

Copyright is owned by the Author of the thesis. Permission is given for a copy to be downloaded by an individual for the purpose of research and private study only. The thesis may not be reproduced elsewhere without the permission of the Author.

**Workforce survey of occupational exposures and health effects in
New Zealand**

**A thesis by publications presented in partial fulfilment of the
requirements for the degree of**

Doctor of Philosophy

in

Epidemiology

at Massey University, Wellington, New Zealand

Amanda Jane Eng

2011

Abstract

This thesis is based on the first workforce survey in New Zealand to assess occupational exposures and health in a random sample of the working population. The aims of this thesis were to: i) describe the prevalence and distribution of occupational exposures and workplace practices in the New Zealand working population; ii) identify gender and ethnic differences in occupational exposure; and iii) examine which occupational risk factors contribute to the risk of respiratory disease.

Over a two year period 10,000 individuals aged 20-64 were randomly selected from the Electoral Roll and invited to take part in a telephone interview. The interview obtained information on lifetime work history, occupational exposures including dust/chemical exposures and certain physical and organisational factors, and selected health effects including respiratory symptoms. A total of 3,003 interviews were completed (37% response rate).

Occupational exposure to dust/chemical and certain physical factors were disproportionately experienced by workers in the agricultural, trades, and manufacturing sectors, where prevalences were as high as 75%. However, exposures also occurred in other occupational groups not traditionally associated with hazardous exposures (for example the legislators and managers group). Substantial differences in exposure prevalence were observed between males and females and Māori and non-Māori workers. The occupations positively associated with current and adult-onset asthma included

printers, bakers, and sawmill labourers, as well as several occupations that have not been previously associated with asthma (for example teachers and certain sales professionals). Finally, a positive association between work-related stress and asthma was identified.

This thesis indicates that the traditional chemical and physical exposures are common in the New Zealand working population, and that emerging factors such as organisational and psychosocial exposures are also prevalent and relevant to occupational health. While the distribution of occupational exposures and risk factors for asthma were concentrated in certain occupational groups, they were also more widely spread across the workforce than previously assumed. Besides occupation, the demographic characteristics of a worker also appeared to determine their occupational exposure. The findings of this thesis illustrate that workforce surveys are a valuable tool for assessing a wide range of exposures in a wide range of workers, and therefore should be carried out on a regular basis.

Acknowledgements

I am indebted to my supervisor Andrea 't Mannetje. Thank you for your invaluable guidance and for challenging me throughout the PhD process. I am fortunate to have had such an accomplished mentor and I am grateful for your level-headed advice as well as for the laughs that we have shared. I am also very grateful to my co-supervisor Neil Pearce. Thank you for your advice and support and especially for your faith in me from the beginning. It was with your encouragement that I decided to undertake this thesis.

I would also like to thank Jeroen Douwes, particularly for his input on the asthma results. I appreciated your ideas and your enthusiasm. I am also grateful to Lis Ellison-Loschmann, Dave McLean, and Barry Borman. Thank you for your valuable feedback on large parts of this thesis.

I wish to thank my colleagues at the Centre for Public Health Research, my second family, for all the support I received whether it was lending a sympathetic ear at work or helping me paint my house. In particular, I would like to thank Fiona McKenzie, my office mate and fellow PhD student. Thanks for letting me bounce ideas off you and for your moral support through the 'ups and downs'.

A big thank you to all those who contributed to the data collection of the workforce survey, including the telephone interviewers and the data entry team, and to the participants of the workforce survey for giving up their time.

Finally, I am grateful to my family and partner, whose patience was probably tested during the PhD process. To Bruce, Andrea, Katie and David, thank you for your unconditional support and for always believing in me. To Ant, the road towards completion would have been a lot more difficult without your calming influence and constant encouragement.

Table of contents

Abstract.....	i
Acknowledgements.....	iii
Table of contents.....	v
List of tables.....	vii
List of figures.....	ix
 1. Introduction and methods	
Chapter 1 Introduction, aims, and outline of the thesis.....	2
Chapter 2 Background.....	8
Chapter 3 The New Zealand Workforce Survey: self-reported occupational exposures.....	52
Supplementary data to Chapter 3: Self-reported exposure prevalence by industry groups (Figures 3S.1 & 3S.2).....	73
 2. Demographic differences in occupational exposure	
Chapter 4 Gender differences in occupational exposure patterns.....	76
Chapter 5 Ethnic differences in patterns of occupational exposure in New Zealand.....	97

3. Work-related risk factors for asthma

Chapter 6 The New Zealand Workforce Survey: occupational risk factors for asthma.....	116
--	-----

Chapter 7 Work-related stress and asthma: results from a workforce survey in New Zealand.....	135
--	-----

4. Discussion and conclusions

Chapter 8 Discussion and conclusions.....	145
---	-----

References.....	165
------------------------	------------

Appendices

Appendix 1 Workforce survey questionnaire	
---	--

Appendix 2 Statements of contribution to Doctoral thesis containing publications	
--	--

List of tables

Table 2.1: Epidemiological studies conducted in New Zealand that have included occupational exposure measurements.....	14
Table 2.2: Epidemiological studies conducted in New Zealand of work-related disease and injury.....	23
Table 2.3: Workforce surveys of occupational exposure conducted in overseas countries.....	38
Table 3.1: Description of total sample.....	57
Table 3.2: Description of study sample.....	58
Table 3.3: Self-reported exposure prevalence by current job (1-digit code).....	62
Table 4.1: Description of total and matched samples.....	81
Table 4.2: Differences in occupational exposure prevalence between males and females.....	85
Table 4.3: Differences in specific occupational exposure prevalence between males and females.....	87
Table 5.1: Description of study sample.....	103
Table 5.2: Differences in occupational exposure prevalence between Māori and non-Māori.....	106
Table 5.3: Differences in occupational exposure prevalence between Māori and non-Māori males.....	108
Table 5.4: Differences in occupational exposure prevalence between Māori and non-Māori females.....	109
Table 6.1: Characteristics of the study participants.....	121
Table 6.2: Odds ratios (OR) and 95% confidence intervals (CI) for <i>a priori</i> high-risk occupations.....	124

Table 6.3: Odds ratios (OR) and 95% confidence intervals (CI) for <i>a posteriori</i> high-risk occupations.....	127
Table 7.1: Odds ratios (OR) and 95% confidence intervals (CI) for job stress and asthma symptoms stratified by smoking status.....	139

List of figures

Figure 3.1: Personal protective equipment by occupational group.....	64
Figure 3.2: Personal protective equipment by occupational exposure.....	65
Figure 3.3: Hearing protection use among respondents exposed to loud noise.....	66
Figures 3S.1 & 3S.2: Self-reported exposure prevalence by industry.....	73
Figure 5.1: Study recruitment using Electoral Roll data.....	102