

Literature review:

Review of health status and labour force
productivity and participation data
with regard to chronic disease

Su Gruszin
Fearnley Szuster

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Su Gruszin
Fearnley Szuster
Public Health Information Development Unit
The University of Adelaide.
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Preface

This literature review was produced in 2008 for the Australian Government Department of Health and Ageing and is made available with their permission. A few changes have been made to bring information up to date, principally in relation to descriptions of the Australian Bureau of Statistics surveys that feature in the text.

The authors acknowledge the kindness of Professor Juhani Imarinen of the Finnish Institute of Occupational Health, Department of Physiology for permission to reproduce the diagram on the 'Concept of work ability' which appears as Figure 2 on page 39.

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1 Background and context

The Council of Australian Governments (COAG) has identified the need for a new national reform agenda policy framework with reform objectives to:

- boost productivity, and
- boost labour force participation.^{1:14}

Lifting labour force participation, especially for older workers, and reducing the numbers of people who are out of the labour force because of illness or injury need to be addressed in the context of Australia's rising dependency ratios. Dependency ratios rise as the proportion of the population that is of working or productive age decreases relative to those who are dependent (i.e. not of working or productive age).¹ In addition concerns have been expressed that major changes in contemporary work practices are creating increasing pressures on working life and on the balance between work and life.²⁻⁵

Human capital outcomes, participation and productivity

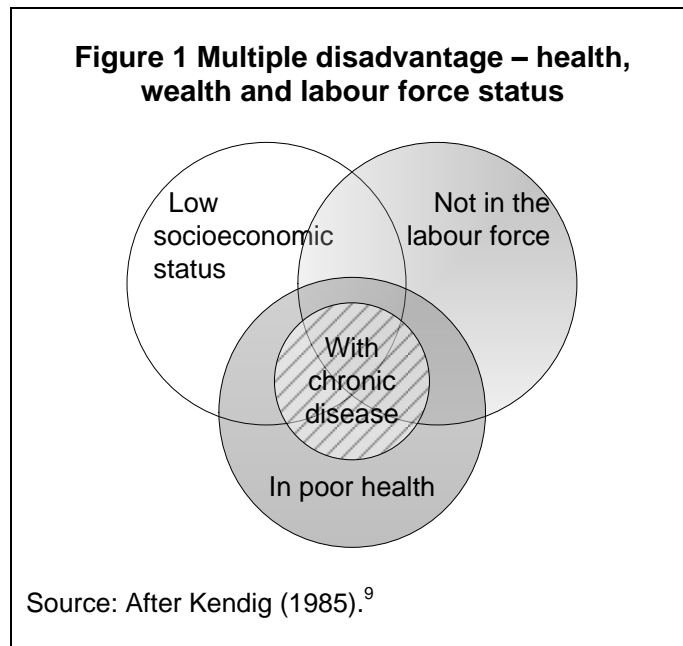
Evidence shows that a healthy, skilled and motivated population is important to both workforce participation and productivity. By achieving better outcomes in health, education and training, and work incentives, GDP will be increased over the long-run, generating a fiscal dividend that could be reinvested in further advances in workforce skills and public health.

COAG. Human capital reform: report by the COAG National Reform Initiative Working Group. Canberra: COAG, 2006, p. 14.

A rise in the incidence and prevalence of chronic diseases implies a greater need for a productive health workforce to treat and prevent both the diseases and their secondary consequences. Although many factors that contribute to the development of various chronic diseases can be prevented, ageing is a non-preventable risk factor. Anticipated population ageing, and the inevitable increase in age-related chronic disease and disability are expected to affect both the demand for, and supply of the health workforce, as well as the labour force more generally.^{6,7} Population ageing, rising dependency ratios and a tightening labour market make it important to attract and retain people in the labour force and to increase their productivity. An additional approach is to focus on the prevention and/or postponement of preventable chronic diseases and their associated risk factors.⁸

The term 'triple jeopardy' was used by Kendig in 1985 to describe the triple disadvantage of older people who had a disability, low income (i.e. a pension), and lived on their own.⁹ Those people whose socio-economic status is low, who are not in the labour force, and whose health is poor, including those who are affected by chronic disease, suffer similar triple disadvantage (**Error! Reference source not found.**).

¹ The population that is of working or productive age is typically described as those people who are of ages 15 to 64 years. Those people who are less than 15 years old, and/or, 65 years and over, are described as not of working or productive age.



Of course, not all people who are affected by poor health and chronic disease are of low socioeconomic status or excluded from the labour force. In addition to the need to increase labour supply, however, there are good equity reasons for prioritising measures that could engage those in this group. The emphasis needs to be twofold: firstly, on assisting people who are multiply disadvantaged into the labour force where possible; and secondly, enabling and assisting those who are in the labour force – including people with chronic diseases – to remain in the labour force and to work more productively.

The aim of this literature review was to identify and draw out the policy implications of studies that contributed potential ways and means of addressing the objectives of lifting labour force productivity and participation with regard to chronic disease.

The following specific chronic diseases were identified as in scope for this review:

- asthma;
- cancer;
- diabetes;
- heart, stroke and vascular disease;
- osteoarthritis, rheumatoid arthritis and osteoporosis;¹⁰ and
- mental health conditions.

2 Overview

At a broad conceptual level, theories suggest that better health improves economic outcomes and that conversely, poorer health is likely to be associated with diminished economic outcomes (including, for instance, reduced labour supply and productivity) whatever the cause, but especially in the case of chronic – rather than acute – diseases and conditions.^{11,12} Although the relationship between unemployment and health is complex and varies for different population groups, there is consistent evidence that unemployment is associated with adverse health outcomes and has a direct effect on physical and mental health over and above the effects of socio-economic status, poverty, health-related risk factors or prior ill-health.^{11,13} Health may be affected by the consequences of employment (e.g., toxic exposures to elements such as asbestos, lead and chemicals) but this affect is generally overlooked in studies of the health and labour force effect of chronic diseases.¹⁴ There is, however, a set of readings in relation to work-caused or -exacerbated asthma¹⁵⁻¹⁷, a few in relation to other specific exposures¹⁸⁻²⁰, and others – mainly derived from retrospective analysis of cancer registry data – on a range of occupational exposures that may elevate the risks of specific cancers.²¹⁻²³

The review searched international literature for peer-refereed articles that addressed the research task, namely a review of health status and labour force productivity and participation data with regard to chronic disease. Further information on the methods used is in Appendix A.

The majority of the studies identified were dated within the last five years. Details of approximately 360 studies from 1996 to date, of varying relevance (more-less) were extracted and briefly reviewed. A total of 70, deemed to be of high relevance, were examined in detail for further information.

The level of analysis and methods used in the studies ranged from simple reports of population prevalence from analysis of cross-sectional surveys (one-offs and series) to multivariate analyses of large samples. They ranged from the effect of unemployment or employment on health and conversely the effect of health on unemployment and employment; as well as the ameliorating effect of employment on 'life stress and strain' (e.g., associated with caring for chronically ill children and others).

2.1 Major issues and areas of concern identified

Studies reviewed and analysed addressed a range of major issues and areas of concern. These are reported below, grouped by their relevance to adults, children, interventions, employer and manager beliefs, and finally, the remaining other issues. Table 1 on page 5 provides definitions of labour force and work-related terms that are used in the text.

Adults:

- impact of health on labour force participation, productivity, employment type (e.g., full-time, part-time, see working definitions in Table 1), and employment transitions (e.g., early retirement);
- impact of chronic diseases and conditions overall, as well as chronic illness, on labour force participation and productivity, employment type and transitions, and costs (direct and indirect);
- impact of specific chronic diseases and/or their risk factors on labour force participation and productivity, employment type, transitions, and costs;
- impact of mental health generally (i.e. in addition to the impact of specific mental health conditions) on work;

- impact of work and competing demands (e.g., family management, caring for children and others) on mental health; and
- impact of ageing on labour force participation and productivity.

Children:

- impact of children with poor health, chronic disease and/or disability on parental employment type, participation and productivity; and
- impact of parental work and health-related practices and family type on children's health (including impact of non-standard work, psychiatric conditions, domestic violence and abuse).

