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Obstructive Sleep Apnoea Syndrome
Among Taxi Drivers:
*Consequences and Barriers to Accessing Health Services*

A thesis presented in partial fulfilment of the requirements for the degree of

Doctor of Philosophy

In

Public Health

at Massey University, Sleep/Wake Research Centre
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ABSTRACT

Untreated Obstructive Sleep Apnoea Syndrome (OSAS) increases the risk of motor vehicle accidents and morbidity. Its prevalence among taxi drivers is unknown. The goals of this thesis were to: (1) estimate the prevalence of OSAS symptoms and risk factors among taxi drivers; and (2) identify the barriers to accessing health care services for the diagnosis and treatment of OSAS.

Between June and July 2004 questionnaires were mailed to 651 taxi drivers from two Wellington taxi companies (response rate 41.3%, n=241). Excessive daytime sleepiness (ESS>10) was reported by 18% of drivers. The estimated proportion with a pre-test risk of OSA (RDI ≥ 15/hour) was 15%, according to a questionnaire-based screening tool. Pacific drivers were more likely to report OSAS symptoms than people of “other” (non-Māori) ethnicities. Logistic regression analyses identified the following independent risk factors for OSAS symptoms: increasing neck size, age groups: 46-53 years and 61-76 years, and self-reported snoring ‘always’.

Three focus groups were conducted in November 2004. Thematic analyses identified the following barriers to accessing health care: (1) sleepiness was not a perceived health problem; (2) personal demands; (3) industry demands; and (4) driver avoidance and dissatisfaction with general practitioner’s services. Detailed examination of these themes indicated that drivers were deterred from seeking care by limited knowledge and awareness of OSAS, confusion about responsibility for health and safety, medical costs, and the risk of finding out about other health conditions. General practitioners reportedly failed to screen for OSAS symptoms and demonstrated little knowledge about sleep health. These barriers are a major cause for concern, and they are used to support the belief that earning a living is more important than personal health and safety. The key finding is that improving drivers’ knowledge is unlikely to change their behaviour, without concurrent measures to address systemic issues in the taxi industry and in the health care system.
ACKNOWLEDGEMENTS

I saw this project as a journey with three goals in mind: (1) a means of developing public health research skills, quantitative and qualitative; (2) an opportunity to do sleep research; and (3) a gate-way of developing myself as a Pacific Researcher by establishing many networks nationally and internationally. With the HRC PhD Pacific scholarship I have completed all three of these goals, and for that I am grateful.

There are many people that have helped me on my journey, and this is a chance for me to acknowledge them. I am grateful to Prof. Philippa Gander who has given me this research opportunity, and especially for allowing me the flexibility in my work (having a baby). Thank you to Dr Angela Campbell, my HRC Academic Mentor, and to Dr Margaret Southwick and Dr Marg Gilling who have guided my qualitative work. I would like to acknowledge my colleagues: Dr Leigh Signal, Dr Kara Mihaere, Dr John Matthewson, Dr Sandy Garden, Dr Nathaniel Marshall, Sarah-Jane Paine, Margo van den Berg, Allison Clark, Noemie Traviers, Naomi Brewer and Heather Purnell. Dr Kara Mihaere requires particular acknowledgement. Thank you for being such a good friend, fixing computer, statistical problems, and formatting this thesis. I have also enjoyed our raving reviews of our favourite trashy-TV programmes which has always been a great distraction kia ora! I would also like to acknowledge my close friends: The Anorpong Family and the Zemke-Smiths Family for all the love and support you have showered upon my family – I consider you all as part of my fanau. I am grateful to the inner-most important circle of support, my fanau. To my parents, Noa and Tua Tupai, Sylvia Barrett, Alexander and Judith Firestone – thank you for being such wonderful parents, you are all pillars of strength. To my brother and sisters: Aubrey, Antonia, and Sala for your love and support. Finally, I wanted to acknowledge my dearest husband James and my beautiful daughter Justice. You have both been the true source of inspiration and my twin towers of support and strength. Thank you for grounding me during the hard times, and for reminding me why I pursued this pathway in the first place– for a better start in life, for a better education, and as ‘education is knowledge’ it is the knowledge that I want to give back to my people (Pacific peoples). I dedicate this thesis to you both.
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**ABBREVIATIONS & GLOSSARY**

