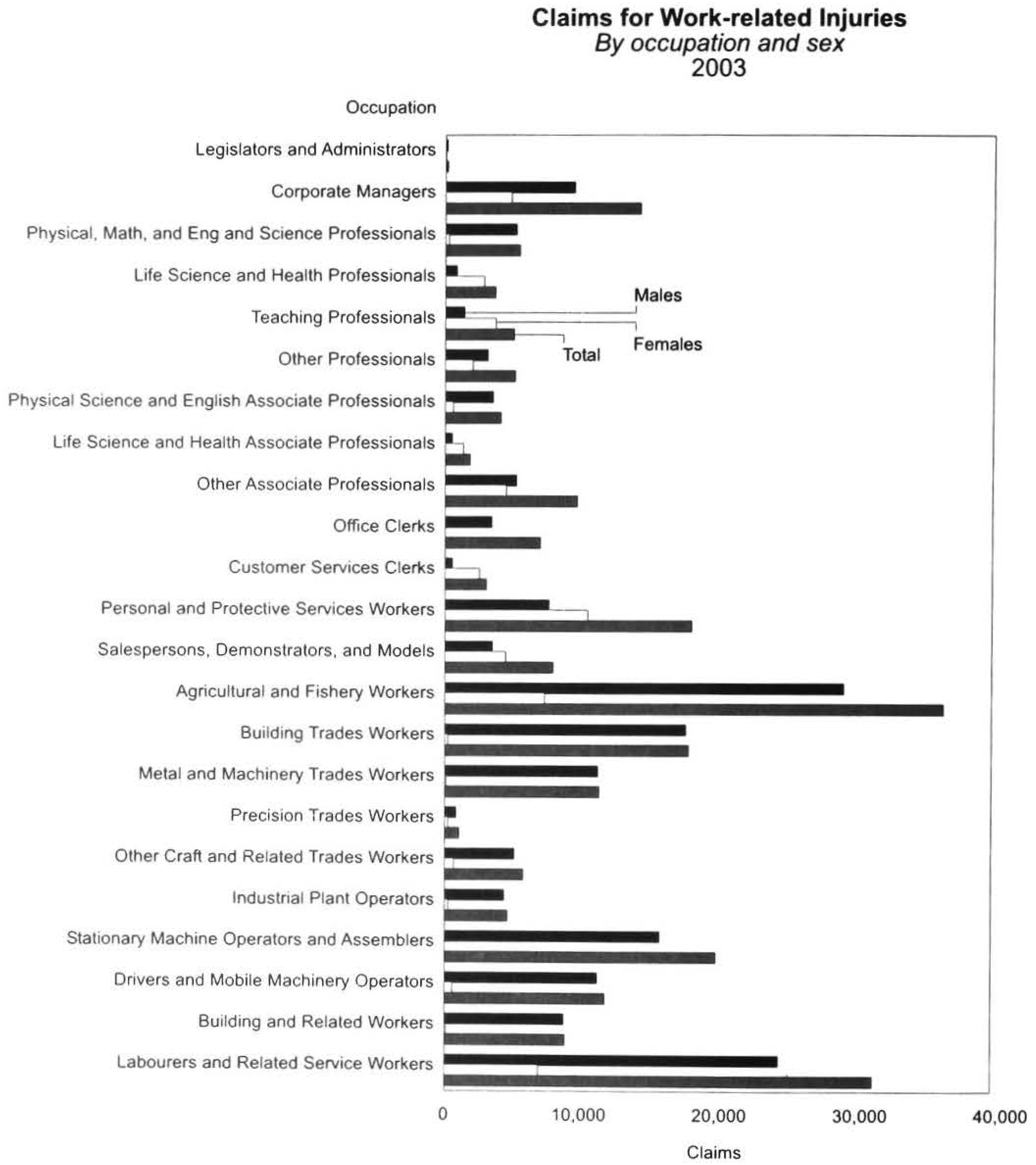
It is important to note that the sampling error associated with subnational estimates, such as age categories within specific occupations, are larger than those associated with national estimates.