Interventions:

- impact and effectiveness of work-based interventions, such as health promotion programs offered at work or in the community, on workers' health and health-related risks;
- use of worksites as settings to offer or incorporate general public health interventions (e.g., screening, vaccinations);
- measures that workplaces can implement to assist and maintain employees who are coping with chronic diseases;
- impact on productivity at work of community-based interventions; and
- limitations on the impact of the interventions due to changes in the organisation of work and rises in work-related illnesses and job strain, and the need for more comprehensive approaches that incorporate structural changes in work organisation.

Employer and manager beliefs:

- employer and manager attitudes and beliefs on the health and ageing of workers and their impact on employees, including those coping with chronic illness and specified chronic diseases (e.g., asthma, diabetes, cancer survivors).

Other:

- measurement of health-affected productivity and productivity loss (see definitions below);
- methods for estimating the economic benefit of occupational health, pharmaceutical, treatment, and other interventions to increase productivity or reduce productivity loss;
- changes in the nature of work over time and possible longer-term consequences (e.g., work-related illnesses and job strain arising from the post-industrialisation or globalisation '24-hour economy'); and
- consequences of 'economic rationalism' and some downsides of the focus on **productivity**.

Table 1: Definitions of labour force and work-related terms

Term	Definition
Ageing workers	Workers aged 50 years and over.
Employment status/ type	Full-time, part-time, casual, permanent, contractor, sole trader, etc.; may include secure/ insecure dichotomies.
Employment transitions	Changes in employment status, e.g., retirement from work, leaving work to study and vice versa.
Employment/ working conditions	Actual conditions at work, can include e.g., exposure to bullying, chemicals or toxins, shift work, dust, air-conditioning, high temperatures, and other work environment characteristics.
Non-standard hours/ times/ work	Working outside the 9 am to 5 pm 'norm', e.g., working long hours, evenings, nights or on weekends; includes shift work.
Participation	Labour force participation by the economically active, i.e., those who are employed or who are unemployed and looking for work.
Productivity loss	Broad concept that can incorporate: absenteeism – time away from work (e.g., short-term sick leave); presenteeism – productivity loss while at work (e.g., when employees perform below par because of illness); and work limitations/ disability.
Work limitations/ disability	Limitation/s on the amount or type of work that can be performed due to health-related disability.

2.2 Research approaches, data sources and study types

The different research approaches that have been taken by the studies reviewed can be categorised according to their data sources. These include:

- studies using cross-sectional national health survey, pooled or unpooled, data;
- studies using panel or longitudinal data, such as medical expenditure panels, longitudinal health studies;
- studies using company-based administrative data – which mainly use some measure of productivity (e.g., sickness absence), often in comparison with health-related treatment costs;
- studies using managed health care funds' billing and related administrative data (mainly in the US); and
- special studies set up to examine specific elements of health-related or health-affected labour force or economic activity, including labour force ageing.

Overall, there was a lack of Australian material published in the peer-reviewed journals. The majority of relevant Australian material was contained in research and special purpose reports, working papers or studies emanating from research institutions or academic centres, and was mainly derived from national longitudinal studies (the Household, Income and Labour Dynamics in Australia [HILDA] Survey, the Australian Longitudinal Study on Women's Health [ALSWH]) and/or single year or pooled data from the Australian Bureau of Statistics' (ABS) cross-sectional survey programs, for example, the National Health Survey (NHS), the Survey of Ageing, Disability and Carers (SDAC), the General Social Survey (GSS) or the National Survey of Mental Health and Wellbeing (SMHWB).

No studies were identified that drew on data from the ABS Census of Population and Housing, or the Household Expenditure or Monthly Labour Force Surveys, presumably because they lack any detailed information on health including chronic diseases. A few specialist (non-national) data collections were used as the source data for studies.

Cai and Kalb, writing in 2004, noted that although overseas literature on the effect of health on labour force participation was relatively extensive, particularly in the US where studies had been 'motivated' by the early retirement of older males, and the negative relationship between health and age, Australian literature, and literature on the Australian context in general, was scarce.^{24:2} Their analysis of data from the HILDA Survey found, unsurprisingly, that better health increased the probability of labour force participation for all of the four age-sex groups examined (males and females of ages 15-49 and 50-64 years).^{24:20} Korda and colleagues, writing in 2002, drew attention to the comparatively poor documentation on the health of the Australian working-age population, noting that, although the health of the workforce was essential to national productivity, data on it was not routinely collated and published (unlike data on other aspects of the labour force, or the health of the whole population).¹⁴

There were also few studies of Australian workplace interventions, employer or manager beliefs, and very few on the costs to employers (which were also more likely to be looked at generally, e.g., as part of the indirect costs of diabetes, rather than studied specifically). Studies on the costs to employers appear to be more usual in the US context although there were also a few from the UK and European countries. Cost studies in Australia were more basic and related to population and chronic diseases (e.g., prevalence and overall cost of diabetes) whereas US studies were more likely to cost interventions - especially pharmaceutical treatments and workplace occupational health, health promotion and disease management programs. It should be noted that the managed care environment in the US is more conducive to this sort of study with the availability of related administrative and billing data (e.g., from large corporations and health management plans). However, problems of data quality (appropriateness, reliability, relevance), and issues to do with the lack of repeatability - or the lack of standard ways to generate and compare results - persist.

3 General findings

The general findings of the literature review are reported in the following sections. These include findings on: interventions to increase labour force participation and productivity; actions that could be taken by different sectors, such as employers and health care professionals, to assist people with chronic disease to remain in or re-enter the work force; areas that would benefit from policy attention and further research; and, finally, information on aspects of general and specific industries and occupations, such as manager beliefs and attitudes, policy changes, the impact of caring, costs, measures, and the need for more information.

3.1 Interventions

In Australia, although providing no new evidence on the cost effectiveness of measures to reduce the prevalence of chronic disease, a 2008 study by Harris illustrated that the effective implementation of chronic disease prevention programs could have a significant effect on the stock of human capital, especially that portion aged 55 years and over for which the risk of chronic disease and potential economic loss is highest.¹² The study estimated the influence of clinically diagnosed diabetes and cardiovascular disease on labour supply in men and women aged 25 years and over (data from the 1999-2000 AusDiab survey including biomedical measures; n=11,247 aged ≥25 years, 55.3% of total respondents).²⁵² Clinically confirmed diabetes and cardiovascular disease, were each found in 8% of men and in slightly lower proportions in women (6.9% and 7.0% respectively). Prevalence rose with age: 16.6% of men and 9.5% of women aged 55-64 years had clinically confirmed diabetes, while 13.6 % of men and 5.3% of women in this age range had cardiovascular disease.

A review of the usefulness of disease management approaches for corporate-sponsored programs in the US drew attention to the small number of studies that had demonstrated the impact of employee health on worker productivity (absenteeism and presenteeism).²⁷ These included studies on the role of health risk factors and disease on worker productivity, the association of health risks with workers' compensation costs, and the influence of participation in a worksite health promotion program on disability days.²⁸⁻³⁰

Studies on the impact of chronic illness on work performance identified the need for interventions that assist individuals to effectively manage their illness and work to prevent serious repercussions (e.g., illness exacerbation). Health care professionals and employers can assist in improving the wellbeing of workers with chronic illness by supporting and facilitating their efforts to overcome health-related limitations at work.³¹ The design and implementation of appropriate intervention strategies is likely to promote employees' physical and psychological wellbeing as well as preventing concurrent psychological morbidity.

