

Digging Deep for Better Health

**A study of the health status of men in the
Goldfields mining industry of Western Australia**

E X E C U T I V E S U M M A R Y

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1 EXECUTIVE SUMMARY

Focus of the study

The present study has investigated the relationship between work practices and the health status of male workers in the Goldfields mining industry of Western Australia with reference to different occupations, employment and long distance commuting status. The analysis is restricted to employed male mine workers engaged in contractual work arrangements, long work hours, intensive shift rosters and work schedules and long distance commuting. The design of the study provides a snapshot of the health status of workers from both the employee's and their partner's perspectives working in the Goldfields region.

The study commenced in late October 2003 and consisted of an integration of both qualitative (interviews) and quantitative (surveys) research techniques. It was participatory in nature and conducted on mine sites located within the Goldfields region of Western Australia including the City of Kalgoorlie-Boulder. The central aim of this study was to examine the general, psychological and social health of a representative sample of 744 male mine workers from 29 mining organisations within the Goldfields region of Western Australia. This report presents information from sources of data via semi-structured interviews and surveys. Two surveys using standardised subjective measures of health including individual differences addressing workers health behaviour and attitudes to work were reported in a survey as indicators of health. These were completed by 510 male mine workers and 53 spouses (partners). Several measures of subjective health are considered: general health, role limitation due to physical and emotional health problems, psychological distress, sleep disturbance, chronic fatigue, measures of personality – extraversion and neuroticism, social functioning, social and domestic satisfaction and interference, work-family balance and social support.

The information derived from the present study results from the consultation and commitment of many individuals. This includes the participating mining organisations who made available their workforce, as well as considerable consultation with many local mining and non-mining entities such as the Chamber of Commerce and Industry, Chamber of Minerals and Energy, as well as other service providers, who supported the nature and intent of the study. As such the following individuals contributed to the study's findings:

- Prior to the initiation of field work, more than 50 people were individually interviewed including local Members of Parliament, Goldfields Men's Health Inc. committee members, health service providers, and community members.
- Over a period of approximately 20 weeks, 234 workers were interviewed on local and FIFO open-cut and underground gold and nickel mining operations. Participants were recruited from management, technical and non-technical areas of the operations.
- 53 partners of those interviewed, completed a self-reported questionnaire.
- 510 male mine workers completed a self-reported questionnaire.
- In total over 850 individuals living and / or working in the Goldfields region were involved in the study.

Conceptual meaning to work practices

The Goldfields mining industry is characterised by work practices that are commonly observed across the majority of gold and nickel mining operations in the Goldfields region. There is evidence to show that work practices including contractual work arrangements, long and extended work hours, intensive shift rosters and work schedules^{25,26,27,28} and long distance commuting requirements⁴⁰ predominate within the mining resource sector of Western Australia. The current study defines work practices as:

- *Contractual work*: Work completed on mine sites by labour contracted to the principal employer.
- *Long work hours*: Hours worked beyond the normal 8 hour work day. Total number of hours usually exceed 44 hours per week.¹⁵
- *Extended work hours*: Hours worked outside the normal 8 hour work day of 8am to 5pm.
- *Shift rosters (roster patterns)*: Defined as how hours of work are performed. In the Goldfields the majority of male mine workers perform shiftwork with a minimum of 10.5 hours per day. Common shift configurations included 14 x 12 hour shifts/ 7 days off; 9 x 10.5 hour shifts/ 5 days off; 7 x 12 hour day shifts/ 3 days off, 7 x 12 hour night shifts/ 4 days off; 2 x 12 hour night shifts, 2 x 12 hour day shifts/ 4 days off. For the purpose of the study, shift rosters include permanent days, nights and a mixture of both day and night shifts (shiftwork).
- *Work schedules*: Where the number of days worked is either even-time (days worked match number of days off) or uneven-time rosters (days worked mismatch number of days off). The majority of participants in the present study worked un-even work schedules where the number of days worked exceed the number of rest days.
- *Long distance commuting (LDC)*: Includes transport methods used by workers to access mine sites and work places such as driving and flying. In Western Australia, the majority of LDC workers commute on a fly in and fly out (FIFO) basis.
- This study will report on the following factors:
- The general, social, and psychological health status of male employees working in the mining industry in the Goldfields region of Western Australia between April 2004 and May 2005;
- The level of social and domestic disruption of work practices on families and spouses (partners);
- A comparison of these issues in three subgroups: occupation (professional, skilled & unskilled workers), employment (principal & primary contractor employees) and long distance commuting status groups (local residentially based & mine site based employees);
- Recommendations for addressing any concerning issues affecting the health of male mine workers.