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Definition</th>
</tr>
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<tbody>
<tr>
<td>%</td>
<td>Percentage</td>
</tr>
<tr>
<td>AASM</td>
<td>American Academy of Sleep Medicine</td>
</tr>
<tr>
<td>AHI</td>
<td>Apnoea-Hyponea Index</td>
</tr>
<tr>
<td>BMI</td>
<td>Body Mass Index. Measured in kilograms divided by height in metres squared (kg/m)</td>
</tr>
<tr>
<td>BP</td>
<td>Blood Pressure</td>
</tr>
<tr>
<td>CI</td>
<td>Confidence Interval</td>
</tr>
<tr>
<td>nCPAP</td>
<td>Nasal continuous positive airway pressure</td>
</tr>
<tr>
<td>CSA</td>
<td>Central Sleep Apnoea</td>
</tr>
<tr>
<td>CSC</td>
<td>Community Services Card</td>
</tr>
<tr>
<td>CVA</td>
<td>Cerebrovascular Accident</td>
</tr>
<tr>
<td>CPS</td>
<td>Cycles per second - measurement for EEG waves patterns</td>
</tr>
<tr>
<td>CVD</td>
<td>Cardiovascular Disease</td>
</tr>
<tr>
<td>ECG</td>
<td>Electrocardiogram</td>
</tr>
<tr>
<td>EDS</td>
<td>Excessive Daytime Sleepiness</td>
</tr>
<tr>
<td>EEG</td>
<td>Electroencephalogram</td>
</tr>
<tr>
<td>ES</td>
<td>Effect size. The size of effect on a given measure divided by the background standard deviation of that measure. Yields the magnitude of the effect.</td>
</tr>
<tr>
<td>EMG</td>
<td>Electromyogram</td>
</tr>
<tr>
<td>ESS</td>
<td>Epworth Sleepiness Scale</td>
</tr>
<tr>
<td>EOG</td>
<td>Electroocullogram</td>
</tr>
<tr>
<td>FOSQ</td>
<td>Functional Outcomes Sleep Questionnaire. Sleepiness related quality of life measure</td>
</tr>
<tr>
<td>Hyperlipidemia</td>
<td>An excess of concentrated fat in the blood</td>
</tr>
<tr>
<td>ICSD</td>
<td>International Classification of Sleep Disorders</td>
</tr>
<tr>
<td>Incidence</td>
<td>The number of new events within a specific period of time</td>
</tr>
<tr>
<td>LTNZ/LTSA</td>
<td>Land Transport New Zealand, former name was Land Transport Safety Authority</td>
</tr>
<tr>
<td>MAP</td>
<td>Multivariable Apnoea Predictive test</td>
</tr>
<tr>
<td>MCI</td>
<td>Myocardial infarction</td>
</tr>
<tr>
<td>MESAMIV</td>
<td>Madaus Electronic Sleep Apnoea Monitor 4</td>
</tr>
<tr>
<td>MSLT</td>
<td>Multiple Sleep Latency Test</td>
</tr>
<tr>
<td>MVA</td>
<td>Motor vehicle accidents</td>
</tr>
<tr>
<td>MWT</td>
<td>Maintenance of Wakefulness Test</td>
</tr>
<tr>
<td>NREM</td>
<td>Non-Rapid Eye Movement sleep</td>
</tr>
<tr>
<td>NZE</td>
<td>New Zealand European group</td>
</tr>
<tr>
<td>NZTF</td>
<td>New Zealand Taxi Federation</td>
</tr>
<tr>
<td>OA</td>
<td>Oral appliance</td>
</tr>
<tr>
<td>ODI</td>
<td>Oxygen Desaturation Index</td>
</tr>
<tr>
<td>OECD</td>
<td>Organisation for Economic Co-operation and Development</td>
</tr>
<tr>
<td>OR</td>
<td>Odds ratio</td>
</tr>
<tr>
<td>OSA</td>
<td>Obstructive Sleep Apnoea</td>
</tr>
<tr>
<td>Acronym</td>
<td>Definition</td>
</tr>
<tr>
<td>---------</td>
<td>------------</td>
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<tr>
<td>OSAHS</td>
<td>Obstructive Sleep Apnoea-Hypopnea Index</td>
</tr>
<tr>
<td>OSAS</td>
<td>Obstructive Sleep Apnoea Syndrome</td>
</tr>
<tr>
<td>Prevalence</td>
<td>The number of events of a given disease or condition in a given population at a designated time</td>
</tr>
<tr>
<td>PSG</td>
<td>Polysomnography</td>
</tr>
<tr>
<td>RCT</td>
<td>Randomised controlled trial</td>
</tr>
<tr>
<td>RERAs</td>
<td>Respiratory effort related arousals</td>
</tr>
<tr>
<td>REM</td>
<td>Rapid eye movement sleep</td>
</tr>
<tr>
<td>RTS</td>
<td>Return to sender</td>
</tr>
<tr>
<td>RDI</td>
<td>Respiratory Disturbance Index</td>
</tr>
<tr>
<td>SAS</td>
<td>Sleep Apnoea Syndrome</td>
</tr>
<tr>
<td>SD</td>
<td>Standard deviation</td>
</tr>
<tr>
<td>SDB</td>
<td>Sleep Disordered Breathing</td>
</tr>
<tr>
<td>SHHS</td>
<td>Sleep Health Heart Study</td>
</tr>
<tr>
<td>SWS</td>
<td>Slow wave sleep or deep sleep. Stages 3 and 4 of sleep marked by the predominance of delta waves in EEG (0-2cps)</td>
</tr>
<tr>
<td>SNZ</td>
<td>Statistics New Zealand</td>
</tr>
<tr>
<td>SWRC</td>
<td>Sleep/Wake Research Centre</td>
</tr>
<tr>
<td>Shift-work</td>
<td>Work hours outside the regular work times 0800-1700</td>
</tr>
<tr>
<td>SSS</td>
<td>Stanford Sleepiness Scale</td>
</tr>
<tr>
<td>TIB</td>
<td>Time in bed</td>
</tr>
<tr>
<td>UAR</td>
<td>Upper Airway Resistance</td>
</tr>
<tr>
<td>UARS</td>
<td>Upper Airway Resistance Syndrome</td>
</tr>
<tr>
<td>UPPP</td>
<td>Uvulopalatopharyngoplasty</td>
</tr>
<tr>
<td>US</td>
<td>United States</td>
</tr>
<tr>
<td>Fanau</td>
<td>Family, extended family - Samoan</td>
</tr>
<tr>
<td>Māori</td>
<td>The indigenous people of New Zealand</td>
</tr>
<tr>
<td>TRRHAEP</td>
<td>Te Ropū Rangahau a Eru Pōmare</td>
</tr>
<tr>
<td>Whānau</td>
<td>Family, extended family - Māori</td>
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