Various evaluation studies reported on the work productivity outcomes of health-related interventions both on- and off-worksites mostly assessing impact on stress, 'psychosocial' work ability, fitness, sleep disruptions and fatigue.³² Others reported on behavioural changes to reduce risk factors (or the intention to do so) after health promotion campaigns without assessing specific work gains.³³⁻³⁵ Most assessed reported outcomes at relatively short time periods (e.g., one year). The Coalfields Healthy Heartbeat program, a ten year community-based intervention in the NSW coalfields was an exception in its duration.³⁶ Evaluated outcome data showed a significantly

² The measured prevalence of hypertension was 29.4% in men and 27.6% in women; 'abnormal or treated' cholesterol was 70.3% in men and 61.2% in women.²⁵ Note, however, that the AusDiab survey comprised an older, more highly educated group than the population average (the so-called 'worried well' or "worried wealthy"^{26:1612}).

larger reduction in case fatality for coalfields men (although nonfatal heart attacks did not decline) while changes in risk factors levels were comparable with surrounding areas apart from the high levels of smoking that did not decline.³⁶

In relation to occupational and work-related stress, some study authors argued for individual treatment-based interventions while others argued for workplace interventions (e.g., job redesign).^{30,37-39} Those sceptical of both can also be found.⁴⁰ Tennant discussed the usefulness of the different types of workplace stress interventions identified, distinguishing between:

- primary interventions: organisational and/or structural change, which aims to reduce the presence of stressors – least often employed;
- secondary interventions: stress management or coping strategies, helping individuals to minimise the negative effects of exposure to work-related stressors – most often employed, presumably because they can be easily and discretely purchased; and
- tertiary interventions: interventions targeting those workers who are actually stressed and/or assessed as at-risk (e.g., counselling, helping identified individuals to minimise negative effects).^{2,40}

Tennant's review found limited evidence that primary organisational interventions had significant mental health benefit (there were few compelling cases) while secondary and tertiary interventions appeared to have positive but short-lived effects (typically three months) the impact of which might have been due to other, non-occupational, causes.²

More recent material suggests that a comprehensive approach which addresses both the organisational origins of stress at work, as well as individual employee symptoms is the most useful way to approach occupational stress.^{41,42} Couser, in a 2008 review, suggested that comprehensive strategies to prevent depression in the workplace would include:

- developing individual resilience;
- screening high-risk individuals to reduce risk;
- improving organisational literacy; and
- integrating workplace and health care systems for accessing proactive quality interventions.⁴³

As well as changing the individual and the organisation, changing team behaviour has been identified as a workable approach.⁴⁴ Two studies identified the positive impact on job performance and stress reduction of weekend and/or leisure respites from demanding jobs (e.g., emergency services such as police and ambulance). The presence of non-work hassles, absence of positive work reflection and low social activity during weekend were found to predict burnout and poor general wellbeing after weekends⁴⁵, while relaxing leisure was found to be the strongest positive predictor of coping with stress, and social and cultural leisure significantly predicted greater mental or physical health.⁴⁶

3.1.1 Interventions to reduce burnout

The two main approaches to intervention programs to reduce burnout and/or its impact have been either changing the organisation or changing individual employees.^{44,47} Similar to the case for work-related stress, most burnout interventions have focused on the individual employee, contra to the majority of the research which identifies work-related organisational factors as a more important cause.^{40,48} The interventions mostly consist of assistance to individual workers to develop coping skills to deal with the stress that leads to burnout. Although evaluations have yielded mixed results, some strategies have proved effective, for example, training in cognitive and behavioural strategies appears to reduce the emotional exhaustion component of burnout.⁴⁸

An unusual quasi-experimental study among staff of 29 oncology wards in 14 hospitals in the Netherlands evaluated the effects of a team-based burnout intervention program combining a staff support group with a participatory action research approach.⁴⁴ The staff were care providers (physicians, nurses, and radiotherapy assistants) working in a team in direct care for oncology patients. The results showed that staff in the experimental wards experienced significantly less emotional exhaustion directly after the program ended and 6 months later, compared with the control wards. Moreover, changes in burnout levels were significantly related to changes in the perception of job characteristics over time.

These findings in relation to team work are in line with recommendations by reviewers focussing on improving critical care, that conclude that improved teamwork – along with increased clinical exposure, and learned systematic responses – may result in both reduced stress and improved care.⁴⁹

Medical treatment effects on work time lost and related productivity loss (e.g., work cutback or restrictions in usual activities) have also been studied, with productivity loss suggested as a more sensitive measure of work impairment in those with mental disorders.^{50,51}

3.2 Actions that could be taken by different sectors

This review identified a variety of positive actions that could be taken by employers and health care professionals to assist people with chronic disease to remain in or re-enter the work force, which are listed below. The section closes with a range of interventions that could improve the working conditions of health care professionals specifically, which mainly address occupational stress and burnout.

Employer' actions and interventions:

- provision of workplace health promotion and wellness programs⁵²;
- employer policies on disclosing illness that are clear and supportive, and that aim to reduce the health-related distress of workers with chronic illness. These could include policies on disclosure of chronic illness related medication-taking, safe medication storage facilities and other measures to increase medication compliance of employees coping with chronic illness at work^{31,53,54};
- employer recognition of the need of employees managing a chronic illness for short spells of absence, to reduce health-related distress and subsequent longer long-term absence³¹;
- line manager training in appropriate work adjustments and job accommodations for those managing chronic illness^{31,55};
- awareness of the extent to which mental health conditions affect employees and effective work place interventions (e.g., mental health risk reduction), with treatment targeted at those with affective and anxiety disorders, especially when they co-occur^{50,51,56-58};
- development of workplace policies for the retention of employed carers^{59,60};
- implementation of strategies to enable older workers to continue working in a healthy and productive manner, based on greater understanding of the match between the workplace and physiological and psychological changes characteristic of older workers⁶¹;
- developing a more preventive and proactive approach to health management, consistent with the needs of older workers⁶¹; and
- other possible strategies advanced in the US context for companies to recover or reduce presenteeism costs included: providing paid sick days, improving co-payments for

medical visits and medicines, allowing carry-over of sick days, and providing free medicines (e.g., flu vaccines).⁵² These strategies were designed to keep workers healthier through prevention and treatment.

Health care professionals' actions and interventions:

- improving clinicians' and health care professionals' awareness of employment issues and employment-related concerns of people coping with chronic illness;
- development of targeted treatments and illness self-management skills that are appropriate to workplace settings and that assist people coping with chronic illness to maintain work productivity and reduce associated psychological distress^{31,62,63};
- development and application of tools for recognising employees at risk for chronic depression;⁶⁴
- establishing and assisting with realistic employment goals prior to surgery (e.g., for heart transplant patients);⁶⁵
- urgent need for better public health and medical interventions to prevent and treat diabetes^{62,66};
- further research on the potential contribution of different treatment interventions to optimise workforce productivity for people with rheumatoid arthritis^{67,68};
- incorporating into medical assessments of workers:
 - (1) occupational histories (e.g., to ascertain cumulative exposures), and
 - (2) evaluation of psychological and sleep disorders, especially of shift workers, and in older workers^{61,69}; and
- implementing a more holistic approach to health care, including measures to promote work ability among older workers.⁶¹

Interventions to improve the working conditions of health care professionals:

[The following mainly relate to occupational stress and burnout]

- reductions in the administrative and bureaucratic workload across the health sector⁷⁰;
- improving the working conditions in primary care and further research to determine the effect of any changes⁷¹;
- strategies to manage or prevent stress in metropolitan GPs including the use of remuneration policies to influence GP work rate⁷²;
- programs to reduce the rate of psychological morbidity and burnout specifically during internship; in oncology care providers; and generally in health care professionals^{44,73};
- continuing need for flexibility in workplace and training environments for women in medicine to ensure equal career choice, a reasonable or healthy balance between work and domestic commitments, and professional satisfaction⁷⁴; and
- attention to workplace safety in health care establishments.⁷⁵

3.3 Areas for policy and research attention

Areas that could benefit from policy attention and further research that were identified in the review are as follows.

Policy attention:

- better documentation on the health of the labour force; and on the impact of workforce casualisation (especially on lower skilled workers, including lack of access to sick leave) and the effects of casualisation on the health of both sick workers and their colleagues, and on occupational inequalities¹⁴;
- improving general population literacy and health literacy skills that are needed to learn, understand, and implement effective self-management of chronic conditions⁷⁶;
- umbrella policies that will encourage self-disclosure of chronic conditions to managers and employers (i.e. without exposing individuals to unfair penalty or mistreatment at work, similar to HIV/AIDS policies)⁷⁷;
- strategies to improve working environments in order to keep workers mentally healthy and productive⁷⁸;
- health policies in relation to children with chronic health problems, to address both issues of associated financial burden, and the labour force participation of caretakers⁷⁹;
- development of workplace policies for employed carers and provision of greater access to formal (i.e. paid) care for 'intensive' carers (those whose carer commitments are intense) who are most at risk of withdrawing from the labour force^{59,60};
- interventions to minimise the psychological distress associated with employment transitions which could include increasing social support to new mothers, those who stay at home with their children, and other carers⁸⁰;
- early identification and intervention programs for those carers most at-risk of psychological distress, together with more effective carer support, targeted resources and monitoring^{80,81};
- design and implementation of improved assessment, referral, and service provision to support women in meeting the challenges of the transition from welfare to work⁸²;
- more understanding and better assistance to income support recipients with mental health problems – an issue with relevance beyond the health portfolio and implications for many social policy and service delivery domains (e.g., welfare reform and tailoring a more active welfare system)⁸³;
- strategies to prevent, reduce or better manage occupational stress in health care professionals including: reductions in the administrative and bureaucratic workload across the health sector⁷⁰; and use of remuneration policies to influence work rates (e.g., of GPs⁷²);
- review the extent to which current regulations provide protection to prevent morbidity in older workers, and to protect those older workers who stay in the workforce⁶¹;
- interventions that address the impact of chronic disease at a population level which take into account the socio-economic inequalities in the prevalence of chronic diseases; although rates are highest at older ages, the development of risk factors for many chronic diseases occurs early in life, and health inequities should therefore be addressed across the life course⁸⁴;
- implement a policy watch on: long working hours and possible actions to prevent health impairment due to overwork (karōshi)^{5,85,86};