The incidence rates were calculated as the number of claims per 1,000 (FTEs) and were obtained from the HLFS.

Methodology

Analysis of variance (ANOVA) is used to explore factors of interest. It was decided the main factors influencing incidence rates were age, sex and occupation.

Figure 1: 2003 Claims for Work-related Injuries by Occupation and Sex



Occupation class is analysed at a more disaggregated level compared with previously published Statistics New Zealand analysis, and is sourced from the last three years of ACC claims.

Other notable factors such as ethnicity or hours worked were left out of the model due to the inability of the HLFS to provide sufficiently accurate disaggregated estimates.

This model was chosen because of its simplicity and ability to find significant relationships between age, sex and occupation with incidence rates.

The key statistic in ANOVA is the F test of difference of group means. If the F test shows that, overall, the independent variables are related to the dependent variable, then post hoc tests are used to explore which value groups of the independents have the most to do with the relationship.

The Tukey Test, designed to perform a pair-wise comparison of the means, was then used to see where the significant differences in the independent variables were.

It was assumed that incidence rates were relatively constant over the three-year sampling frame, so that a replication could be used in the ANOVA model. This may not be the case in certain occupations whose employee numbers may have increased or decreased dramatically in this time period. An example would be workers in the housing industry such as bricklayers and roofers, whose numbers have increased during the recent housing boom.

One of the assumptions of ANOVA is that the dependant variable is normally distributed.

The incidence rate appeared to display an exponential distribution, so was transformed using the natural log to obtain a more normally distributed form.

It was also decided to group some occupations together to a higher level of classification due to the low numbers of workers estimated in these areas, to minimise the risk of providing inaccurate rates.

Descriptive Statistics

Figure 1 shows large differences in the number of claims made for work-related injury by male and female workers in particular occupations. In many instances, these differences in the number of claims between sexes reflect the fact that there are mostly male workers in some occupations (eg building and related workers, and labourers and related service workers). Entitlement data shown in Graph 2 follows a similar pattern to Graph 1, and is affected by the same differences in the sex ratio of some occupations. Entitlement payments cover things such as rehabilitation and loss of earnings, and are considered the more serious injuries.

The main point from these two graphs is that male workers, in absolute terms, dominate the number of work-related injury claims made. Therefore, if 'maleness' is a risk factor in work-related injury, small improvements targeting 'maleness' in prevention strategies may provide significant returns in terms of reducing the cost of injury.

Figure 3 shows the incidence of injury by sex and occupation. The occupation with the highest incidence of injury to males is plant and machine operators and assemblers. The occupation with the highest incidence of injury to females is agricultural and fishery workers.

Figure 2: 2003 Claims for Work-related Injuries Resulting in Entitlement Payments by Occupation and Sex