Key findings

Interviews

- The quality of health and lifestyle of mine workers is, in part, determined by their work practices.
- Many interviewees clearly identified health components that are reflective of a healthy lifestyle: sound nutrition, regular physical exercise, relaxation and good quality sleep, but few reported maintaining a 'healthy lifestyle'.
- Many interviewees recognised the benefits of keeping physically active and fit, but failed to adopt or maintain physically active and healthy lifestyles.
- Few male interviewees regularly participate in individual or group sporting teams or engage in moderate intensity levels of physical activity.
- Many respondents, especially those undertaking shiftwork duties, are failing to maintain healthy eating practices between shifts and days off.
- Male mine workers are concerned with the following personal health issues: fatigue, stress, adverse physical, emotional, and behavioural changes, social isolation and relationship problems.
- Some experienced underground workers are concerned with the quality of 'dirty' air around diesel operated mobile equipment.
- The majority of interviewees perceived their physical health as 'average' and their fitness as 'poor or below average'.
- Night workers compared to day workers reported more acute cognitive, emotional, and behavioural changes. Cognitive problems include problems with concentration levels, short-term memory and alertness. Emotional problems include stress, anxiety, depressed mood and irritability. Behavioural problems include poor sleeping habits, the consumption of excessive amounts of alcohol and cigarettes and maintaining sedentary lifestyles.
- Quality of sleep was identified as an important determinant affecting the quality of their health status for most shift workers.
- Most shift workers reported high levels of sleep disturbance involving deficits in the quality and quantity of sleep.
- Acute and chronic fatigue symptoms were evident amongst all workers, especially shiftworkers.
- The effects of long hours and shift work such as changes to mood and energy levels are transferred between the work place and home, which impact negatively on work and family relationships.
- Shift workers compared to day workers reported constrained time for sports, hobbies, social and domestic activities as well as time for their partner and children.
- Interviewees described the frequent use of both effective and non-effective coping strategies to manage or tolerate stress associated with the demands of work practices such as fatigue, sleep disturbance, cognitive and emotional changes and disrupted social and domestic life.
- Some workers use alcohol, sleeping pills and other drugs to help them sleep between shifts as well as on days off.
- Many find that their initial short-term plan is extended due to the "golden handcuff". These workers work in the industry and tolerate work practices because of the necessity to meet their personal financial commitments.

Surveys

Interpreted thematic information obtained from the interviews guided the selection of standardised psychometric scales used to develop the quantitative measures. These took the form of two surveys, which were used to quantify data arising from the qualitative stage of the study. The salient findings arising from the completion of the Social Health and Wellbeing (SHW), and the Psychosocial Health and Wellbeing (PHW) surveys are reported below.

What is the level of workers health from spouse's (partner) perspective?

General health

- More than half (54.7%) of the 53 respondents reported their partner's health as 'good' or better and 45.3% either 'fair' or 'poor'.
- Nearly a third (32.1%) reported no problems with work or other activities as a result of physical health problems. In contrast, 67.9% reported that their partner's role was limited due to a problem with physical health in the previous 4 weeks.
- Compared to a year ago, half (50.9%) reported their partner's health was 'the same'. A quarter (28.3%) reported deterioration in their partner's health while a further similar percentage reported an improvement in health.