- better policies to improve the labour market outcomes of people with disabilities that address the issues of getting people with disabilities into jobs, as well as improving outcomes for those already in jobs⁸⁷; and
- more effective strategies and interventions for the labour force of the future (i.e. an ageing labour force, with higher rates of chronic disease and related disability), such as rehabilitation while people are still employed to maximise outcomes, work adjustments to assist those with chronic conditions to remain in work, and better information on interventions likely to reduce premature work cessation.⁸⁸

Further research needs to:

- employ a more detailed classification of employment situation as studies show a graduation in health inequalities across different labour market groups within the employed and the unemployed^{89,90};
- examine the relations between various types of employment, especially to address precariousness, including casualisation, and health^{14,89,91,92};
- use standardised definitions of types of under-employment and health-related outcomes, with stronger epidemiological designs and the inclusion of information on contextual socio-economic information (e.g., on social security systems and incapacity benefit schemes)⁹¹;
- distinguish between different aspects of employment security (e.g., contractual security and perceived security) in studies of labour market status and health as these are differentially associated with health; studies also need to control for health selection, which is unlikely to function in the same way in permanent and non-permanent employees⁹⁰;
- focus on the characteristics of working conditions, such as physical and mental work load, job latitude, social support and other factors, and identify different groups of older workers⁹³;
- investigate, in longitudinal studies, the impact of work-family conflict on employee mental health, together with important work environment characteristics^{92,94,95};
- longitudinal analyses are also needed to study 'uncrip' patterns of labour force departure that may be becoming increasing diverse and common (e.g., repeated labour force exits and entrances and/or combinations of retirement and work) ⁸⁸;
- further examine the consequences of the known high rates of psychological morbidity and burnout in health care professionals on the communities they serve (e.g., patients)⁷³;
- identify different types of burnout interventions as a priority, as there is empirical support for their effectiveness⁴⁴;
- determine effective interventions to reduce the socio-economic inequalities evident in prevalence rates of chronic disease and associated risk factors, and why other interventions have not had the desired impact, particularly for those who are from socio-economically disadvantaged areas⁸⁴;
- establish life span models of work design and management – as opposed to 'age-free' models; put more emphasis on contextual research and less on broad-brush, epidemiological models; and undertake more evaluated workplace interventions (and fewer cross-sectional studies)⁹⁶;
- pay more attention to the prevalence and consequences of long working hours, overwork (karōshi), shift work and other non-standard work times as well as identifying actions to prevent health impairment due to these causes^{5,85,86};

- push for the use of trichotomised (poor-good-excellent) rather than dichotomised (poor-excellent) self-rated health variables in analyses, as finer distinctions seem to be needed to reveal, for example, occupational gradients for women¹⁴; and
- investigate the nature and sources of barriers to employment by older persons with a disability, and especially those with mature-age disability onset.⁸⁷

3.4 Industries and occupations

A small number of studies reported on the effects of chronic disease in relation to specific industries and/or occupations. Few examined the effects of chronic disease on health care professionals. The major studies of health care professionals were in relation to occupational stress and are dealt with in more detail in *Section 6* of this report. A few studies investigated the impact of specific work-related exposures (e.g., in relation to refinery workers and cancers including mesothelioma^{19,20}), and another set studied work- caused, -related, or -exacerbated asthma.^{15,16}

A study by Leigh and colleagues ranked industries on the basis of estimated total costs, and the costs per worker, of occupational illness and injury, using fatal and nonfatal injury and illness data from the large data sets of the US Bureau of Labor Statistics onto which cost data were merged.⁷⁵ The following industries topped the ranking of average cost per worker: taxicabs, bituminous coal and lignite mining, logging, crushed stone, oil field services, water transportation services, sand and gravel, and trucking.

Those industries low on the cost-per-worker ranking included legal services, security brokers, mortgage bankers, security exchanges and union offices.⁷⁵ Industries that were high on the total-cost list were: trucking, eating and drinking places, hospitals, grocery stores, nursing homes, motor vehicles, and department stores. The authors noted that – to their surprise – two of the top five industries in the total cost per industry ranking were in the health sector: hospitals and nursing and personal care facilities. Neither appeared in the top of the average cost-per-worker list, but it was felt that as these industries were in the business of providing health care, they should have been near the bottom in generating occupational injuries and illnesses. The results clearly showed that the health care sector was not as safe as is generally assumed and were considered to support other findings on poor levels of patient safety in hospitals.

Section 6 of this report examines occupational stress in general and specifically in relation to health care professionals.

3.4.1 Manager beliefs

A group of studies reported on surveyed manager attitudes and beliefs, and those of certain health professionals, on the benefits of workplace health promotion and ‘wellness’ programs providing services such as: flu shots, weight-loss, physical activity, and fitness programs. Senior managers were less likely to see barriers than line managers, and more likely to be convinced of the benefits including cost-benefits to the employer.³⁸ Occupational health professionals saw themselves as supporting workers through services such as health examinations and counselling, and believed that the impacts of health promotion activities were better health, and improved productivity and job satisfaction.⁹⁷

A study of Australian ‘hiring decision-makers’ on their management attitudes towards ageing workers confirmed that age discrimination was correlated with hiring decisions.⁹⁸ Ageing workers were stereotyped as inferior to younger workers in: trainability, adaptability, creativity, and interest in new technology.

3.4.2 Policy changes

Among the studies located there were none that deliberately studied the effects of policy changes on labour force participation and productivity in relation to chronic disease (with the exception of those that examined the effects of changes in workplace smoking policies^{99,100}). One panel study over eight years in Belgium (1992-2000) did, coincidentally, show a double-edged sword effect of government policies that encouraged early retirement (to remove older workers from a high unemployment labour market). These changes appeared to have had a positive effect on the life satisfaction and mental health of older 'pre-retiree' workers, unemployed people, and those not in the labour force, but a negative effect on older workers who remained in the labour force.⁹³ The study noted diminished subjective wellbeing in older workers in 2000 compared with 1992, and questioned whether this reflected a deterioration in working conditions over the period. There have been similar findings for other European countries.¹⁰¹ It was suggested that further research should focus on:

- (1) the differences between different groups of older workers; and
- (2) the characteristics of working conditions, such as physical and mental work load, job latitude, social support and other factors.

A US study found that the poor health status of women and/or their children placed low-income single mothers at significant risk of job loss, after changes in welfare policy had made many single mothers living in poverty dependent on work as their only income source.¹⁰² Policies to help reduce job loss as a consequence of family health were found to have a positive impact. Other studies examined transitions between welfare or social security payments and work and vice versa, however, rarely in the context of policy changes.^{82,102}

Successive cohorts of women have been found to have higher propensities to work throughout their lives than did their predecessors.¹⁰³ Among the compositional changes, the strong rise in women's educational attainments and the large decline in fertility have both exerted substantial influences on elevating women's labour force participation and their hours worked.

3.4.3 Impact of children's poor health and chronic conditions on parental employment

Having a child with poor health was associated with reduced parental employment in both mothers and fathers¹⁰⁴, in single parents of young children with asthma¹⁰⁵, and in carers of children with inadequately controlled asthma.¹⁰⁶ Poor child health may be a direct cause of reductions in parental labour force participation.¹⁰⁴

Caring for a child with a chronic illness or disability who is assisted by technology acts as a barrier to maternal employment.⁷⁹ The tendency is for these children to live longer now than in the past, and to be able to return home from hospital, or to remain at home, where their care needs can be substantial. Lack of family support and child care services increased the likelihood that mothers of children with chronic illness or disability would remain out of the labour force. Conversely, mothers who remained employed buffered the negative effects on maternal mental health of caring for children with chronic illness or disability at home.⁷⁹

A UK study examining the effects of transitions to and from employment found that starting maternity leave, and staying home to look after the family, were both associated with psychological distress in women.⁸⁰ Transitions from these roles to formal employment resulted in an improvement in women's mental health.