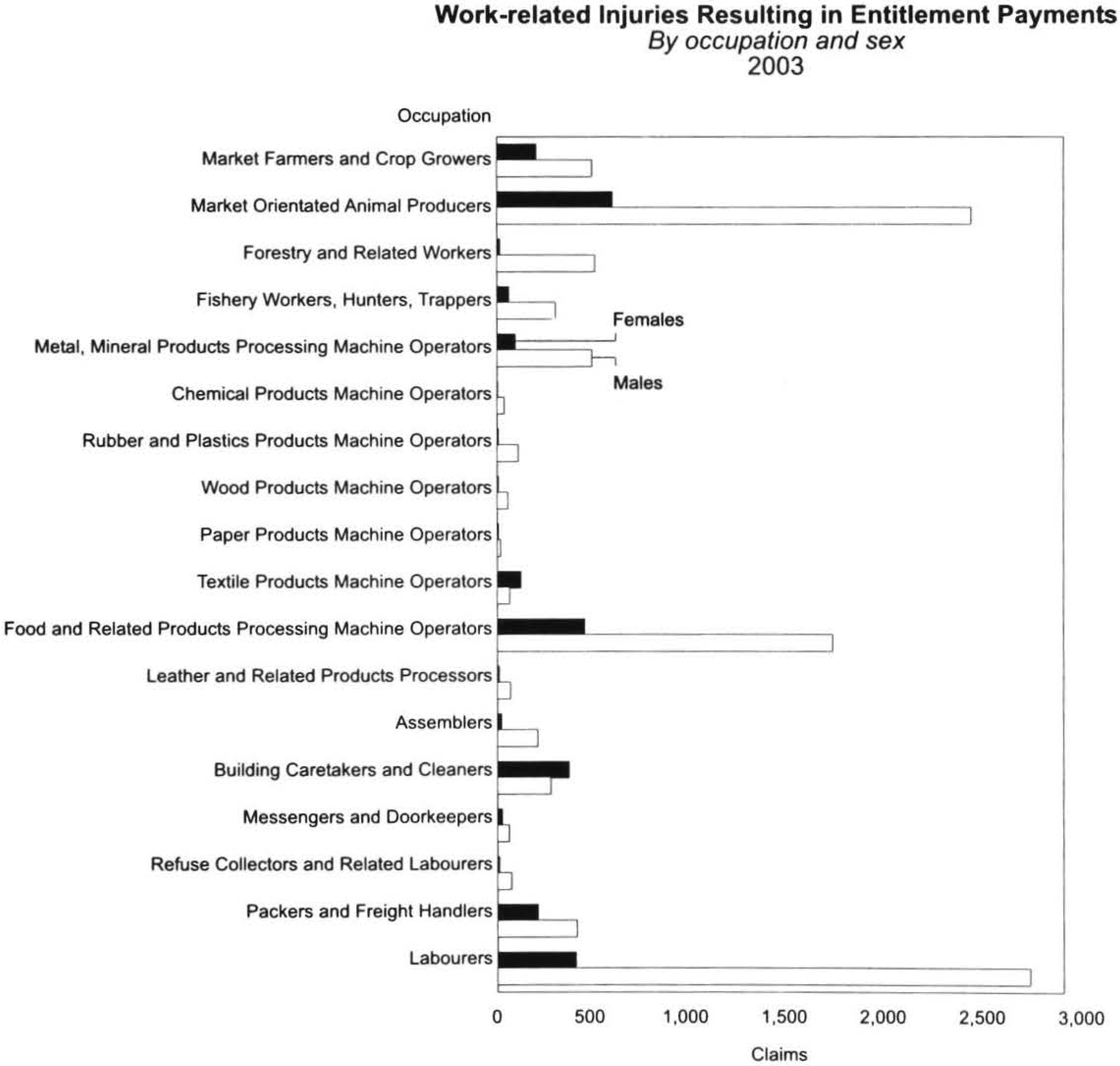


Figure 3: 2003 Incidence Rates for Work-related Injuries by Occupation and Sex

Across professional occupations, the incidence rate is lower in both males and females than in the higher-risk elementary occupations. The disparity between males and females is much more prominent in these elementary occupations than the less risky professional occupations.

Figure 4 shows the incidence of injury resulting in entitlement payments by sex and occupation. The highest incidence of injury is in the occupation of plant and machines operators and assemblers.

There is some evidence of an 'age effect' among the younger male workers, with Figure 5 showing the incidence of injury between younger males and females and the rest of the workforce over the last three years. Males under the age of 25 exhibit a higher rate of injuries compared to all male and female workers. Females under the age of 25 show a similar rate of injuries to females in all age categories.

Results and Conclusions

Table 1 shows the results of running the three-way ANOVA on the model. Sex, age and occupation all have strong statistical significance for the incidence rate of injury, represented by the high F values in the table.

There are also significant interaction effects between all these variables. This three-way interaction effect shows that age, sex and occupation interact together to affect the incidence of injury.

