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Abstract

Aim: Hairdressing is a common worldwide occupation which, in Australia, comprises largely of a female workforce. Hairdressers are exposed to a range of potential health hazards in their work environment. There is a lack of current research into common health problems experienced by Australian hairdressers. This study aims to investigate health issues experienced by this occupational group, to identify potential health problems that may be associated with their work and to identify concerns for future research.

Methods: A review of current literature examining the health of hairdressers was conducted to ascertain areas of health concern for hairdressers. This information was used to inform a survey to investigate the prevalence of common health problems for female, Western Australian hairdressers. The survey included a range of workplace related questions, as well as questions on common health problems sourced directly from the Australian Longitudinal Study on Women's Health (ALSWH). The survey was distributed to all hairdressing salons in Western Australia. The data obtained from the hairdresser group was compared to data obtained from the Australian Longitudinal Study on Women's Health data books. Additionally, some comparisons were also made to other published Australian data on women's health.

Results: Overall, working as a hairdresser impacts negatively on an individual's health. In particular, this study found that younger hairdressers were most at risk of increased respiratory illness, musculoskeletal problems, skin conditions, bowel issues, and general poor health. Other specific areas of health concern for hairdressers include an increased use of fertility hormones and a possible increase in pelvic organ prolapse.

While younger hairdressers reported a higher prevalence of common health problems than the general population cohort, mid age and older hairdressers were overall as healthy as the general population. This result may be attributable to the 'healthy worker effect', in which poorer health individuals, prompted by health concerns, retire from the occupation.

Poor health behaviours were demonstrated by hairdressers across all of the age ranges. These behaviours include a poor dietary and fluid intake, a high prevalence of smoking and a lack of awareness and/or commitment to use protective equipment such as gloves when undertaking wet work and handling a range of chemicals.

Conclusions: Education concerning the existing risks in the workplace environment is recommended for all hairdressers. Encouragement and support for better personal health management would promote general health and well being across the industry. Younger workers are particularly identified as requiring support to manage their own health. Further health research is indicated for a range of concerns, but this research needs to be occupation specific.

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The research on which this paper is based was conducted utilising data obtained from the Australian Longitudinal Study on Women's Health, The University of Newcastle and The University of Queensland. I am grateful to the Australian Government Department of Health and Ageing for funding and to the women who provided the survey data.

Contents

Chapter 1: Introduction

Hairdressing is a common occupation worldwide. There are about 6,879 hairdressers, including apprentices, registered in Western Australia (Hairdressers Registration Board of WA, 2010b). The work environment for hairdressers includes a range of potential hazards, some which are easily observed, and others that are more insidious. The nature of hairdressing work often requires the individual to maintain extended hours of working with minimal breaks. Hairdressers are required to stand for long periods of time and use their arms in repetitive movements. Hairdressers may be exposed to a range of chemicals in their work environment, often without adequate ventilation, or the use of personal protective equipment. Many hairdressing establishments are sole traders, with few employees, which can promote an environment in which there is limited support for workers to manage their own health in the workplace.

A review of current research literature identified an absence of research investigating work-related health effects for this occupational group, and in particular a lack of Australian-based research. Areas of concern examined in this research project include: gynaecological conditions; bladder and bowel conditions; musculoskeletal disorders; dermatological conditions; respiratory illness; and psychological health.

Health issues outside the scope of this research project

There are a range of other potential health issues which may impact on the health of hairdressers. Many of these health concerns result from the insidious effect of exposure to different chemicals. Health issues associated with chemical exposure are often rare and difficult to assess. For example a potential association between the occupation of hairdressing and breast cancer (Gustavsson & Pollan, 1999) and the association between vinyl chloride propellant in hair spray and angiosarcoma of the liver (Rosner, Markowitz, Groth, Petty, & Infante, 2009).

A hairdresser's exposure to chemicals often encompasses a wide range of products, over widely varying time periods. This makes exposure measurement for occupational groups such as hairdressing very challenging. Estimating dose-response

relationships for individual chemical exposures in hairdressing is difficult due to the range and variability of potential hazards (Checkoway, Pearce, & Kriebel, 2004). Comprehensive investigation into the wide range of potential chemical health hazards in the hairdressing workplace is outside the scope of this research project.

The nature of hairdressing work, in which hairdressers work in close proximity to numerous clients on a daily basis, increases the risk of exposure to infectious diseases such as influenza (Victorian Government Health Information, 2010). Another health issue identified by hairdressers is the occurrence of pilonidal sinus, a condition in which hair gets trapped under the skin causing a pimple like irritation. Untreated, pilonidal sinus can become infected and require surgical intervention (Slater, 2009). While these other health issues are of interest and merit investigation, they are outside the scope of this research project.

Hypotheses

The primary hypothesis for the study was that undertaking hairdressing work increased the occurrence of common health problems.

The secondary investigation examined behaviours in the work place that may impact on hairdresser health.

Study Design

A 42 item written questionnaire was devised to collect data in a cross sectional study of the hairdresser cohort (Appendix 1). The questionnaire was developed based on the instruments used for the Australian Longitudinal Study on Women's Health (ALSWH). Questions about common health problems used in the hairdresser questionnaire are directly attributable to the ALSWH, thus enabling direct comparison with the ALSWH cohort.

Additional questions were included to investigate specific hairdressing work related practices. These questions were derived following an examination of current literature on the health of hairdressers.

Ethical consideration

Ethical clearance for this study was granted by the Human Research Ethics Committee of Edith Cowan University (Perth, Australia) (ref. 4274). Participation was voluntary and participants were assured of confidentiality and anonymity. The surveys were non-identifiable and a returned, completed survey was taken as consent to participation in the study.

Study Participants:

Hairdresser Cohort

The study population consisted of female hairdressers, aged 22 to 66 years, who resided in Western Australian. Male hairdressers were excluded from this study as the comparative group for this study was a female only group.

The health problems investigated in the study are related to ongoing occupational exposure. For this reason, hairdressers aged 21 years and younger were excluded from participation. Older age hairdressers (over 67 years) were also excluded, as this study examined the health of currently working hairdressers.

The comparative group for the study comprised of participants in the Australian Longitudinal Study on Women's Health (ALSWH). To ensure that study participants in the hairdresser cohort were not concurrently participating in the ALSWH, each participant was asked at the commencement of the questionnaire to indicate if they were an ALSWH participant, and if they answered in the affirmative, they were directed to discontinue the hairdresser survey.

Comparative Group:

Australian Longitudinal Study on Women's Health

The Australian Longitudinal Study on Women's Health (ALSWH) is a 'longitudinal population-based survey that examines the health of three large cohorts of Australian women over a 20 year period' (Women's Health Australia, 2008). Three ALSWH cohorts have been established using distinct age groups – Younger, Mid-age and Older, with each cohort being surveyed every three years. As would be expected in a large-scale, longitudinal survey, the number of respondents has decreased over time since the first survey in 1996. However, the total of respondents for each of the cohorts relevant to this research project range between 9,081 and 14,799 for each survey (Women's Health Australia, 2008).

Using ALSWH data enabled a direct comparison between the hairdresser group and an Australia wide, comprehensive, peer reviewed population sample. This data was obtained from the ALSWH data books which are available online. In this study, not

all the ALSWH surveys were required. The ALSWH age-specific cohorts utilized in this study are: y2 (22-27 years); y4 (28-33 years); m1 (45-50 years); m3 (50-55 years); and m5 (56-61 years).

Some limitations have been identified in managing the data in this way. There is no comparative group for hairdressers aged 34-44 years. This limitation has been considered, and results for this age group are reported as descriptive only. Another limitation is that the data for the comparative group has been collected at a different time to that of the hairdresser cohort. This is reported as a limitation of the study design.

Chapter 2: Literature Review

Limitations of Existing Research

Hairdressers are potentially exposed to a range of hazards in their work environment. There is an absence in the current literature of studies investigating general health problems in hairdresser cohorts.

When studies are conducted with hairdressers, researchers tend to investigate occupational hazards in a range of workplace environments. Hairdressers are included as one group amongst other occupationally exposed cohorts, such as tattooists and body piercers (Oberdorfer, Wiggers, Considine, Bowman, & Cockburn, 2003); farmers, loggers and police officers (Arokoski, Juntunen, & Luikku, 2002); and construction workers, nurses, metal workers and cleaners (John, 2008).

A problem with including hairdressers as one of a range of occupational groups is that many studies find small, but significant increased health risks for hairdressers. Unfortunately, the importance of these results for hairdressers is often eclipsed by a large range of occupations and alternate exposures.

A common source of research literature concerning hairdresser health comprises of investigations undertaken as part of large cohort studies. Characteristically, these population based studies utilise national health records and encompass a wide range of occupations. Often in these studies hairdressers demonstrate slight, but significantly increased risks of poor health outcomes. An example of this is a large, historical cohort study to determine occupational risk for Breast Cancer in Sweden. The health records of over one million women were examined and the researchers concluded that for hairdressers further investigation is recommended (Gustavsson & Pollan, 1999).

For rare diseases, such as bladder cancer, hairdressers are again included as part of a larger cohort. For example in a Canadian case-control study utilising 887 cases of people with bladder cancer and 2487 age and sex matched controls, there were 8

male cases who nominated their occupation as a hairdresser and these were compared to only 6 male hairdressing controls. The researchers utilising these small numbers still asserted that one of their major findings was an increased risk of bladder cancer in male hairdressers (Gaertner, Trpeski, Johnson, & The Canadian Cancer Registries Epidemiology Research Group, 2004).

There is a need for an occupation specific examination of health concerns for hairdressers. Specific studies have been conducted using hairdresser only groups. The main areas for which a range of studies have been conducted using hairdresser cohorts include occupational rhinitis and asthma; occupational dermatitis (including glove usage); fertility concerns and gynaecological health. The majority of these, however, are internationally based and there is an absence of Australian based data.

For areas such as musculoskeletal heath and psychological health there is limited research literature. Hairdressers as a group are difficult to contact – the customer focussed nature of their work inhibits telephone communication. In Australia they have a low level of union representation and throughout all States except Western Australia are not registered. Local councils do have listings of hairdressing establishments – but not of individual hairdressers. A further examination of some of the challenges of researching hairdresser cohorts will be included in the discussion section of this paper.

Review of the Existing Literature

Gynaecological and Reproductive Health

Epidemiological studies of female hairdressers have attempted to determine if there is a link between gynaecological health and the practice of hairdressing. Exposure to chemicals in the hairdresser work environment has prompted some epidemiological investigations, but the results of these studies have been mixed. Some studies have found little or no evidence of an increased risk to the gynaecological health of female hairdressers (Gallicchio, Miller, Greene, Zacur, & Flaws, 2010; Hougaard, Hannerz, Bonde, Feveile, & Burr, 2006). Other studies have found small, but significant, negative gynaecological and reproductive health outcomes for hairdressers (Baste, Moen, Riise, Hollund, & Oyen, 2008; Jaakkola, Gissler, & Halliday-Bell, 2009; Li, Song, Meng, & Gan, 2003; Rylander, Axmon, Toren, & Albin, 2002). Work which

involves extensive standing, has been identified as a risk factor for spontaneous abortion (Fenster, Hubbard, Windham, Waller, & Swan cited in Baste, et al., 2008).

The main reasons Western Australian women underwent a hysterectomy in 2003, was for the treatment of fibroids (27%), for genital prolapse (23%) and for menstrual disorders (21%) (Spilsbury, Semmens, Hammond, & Bolck, 2006, p.806). It is worth noting that the rate of hysterectomy in the general population, Western Australian cohort that was directly attributable to menstrual disorders has decreased 'four-fold' from 1981to 1992 and has remained low (Spilsbury, et al., 2006, p.806). A case-control study of Chinese hairdressers found that hairdressers who had long term exposure to permanent wave solution were found to have an increased risk of experiencing abnormalities with menstruation ($p<0.05$) (Li, et al., 2003).