Health policies in relation to children and especially children with chronic health problems need to address the issues of associated financial burden and the labour force participation of their carers.⁷⁹

3.4.4 Impact of parental employment and stress on children

With the development of 'around-the-clock economies' and 'dual-earner' or 'working families' becoming the norm, many more children now live in households where one or both parents work non-standard times (i.e. evenings, nights or on weekends). A Canadian study examining child wellbeing in dual-earner families found that one or both parents worked non-standard times in nearly 75% of dual-earner families (using 1996-97 data from the Canadian National Longitudinal Survey of Children and Youth).¹⁰⁷ There were associations between children's wellbeing and parental work schedules, with higher odds ratios for child difficulties (e.g., hyperactivity-inattention, aggression, emotional disorder-anxiety) when parents worked non-standard times. These associations persisted after adjusting for potential confounders (e.g., socio-economic status, parental part- or full-time work, and childcare use) and were evident whether mothers, fathers or both parents worked non-standard times. The authors noted that jobs were usually designed as if workers had no caring responsibilities, and that there was increasing pressure on family life with the requirement to 'work around-the-clock'.^{107:1525}

Further research on the ways in which non-standard work times are linked to outcomes for children was considered to be important.¹⁰⁷ Non-standard work may make family management harder, making it difficult or impossible to share meals and leisure, find child care, and integrate parental work schedules with children's needs and schedules. Working 'unsociable' hours may place additional strains on marital relationships, with associated fatigue, depression and negative emotions and consequent negative effects on children's wellbeing.¹⁰⁷ The authors highlighted the interconnections between family life, work and broader social and economic change, while noting that the discussion remains focused on issues such as *whether* mothers should work or stay at home to care for children, rather than debating the *nature* of work and the effects of changes in work on family life and on children.

Chronic family stress was associated with increased illnesses in children in a study that included objective biomedical measures of stress (natural killer cell cytotoxicity assays). Impaired parental functioning was advanced as the possible mechanism linking family stress with adverse effects on children's health.¹⁰⁸

3.4.5 Impact of caring

A systematic review of international research on the labour market choices of unpaid carers, found that:

- (1) generally, carers were equally as likely to be in the labour force as non-carers; however,
- (2) carers in the labour force were more likely to work fewer hours than non-carers, especially if their caring commitments were heavy; and
- (3) only those who were heavily involved in caring were significantly more likely to withdraw from the labour force than non-carers.⁵⁹

Policy action to provide greater access to formal (i.e. paid) care for 'intensive' carers who are in the labour force, and development of workplace policies for the retention of employed carers, were recommended.⁵⁹

A detailed study on employment transitions found significant levels of psychological distress among those people taking 'family leave' who had substantial caring responsibilities, such as looking after children, or spending more than 20 hours a week caring for a sick person.⁸⁰ These findings confirm those of other studies that have found poor psychological health in carers.^{60,109,110} Interventions to minimise the psychological distress associated with employment transitions were suggested, including increasing social support to those who depart or take leave from paid employment to care for children and others, as well as early identification and intervention of those carers most at-risk, and targeted resources and monitoring.^{80,81}

3.4.6 Characteristics of people not in, or likely to leave, the labour force

In Australia, Ciurej and Kumar described the characteristics of older people of working age (those aged 45-64 years) who were not in the labour force at the time of the ABS 2002 General Social Survey.¹¹¹ They were more likely to be older, female, have less satisfactory health, and lower levels of education, than those in the labour force. They were also more likely to have higher income, wealth, home-ownership, and lower financial and social stress, than their unemployed counterparts.

Also in Australia, Jose and colleagues found a strong association between labour force non-participation and long-term health conditions, risk factors and health-related actions.¹¹² Odds ratios suggested that men and women as they became older were more likely to leave the labour force due to long-term medical conditions and health risk factors. More than one third of working age males who were not employed gave illness or disability as their reason for leaving their last job, and the proportion rose from 29% of those aged 15 to 49 years, to 39% of those aged 50 to 64 years (data sourced from the HILDA Survey).²⁴ The proportions were lower in females (14% of those aged 15-49 years and 21% of those aged 50-60 years [different age group reflecting the younger age at which women qualified for the age pension]).

In the US, studies of welfare recipients and barriers to employment, such as mental health disorders, substance dependence, physical ill health or disability, and their co-occurrence with human capital problems (e.g., lack of, or limited education, skills or work experience), have found that women with co-occurring human capital, mental health, and physical health problems have the poorest work outcomes.⁸² About half of those women transitioning from welfare had one or more of these problems in a random sample from the Women's Employment Survey, a longitudinal study of low income women drawn from welfare rolls in Michigan in 1997 and re-interviewed in 1998.⁸²

Women with health limitations and mothers of children with health limitations were found to be at particularly high risk of losing their jobs in a US study examining the causes of job loss in former welfare recipients.¹⁰² In an Australian study, Butterworth found that mental illness was a significant issue among income support recipients, and a substantial barrier to work.⁸³

Box: Absenteeism and presenteeism

Absenteeism consists of days not at work, being late and taking excessively long breaks. In most studies it referred to paid and/or unpaid sick leave absences; some studies further categorised these as short (one or a few days) or long (some longer period). The cost of absenteeism is obvious: 100% of the worker's productivity is lost each day the worker is not on the job. Costs associated with the absenteeism of employees have been long studied.

Presenteeism is defined as lost productivity that occurs when employees come to work but perform below par due to any kind of illness. The cost of presenteeism is a more 'hidden' cost than the cost of absenteeism because the worker is on the job but is not accomplishing as much. The costs of presenteeism have only recently been studied.

Presenteeism can have large negative effects on company output and may denote hidden long-term costs and wider social problems that go beyond the enterprise. An employee who goes to work despite illness may operate at only a fraction of their normal capacity despite requiring the same expenditure in wages, social contributions and taxes as an employee operating at 100%. They may also be more likely to make mistakes. An employee who goes to work with a contagious disease (e.g., flu) may infect others, causing wider spread and increased deficits in work efficiency. Presenting at work when ill may also result in longer-term health issues.

Sources: Adapted from Levi-Epstein (2005); Goetzl and colleagues (2004).^{52,113}

3.4.7 Costs

In Australia, a Medibank Private commissioned study that estimated the economic cost of productivity losses due to workplace presenteeism ('being present at work but working at reduced capacity'^{114:211}, see box above), found that investments in interventions to improve functioning for workers with health conditions could have considerable positive impact on productivity improvements and macroeconomic aggregates.¹¹⁵

In the US policy context where only half of all workers have paid sick days for themselves, and even fewer can take paid leave to care for a sick child, research on presenteeism suggests that it is far more costly than absenteeism.⁵² This situation may also be developing in Australia, with the proportion of employees who are 'casuals' rising from 21% to 25% between 1992 and 2007.³ It has also been asserted that the trend in increasing casualisation is more common in lower skilled (blue collar) occupations; there is evidence that blue-collar workers report the worst health and that those reporting health problems were the least likely to take time off work.^{14:325}

Inability to access paid sick leave makes it harder for workers to recover from illnesses, further compounding health problems, and may partially explain the observed occupational gradient in health. US studies remarked that while many employers focused on the large and measurable direct costs of employee health care, they tended to ignore the impact of health on productivity. Yet studies of some chronic conditions and related health risk factors suggested that lost productivity (indirect) costs exceeded direct health care costs.^{113,121}

A 2004 US study found that presenteeism (indirect) costs were higher than direct medical costs in most cases, representing 18% to 60% of the total costs for ten chronic conditions.¹¹³ Note that although respiratory infections accounted for around one fifth of presenteeism costs (21%), this did not include the costs of others potentially infected. The economic output foregone in the US due to health-related productivity losses (defined as not working, sick days, and subpar productivity on the job due to health worries) was estimated at US\$260 billion for 2003, or approximately 2.4% of GDP (based on an analysis of 2003 Commonwealth Fund Biennial Health Insurance Survey data).^{114,122:4} By contrast, an Australian study estimated the direct costs of presenteeism to Australian employers at approximately 1.9% annually, leading to a long-term decrease in GDP of about 2.79% per year.¹¹⁵

A significant and growing body of work in this area is related in part to the need to justify and evaluate the benefits of occupational health services and other health- and wellbeing-related programs run by large companies and corporations.¹²³ A variety of measures of presenteeism were available and this number was growing. Many measures of presenteeism, however, were unvalidated – as opposed to measures of absenteeism.