Psychological Health

- More than two thirds (67.9% $N = 36$) of respondents reported partners' emotional wellbeing as 'good' or 'excellent' health. In contrast 32.1% reported partner's emotional wellbeing as 'fair' or 'poor'.
- 45.3% of spouses reported partners having no problems with work or other activities as a result of emotional health during the past four weeks. In contrast, over half (54.7%) reported that their partners role was limited due to a problem with emotional health in the past 4 weeks.
- Nearly half (41.5%) of all respondents partners reported moderate or higher levels of sleep disturbance.
- The highest level of sleep disruption reported was for employees working night shifts.
- 62.3% of respondents indicated that their partners use sleeping pills to sleep on day shifts ($N = 53$). In contrast, approximately a third never use sleeping tablets.
- 5% use sleeping tablets 'frequently' or 'almost always' when working day and night shifts.
- More than two-thirds of all respondents use alcohol to sleep between day shifts, night shifts and days off.
- Workers consume nearly eight times as much alcohol on days off than when rostered on.
- More than a third (37.7%) reported that their partners do not use *other* drugs to sleep between shifts but nearly two-thirds (62.3%) do.

- Overall respondents showed that workers are conservative in the utilisation of both effective and non-effective coping strategies to cope with stressors associated with the demands of work practices. However, respondents reported a higher use of more effective coping strategies than non-effective coping strategies.

Social health

- Overall, spouses reported a moderate level of dissatisfaction with the amount of time their partners have to complete social and domestic activities.
- More than two-thirds of respondents reported moderate or higher levels of interference with social tasks, domestic and non-domestic activities as a result of their partners' job.
- The highest level of interference reported was with time for social activities such as individual and group sporting events and hobbies.
- 62.3% agreed that their partner's job has a positive effect on family.
- 37.7% agreed that their partner's job impacts negatively on family.
- 62.3% reported that because of their partner's job, he missed out on home or family activities as well as the rewarding aspects of being a parent.
- 88.7% of spouses (partners) agreed that their partner's job had a positive effect on their partner in terms of parenting. In contrast, only 11.7% reported that their partner's job was detrimental to his ability to be an effective father.

What is the level of health from a workers perspective?

General health

- The overall level of general health measure reported by male respondents was evaluated as 'good'.
- 43.7% of respondents reported their personal health as 'very good' or 'excellent' and 13.3% rated their health as 'fair' or 'poor'.
- 47.8% of all respondents reported being 'about the right weight' and 46.9% reported 'being too heavy' (overweight).
- 46.7% reported they were 'trying to lose weight'. In contrast, 48.4% were 'not trying to change their bodyweight'.
- Compared to a year ago, 64.7% of all respondents reported their health 'about the same'.
- 17.7% reported either an improvement or deterioration in their health status in the past year.
- 62.5% reported no problems with work or other activities as a result of physical health problems in the previous 4 weeks, while 37.5% reported a problem with their physical health in the four weeks prior to completing the survey.

Psychological health

- 28% ($N = 143$) of the 510 respondents were detected with possible minor psychiatric disorders such as anxiety and depression.
- High levels of reported psychological distress were reported by those who work nightshifts and 12 hours or more per day.