One of the difficulties encountered by researchers investigating reproductive outcomes amongst hairdressers, is that many negative reproductive outcomes are rare events. For example, the risk of stillbirth and newborns with malformations in hairdresser groups is difficult to determine due to the small numbers of these events (Rylander, et al., 2002). Some specifically targeted studies have been able to demonstrate small but significant adverse reproductive outcomes, for example the association between hairdressers and spontaneous abortion (RR 1.31, 95% CI 1.07-1.60) (Baste, et al., 2008).

Commonly assessed reproductive outcomes include an examination of the length of gestation and a record of babies birth weight (Nguyen, Gee, & Le, 2008). A slightly increased risk of pre term babies born to hairdresser mothers has been observed in a Finnish study (OR 1.21, 95% CI 1.07–1.38) (Jaakkola, et al., 2009). An increased incidence of hairdresser mothers giving birth to babies with a low birth weight has been reported in a Swedish study (OR 1.2, 95% CI 1.0-1.5) (Rylander, et al., 2002). Working as a hairdresser during pregnancy has been observed to decrease the risk of giving birth to a baby which is large for gestational age. When compared with their sisters, hairdressers' babies were less likely to be large (OR 0.77, 95% CI 0.54-1.09) and this effect was increased when the hairdressers worked during the pregnancy (OR 0.60, 95% CI 0.39-0.92) (Rylander & Axmon, 2009).

The duration of exposure in the work environment appears to have an effect. Hairdressers working greater than thirty hours per week during pregnancy were more likely to give birth to a baby with a low birth weight (less than 2.5 kg) than hairdressers who worked less hours (OR 1.8, 95% CI 1.0-3.3) (Rylander, et al., 2002).

Concern over chemical exposure has prompted investigations into potential fertility problems for hairdressers. Slight risks of infertility in hairdresser groups have been identified in international studies (RR 1.30, 95% CI 1.08-1.55) (Baste, et al., 2008). Additionally, reports by In Vitro Fertilisation (IVF) clinics in Queensland and New South Wales of a disproportionately high number of hairdressers seeking IVF treatment has prompted a current Australian study examining the reproductive toxicity of commonly used hairdressing solutions (Liao, 2009).

In a recent Norwegian study of hairdressers and infertility, an interesting result was observed. Researchers found that smoking increased the risk of infertility among women across other occupations (Never smoker RR 1.00; Ever smoker RR 1.32, 95% CI 1.23-1.42), but in the hairdresser cohort, the risk of infertility decreased for those that smoked (Never smoker RR 2.01, 95% CI 1.45-2.80; Ever smoker RR 1.55, 95% CI 1.24-1.92). The researchers hypothesised that smoking may inhibit chemical exposure in hairdressing work, or alternately taking a small break to smoke might limit chemical exposure (Baste, et al., 2008, p.1375).

Bowel and Bladder Health

Urinary incontinence is a common health problem throughout the Australian community. Estimates on the prevalence of female urinary incontinence differ widely due to the range of different methods used to measure the condition. The Australian Government's 2006 report on 'Measuring Incontinence in Australia' estimates that 40% of Australian females experience urinary incontinence (Hawthorne, 2006).

There are several factors, however, that may contribute to a potential relationship between hairdressing and urinary incontinence. These include the influence of chemical exposure, the effect of extended periods of standing with minimal breaks,

and the avoidance of fluid consumption throughout the day due to the customer focused nature of the work. There is an absence of knowledge in current research literature on the effect of standing for long hours and awkward positioning while at work and how this may impact on the occurrence of urinary incontinence (Fultz et al., 2005). Similarly, there is an absence of investigation into how these factors may affect bowel health.

An elevated risk of bladder cancer has been observed in hairdresser groups in a range of studies (Geller et al., 2008; Reulen, Kellen, Buntinx, Brinkman, & Zeegers, 2008). Exposure to hair colorants has been identified as the most likely cause of this elevated risk (Geller, et al., 2008; Pearce et al., 2008). Geller et al, (2008), assert that it is the exposure to the dye through dermal contact that is an important concern for hairdressers. Additionally, Geller et al, (2008), recognise that even 'low amounts of aromatic amines released from azo dyes are capable of increasing bladder cancer risk markedly' (p. 853). Azo dyes are used in some hair colorant products in Australia (National Industrial Chemicals Notification and Assessment Scheme, 2007). When products containing azo dyes are used by hairdressers, the use of impermeable gloves is required to protect the hairdresser's health (National Industrial Chemicals Notification and Assessment Scheme, 2008).

Evidence from a recent meta analysis of 130 studies suggests a small but significant association between hairdressing and bladder cancer (Summary RR 1.23, 95% CI 1.11-1.37). These researchers also assert that despite some changes in work practice, the risk to hairdressers has not decreased in recent years (Reulen, et al., 2008).

Musculoskeletal Health

The practice of work as a hairdresser, involves standing for long periods of time and may involve awkward positioning, twisting and repetitive movements. Hairdressers use both arms extensively (Veiersted, Gould, Osteras, & Hansson, 2008). Difficulties in the work environment can also include poorly designed workplaces, with poor space utilization and difficult access to equipment. Poor ergonomic design of work tools also has the potential to impact on hairdresser health (Arokoski, et al., 2002).

Hairdressers are at risk of lower back, leg, neck, shoulder, arm, wrist and foot injury (Arokoski, et al., 2002; Gisele & Nelson, 2008; Hairdressers Registration Board of WA, 2005). The customer focused nature of hairdressing work may inhibit taking frequent and adequate breaks.

Despite the potential risks to hairdresser health, there are few research studies which examine the musculoskeletal health of hairdressers. A lack of knowledge about the hazards of hairdressing work has been identified as a contributor to work related musculoskeletal disorders (Gisele & Nelson, 2008).

Respiratory Health

Working in a hairdressing salon exposes hairdressers to a range of known airway irritants (Mounier-Geyssant, Oury, Mouchot, Paris, & Zmirou-Navier, 2006). Adequate ventilation in the workplace is essential when working with chemicals, and the small workplace environment of a hairdressing salon has the potential to provided inadequate ventilation when using chemical substances (Mounier-Geyssant, et al., 2006).

Potential respiratory health consequences identified in international studies of hairdressers, include an increased prevalence of chronic bronchitis, asthma, asthma like symptoms, allergy and other respiratory illnesses (Akpinar-Elci, Cimrin, & Elci, 2002; Albin et al., 2002; Leino, Tammilehto, Luukkonen, & Nordman, 1997). Older aged hairdressers (over 40 years) are at an increased risk of respiratory illness than younger workers (Hollund, Moen, Lygre, Florvaag, & Omenaas, 2001).

Hairdressing work is characterised by a range of intermittent tasks (Moscato, Pala, Perfetti, Frascaroli, & Pignatti, 2010). Exposure to chemical products is often for a short duration, but is consistently frequent. This creates a difficulty when attempting to determine the exposure levels of chemical products for hairdressers (Checkoway, et al., 2004).

For example, products used for hair bleaching contain perisulphate salts. These low molecular weight compounds have been directly linked to both asthma and contact dermatitis in several international studies of hairdresser groups (Moscato, et al.,

2010). Studies have demonstrated that there is a longer than expected latency period for exposure to perisulphates and the occurrence of asthma symptom onset. This delay in sensitization has been attributed to hairdresser's shorter but frequent regular exposure to the perisulphate products (Moscato et al., 2005).

The difficulty of assessing exposure levels in a range of chemical products has discouraged research into potential health effects of airborne exposure in hair salons (Akpinar-Elci, et al., 2002; Hollund, et al., 2001). When difficulties are encountered in complex exposure measurement, an examination of health outcomes can provide support for possible associations (Checkoway, et al., 2004). The majority of the literature related to assessing the impact of airway irritants in hairdressing salons utilises this approach (Albin, et al., 2002; Leino, et al., 1997).

Dermatological Health

The use of gloves is required to protect hairdressers from a range of potential health consequences. A New South Wales telephone survey of hairdressers (n=353) found that approximately half (48.7%) believed that wearing gloves was only required for general hygiene while performing hairdressing work if a person had broken skin (Oberdorfer, et al., 2003). This hairdresser group were found to have an acceptance (92%) of the existence of infection control guidelines, but the majority reported that compliance in their workplace could be improved (57.1%) (Oberdorfer, et al., 2003).

The main barriers to complying with infection control guidelines observed by this NSW hairdresser group, was that it was too difficult to undertake good practice when the salon was busy (39.6%) and a concern that some infection control practices were perceived negatively by clients (33.9%) (Oberdorfer, et al., 2003). Making a client feel comfortable has been identified as the most important social variable (β=0.49, $p< 0.001$) in a study of social influences effecting the success of hairdressing businesses (Butcher, Sparks, & O'Callaghan, 2002).

Dermatitis of the hand may affect up to 50% of hairdressers within three years of starting work (Worth, Hasan Arshad, & Sheikh, 2007). Although many hairdressers experience dermatitis early in their working life, an Australian study found that 'senior hairdressers had significantly increased evidence of moderate to severe skin

changes when compared with trainees' (Roberts, Frowen, Sim, & Nixon, 2006, p.175). Despite expectations that apprentices perform the more simple roles of shampooing and other wet work, a German study found that experienced hairdressers participated in a longer duration of wet work than their less experienced colleagues (Kralj et al., 2010).

Wet work has been identified as a major cause of occupational contact dermatitis (Brown, 2004). Hairdressing work involving exposure to water, combined with shampooing and conditioning is the most important risk factor for irritant contact dermatitis (Nixon, Roberts, Frowen, & Sim, 2006). The duration of hairdresser exposure to wet work is estimated to be between 2 and 4 hours in an eight hour shift (Kralj, et al., 2010).

The long term management of occupational skin disease, as well as the potential carcinogenic influence of handling chemicals can be extremely challenging to an individual's health (Brown, 2004). Occupational contact dermatitis includes both irritant contact dermatitis (ICD), which is usually the result of prolonged exposure to mild irritants such as shampoo and water, as well as allergic contact dermatitis (ACD) in which an immune response has been activated in a sensitised individual (Nixon, et al., 2006). Common causes of ACD include 'p-phenylene diamine (PPD) in hair dyes, ammonium persulpate (APS) in bleach and glyceryl monothioglycolate (GMTG) in permanent wave solutions' (Nixon, et al., 2006, p.112).

There is a poor prognosis for persistent occupational contact dermatitis (Nixon, et al., 2006; Wall & Gebauer, 1991). Prevention is considered to be of primary importance and the wearing of gloves is essential to reduce contact with known irritants (Nixon, et al., 2006). However, a range of studies have demonstrated a low level of glove use by hairdressers, particularly when undertaking wet work (Ling & Coulson, 2002; Nixon, et al., 2006).

The small business environment of the hair salon has been identified as contributing to a lack of comprehensive health education services available for hairdressing employees (Chen, Turner, McNamee, Ramsay, & Agius, 2005). A lack of glove

usage has been directly attributed to a lack of knowledge regarding the potential health consequences of occupational contact dermatitis (Nixon, et al., 2006).

Wearing gloves is an occupational health and safety requirement when handling chemicals (National Industrial Chemicals Notification and Assessment Scheme, 2008). In an Australian study on glove usage by hairdressers, 91.9% (*n*=169) wore gloves when undertaking hair dye work, but only 33.2% (*n*=61) wore gloves while using perm solution (Nixon, et al., 2006). Nixon et al., (2006), assert that hairdressers may be more concerned about the immediate impact of discoloured hands, than the potential health risks associated with chemical handling.