The Netherlands has begun building a stakeholder consensus of employers, employees, policy makers, insurers, occupational health professionals, and researchers, on the most relevant data items from a company perspective, to estimate the costs of overall productivity loss consistently.¹²⁴ The three separately recognised forms of productivity loss or work loss are:

- (1) work presenteeism: decreased work performance while at work;
- (2) short-term absenteeism: absence of less than two weeks; and
- (3) long-term absenteeism: absence of more than two weeks.¹²⁴

³ The ABS currently defines casuals as "employees (excluding owner managers of incorporated enterprises) who are not entitled to paid sick leave and paid holiday leave".^{116:18} While this measure is widely used, and is considered a proxy measure for casual employment, it does have limitations. It does not fully capture the attributes typically associated with casual employment, such as precariousness of tenure and variability of hours and earnings. Further information about different measures of casual employment is in ABS (2008).¹¹⁹

The aim in the Netherlands is to standardise cost estimation to facilitate the comparability and usefulness of economic evaluations of occupational health interventions. Similar work in the US includes attempts to cost the contribution of presenteeism-lost productivity into the overall burden of disease estimate. Other studies are an attempt to cost employer responses to chronic disease (e.g., pharmaceutical interventions and other treatments). They include examples where employer investment in employee chronic disease treatments were estimated at less than the productivity lost to the company through untreated employees (i.e. treatment achieves a net benefit).¹²⁵⁻¹²⁷

Another growing body of work provides basic data on the costs of specific mental health conditions to workplaces in terms of productivity, and correspondingly identifies the monetary value in workplace-based preventive programs.^{56,128} The specific mental health conditions costed included depression, anxiety, and bipolar disorder.

Studies that costed multiple chronic diseases and/or conditions in the US, where employers frequently pay for health care, have found variously that: rheumatoid arthritis, depression, asthma (especially when included with rhinitis), cardiovascular and circulatory system diseases including hypertension, and diabetes were the most costly to employers.^{113,129} Chronic conditions with the highest productivity-related losses (costs of presenteeism were generally considered to dominate absenteeism costs) were: depression, asthma, and rheumatoid arthritis.

For example, one US study used retrospective administrative claims data from a large medical/absence database, combined with the findings of published productivity surveys, to generate metrics on the economic burden of ten chronic diseases (n=374,799 employees at 6 large corporations in 43 US States over the 3-year period 1997-1999).¹¹³ The chronic diseases examined were: allergy, arthritis, asthma, any cancer, depression/ sadness, diabetes, heart disease, hypertension, migraine/ headache; and respiratory infections.

The application of average impairment and prevalence estimates suggested that the overall economic burden of illness was highest for:

- hypertension (US\$392 per eligible employee per year);
- heart disease (US\$368);
- depression and other mental illnesses (US\$348); and
- arthritis (US\$327).¹¹³

Presenteeism costs were higher than medical costs in most cases, representing 18% (low end) to 60% (average) of total costs for the ten conditions. Approximately half of the costs associated with migraine/ headache and allergy resulted from presenteeism losses (low end estimates: 49% and 55%).¹¹³

Another study using the same data source to estimate medical expenditures, absenteeism, and short-term disability costs for workers with rheumatoid arthritis calculated the 12-month direct and indirect cost burden of a number of illnesses (n=32,916 employees of nine large US employers 1997-2002).¹²⁹ The comparative annual costs by disease were:

- renal failure (US\$18,296);
- rheumatoid arthritis (US\$11,120);
- heart disease (US\$4,653);
- bipolar disorder (US\$3,374);
- any cancer (US\$3,415);
- depression (US\$2,642);
- diabetes (US\$2,517);
- chronic obstructive pulmonary disease (US\$2,099);
- low back disorder (US\$1,703);
- hypertension (US\$1,174); and
- asthma (US\$945).

Only one of the studies located used objective (as opposed to self-report or administrative) assessments.¹²⁷ This study measured moment-in-time work performance in service workers and found that major depression was the only condition significantly related to decrements in productivity (presenteeism) when compared with allergies, arthritis, back pain, headaches, high blood pressure and asthma).

Studies used a range of different methods with which to calculate impact and were dominated by those from the US, possibly because the structure of US health care financing enables comparisons such as those in the cost-based studies reported above to be made relatively easily. Their conclusions should, however, be regarded with caution, as the data is mainly administrative, was gathered for other purposes, is subject to high variation (especially cost estimates), and data samples may be biased as the most severe cases may have retired already or have otherwise withdrawn from the labour force.^{113,129} Researchers were well aware of these limitations and have called for the standardisation of future research.¹¹³

In Australia, a 2007 Productivity Commission staff working paper reported on a study of the impact on labour force participation in relation to six chronic health conditions: cancer; cardiovascular disease; mental/ nervous condition; major injury; diabetes, and arthritis.¹³⁰ The authors concluded that averting a mental health or nervous condition had the largest positive impact on labour force participation.

A review of the economic evidence on the benefits of offering health coverage to workers (again in the US) to assist private employers and public officials make appropriate investments in health, found the evidence on health insurance inconclusive.¹³¹ A range of measurement issues were identified, including querying the relevance of 'societal costs' to employers for whom part of these costs are externalities.

3.4.8 Measures

Health-related productivity is increasingly recognised as a significant component of the burden of disease. Without reliable measures, this burden cannot be reliably assessed.¹³²

A small number of studies reviewed the various measures that had already been used to quantify health- or chronic illness-related productivity losses. Two reviews in 2004 identified a number of self-report productivity instruments that had been used to measure the impact of illness, and discussed their capacity to show the effect of medical treatment on productivity.^{132,133} Some general measures have also been adapted to specific diseases. For example, the Work Productivity and Activity Impairment Questionnaire (WPAI), which was the most frequently used instrument, has been modified to measure productivity reductions specifically associated with allergic rhinitis and gastro-oesophageal reflux disease, among others. Stakeholders have identified the need for better disease-specific productivity-related measures (similar to disease-tailored quality of life outcome measures) (e.g., in relation to arthritis^{28,55}).

A review with a somewhat different purpose (to clarify the return to employers and others of investments in health), noted that estimates of indirect costs were controversial, as there was no agreed way to value component costs (e.g., productivity loss due to poor health).¹³¹ A final review of instruments to measure productivity loss and associated costs found 27 instruments in use, few of which had been validated. The unvalidated instruments included all of those that attempted to monetarise productivity loss.¹¹⁴ Challenges in measuring presenteeism far exceeded those of measuring absenteeism as many jobs did not have easily measurable output.¹¹⁴ The greatest impediment to improving cost estimation was considered to be the lack of established and validated methods.

3.4.9 Need for more information

Australian studies, research, and basic documentation on the health of the Australian working-age population and the effect of health on labour force participation and productivity in the Australian context, was scarce, as has already been noted above and by commentators.^{14,24} Australia also lacked studies of workplace interventions, employer and manager beliefs, and analyses of the costs to employers of health-related participation and productivity losses and the corresponding benefits of workforce health-related investments.

A paper prepared by Segal as part of the Victorian response to the COAG Human Capital Reform Agenda identified the priorities for future research as being to:

- (1) estimate the level of expenditure on prevention variously by disease or health problem, modality, stage in disease progression, and population target; and
- (2) develop a research agenda on the determinants of health, the effect of interventions on health, downstream cost impacts and labour force participation and productivity.¹³⁴

The results of this literature review have shown that there is indeed much to be done in this area in Australia.

4 Impact of specific chronic diseases

In terms of the impact of specific chronic diseases on labour force participation and productivity, asthma, anxiety, depression, diabetes, and rheumatoid arthritis were those most often described as having substantial workplace effects and their impact specifically costed.¹³⁵ There were relatively few studies on cancer survival, heart disease, stroke, or on other mental health disorders that specifically related to labour force participation and productivity.

Impacts and issues that were studied in relation to specific chronic diseases included the following.