Figure 4: 2003 Incidence Rates for Injuries Resulting in Entitlement Payments by Occupation and Sex

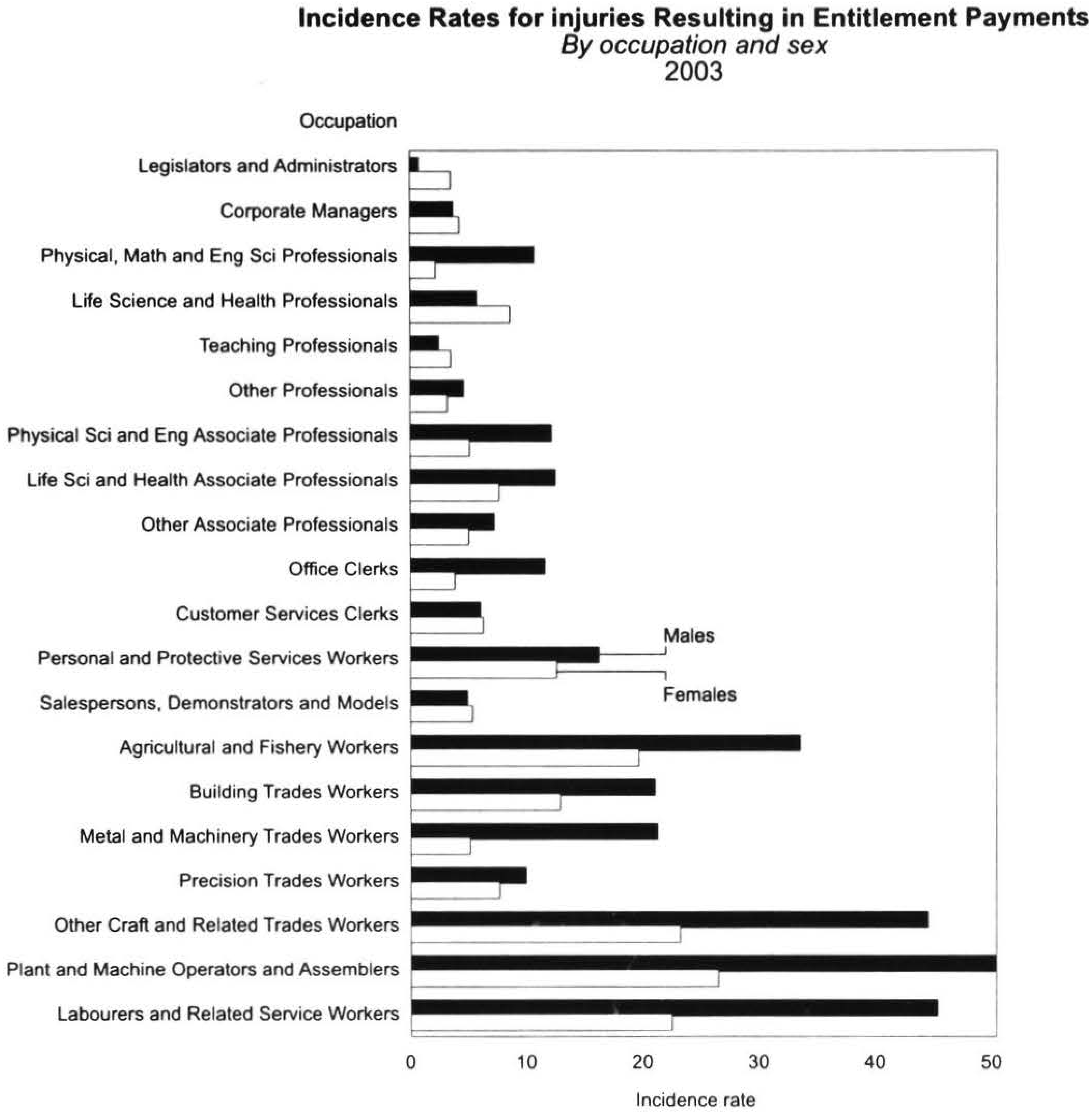


Figure 5: Incidence Rates for Work-related Injuries

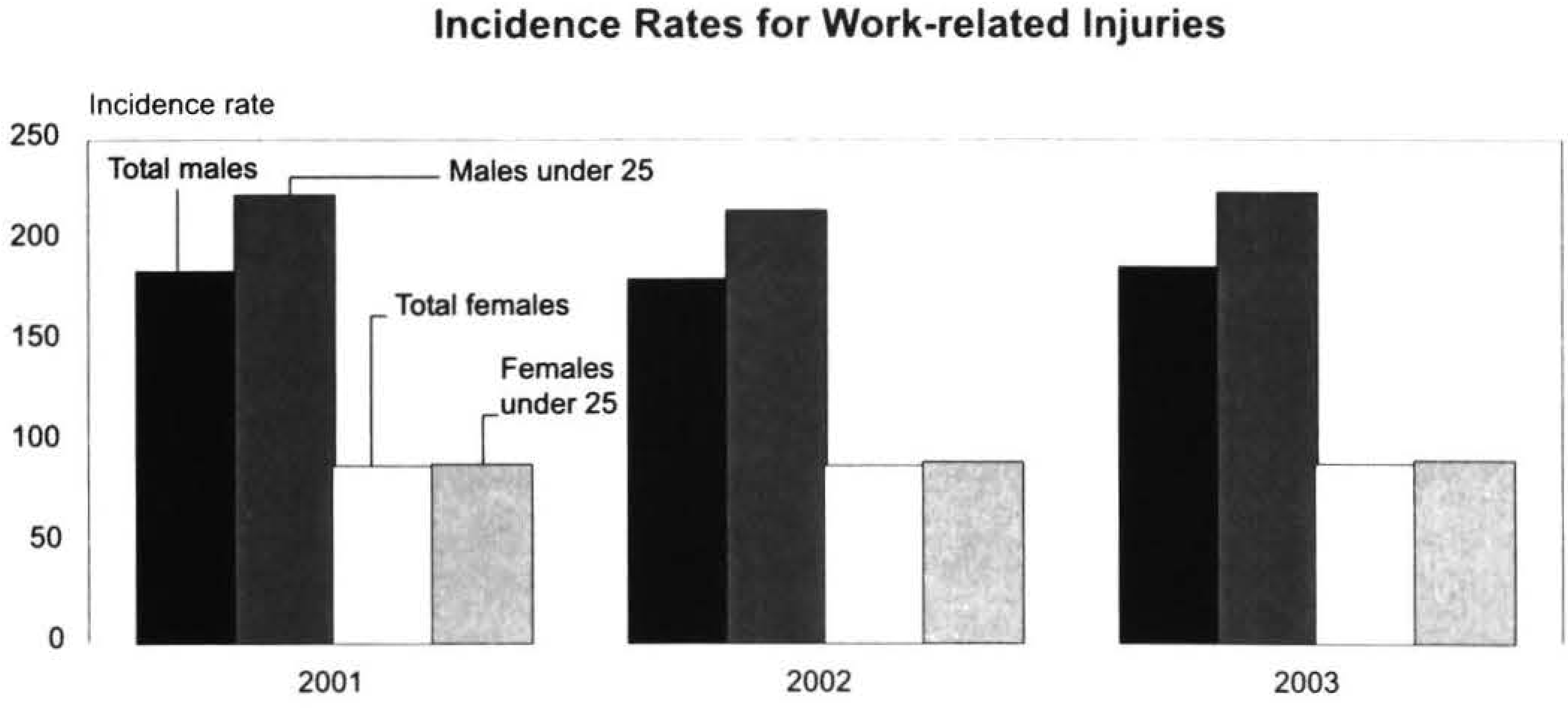


Table 1 - ANOVA Test

The GLM Procedure

Dependent Variable: a

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	159	331.8983558	2.087411	38.06	<.0001
Error	320	17.5490376	0.0548407		
Corrected Total	479	349.4473934			

R-Square	Coeff Var	Root	MSE	a Mean
0.949781	5.194822	0.234181	4.507	970

Source	DF	Type I SS	Mean Square	F Value	Pr > F
occupation	19	184.3142719	9.7007512	176.89	<.0001
sex	1	36.932929	36.932929	673.46	<.0001
sex*occupation	19	43.4838338	2.2886228	41.73	<.0001
age	3	30.7864974	10.2621658	187.13	<.0001
occupation*age	57	20.4576481	0.3589061	6.54	<.0001
sex*age	3	1.8518262	0.6172754	11.26	<.0001
sex*occupation*age	57	14.0713495	0.2468658	4.5	<.0001

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In simple terms, there is a statistical difference between the incidence of injury to males and females, but it is confounded by the other variables in the model.