Psychological Health

The psychological impact of hairdressing is another common health problem that hairdressers may encounter in the workplace. Hairdressers often find themselves in the role of counsellor and confidant and must deal with a range of clients throughout a typical workday. Stress has the potential to seriously impact health. Depression, tiredness, anxiety and difficulty sleeping are some manifestations of stress (Children Youth and Women's Health Service, 2009).

Hairdressers have reported subjective high levels of mental stress (Arokoski, et al., 2002). In this Finnish study, hairdressers expressed a greater concern about mental strain at work than other occupational groups, including police officers (Arokoski, et al., 2002, p.126). While industry journals provide anecdotal descriptions of the stressors that hairdressers experience in the workplace, there are few research studies to investigate the psychological health of hairdressers.

A recent study supports this assertion that there is a wealth of anecdotal evidence, but few research studies, into the social relationship between hairdressers and their clients (Anderson, Cimbal, & Maile, 2010). In this American study, the researchers found that hairdressers played an important role in the life of their elderly clients. Hairdressers (*n*=40) perceived their role to be as ‘a friend’ (77.5%); ‘like family’ (72.5%); as a ‘helper’ (47.5%); and as a ‘counsellor’ (35%). Only 10% of hairdressers perceived their role to be as an ‘employee’ (Anderson, et al., 2010, p.375). Nearly half of this hairdresser group (45%) indicated that they would be

interested in further mental health training to support them in their informal caregiving role (Anderson, et al., 2010).

Chapter 3: Methods

As a group, hairdressers in Australia have low levels of union membership, and tend to work independently and often competitively in local areas. One of the major challenges to this study was the difficulty in sourcing study participants. Western Australia is the only state that requires hairdressers to be registered with the Hairdressers Registration Board of Western Australia. The Hairdressers Registration Board of Western Australia assisted this study by advising Western Australian hairdressers of this research project through their website and newsletter.

During late 2009, hairdressers were sourced using the On-Line Yellow Pages phone directory. There were initially 1500 hair salons listed in the directory for Western Australia. However, when duplicate entries and male-only barbers were excluded, the final number of hair salons available for inclusion in the mail out was 718.

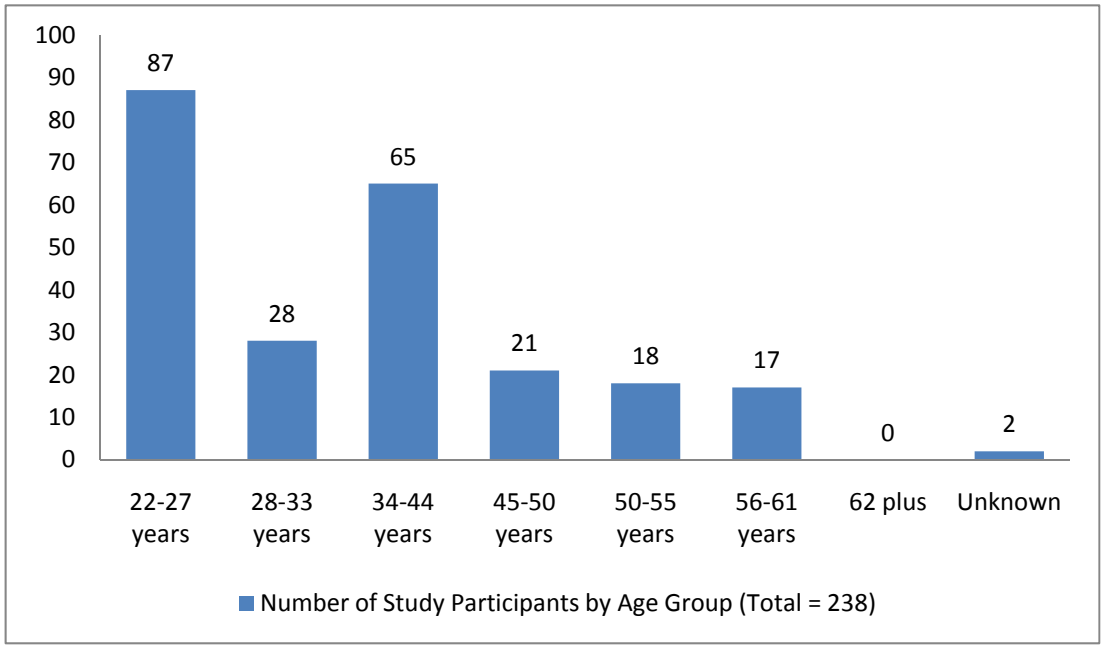
Each of the 718 listed hair salons received a questionnaire package containing an introductory letter, details on ethics approval for the study, two copies of the questionnaire and two reply paid envelopes.

Sample Size

Sample size calculations were undertaken using the Gpower computer program to perform apriori power analysis. Using Cohen's convention of a medium effect size, the estimated minimum sample size was 88 (Faul & Erdfelder, 1992).

The actual number of study participants was 238. Divided into the age-specific cohorts, there were 87 in the y2 age (22-27 years); 28 in the y4 age (28-33 years); 65 in the 34-44 year age; 21 in the m1 age (45-50 years); 18 in the m3 age (50-55 years); and 17 in the m5 age (56-61 years). There were no respondents in the 62 years plus age group, and 2 participants did not report their age (see Figure 1).

Figure 1: Hairdresser cohort by age group



Instrument

ALSWH Survey Questions

To enable a direct comparison between the hairdressers and the ALSWH cohort, ALSWH survey questions were utilised with the exact wording. The majority of the survey questions used from the ALSWH related to 'Common Problems' (CPRB). These questions were developed by Women's Health Australia (WHA) and approval was obtained from WHA to reproduce them in this study. Data for each question was available for most of the y24 and m135 cohorts.

Appendix 2 provides an outline of each question; the question code; a reference to the survey in which it occurs; and the identification of the source of each question.

Questions on fruit/vegetable and fluid consumption were included to construct a profile of the cohort. The responses are reported and compared to Australian recommended intakes and Western Australian health survey data.

Questions on smoking are attributable to the Australian Institute of Health and

Welfare (AIHW) via the ALSWH. Comparison on smoking is made to Australia's National Health Survey.

Some of the questions on female health are not asked across the range of age groups in the ALSWH, and are not worded consistently across the ALSWH surveys. This makes direct comparison with the hairdresser group difficult. For the purpose of this research project, the female health questions were analysed using ALSWH data where it existed, and where no direct data exists, the results are described with reference to other published Australian data.

Data Analysis

Completed questionnaires were collated and the de-identified data entered into the statistical program, Predictive Analytics Soft Ware (PASW Statistics) version 18.

Demographic items were examined using frequency tables.

Chi-Square analysis was used to compare differences between the study group and the comparative group(s).

Cross tabulation was performed to describe variation within, and between some variables, for example by age and smoking status.

Chapter 4: Results

Hairdresser Profile

The study participants consisted of a group of 238 female, Western Australian hairdressers. The majority reported living in the Perth area (*n*=167, 72.6%) with a further 24.8% (*n*=57) living in regional areas and 2.6% (*n*=6) living in a remote area of Western Australia. A large proportion of the group had worked as a hairdresser for over 11 years (*n*=151, 65.4%).

The majority of participants were full time workers (*n*=185, 78.4%) with 70 of these hairdressers reporting that they worked more than 40 hours per week. Additionally, 16.5% (*n*=39) reported that they never or rarely had sufficient time for a meal break when working, and a further 11.4% (*n*=27) reported never or rarely having time for a toilet break at work.

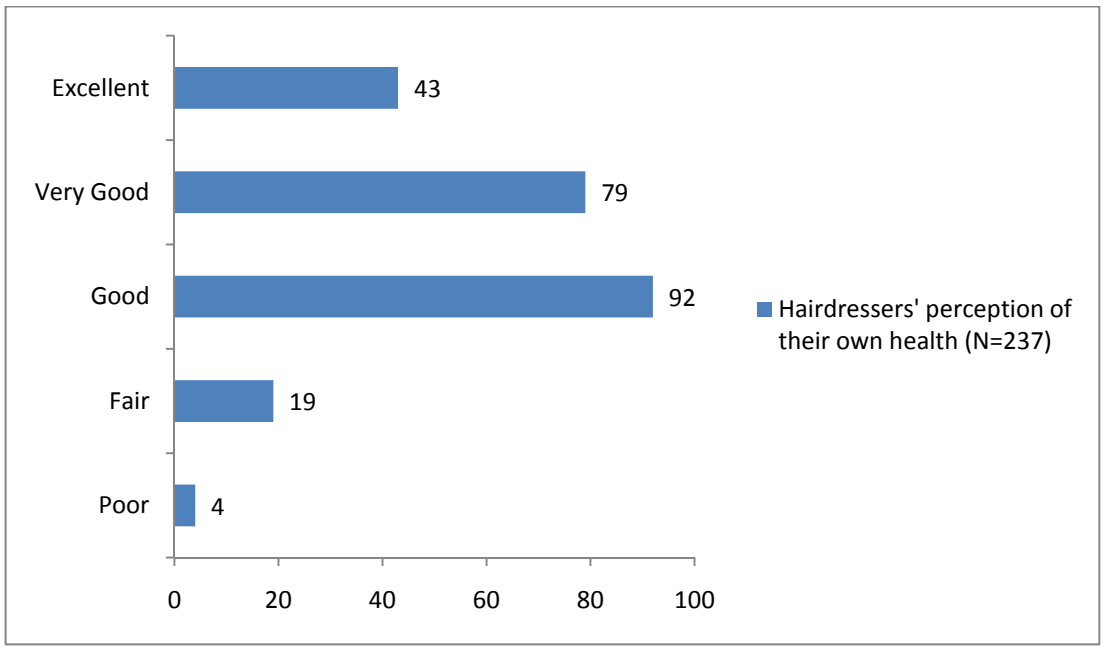
Only 5.9% (*n*=14) of hairdressers reported eating the recommended five serves of vegetables per day. Concurrently, the hairdresser group also reported low levels of fruit consumption with only 38.3% (*n*=91) eating the recommended two or more serves daily.

Historically hairdressers have used a range of chemicals in the workplace that have the potential to affect health. Concern about the effect of chemical exposure has prompted some hairdressers to use organic based products. In this study, a small proportion of hairdressers reported using organic dyes exclusively in the workplace (*n*=11, 4.6%). The majority of hairdressers, however, continue to work with chemically based dyes (*n*=180, 75.6%).

Self Perceptions of Health

Self rated perceptions of general health are a commonly used measure in international research (Joyce & Daly, 2010). For this study, hairdressers were asked to respond to the question 'in general, would you say your health is: excellent; very good; good fair; or poor'. Over half of the hairdressers in the study declared themselves to be in excellent or in very good health (*n*=122, 51.3%). A further 38.7% perceived their own health as good (*n*=92), while 9.7% reported their health as fair or poor (*n*=23) (see Figure 2).

Figure 2: Hairdressers' perception of their own health



To examine this self reported perception of general health, the responses of the hairdresser group was compared with the Western Australian government's Health and Wellbeing Surveillance System (HWSS) data for 2009 (Joyce & Daly, 2010). The HWSS reports on the health of Western Australians, and is categorised both by gender and age. To enable comparison, the hairdresser age ranges were collapsed, using PASW, into 2 groups a younger group aged 22-44 years and a mid aged group aged 45-62 years. The HWSS age ranges were slightly wider, that is aged 16-44 years and aged 45-64 years respectively. The hairdresser group was compared to the female data from the HWSS for each age range using Chi Square analysis.