- 64.7% reported no problems with work or other activities as a result of experiencing a problem with emotional health in the four weeks prior to completing the survey. In contrast, over a third (35.3%) of all respondents reported a problem with their emotional health.
- Those who work less than 12 hours per day reported fewer problems due to emotional health than those who worked 12 hours or more per day.
- Overall a moderate level of sleep disturbance was reported by male respondents.
- The highest level of sleep disruption was reported for those working night shifts.
- Those working more than 12 hours per day, experienced higher levels of sleep disturbance compared with those working lesser hours.
- Respondents reported the most sleep disturbance on night shifts and the least amount on days off.
- 38% reported moderate or higher levels of chronic fatigue.
- Those working more than 12 hours per day experienced higher levels of chronic fatigue than those working fewer hours.
- When comparing chronic fatigue by age-groups, the youngest respondents 18-24 years age group ($N = 33$) reported the lowest chronic fatigue score. The second oldest age group (25-34 years, $N = 158$) reported the highest chronic fatigue score.
- Overall respondents showed a conservative utilisation of both effective and non-effective coping strategies. However, respondents reported higher frequency of more effective coping strategies than non-effective coping strategies.
- 80.4% of the sample demonstrated average or higher levels of extraverted traits of personality, while only 18% indicated average or higher levels of neurotic traits of personality.

Social health

- 80% of all respondents reported a perceived high level of social functioning indicating the performance of normal social activities without interference due to physical or emotional problems.
- Overall two-thirds of all respondents reported moderate or higher levels of dissatisfaction with the time available for social tasks and domestic activities.
- Moderate scores of work-family strain and gain were equally reported among respondents with 59% 'agreeing' that their job has both a negative as well as positive effect on their family.
- 23% of respondents 'strongly agree' that their job has negative effects on their family. In contrast, only 13% 'strongly agree' that their job has positive effects on their family.
- A high level of perceived work-parenting gain was reported with 71.0% of respondents 'agreeing' that work has a positive effect on self.
- Family-work strain means increased as hours of work increased.
- Overall respondents reported moderate levels of family and work support being available to them.
- Workers reported higher levels of support being available from family and friends than work supervisors and colleagues.

- The amount of perceived social support being available to them from both work and home did not vary as a function of the number of hours worked

Individual differences

Health behaviours

- Less than a third (29.4%) of respondents reported sufficient levels of physical activity.
- 49% of respondents reported participating in moderate or vigorous levels of physical activity three or more times per week. In contrast, more than half (51%) of all male respondents exercise less than three times a week.
- One hundred and sixty one (32%) of the 510 males smoked.
- Permanent day workers smoked fewer cigarettes than shift workers.
- Four hundred and ninety two (96.5%) men reported drinking alcohol with 25% drinking more than 4 standard drinks in one sitting and 9% drinking 5 or more standard drinks in a single sitting (daily basis).
- 16.4% of the respondents were classified as being at risk of harm (risk and high risk) from alcohol in the short term and 32.8% of the respondents as being at risk of harm from alcohol in the long term.
- The majority of respondents (96.7%) in this study reported consuming caffeinated beverages.
- 16% of those surveyed reported consuming the minimum equivalent of 5 cups per day of products containing caffeine.

Attitudes to work (Job characteristics)

- 73.7% of all male respondents were 'satisfied' with their job.
- 39.0% of all male respondents 'agreed' with the statement, "I frequently think of quitting (their job)".
- High level of perceived job security was reported.
- Low levels of perceived job stress reported.
- A perceived high level for fairness of pay was reported.
- A moderate level of perceived autonomy was reported.
- A high level of perceived skills utilisation was reported.

Interrelationships between health measures

There were several intercorrelations of statistical significance found between the health measures, individual differences and work practices suggesting a complex interaction between work practices and general, psychological, and social health of male mine workers.

Psychosocial Health and Wellbeing Survey by three groups: Occupation, Employment and LDC status

General health

- Overall, professional and unskilled workers, as well as principal and mine site based employees are more likely to report better 'general health' than their counterpart groups.
- 50.4% of all professional and skilled workers reported being 'too heavy' compared to 49.0% skilled and 37.2% unskilled workers.
- 57.9% of all unskilled workers compared to professional (46.2%) and skilled workers (42.6%) reported being 'about the right weight'.
- Professional and unskilled groups, as well as principal and mine-site based employees are more likely to perform all types of physical activities including physically demanding tasks with fewer limitations due to physical health than their counterpart groups.