Table 2 shows the summary results of the Tukey Test on occupation and age. It shows that all age categories are statistically different. It also groups similar-risk occupations together; the general trend showing elementary occupations as the highest-risk and professional/office work as the lower-risk occupations.

It can be concluded that all three factors included in the ANOVA were influential in respect of the incidence of work-related injury claims, including sex. Moreover, these factors interacted. As a result, while gender is shown to be an important source of variance in respect of rates of work-related injury claims, this result is confounded by a relationship with the other factors included in the model. In essence, ANOVA has not picked out sex as important by itself, reflecting both the limitations of the model used, and the administrative and survey data analysed.

Table 2 - Tukey Test

Tukey's Studentize Range (HSD) Test

Means with the same letter are not significantly different

Tukey Grouping	Mean	N	age
A	4.80049	120	40-55
B	4.68588	120	25-40
C	4.3925	120	under25
D	4.15301	120	over55

Tukey Grouping				Mean	N	occupation
A				5.63867	24	Plant and machine operators and assemblers
A						
B	A			5.41814	24	Labourers and related elementary service workers
B	A					
B	A			5.40647	24	Market orientated agriculteral and fishery workers
B						
B				5.29662	24	Other craft and related trades workers
C				4.89807	24	Life science and health associate professional
C						
D	C			4.79598	24	Building trades workers
D	C					
D	C			4.77805	24	Personal and protective services workers
D						
D	E			4.56898	24	Metal and machinery trades workers
E						
F	E			4.48959	24	Precision trades workers
F	E					
F	E	G		4.47237	24	Corporate managers
F	E	G				
F	H	E	G	4.41942	24	Physical science and engineering associate professionals
F	H	G				
F	H	I	G	4.30542	24	Other professionals
F	H	I	G			
F	H	I	G	4.29721	24	Salespersons, demonstrators and models
H	I	G				
H	I	G		4.24375	24	Other associate professionals
H	I	G				
H	I	G		4.24287	24	Physical, mathematical and engineering science professionals
H	I					
H	I			4.19482	24	Life Science and health associate professionals
I						
I				4.11142	24	Teaching professionals
J				3.86176	24	Customers services clerks
J						
J				3.73923	24	Office clerks
K				2.98056	24	Legislators and administrators

The model is not able to account for the differences in personality, behaviour and social conditions that exist within genders, and these differences may be related to variation in health outcomes. In respect of work-related injury claims, however, the evidence presented here leaves us with more questions than it answers. For example:

Do males take more risks than females in the workplace?

To what extent does role differentiation within a broad occupation class influence the risk of injury?

What kind of data would we need to answer these questions, and is this data worth pursuing or are other areas of injury more important?

Within the same job, gender responsibilities can differ. In places such as offices, tasks such as heavy lifting may be left to males to perform.

Studies that have been done in New Zealand with regard to risk taking suggest young males have a tendency to exhibit high-risk behaviour. (Water Safety New Zealand, 2003)

Younger, less experienced workers may be unable to assess the risk involved in certain tasks or be assigned more dangerous tasks by their employer.

One important conclusion from this study is that inferences about gender differences can be made erroneously. This is because gender, age and occupation are confounded with many other variables in our society. These variables have to be taken into account before conclusions about gender can be made.

Future Work

This paper merely touches the surface as to the underlying causes behind workplace accidents. The current administrative data available on workplace accidents are not sufficient to cover the physiological and psychological causes that are likely to contribute to the male dominance of workplace accidents. A well-designed survey targeting these areas of interest would help to give a better understanding of 'maleness' as a risk factor and aid in concentrating injury prevention strategies in this area of concern.

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