The results for this self perception of health were interesting. For the younger age range 22-44 years, fewer hairdressers reported being in excellent or very good health and an increased number of hairdressers reported being in fair or poor health when compared to the general population. The differences in the hairdresser group and the general population group for the younger aged was statistically significant $X^2(4,N=179)=18.213$, $p< .05$. For the mid aged group 45-62 years, the difference between the hairdresser and the general population group was not statistically significant. Overall, mid aged hairdressers considered themselves to be in excellent or very good health more than the general population.

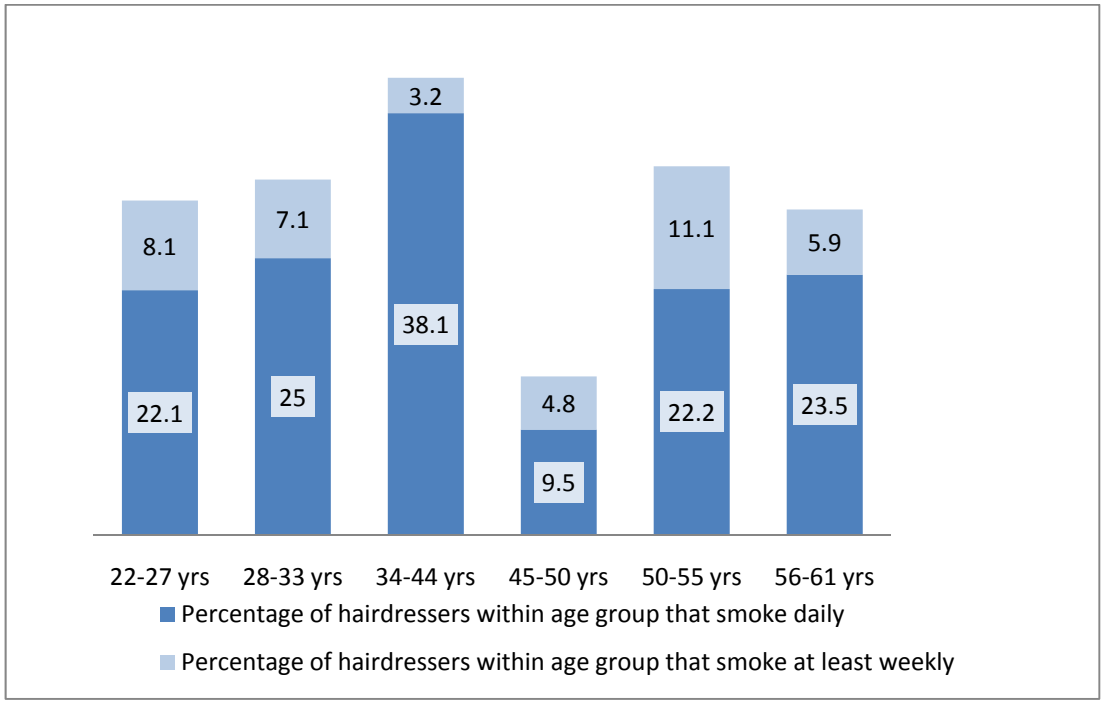
Additional Chi Square analysis of the total hairdresser population compared to the overall female general population provided support for the assertion that hairdressers perceive themselves to be in poorer health than the general population with a statistically significant difference in the self perception of health between the groups $X^2(4,N=237)=12.477$, $p< .05$.

Smoking

A quarter of the hairdressers reported smoking daily (*n*=60, 25.5%), with a further 10.2% (*n*=24) smoking, but less than daily, giving a total current smoking frequency of 35.7% (*n*=84). This is significantly higher than the prevalence of smoking reported in the Australian Government's National Health Survey (2007-2008), in which only 18% of the Australian female population over 18 years of age were current smokers (Australian Bureau of Statistics, 2009). This high prevalence of smoking is consistent with international studies on hairdresser groups (Baste, et al., 2008).

Within the hairdresser age cohorts, the 34-44 years had the highest proportion of daily smokers (*n*=24, 38.1%). Figure 3 illustrates the proportion of hairdressers in each age group who reported currently being either a daily smoker or smoking at least weekly.

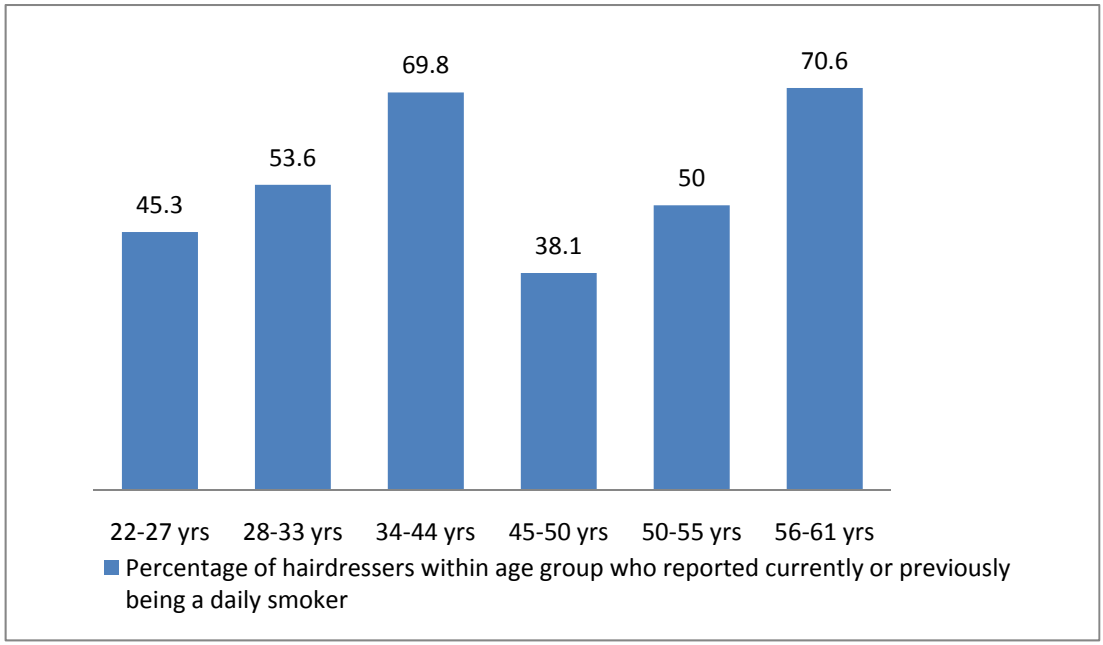
Figure 3: Smoking in hairdresser cohort, by age and frequency



Additionally, more than half of the hairdresser cohort reported that they were either currently or previously, a daily smoker (*n*=129, 54.9%). Figure 4 illustrates the percentage of hairdressers within each age cohort that report having ever smoked

daily. Both the 34-44 years and the 56-61 years age cohorts show a significantly large proportion of hairdressers being a current or previous daily smoker.

Figure 4: Proportion of hairdressers, by age cohort, with a history of daily smoking



Another important characteristic of smoking in the younger and mid aged hairdressing groups can be observed in Figures 3 and 4. That is, the proportion of hairdressers smoking is increasing from young to mid age.

Gynaecological and Reproductive Health

Hysterectomy

Hysterectomy, or the removal of the uterus, is one of the most common surgical procedures for women, particularly in Western countries (Garry, cited in Spilsbury, et al., 2006, p.804). Researchers examined data records in Western Australian hospitals to describe the experience of female, Western Australian women over the age of 20 who had undergone a hysterectomy from 1981 to 2003. They determined that Western Australian females experienced one of the highest rates of hysterectomy in the world (Spilsbury, et al., 2006). The lifetime risk of hysterectomy for Western Australian females was estimated at 35% (Spilsbury, et al., 2006).

In this study, the overall prevalence of hairdressers who had undergone a hysterectomy was 7% (*n*=16). The average age for females undergoing a hysterectomy in Western Australia in 2003 was 48 years (Spilsbury, et al., 2006). This is consistent with this study's findings as no hysterectomies were reported in the 22-33 years age groups, and the number of hysterectomies was almost evenly spread across the 34-44; 45-50; 51-55 and 56-61 years age ranges.

The data on women's experience of hysterectomy was difficult to compare directly with the ALSWH, as the questions in the ALSWH in the older cohorts related only to the previous three years. However, for the 45-50 years cohort, the question on hysterectomy was directly comparable. Analysis was performed using Chi Square for the hairdresser and ALSWH 45-50 years age group, and there was no significant difference observed between the groups for having had a hysterectomy.

Pelvic Organ Prolapse

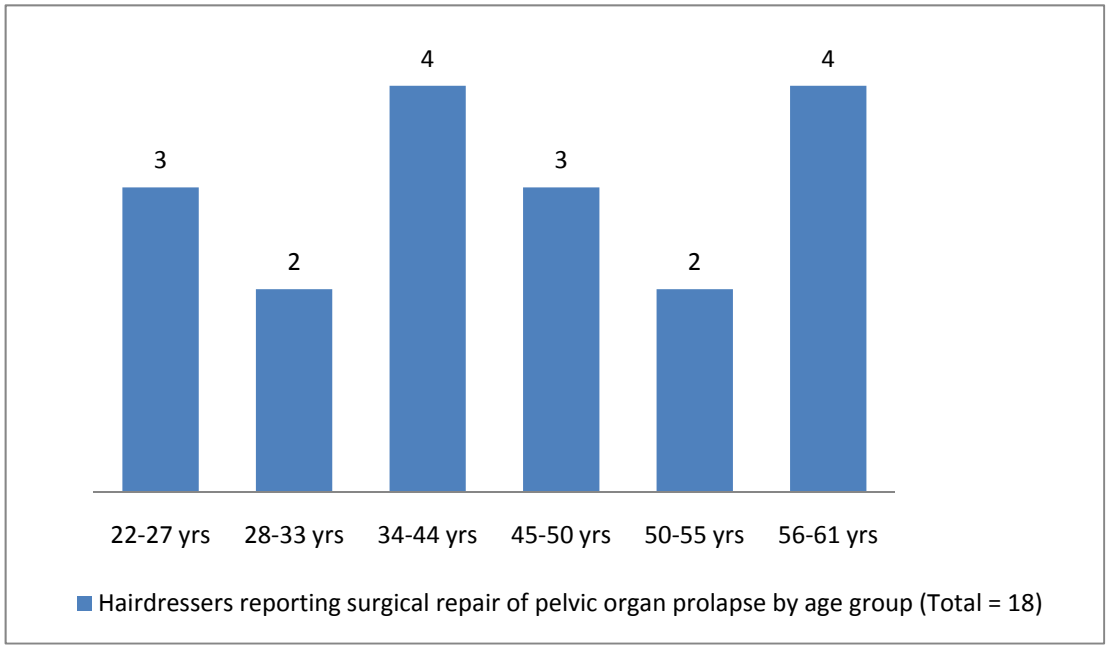
Pelvic floor disorders include urinary incontinence, faecal incontinence and pelvis organ prolapse (Nygaard et al., 2008). Prolapse of the vagina, bladder and/or bowel is commonly treated by surgical intervention (Blain & Dietz, 2008). It is important to recognise that many women only report the occurrence of pelvic floor disorders to a medical practitioner when the condition has deteriorated to a situation of discomfort that requires intervention. Nygaard, et al., (2008) observe that studies to examine

pelvic organ prolapse are rare, as an internal examination is required to determine the status of the condition (p.1314).

A national study in the United States found that 2.9% of women (95% CI, 2.1%-3.7%) experience pelvic organ prolapse and that the prevalence of pelvic organ prolapse increases with age (Nygaard, et al., 2008). In the hairdresser cohort 7.8% of the group reported having undergone a surgical repair for a prolapsed vagina, bladder or bowel (*n*=18). Compared to the national United States data for pelvic organ prolapse prevalence (Nygaard, et al., 2008), there is a statistically significant increase in the prevalence and surgical intervention for pelvic organ prolapse in the hairdresser group $X^2(1,N=230)=19.821$, $p< .05$. Data was available for direct comparison from the ALSWH 45-50 year age group, and when compared directly with the hairdresser group of the same age range, the results did not demonstrate a statistically significant difference.