Asthma:

- impact of asthma and the treatment of asthma, on labour force participation, productivity, and indirect costs¹³⁶⁻¹⁴⁰;
- impact of childhood asthma on parental labour force participation and productivity¹⁰⁵;
- exacerbation of asthma by other risk factors, for example, obesity^{141,142};
- asthma that is caused by or exacerbated by work¹⁵⁻¹⁷: 25-34% of adult-onset asthma was attributed to workplace exposures in a US study¹⁴³, while in the UK, 26% of an estimated 3,903 new occupational disease cases in a clinically-based reporting scheme were of occupational asthma¹⁴⁴;
- need for studies to assess the economic burden and the cost-effectiveness of strategies to respond to, minimise harm from, and prevent, occupational asthma (including work-exacerbated asthma) in order to implement cost-effective prevention policies^{17,144,145};
- need for further studies, that include disease severity and health care use, to distinguish the consequences of work-exacerbated asthma from asthma unrelated to work, to determine whether the former is associated with higher rates of symptoms and disability¹⁴⁶;
- findings that poor longer-term asthma outcomes are associated with lower health literacy⁷⁶; and
- the need to take into account the socio-economic impact of work-exacerbated asthma.¹⁷

Diabetes:

- negative impact on labour force participation and productivity^{66,147-150};
- for instance, a longitudinal study (1992-1994) in the US found that among individuals with diabetes, the absolute probability of working was 4.4% less for women and 7.1% less for men relative to those without diabetes. Although change in hours worked per week was not statistically significantly associated with diabetes, women with diabetes had two additional work-loss days a year when compared with women without diabetes, and men and women with diabetes were more likely to have work limitations (5.4% and 6.0% more likely respectively [absolute increase])¹⁵⁰;
- in another example, a cohort study examining clinical predictors of work disability in working-age people with diabetes (n=1,642, excluding homemakers and retirees) found that 19% had significant work disability and 12% were unemployed.¹⁵¹ Of those who were employed, 7% had missed five days or more from work in the prior month, and 4% reported severe difficulties with work tasks. Diabetes complications predicted unemployment and overall work disability status: for those experiencing both three or more diabetes complications and major depression, 50% or more were unemployed; for those with significant work disability, half met the criteria for major or minor depression;

- need to address physical and psychological impairments in the management of work disability in diabetic patients¹⁵¹;
- population prevalence projections and associated economic costs (i.e. indirect costs related to work absence, early retirement, lost productivity etc.) are staggering in the US (with a prevalence similar to Australia)^{66,152};
- urgent need for better public health and medical interventions due especially to the high anticipated prevalence^{66,152}; and
- improved control and intensive management of the disease are likely to result in fewer complications and hence longer and more productive working lives.^{62,126,148}

Rheumatoid arthritis and osteoarthritis:

- significant associated costs, both direct and indirect: for example, job-related osteoarthritis costs were found to be as costly as all asthma costs.¹⁵³ After adjusting for prevalence, rheumatoid arthritis (RA) was the fourth most costly chronic condition per employee in the US (after heart disease, hypertension, and depression), and the 12-month total cost burden of RA illness was second only to chronic renal failure¹²⁹;
- worldwide prevalence of rheumatoid arthritis was approximately 0.5% to 1.0% in the adult population, with women affected about three times as often as men.¹⁵⁴ A US study showed that approximately 80% of patients with RA were aged between 25 to 55 years, that is, in their working prime.^{129,155}
- co-morbidities: on average, RA patients with established illness had two or more co-morbid conditions¹⁵⁶;
- RA is especially devastating when it strikes young; although there is hope for improved and earlier treatment, the time from diagnosis to significant disability remains short: with the time to a 50% probability of being work disabled varying, in one study, from 4.5 to 22 years²⁸;
- in Australia a detailed study of 497 people aged 18-65 years with RA (60.2% participation rate) found that 20% of those who were employed at the time they were diagnosed had ceased work within five years, and around 40% had ceased work by 20 years after diagnosis.⁶⁸ Among these, the mean duration from diagnosis to work cessation was seven years with half ceasing work within four years of diagnosis. Those who ceased work were more likely to work in physically demanding, semi-skilled or unskilled) jobs (e.g., machine operating, driving or labouring). Those who continued working were more likely to be employed in managerial or professional jobs, and a significant proportion of those who maintained employment did so by changing the nature of their work⁶⁸;
- RA was associated with increased probability of labour force withdrawal, increased effort to maintain work performance, and more sickness absence⁶⁷; a review of studies on the impact of RA on reduced workplace productivity found that a median of 66% (range 36-84%) of employed RA subjects had experienced work-loss due to the disease in the previous 12 months, for a median duration of 39 days (range 7-84 days)²⁸; and
- the significant indirect costs of RA to employers warrant further research on the potential contribution of different treatment interventions to optimise workforce productivity.⁶⁷ Intervention strategies to reduce early work disability should be tested prospectively in a working cohort of RA patients.⁶⁸

Depression and anxiety:

See *Section 5* on the impact of mental health conditions, from page 29.

Cancer survivors:

- optimistic outcomes can be expected, especially for adult cancer survivors, in terms of continued labour force participation and productivity^{157,158};
- a large Finnish cancer registry study (n=46,312) that compared working-age cancer survivors with age- and sex-matched general population controls found that 50% of cancer patients were employed, only slightly less than the 55% of their referents, although the employment rate of those with cancer varied greatly according to the cancer site.¹⁵⁸ The main difference in the employment rate was a higher retirement rate, with 34% of cancer patients having retired from the labour force, compared to 27% of their referents. Similarly, a review of research found that the majority of cancer survivors were able to continue working¹⁵⁹; although in another study using Finnish cancer registry data (n=12,542), the probability of being employed was highest in the lower education level groups¹⁶⁰;
- a Norwegian study comparing cancer survivors (n=852) with matched general population controls found that despite poorer health, tumour-free survivors of breast, testicular, and prostate cancers reported no difference in work hours or full-time jobs, and mostly equivalent living conditions¹⁶¹;
- at 12 months after diagnosis, the likelihood of employment for prostate cancer patients aged 30-65 years (n=267) compared to control subjects was not statistically significantly different, although there was some interference with their ability to perform physical and cognitive tasks at work (e.g., 26% reported interference with ability to perform tasks involving physical effort)¹⁶²;
- a US study of long-term cancer survivors (n=253) found that of those who were working when initially diagnosed, 67% were employed five to seven years later. The majority of those who had ceased working did so because they retired (54%), or were in poor health or disabled (24%). Many of those who were employed worked more than 40 hours per week although some reported a degree of disability that interfered with job performance¹⁵⁷;
- another US study of the long-term effects of cancer and its treatment on employment and productivity, found that around 40% of cancer survivors were of working age; and that even for cancer-free survivors, the adjusted disability rate was significantly higher than that in adults with no chronic conditions.¹⁶³ Disability rates for cancer were similar to those for heart disease, stroke, diabetes, lung disease, and arthritis/rheumatism;
- cancer was associated with the highest reported prevalence of any impairment (66.2%) and the highest conditional number of impairment days in the past 30 days (16.4) in a comparison of common chronic conditions on work impairment in a US general population sample (n=2,074 persons aged 25-54 years); the study noted that as the majority of employed people who are diagnosed with cancer remain in the labour force through at least part of their treatment course, interventions to reduce the workplace costs of cancer should be a priority¹⁶⁴;
- long term survivors of childhood cancer were at increased risk of functional limitations in physical performance and participation in activities needed for daily living, when compared with their cancer free siblings, and these translated into participation limitations at school and work¹⁶⁵; and
- the elevated disability rate in cancer survivors was seen as an argument for the need to treat cancer survivorship as a chronic condition potentially requiring a broad range of psychosocial services.¹⁶³

Cardiovascular diseases and events:

Cardiovascular diseases and events include, for example, heart disease, heart attack, stroke, and associated risk factors.