Psychological health

- Professional and unskilled workers, as well as principal and mine site based employees are more likely to perform all types of activities with fewer limitations due to emotional health than their counterpart groups.
- Skilled and unskilled workers reported higher levels of sleep disturbance than professional workers.
- Mine-site based (FIFO) workers experienced higher levels of sleep disturbance than local residentially based workers.
- Skilled workers experienced lower levels of chronic fatigue than professional and unskilled workers.
- Mine-site based workers reported the frequent use of more effective coping strategies compared with local residentially based workers. Positive coping styles: active coping; positive reframing and planning responses were used more frequently by mine-site based workers.

Social health

- Principal employees are more likely to perform normal social activities with less interference with work or other activities due to physical or emotional problems than primary contractor workers.
- Principal employees are more likely to be satisfied with the amount of time their job leaves for social and domestic activities than primary contractor workers.
- Professional workers, compared to skilled and unskilled workers, reported lower levels of interference with social activities as a result of their job.
- Local residentially based workers compared to mine-site based (FIFO) workers are more likely to experience less interference from their job to perform social and domestic activities such as participating in sporting activities, looking after children and going to the doctor.

- Primary contractor workers compared to principal employees reported significantly higher levels of interference with social activities as a result of their job requirements.
- Mine-site based workers are more likely to experience greater strain on the family as a result of their job than local residentially based workers.

Individual differences

Health behaviours

- Mine-site based workers are more likely to engage in sufficient levels of physical activity than local residentially based workers.
- 41.3% of skilled workers reported smoking as compared with 30.0% unskilled and 26.0% professional workers, respectively.
- Principal employees ($N = 304$) are much less likely to smoke cigarettes (24.7%) than primary contractor workers (41.7%, $N = 206$).
- Mine-site based employees ($N = 149$) were less likely to smoke (24.8%) than local residentially based workers (34.3%, $N = 361$).
- More skilled and unskilled workers (25.8%) than professional workers (16.6%) drink alcohol more than four days per week.
- Unskilled workers (16%) drink alcohol on a daily basis compared to skilled (9%) and professional (6%) workers.
- More skilled (48%) and unskilled (45%) compared to professional workers (32%) drink more than 4 standard drinks in one sitting.
- 10.1% of the professional workers compared to 25.2% of skilled and 17.4% unskilled workers were classified to be at risk of harm from alcohol in the short term.
- 16.6% of professional workers compared to 25.8% skilled and unskilled workers were classified as being at risk of harm from alcohol in the long term.
- 15.3% of the principal employees compared to 18.0% of primary contractor employees were classified as being at risk of harm from alcohol in the short term.
- In the long term, 19.4% of principal employees compared to 24.8% primary contractor employees were considered at risk of harm from alcohol.
- 18.6% of the residentially based employees compared to 11.1% of mine site based employees were classified as being at risk of harm (risk and high risk) from alcohol in the short term and 23.5% of residentially based employees compared to 16.7% mine site based employees as being at risk of harm from alcohol in the long term.

Attitudes to work (Job characteristics)

- Professional workers reported higher levels of job stress than skilled and unskilled workers.
- Professional workers also reported higher levels of autonomy and skills utilisation than unskilled and skilled workers.

Conclusions:

The findings indicate significant problems associated with the relationship between work practices and the status of male workers health. Moreover, stressors including 12 hour work days and shift work are associated with concerning levels of psychological distress, chronic fatigue and disruption with sleep, social and domestic life. Workers are meeting the demands of these stressors by having emotional and behavioural reactions. Emotional reactions include fatigue and psychological distress. Behavioural reactions include decreased physical activity, increased smoking, caffeine and alcohol consumption.

Local residentially based workers employed by principal employers who work permanent days involving less than 12 hours of work are more likely to report less negative symptoms affecting their general, psychological and social health status. Generally those employees working permanent days and less than 12 hours experience better health in terms of quality of sleep and social and domestic life than those who work more than 12 hours per day and perform shiftwork. Sleep patterns were highly compromised for shiftworkers as a function of working 12 hour shifts and the necessity to work and sleep at times incompatible with normal circadian rhythms. In addition, uneven work schedules appear to contribute to health problems affected by reduced sleep quality and quantity that in turn is associated with chronic fatigue and reduced general psychological health.