Pelvic organ prolapse is particularly associated with older, post menopausal women, and the incidence of the condition increases with age (Olsen, Smith, Bergstrom, Colling, & Clark, 1997). However, an interesting result was observed in the hairdresser group relating to pelvic organ prolapse. Across each of the age ranges, the number of hairdressers reporting having a surgical repair of a prolapsed vagina, bladder or bowel was consistent (see Figure 5).

Figure 5: Hairdressers reporting a surgical repair for pelvic organ prolapse, by age



Although only demonstrated by small numbers, this result is surprising, as there was not an expectation of women in the younger age cohorts (22-44 years) reporting surgical intervention for pelvic organ prolapse.

Reproductive Outcomes

Many reproductive outcomes, such as still births and spontaneous abortion, are rare events in the general population (Baste, et al., 2008; Rylander, et al., 2002). The uncommon prevalence of these events, in combination with a consideration of the ethics of investigating what can be a traumatic life event, has deterred investigation into a wider range of reproductive outcomes for the hairdresser cohort. The areas relating to reproductive outcomes examined in this study are fertility, premature birth and babies with a low birth weight.

Fertility

11.8% of the total hairdresser group had tried unsuccessfully for over twelve months to get pregnant (*n*=28). However, in the hairdresser group, 45.8% (*n*=108) had never tried to get pregnant. When hairdressers who had never tried to get pregnant were removed from the total group, 22% (*n*=28) of the remaining 128 hairdressers reported being unsuccessful in trying to get pregnant for a period greater than twelve

months. Of these 50% (*n*=14) had sought help for fertility treatment. A small percentage of hairdressers reported currently or previously using In Vitro Fertilisation (*n*=6, 2.6%). However, nearly twice as many hairdressers had used fertility hormones to assist with pregnancy (*n*=11, 4.7%).

Data was available for comparison from the ALSWH only for the younger age cohorts regarding any difficulty falling pregnant for a period of twelve months or more. For both the 22-27 years and the 28-33 years age groups there was no significantly observable difference between the hairdresser group and the ALSWH cohort. For the 28-33 years age group data was also available for comparison regarding current and previous use of IVF and fertility hormones. While there was no statistically observable difference between the groups for IVF, the hairdresser cohort had a statistically significant increase in the usage of fertility hormones when compared to women participants in the ALSWH of the same age $X^2(1,N=28)=4.823$, $p< .05$.

Premature Birth

In this study, of the 111 hairdressers who reported having given birth, 11.7% (n=13) had at least one experience of giving birth to a live baby at 36 weeks or less. When compared with the ALSWH cohort for the relevant age groups, both the 22-27 years and the 28-33 years hairdresser groups did not demonstrate any statistically significant differences for having a pre term baby.

Babies with a low recorded birth weight

In this study, of the 111 hairdressers who reported having given birth, 9% (n=10) had given birth in at least one instance to a baby with a recorded low birth weight of less than 2.5 kilograms. For the 28-33 years age group, the hairdresser group did not differ significantly from the ALSWH cohort for the number of mothers giving birth to babies with a low birth weight.

Bowel and Bladder Health

Bladder Health

The overall frequency of leaking urine in the hairdresser group was 26% (*n*=59). Across the age ranges there was no statistically significant difference between the hairdresser and the ALSWH cohort for leaking urine.

Urinary tract infection increases the occurrence of female urinary incontinence (Chiarelli, Brown, & McElduff, 1999). To exclude the possibility that any increase in leaking urine may be attributable to an increase in urinary tract infection, the questionnaire included an item regarding 'urine that burns or stings'. For each of the age cohorts there was no statistically significant difference between the hairdresser cohort and the ALSWH group for the experience of urine that burns or stings.

Bowel Health

There are a range of problems that can affect the bowel. Constipation and haemorrhoids are two of the most common bowel problems experienced by the Australian community (Australian Government, 2008d).

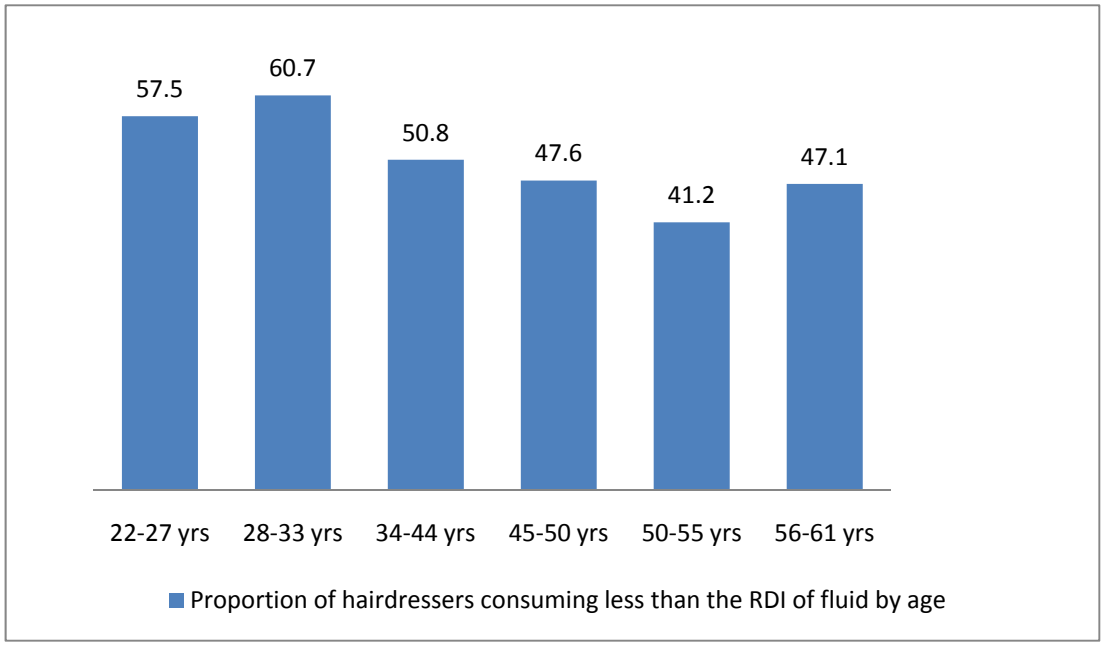
Over half of the hairdresser group reported some constipation (*n*=119, 52.6%), with a significant increase in constipation in the younger age groups. For the 22-27 years age group the prevalence of constipation was significantly higher than in the ALSWH group $X^2(3,N=85)=9.454$, $p< .05$. This result was also observed in the 28–33 years age group $X^2(3,N=28)=10.401$, $p< .05$.

A lack of fluid, constipation and straining can promote inflammation and the development of haemorrhoids (Australian Government, 2008b). Hairdressers aged 50-55 years reported a statistically significant increase in the occurrence of haemorrhoids when compared to the ALSWH cohort of the same age $X^2(3,N=16)=14.078$, $p< .05$. For each of the other age ranges there was no statistically significant difference.

A low fluid intake is directly associated with constipation (Arnaud, 2003). The recommended daily water intake for adults is at least 6 to 8 cups or 1.5 litres (Australian Government, 2008c). Hairdressers reported drinking significantly less than the recommended daily fluid intake. Over half drank less than the recommended 6 to 8 cups of fluid daily (*n*=129, 54.5%). This group included 13.1% (*n*=31) who reported drinking less than 500mls of non-alcoholic drinks per day.

Age again was a notable factor in fluid consumption. The younger two cohorts, 22-27 years (*n*=50, 57.5%) and the 28-33 years (*n*=17, 60.7%), reported the greatest proportion of hairdressers who drank less than the required daily fluid intake. The older age groups reported a slightly better consumption of daily fluid intake. Figure 6 (below) illustrates the proportion of hairdressers in each age group who reported drinking less than the recommended daily intake (RDI) of fluid.

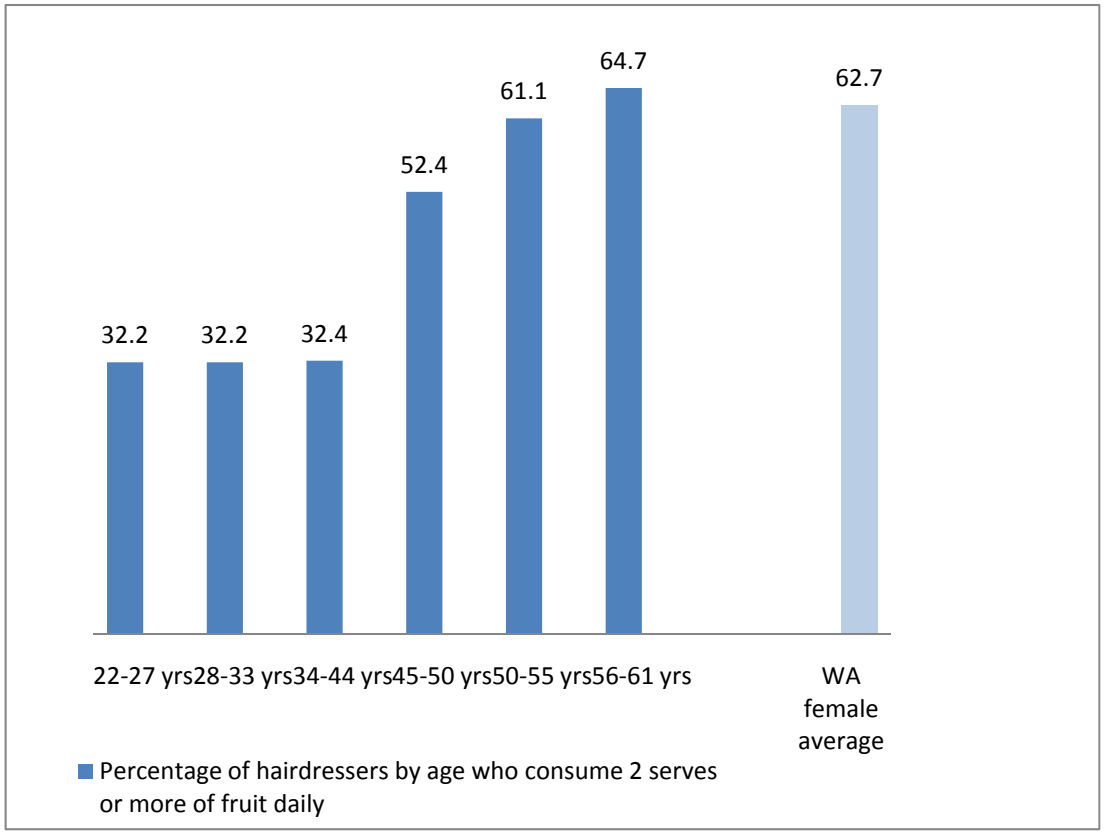
Figure 6: Hairdressers consuming less than the RDI of fluid, by age



Dietary intake has a direct effect on bowel health. Eating an adequate diet of fruit and vegetables promotes bowel health and reduces problems such as constipation (Australian Government, 2008a). Figure 7 (below) illustrates the proportion of hairdressers who are eating the recommended 2 or more serves of fruit daily. The proportions by age group are compared to the Western Australian female population