The effects of work practices have the potential to impoverish workers social and domestic lives. Work-family strain is evident among shiftworkers with some respondents reporting a lack of time and energy for family as a function of their job. The results show that many workers consider their hours of work and roster patterns not only contribute to disturbed sleep, but impact negatively on their social and domestic lives. The present study found that mine-site base (FIFO) workers experienced higher levels of disruption with social and domestic life than local residentially based workers. This finding is consistent with earlier studies that found social and domestic disruption experienced by long distance commuting workers and others was increased by intensive work schedules and long working hours.^{9,28,40} Thus the results suggest that sleep disturbance and chronic fatigue is multifactorial, involving a range of work and non-work related factors which exist within the context of a demanding work environment and a 24-hour industry. A combination of social, domestic and family circumstances, long distance commuting requirements and prior physical and psychological health problems may influence sleep disturbance and fatigue levels. Furthermore, recovery from fatigue may be influenced by other biological and environmental factors such as ageing, work demands and lifestyle behaviour.⁶

Lifestyle behaviour of male respondents differed according to the type of shift roster worked. Smoking and alcohol consumption was higher for shiftworkers than day workers. Lifestyle habits of male respondents differed according to LDC status with smoking, alcohol and caffeine consumption higher for local residentially based workers than mine site based workers. Compared to skilled and unskilled workers, professional workers (e.g., managers, supervisors and administration personnel) were more likely to be healthier in terms of lifestyle, quality of sleep, social and domestic satisfaction, work-family balance and fatigue.

In summary, these findings have illustrated a strong interrelationship between long hours, intensive shift rosters, work schedules, individual lifestyle and the incongruency with good health at an individual and family level. However, the relationship between work practices and the general, social and psychological health of male mine workers is complicated by a number of other work and non-work related factors, including behaviour (e.g., lifestyle practices), cognitive (e.g., attitudes, beliefs, knowledge, satisfaction, perceived needs) and socio-cultural (e.g., environmental, biological and personality).

Recommendations

The following recommendations are based on the salient issues arising from the current study but should only serve as a guide to both the organisation and the individual for further consideration of strategies designed to improve the health status of men in mining.

- *Seek feedback from stakeholders and the community* in respect to the findings of the study.
- *Re-examine current work practices* in terms of risk management considering fatigue and the design of shift rosters and work schedules.
- *Education in self-care.* Employers provide workers information on self-care relating to understanding and effectively coping with stressors associated with the demands and work practices involved in their job.
- Consider *adopting a 'person-environmental fit'* that focuses on the relationship between work demands and worker's capacity to cope with issues concerning their health.
- *Promote health enhancing behaviours.* Lifestyle factors including dietary, exercise, smoking and alcohol habits are implicated in the onset of coronary heart disease, which is the biggest killer of men in the Goldfields region.
- Further *encourage the use of healthcare services* in the Goldfields region.
- Consider the *introduction of lifestyle training.* Lifestyle training reduces absenteeism and turnover rates. Tailor interventions that motivate and encourage action favourable behavioural change, oriented at improving the overall physical and psychological health of men in mining.
- *Improve implementation of stress and fatigue management procedures.* Workers experiencing chronic sleep and fatigue problems should consult their doctor for assessment of possible circadian rhythm disorders and other sleep problems such as insomnia; sleep apnoea, narcolepsy, gastrointestinal and leg twitching problems.
- Mining organisations should consider the *introduction of workplace wellness (fitness) programs* aimed at improving the overall level of fitness of the workforce.
- *Promote Employee Assistance Programs* among mine workers and their families and implement strategies to encourage greater access to these programs.