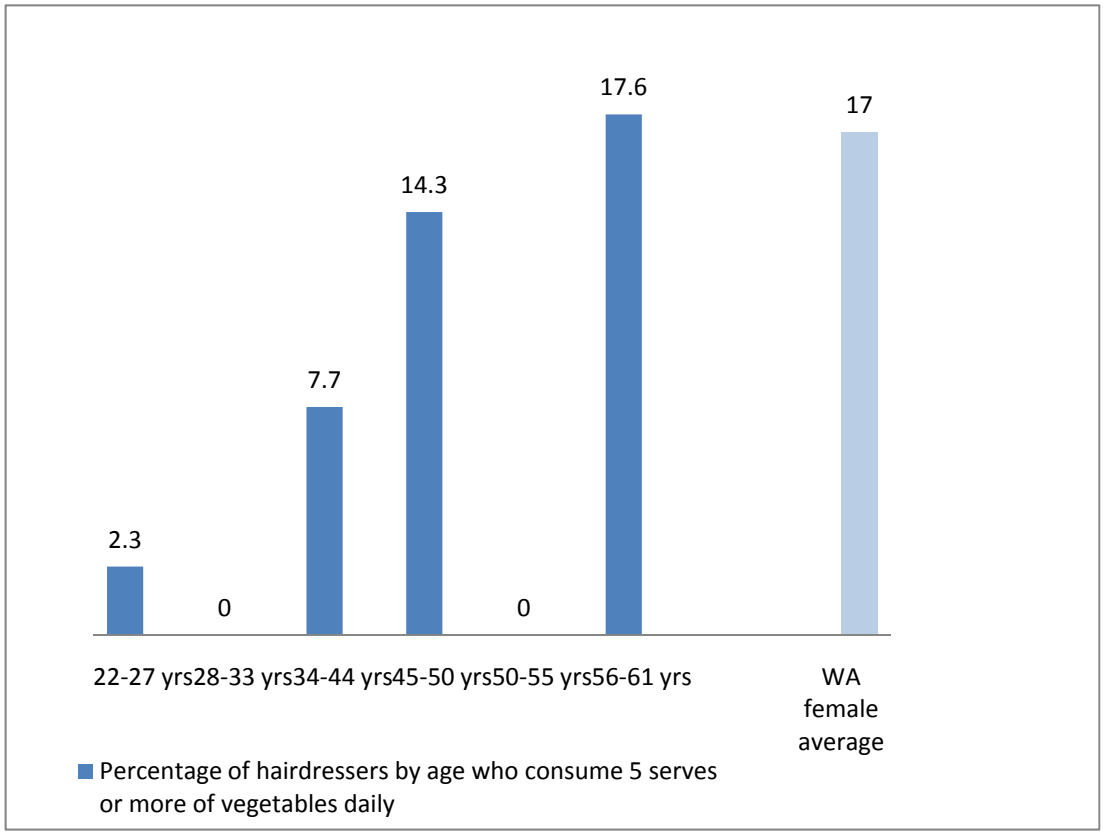
average intake of 62.7% (Draper & Codde, 2004). The younger age hairdresser cohorts have the most inadequate fruit intake.

Figure 7: Hairdressers consuming at least the RDI of fruit, by age



Similarly, when compared to the Western Australian female average for consuming 5 serves or more of vegetables daily (17%)(Draper & Codde, 2004), the younger hairdresser cohorts and the 50-55 years cohort also report poor vegetable consumption (see Figure 8).

Figure 8: Hairdressers consuming at least the RDI of vegetables, by age



'Other Bowel Problems'

Excluding constipation and haemorrhoids, hairdressers were asked if they experienced 'other bowel problems'. This is a question that could relate to a range of bowel conditions. Examples of 'other bowel problems' include bowel cancer, irritable bowel syndrome, colitis, Crohn's disease and worms (Australian Government, 2008d). Although not specific, this question is asked across all the age ranges of the ALSWH and so the hairdresser responses are directly comparable to the wider group.

For the younger aged cohorts the responses were significant. The youngest group, 22-27 years, reported a statistically significant increase in 'other bowel' problems when compared to the same aged ALSWH cohort $X^2(3,N=84)=23.830$, $p< .05$. The next aged cohort, 28-33 years, also reported an increase in 'other bowel' problems $X^2(2,N=28)=19.134$, $p< .05$. For this cohort, due to the smaller sample size, the variable 'often' did require to be collapsed in order to demonstrate a statistically

significant result. For the older cohorts, aged 45-50, 50-55 and 56-61 years, there was no statistically significant difference between the hairdresser and the ALSWH cohort for ‘other bowel’ problems.

Musculoskeletal Health

Hairdressers reported a statistically significant increase in back pain across several of the age groups when compared to the ALSWH group. An increase in back pain was observed in the 22-27 years age group $X^2(3,N=86)=80.111$, $p< .05$; the 28–33 years age group $X^2(3,N=28)=28.836$, $p< .05$; and the 50–55 years age group $X^2(3,N=17)=9.958$, $p< .05$. The results for the 45-50 years and the 56-61 years were not statistically significant. Over the total group, the majority of hairdressers reported experiencing back pain either sometimes (*n*= 82, 35.3%) or often (*n*=88, 37.9%).

The 28-33 year old hairdresser group reported a statistically significant increase in their experience of stiff or painful joints when compared to the ALSWH cohort $X^2(3,N=28)=12.195$, $p< .05$. There was no comparative data available for the 22-27 or 34-44 year age groups. The older age groups did not have a statistically significant increase in stiff or painful joints.

Hairdressers are part of the fashion and beauty industry. It is common in hairdressing for footwear to be more fashionable than practical and unsuitable footwear has the potential to aggravate injury. Nearly half of hairdressers sometimes (*n*=66, 28.9%) or often (*n*=39, 17.1%) experienced problems with one or both of their feet. The only group that had data available for comparison with the ALSWH cohort was those aged 28-33 years, and for this group the results demonstrated a statistically significant increase in foot problems $X^2(3,N=28)=20.137$, $p< .05$.

Respiratory Health

In this study, a large proportion of the hairdresser group reported experiencing allergies, hayfever and sinusitis (*n*=165, 74.4%). Compared to the ALSWH cohort, hairdressers reported a significant increase in allergies, hayfever and sinusitis in the 22–27 years age group $X^2(3,N=83)=12.920$, $p< .05$; the 28–33 years age group $X^2(3,N=27)=12.470$, $p< .05$; and the 50–55 years age group $X^2(3,N=15)=11.473$, $p< .05$. Additionally 38.5% (*n*=85) of all the hairdressers reported breathing difficulties.

Airway irritants which promote allergy, sinusitis and hayfever may also contribute to an increase in headaches and migraines (Victorian Government, 2010). Headaches and/or migraines were experienced by 86.3% (*n*=196) of hairdressers with 63.8% (*n*=145) of hairdressers reporting that they experience headaches and/or migraines sometimes or often. These results were not statistically significant when compared to the age specific ALSWH groups, excepting for an increase in the prevalence of headaches and migraines reported by hairdressers in the older age range, 50–55 years $X^2(3,N=15)=9.769$, $p< .05$.

Dermatological Health

Wearing gloves when handling chemicals is required for hairdresser's occupational health and safety (National Industrial Chemicals Notification and Assessment Scheme, 2008).

Hair dyes and permanent wave solution are the two main types of chemicals used during hairdressing work (Nixon, et al., 2006). When using hair dyes, only 1.3% (*n*=3) of hairdressers reported not wearing gloves. This compares with 57.1% (*n*=136) who reported not wearing gloves when applying permanent wave solution.

Despite the dermatological advice to wear gloves while undertaking wet work, 84.0% (*n*=200) of hairdressers reported never wearing gloves while undertaking wet work.

A low level of glove usage during wet work has potential health consequences for hairdressers. Substantially fewer members of the hairdresser cohort reported 'never' experiencing skin problems when compared to the ALSWH group across all the age groups for which data existed (y2, y4 and m1). In the 22–27 years group the prevalence of skin problems was significantly higher in the hairdresser cohort than the ALSWH group $X^2(3,N=85)=30.404$, $p< .05$. There was no significant difference observed for the 28-33 years or the 45-50 years age group when compared with the ALSWH group.

Psychological Health

Although an in depth analysis of psychological health was outside the scope of this study, questions about sleeping difficulties, tiredness and depression were included. Severe tiredness was experienced often by 23.2% of the hairdresser cohort (*n*=53), with 18.1% (*n*=41) of hairdressers reporting that they often having difficulty sleeping.

The youngest hairdressers were the most affected by severe tiredness and having an increased difficulty sleeping. In the 22–27 years age group, the results for difficulty sleeping were significant when compared with the ALSWH cohort $X^2(3,N=86)=36.451$, $p< .05$. This young group of hairdressers also reported a statistically significant increase in severe tiredness when compared to the ALSWH women participants of the same age $X^2(3,N=85)=46.457$, $p< .05$.

For the 28–33 years, 45-50 years, 50–55 years age groups there was no significant difference in difficulty sleeping between the hairdresser and ALSWH cohorts. There was no comparative data available for the 34-44 years and the over 56 years age groups. The data for severe tiredness again showed no significant differences between the hairdresser and ALSWH cohorts for 28-33 years, 45-50 years and the over 56 years groups. The 50-55 years group did report a significant increase in tiredness when compared to the ALSWH cohort of the same age $X^2(3,N=16)=11.836$, $p< .05$. The sample size, however, for this group was small (*n*=18).

Depression was experienced ‘often’ by 7.1% of hairdressers (*n*=16). Nearly half reported never feeling depressed (*n*=112, 49.6%). There was no significant difference for reported depression between the hairdresser cohort and the ALSWH cohort across any of the age ranges (with no data available for comparison for the 34–44 year range).

Chapter 5: Discussion

This investigation of common health problems of female, Western Australian hairdressers indicates that working as a hairdresser may detrimentally affect health. However, any interpretation of this study's results must be examined with reference to the limitations of this study design.

In this study, the source group comprised of currently working hairdressers. Consideration must be given to those hairdressers who due to the impact of health concerns are no longer working in this occupation. When workers remove themselves from an occupation due to poor health, the population that remains working tends to be healthier. This is a phenomenon known as 'the healthy worker effect' in epidemiological studies (Aschengrau & Seage, 2008, p. 214). Studies of workplace risks that have non-fatal health outcomes, such as asthma and musculoskeletal problems, are particularly likely to be effected by this bias as workers leave the occupation and transfer to a less-exposed environment (Pearce, Checkoway, & Kriebel, 2007).

An example of the effect of adverse health outcomes on a hairdresser cohort is illustrated in a recent Finnish study. Researchers examined the consequences for hairdressers following a diagnosis of occupational skin disease. Six months following diagnosis and treatment, the hairdresser group (n=51) reported that 33% (n=17) had their skin condition healed. However, 20% (n=10, $p<0.05$) of hairdressers had lost their job; 18% (n=9) had changed occupation; 12% (n=6) had changed work tasks; and a further 14% (n=7, $p<0.05$) were on sick leave (Malkonen et al., 2009).

The impact of the healthy worker effect on the study design involves the creation of a selection bias. Selection bias occurs when there is 'systematic differences in characteristics between those who take part in a study and those who do not' (Aschengrau & Seage, 2008, p.263). In this study, there is a difference between the hairdresser group and the general population cohort. When the healthy worker survivor effect occurs, the hairdresser group consists of more healthy individuals.

The hairdresser group is different to the general population cohort which comprises of both healthy and poorer health individuals. When comparing health outcomes between the groups, there is a potential for results to be underestimated as the healthy worker effect has created a bias in the results (Pearce, et al., 2007).

In occupational groups that are affected by chronic health conditions, the impact of the healthy worker effect changes over time. As the population ages, the remaining workforce is likely to be healthier than the general population of the same age range. This is particularly relevant when examining the results from this study. Overall, mid and older age hairdressers did not demonstrate poorer health outcomes when compared to the ALSWH and general population cohorts of the same age. The younger age ranges, however, did demonstrate significant poorer health outcomes. The younger age hairdresser group is likely to be more similar to the general population group of the same age range, than the older age hairdressers. The impact of the healthy worker effect needs to be considered, particularly when examining the results for the older aged hairdresser cohorts.

Studies have been undertaken to determine if there are differences between the ALSWH cohort and the general Australian population. These studies have illustrated that participants in the ALSWH tend to be of a higher socio-economic status and also report better health behaviours when compared with the National Health Survey participants for the relevant age cohorts (Women's Health Australia, 2009). Women's Health Australia notes that this 'finding is not unexpected, given that the ALSWH women, although initially selected at random, participated voluntarily in the study' (Women's Health Australia, 2009, p.142). When examining the results of this hairdresser study, it must be considered when the hairdresser group is compared to the ALSWH cohort, that potentially the ALSWH cohort is healthier and better educated about their own health than their hairdresser counterparts, although any difference is difficult to quantify.

Non-response bias is another form of selection bias that may have impacted on this study's results. Non-response bias is a type of selection bias, in which those that respond to the opportunity to participate in research are different to those that choose not to respond (Gordis, 2009). It is likely that those with an interest or concern about

the health of hairdressers were more likely to respond to the written survey and become a participant in this study. Ronmark et al., (cited in Gordis, 2009, p.247) assert that non-responders were more likely to be smokers and in poorer health than respondents.

There was difficulty in accessing hairdressers for the purpose of this research. The method of a telephone survey was discounted as hairdressers work in a very customer orientated environment. A low level of union participation and no national organisational body prevented access directly to individual hairdresser contact details. The only Australian state in 2009 with a hairdresser registration requirement was Western Australia, although the Hairdressers Registration Board of WA is due to be abolished by the end of 2010 (Hairdressers Registration Board of WA, 2010a). The electronic Yellow Pages directory was utilised to obtain the details of all Western Australian hair salons. However, of the 718 hair salons contacted by post for this project, 48 were returned to sender with the majority commenting that the business had closed or left the address. One method to have reduced this loss of potential subjects would have been to have made initial telephone contact directly with participants. Although this was outside the scope and funding of this study, it is mentioned as a suggestion for future studies with hairdresser groups. Email contact was also considered. However, while younger hairdressers are likely to be computer orientated, the majority of mid aged and older hairdressers have had little computer exposure as part of their work environment.

The high prevalence of smoking in the hairdresser group may also have led to a reporting bias. This kind of bias occurs when participants are ‘reluctant to report an exposure he is aware of because of attitudes, beliefs, and perceptions’ (Gordis, 2009, p.250). Hairdressers who are smokers may have underreported the effect of respiratory concerns, such as breathing difficulties, due to the perception of smoking being an indicator of poor health.

Another bias that may have affected the results of this study was the difference in time periods for the collection of data between the hairdresser cohort and the ALSWH cohorts. In particular, the data for the m1 cohort (ages 45-50 years), which was collected in 1996; the y2 cohort (ages 22-27 years) which was collected in 2000;

and the m3 cohort (ages 50-55 years) which was collected in 2001. Differences between these groups and the hairdresser cohort need to be considered for changes in health outcomes over the past 10 years.

The potential effect of confounding needs to be considered when reviewing this study's results. A confounder is another variable that is associated with both the exposure and the health outcome (Aschengrau & Seage, 2008). This confounding variable distorts the relationship between the exposure and health outcome, or in this case, the practise of hairdressing and the common health problems under examination.

There are several confounders that could have influenced the results of this study. Smoking is a likely confounder, particularly with a high rate of smoking being observed in the hairdresser group. Smoking has the potential to influence a range of health issues, including respiratory ill health, fertility and some cancers. The potential for smoking to confound the results is to be considered when reviewing the results of this study.

Some hairdressing salons include an area for acrylic nail work. In this study, 6% (n=14) of hairdressers reported that their workplace included an area for acrylic nail work. The hairdresser group was not specifically asked if they personally performed acrylic nail work as part of their job description. Exposure to the chemicals used in acrylic nail work may have some similar health effects to those experienced by exposure to hairdressing chemicals. Respiratory irritation, breathing difficulties and skin problems have been identified as potential health hazards for workers in nail salon (Roelofs, Azaroff, Holcroft, Nguyen, & Doan, 2008). For workplaces which combine both hairdressing and acrylic nail work, there is the potential for any observable health effects to be attributable to either work activity. Due to the small number of hairdressers reporting exposure to acrylic nail chemicals in their workplace, no attempt has been made to stratify the cohort for acrylic nail salon exposure. This is a limit to this study design.

General Health

There were distinct variations in how hairdressers perceive their own health in this study. Younger hairdressers, aged 22-44 years perceived themselves to be in poorer health than their general population comparative group. However, mid aged and older hairdressers considered themselves to be in better health. These results are consistent throughout many of the common health problems individually examined in this study. The healthy worker effect, specifically the healthy worker survivor effect is very likely to be responsible for these results. Hairdressers in poorer health are not able to continue with employment and leave the occupation (Pearce, et al., 2007).

Gynaecological and Reproductive Health

A small sample size, in combination with the rare occurrence of many gynaecological and reproductive health events has not enabled this study to determine strong associations between the occupation of hairdressing and poor gynaecological health outcomes. There are however, some concerns that have been highlighted in this study.

The occurrence of pelvic organ prolapse across all age groups, but in particularly the younger age ranges merits further investigation.

Other researchers have observed a link between the use of permanent wave solution and menstrual difficulties (Li, et al., 2003). Although outside the scope of this research project, it has been observed by several participants in the current hairdresser group that they have ‘not used permanent wave solution in over 10 years’ (notation on Hairdresser Health Survey, personal communication, 2010). A potential area for future research could involve an investigation of a decrease in menstrual disorders (Spilsbury, et al., 2006) and a corresponding decrease in the usage of permanent wave solution. This would be of particular interest as there has been a very recent increase in the use of some permanent wave products (notation on Hairdresser Health Survey, personal communication, 2010).

In this study, female hairdressers in their most active child bearing years were observed to be using hormone based medications to promote fertility significantly

more than the general population. Smoking has been associated with poor fertility outcomes and so must be considered as a potential confounder in this study (Whitcomb et al., 2010). Further analysis of this hairdresser cohort found that none of the hairdressers in the 28-33 years age group who reported using fertility hormones was also a current smoker. Additionally, none of this group reported having ever been a daily smoker. Further research into the use of fertility medications by hairdressers would be of value.

The results of this study are not strong enough to support the conclusion that there is a substantially greater risk to female hairdressers' fertility than for the general population. However, any risk, even slight, in which workplace exposure may affect a women's fertility requires further examination.

Bowel and Bladder Health

Despite an expectation of an increased risk to hairdressers for urinary incontinence, this study does not support the hypothesis that the occupation of hairdressing increases the likelihood of women experiencing either leaking urine or urinary tract infection.

For bowel health, the results of this study were significant – particularly for the younger age range. Younger hairdressers, aged 22-33 years reported an increase in bowel problems, particularly constipation and other bowel problems, when compared to the women participants in the ALSWH cohort. Concurrently, this younger group does not consume an adequate daily fluid, fruit or vegetable intake.

Hairdressers in the 50-55 years age group demonstrated an increase in the occurrence of haemorrhoids. Concurrently, this group also had an inadequate fluid and vegetable intake when compared with the respective recommended daily intakes for fluid and vegetables. This group did report that their fruit intake, while inadequate, was almost the same as the Western Australian female average.

Health hazards for hairdressers may be promoted by the workplace environment. Opportunities to attend to personal health maintenance throughout the work day, such as to drink adequate fluid and access quality food are necessary to promote a

healthy workplace. The customer focussed nature of hairdressing work can inhibit hairdressers' ability to attend to their own basic health needs. The results demonstrated in this study regarding poor fluid, fruit and vegetable consumption and the impact on bowel health illustrate the need for the hairdressing workplace to enable and encourage hairdressers to attend to basic health needs on a daily basis.

Musculoskeletal Health

Hairdressers demonstrated a statistically significant increase in back pain across the younger age ranges (22-33 years), as well as the mid aged (50-55 years). No association was found for the 45-50 years and 56-61 years. These results are potentially related to the impact of the healthy worker effect – as those suffering back pain are prompted to leave the occupation of hairdressing.

For foot and joint problems, the results were limited by a lack of comparative data for several of the age ranges. The 28-33 years age range did demonstrate an increase in stiff or painful joints as well as foot problems compared to the ALSWH group. The 45 years and over hairdresser age groups did not demonstrate an increase in joint problems when compared to their respective ALSWH age ranges. Again, the healthy worker effect needs to be considered as hairdressers experiencing joint pain remove themselves from the hairdressing work environment.

The results of this study indicate that there is a potential association between the occupation of hairdressing and musculoskeletal health problems, supporting the findings from previous international research (Arokoski, et al., 2002; Gisele & Nelson, 2008). In particular, the younger 22-33 year old hairdressers are most at risk. This finding has implications for hairdressing work practices to ensure awareness of protective behaviours and to eliminate the occurrence of preventable occupational injury.

Respiratory Health

Consistent with other previous studies on hairdresser cohorts, this study demonstrates that Western Australian hairdressers report high levels of both current and previous smoking behaviour. The impact on respiratory health is well

documented and hairdressers who smoke are at risk of a range of cancers and other health issues (Health Direct Australia, 2010).

Statistically significant results were demonstrated for an increase in allergies, hayfever and sinusitis for hairdressers aged 22-33 and 50-55 years when compared to the ALSWH cohort. This result was expected and is consistent with a range of previous studies (Akpinar-Elci, et al., 2002; Albin, et al., 2002; Leino, et al., 1997).

Older age hairdressers (age 50-55 years) have demonstrated a statistically significant increase in allergies, hayfever, sinusitis, headaches and migraines in this study. This is consistent with other studies which have identified that older hairdressers are at an increased risk of respiratory illness than younger workers (Hollund, et al., 2001).

Although limited by sample size and the lack of a comparative group for hairdressers aged 34-44 years, the available evidence from study participants supports the hypothesis that hairdressing work has a negative impact on respiratory health.

Dermatological Health

Dermatological health is an important issue for hairdressers and there was an expectation that there would be an increase in skin problems for working hairdressers compared to the general population group. For the youngest age group the results of this study support the hypothesis of increased skin problems for hairdressers. This study did not find a significant increase in skin problems for hairdressers over 28 years. The impact of the healthy worker effect needs to be considered as other studies have demonstrated that many hairdressers are forced to discontinue work due to occupational skin disease (Malkonen, et al., 2009).

There was a considerable lack of glove usage in the hairdresser cohort. This is consistent with previous studies and has implications for long term skin conditions as well as for exposure to a range of chemical products with a variety of both known and unknown potential health consequences. The assertion that hairdressers used gloves to prevent discolouration rather than to reduce chemical risk (Nixon, et al., 2006) was supported in this study.

Occupational skin disease has high social and economic costs. In Germany, new employees engaging in wet work for greater than 4 hours per shift are legally required to attend a pre-employment screening programme. Driven by the high cost of workers' compensation related to occupational skin conditions, this programme aims to alert new employees to the requirements for the use of personal protective equipment as well as to exclude those at high risk of injury. Screening is also recommended, but not prescribed, for employees engaged in wet work for over 2 hours daily (John, 2008; Kralj, et al., 2010).

Despite the known health threat associated with wet work and chemical exposure, a low level of glove usage continues to be demonstrated in this group of Western Australian female hairdressers.

Psychological Health

This study is not a comprehensive analysis of the psychological health of hairdressers. However, the results of this study do demonstrate that the younger hairdresser group, age 22-27 years, report an increase in both difficulty sleeping and severe tiredness compared to the ALSWH group of the same age. The 50-55 years group also demonstrated an increase in tiredness. Depression, however, was not found to be significant in the hairdresser group and these results do not substantiate the hypothesis that hairdressing work is directly damaging to the psychological health of hairdressers.

Chapter 6: Conclusions and Recommendations

Undertaking hairdressing work does increase the occurrence of a range of health problems.

The hairdressing culture of a 'customer focussed' workplace environment is integral to the running of a successful hair salon, but the needs of customers need to be balanced with an understanding that a healthy employee provides the best service.

Hairdressers, particularly the younger workers, need to be encouraged to maintain adequate food and fluid intakes. Education on the importance of using personal protective equipment, particularly gloves, needs to be promoted.

An understanding of the impact of repetitive and awkward movement and positioning needs to be promoted in the work environment. All hairdressers need to be educated and encouraged on ways to prevent musculoskeletal injury.

It appears that a culture of smoking has existed in hairdressing, and although there is some evidence to suggest that the prevalence of smoking in hairdressing groups has decreased, hairdressers as an occupational group still smoke significantly more than the rest of the population. Education and support for a reduction of smoking, particularly around the workplace environment is indicated for hairdressers.

Younger workers have been identified in this study at being most at risk for a range of health concerns including allergy, hayfever, sinusitis, skin problems, back pain, joint pain, foot problems, tiredness, sleeping, constipation and other bowel problems. Education and support needs to be focussed on these young workers to enable them to continue as healthy workers in their chosen career. It is essential that young workers are aware of the insidious nature of some of the workplace hazards they are exposed to, for example the cumulative effect of wet work on dermatological health. An examination of the impact of current occupational health and safety training for apprentices is suggested, as well as education for established hairdressers to promote healthier behaviour choices in the workplace.

Research conducted for hairdresser cohorts needs to be industry specific. Studies which examine a range of occupations and exposures are not providing the detailed information that hairdressers require to promote a change to current practice in their workplace environment.

Future research studies that would be beneficial to hairdressers include those which directly measure their level of exposure to chemicals in the work environment. Workplace attributes such as ventilation and exposure to acrylic nail work need to be considered in these calculations. Characteristics of the exposure, which include short, but frequent duration and over an extended period of time, need to be incorporated into any measurements.

Investigation is also indicated for some less common health problems such as the use of fertility hormones and the occurrence of pelvic organ prolapse in hairdresser cohorts. These occupation specific studies need to determine if there is an association between these poor health consequences and the hazards of working in a hairdressing environment.

Hairdressing can be a creative and rewarding career. It is the intent of this study to better inform hairdressers of the potential consequences of the hazards that they encounter in their workplaces and to encourage improved health and well being for all.

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Appendix 1 - Questionnaire

As per the following pages

Hairdresser Health Survey

□ *please tick your responses*

Are you a participant in the Australian Longitudinal Study on Women's Health (ALSWH)
□ if Yes, (and you will know if you are) could you please pass this survey to another hairdresser
□ if No, then please continue

What is your age?
□ *Under 22 – not for this study*
□ *22-27 years*
□ *28-33 years*
□ *34-44 years*
□ *45-50 years*
□ *50-55 years*
□ *56-61 years*
□ *Over 62 years*

Where do you live?
□ *Perth (metropolitan and greater Perth)*
□ *Regional WA*
□ *Remote town or area* of WA (less than 1000 people)

How many years have you worked as a hairdresser? (Including training and apprenticeship years)
□ Up to 5 years
□ 6 - 10 years
□ 11 - 20 years
□ over 21 years

What is your current role?
□ Hairdresser
□ Salon owner
□ Apprentice
□ Currently not working
□ Other – please specify ……..

How many hours do you currently work in an average week?
□ Up to 10 hours per week
□ 11- 30 hours per week
□ 31- 40 hours per week
□ Over 40 hours per week
□ Currently not working

Does your workplace include an area for acrylic nail work?
□Yes
□ No

Do you have sufficient time to have a meal or drink break when at work?
□ Never
□ Rarely
□ Sometimes
□ Often

Do you have sufficient time to have a toilet break when at work?
□ Never
□ Rarely
□ Sometimes
□ Often

Does your workplace use chemical or organic hair colour products?

- □ Chemical only
- □ Organic only
- □ Both organic and chemical

Do you wear gloves when you use hair dye in the workplace?

- □ No, I do not wear gloves
- □ Sometimes I wear gloves
- □ I wear gloves most of the time
- □ I wear gloves all of the time
- □ I do not use hair dye at work

Do you wear gloves when you use permanent wave solution in the workplace?

- □ No, I do not wear gloves
- □ Sometimes I wear gloves
- □ I wear gloves most of the time
- □ I wear gloves all of the time
- □ I do not use permanent wave solution at work

Do you wear gloves when you undertake wet work in the workplace?
E.g. applying shampoo/conditioner

- □ No, I do not wear gloves
- □ Sometimes I wear gloves
- □ I wear gloves most of the time
- □ I wear gloves all of the time
- □ I do not undertake wet work at work

In general, would you say your health is:

- □ excellent
- □ very good
- □ good
- □ fair
- □ poor

How many glasses/cups (250mls) of non-alcoholic drinks do you usually have each day?
E.g. juice, tea, coffee, water, milk, etc

- □ 0-2 glasses
- □ 3-5 glasses
- □ 6-8 glasses
- □ 9 or more glasses

How many SERVES of fruit do you usually eat per day?
A serve = one medium piece or two small pieces of fruit or one cup of diced pieces

- □ None
- □ Less than 1 piece per day
- □ 1 piece per day
- □ 2 pieces per day
- □ 3 pieces per day
- □ 4 pieces per day
- □ 5+ pieces per day

How many SERVES of vegetables do you usually eat each day?
A serve = half a cup of cooked vegetables or a cup of salad vegetables

- □ None
- □ 1 serve
- □ 2-3 serves
- □ 4 serves
- □ 5 or more serves

How often do you currently smoke cigarettes or any tobacco products?

- □ Daily
- □ At least weekly (but not daily)
- □ Less often than weekly
- □ Not at all

Have you EVER smoked daily?

- □ Yes
- □ No

In the LAST 12 MONTHS, have you had any of the following:
(Mark all that apply)

	Never	Rarely	Sometimes	Often
Allergies, hayfever, sinusitis	□	□	□	□
Headaches/migraines	□	□	□	□
Breathing difficulty	□	□	□	□
Indigestion/heartburn	□	□	□	□
Severe tiredness	□	□	□	□
Back pain	□	□	□	□
Stiff or painful joints	□	□	□	□
Problems with one or both feet	□	□	□	□
Urine that burns or stings	□	□	□	□
Leaking urine	□	□	□	□
Constipation	□	□	□	□
Haemorrhoids (piles)	□	□	□	□
Other bowel problems	□	□	□	□
Skin problems	□	□	□	□
Difficulty sleeping	□	□	□	□
Depression	□	□	□	□

Have you ever had any of the following surgeries?

Surgical repair of a prolapsed vagina, bladder or bowel □ Yes □ No

Hysterectomy (removal of the uterus) □ Yes □ No

Have you and your partner (current or previous) ever had problems with fertility - that is, tried unsuccessfully for 12 months or more to get pregnant?

- □ No, never tried to get pregnant
- □ No, had no problem with fertility
- □ Yes, but have not sought help/treatment
- □ Yes, and have sought help/treatment

Do any of the following apply to you?

I am using/have used In Vitro Fertilisation (IVF) □ Yes □ No

I am using/have used fertility hormones (eg Clomid) □ Yes □ No

How many times have you had each of the following:
(Mark one on each line)

	None	One	Two	Three	Four	5 or more
Live birth (more than 36 weeks)	□	□	□	□	□	□
Live premature birth (36 weeks or less)	□	□	□	□	□	□
Given birth to a baby with a low birth weight (weighing less than 2.5 kilograms or 5½ pounds)	□	□	□	□	□	□

Appendix 2 - ALSWH Questions

		y2,4	m1,3,5	m4	Source
Introduction					
In general, would you say your health is:	SF36-001	**y24**	**m135**		Ware, J.E. *
Descriptive					
How many glasses/cups (250mls) of non-alcoholic drinks …	EATS-053		**m5**		WHA
How many SERVES of fruit do you usually eat per day?	EATS-052	**y4**		**m4**	WHA
How many SERVES of vegetables do you usually eat each day?	EATS-051	**y4**		**m4**	WHA
	EATS-054		**m5**		WHA
Smoking					
How often do you currently smoke cigarettes …	SMOK-007	**y24**	**m35**		AIHW
Have you EVER smoked daily?	SMOK-011		**m5**		AIHW
	SMOK-019	**y2**			AIHW
	SMOK-030	**y4**		**m4**	AIHW
Common Health Problems					
Allergies, hayfever, sinusitis	CPRB-001	**y4**	**m135**		WHA
	CPRB-170	**y2**			WHA
Headaches / migraines	CPRB-005	**y4**	**m135**		WHA
	CPRB-171	**y2**			WHA
Breathing difficulty	CPRB-002		**m135**		WHA
Indigestion/heartburn	CPRB-003		**m135**		WHA
Constant tiredness	CPRB-006		**m1**		WHA
Severe tiredness	CPRB-084	**y4**	**m35**		WHA
	CPRB-172	**y2**			WHA
Back pain	CPRB-008	**y4**	**m135**		WHA
	CPRB-173	**y2**			WHA
Stiff or painful joints	CPRB-007	**y4**	**m135**		WHA
Problems with one or both feet	CPRB-230	**y4**			WHA
Urine that burns or stings	CPRB-010	**y4**	**m135**		WHA
	CPRB-174	**y2**			WHA
Leaking urine	CPRB-011	**y4**	**m135**		WHA
	CPRB-175	**y2**			WHA
Constipation	CPRB-012	**y4**	**m1**		WHA
	CPRB-176	**y2**			WHA
Haemorrhoids (piles)	CPRB-013	**y4**	**m135**		WHA
	CPRB-177	**y2**			WHA
Other bowel problems	CPRB-014	**y4**	**m135**		WHA
	CPRB-178	**y2**			WHA
Skin problems	CPRB-022	**y4**	**m1**		WHA
	CPRB-184	**y2**			WHA
Difficulty sleeping	CPRB-025	**y4**	**m13**		WHA

	CPRB-185	**y2**		WHA
Depression	CPRB-085	**y4**	**m35**	WHA
	CPRB-186	**y2**		WHA

Female Health

Have you ever had any of the following surgeries?				
Surgical repair of a prolapsed vagina, bladder or bowel	not exact - asked over differing time periods			
Hysterectomy (removal of the uterus)	not exact - asked over differing time periods			
Have you … ever had problems with infertility …	REPH-065	**y24**		WHA
not exact wording - will use REPH-065	REPH-078		**m3**	WHA
Do any of the following apply to you?				
I am using/have used In Vitro Fertilisation (IVF)	REPH-130	**y4**		WHA
I am using/have used fertility hormones (eg Clomid)	REPH-131	**y4**		WHA
How many times have you had each of the following?				
Live birth (more than 36 weeks)	REPH-059	**y2**		WHA
	REPH-097	**y4**		WHA
Live premature birth (36 weeks or less)	REPH-060	**y2**		WHA
	REPH-098	**y4**		WHA
Given birth to a baby with a low birthweight (not exact wording)	REPH-146	**y4**		WHA

* Ware, J.E., & Sherbourne, C.D. (1992) The MOS 36-Item Short-Form Health Survey (SF-36): 1. Conceptual Framework and Item Selection, *Medical Care, 30*(6), 473-483.