- heart disease and hypertension were the most costly chronic conditions on a per employee basis in the US after adjusting for prevalence^{113,129}; the 12-month total (direct and indirect) cost burden of illness related to heart disease was only exceeded by chronic renal failure and RA¹²⁹;
- heart disease and hypertension were associated with the largest number of work impairment days after cancer in a sample of the US general population aged 25-54 years (n=2,074)¹⁶⁴;
- a review of the evidence on the economic burden of chronic angina found that workplace productivity loss due to angina was substantial and that while interventions (e.g., revascularisation procedures, medication) achieved some improvement in employment and work limitations in the short term, the positive effect of revascularisation procedures eroded over the longer term (≥ 3 years) in a substantial number of patients¹⁶⁶;
- a small US study that examined work-related outcomes seven months after a heart attack found that 21 of the 89 patients who had worked before, had not returned to work (23.6%).¹⁶⁷ Pre-existing cardiac disease and poorer physical functioning were predictive of worse work-related outcomes;
- the employment status of long-term survivors of heart transplantation (50% of whom survived for ten years or more) was found to be good: a study that followed patients operated on at a UK centre for 12 years (n=62), found that 69% at one year, 69% (of 55 survivors) at five years, and 57% (of 35 survivors) at 12 years respectively, were working.⁶⁵ Older patients with poor pre-surgical work history were less successful in finding work, and although blue-collar work status was not a deterrent to employment, trade and/or legislative restrictions forced some (who were willing and capable of returning to previous employment), into lower paid, less satisfactory jobs. The study suggested that those patients likely to be unemployed needed to be identified prior to surgery and assisted to establish realistic employment goals⁶⁵;
- in the US, individuals with cardiovascular risk factor clusters (e.g., hypertension, hyperlipidemia, smoking, unhealthy weight) were found to be significantly less likely to be employed (especially those who were obese) than those without risk factor clusters⁶³; and
- studies have demonstrated a significant relationship between high job strain (e.g., high production demands and low levels of control and social support) and hypertension and cardiovascular disease.¹⁶⁸⁻¹⁷² A causative relationship between 'overwork' (karōshi) and sudden death, and other effects due to cardiovascular and cerebrovascular disease, has now been explicitly recognised in compensation systems in Japan.⁸⁵ Where studies are available, significant differences have been observed between the sexes.^{170,172,173} See *Section 6* on page 31 for further discussion on modern work practices that are thought to contribute to this situation.

4.1 General impact

A US cross-sectional survey, unusual in that it studied a large group of nearly 8,000 employees of one company in five locations (response rate 63%), found that overall, chronic diseases increased work absences and reduced productivity.¹⁷⁴ A majority of workers, regardless of type, with an average age of 43.2 years, reported at least one chronic condition as follows: clerical and office workers (70.6%), craft workers – skilled (69.2%), officials and managers (68.5%), technicians

(68.5%), professionals (66.6%), operatives – semiskilled (64.4%), service workers (60.5%), sales workers (58.2%), and labourers – unskilled (25.0%).¹⁷⁴ The study authors concluded that chronic disease constituted a major economic burden.

Box: Employees with chronic conditions

“Many CEOs have made statements that their employees are their companies’ greatest asset. There is little doubt that the creativity and productivity of the workforce is the engine for corporate success. Chronic health conditions are common among all job types and have the potential to significantly impact a company’s financial performance. Although most management attention to date has focused on direct medical costs and absenteeism, our experience suggests there is far greater loss of productivity resulting from decrements in presenteeism, representing a substantial management opportunity as well as a compelling focus for healthcare providers and policymakers.”

Source: Collins et al. (2005).^{174:556}

In data from the Maastricht Cohort Study of Fatigue at Work in the Netherlands, 27.1% of employees reported the presence of one or more chronic diseases (25.8% of men and 30.6% of women) (baseline analysis of respondent characteristics in 1998, n=12,137 employees aged 18-65 years [mean age 41.0 years] in 45 companies and organisations, 45% response rate).¹⁷⁵ Of those employees reporting the presence of chronic diseases, 9.3% reported two or more, with chronic back pain predominating (7.2%), followed by heart disease or hypertension (5.0%), psychological disorders (4.8%), rheumatoid arthritis (4.2%), asthma or COPD (3.9%), and migraine or severe headache (3.9%).

The presence of chronic disease was related to, and varied with age. Those employees reporting a chronic disease were an average of 2.7 years older than those without a chronic disease.¹⁷⁵ In the younger ages (18-24 years), 16.5% reported one chronic disease and 4.1% reported two or more. Psychological disorders (6.1%) and asthma or COPD (4.1%) were reported most frequently in younger employees. In the older ages (45-64 years), 20.9% reported one chronic disease and 13.5% reported two or more. Chronic back pain (10.2%) and heart disease or hypertension (10.0%), were reported most frequently in the older age group, followed by psychological disorders (5.7%).

The Netherlands study, which examined the association of fatigue with chronic disease, found that overall employees with a chronic disease were 2.9 times more likely to be a fatigue ‘case’ than employees without chronic disease, getting high scores on an instrument developed for hospital studies of chronic fatigue syndrome and since validated in working populations.¹⁷⁵ A strong linear association between the number of chronic diseases and fatigue was evident. Among those with a chronic disease, however, employees with diabetes and asthma or COPD had the lowest fatigue scores.

In Australia, Glover and colleagues calculated the prevalence of major chronic diseases and their risk factors in different socio-economic groups by analysing the 2001 National Health Survey (NHS).⁸⁴ An excerpt detailing the prevalence of selected chronic diseases for people of working age in two bands (aged 15-24 and 25-64 years) is shown in Table 2. Significant socio-economic inequalities were apparent for many of the major chronic diseases. The largest disparity was found in people aged 25 to 64 years with diabetes: those in the most disadvantaged quintile were more than twice as likely to be affected as those in the most advantaged quintile. Circulatory system diseases (especially hypertensive disease) and digestive system diseases also showed a strong socio-economic differential in the same age group. The authors highlighted the need for public policy initiatives to reduce these socio-economic inequalities in health.⁸⁴

Table 2: Inequality in prevalence of selected chronic diseases, Australia, 2001

Inequality in prevalence of selected chronic diseases ¹ , 2001						
Age group (years) and chronic disease	Rate ²	Rate ratio by quintile of socioeconomic disadvantage of area ³				
		First	Second	Third	Fourth	Fifth
15–24						
Mental and behavioural problems ⁵	10,284	1.00	1.02	0.97	1.08	1.28
Respiratory system	33,373	1.00	1.04	1.12	1.09	1.00
Asthma	16,263	1.00	0.82	1.14	1.02	1.00
Bronchitis/emphysema	1,701	1.01	1.33	1.67	1.95	1.97 ⁶
Musculoskeletal system ⁷	19,088	1.00	1.11	1.00	1.08	0.94
25–64						
Diabetes mellitus	2,234	1.00	1.37	1.67*	1.72*	2.28***
Mental and behavioural problems ⁵	11,093	1.00	1.05	1.20*	1.36***	1.67***
Circulatory system	17,491	1.00	1.04	0.97	1.15*	1.28***
Hypertensive disease	9,751	1.00	1.12	1.01	1.24*	1.54***
Respiratory system	32,964	1.00	1.00	0.99	0.99	1.01
Asthma	10,393	1.00	1.10	0.99	1.19*	1.14
Bronchitis/emphysema	3,429	1.00	0.97	1.14	1.55**	1.70***
Digestive system	8,074	1.00	1.03	1.07	1.12	1.37***
Musculoskeletal system ⁷	39,840	1.00	1.10*	1.16***	1.16***	1.22***

¹Survey respondents can report more than one disease.

²Rate is the number of persons per 100,000 population reporting the disease.

³The extent of any inequality is shown by the rate ratio, which expresses the ratio of the rate in each quintile to the rate in Quintile 1 (the most advantaged areas, with a rate ratio of 1.00); rate ratios differing significantly from 1.0 are shown with * p < 0.05; ** p < 0.01; *** p < 0.001.

⁵Information may be based on self-diagnosis, rather than diagnosis by a health practitioner.

⁶Indicates rate ratio based on estimates with a Relative Standard Error of between 25% and 50% and should be used with caution.

⁷Includes diseases of the connective tissue.

Source: National Health Survey, ABS 2002

Table source: Glover, Hetzel & Tennant (2004).⁸⁴

Jose and colleagues, in an analysis of pooled data from three NHS (conducted in 1989-90, 1995 and 2001) derived odds for non-participation in the labour force (NILF) by people aged 44 to 60 years with the long term health conditions of hypertension, asthma, arthritis, diabetes, cancer and anxiety.¹¹² Their findings indicated that mature age women reporting diabetes were 84% more likely to be NILF than those not reporting diabetes. For mature age men the differences were even starker: those reporting diabetes were 2.47 times more likely to be NILF than those not reporting diabetes; and those reporting anxiety-related problems had the largest difference, being more than three times as likely to be NILF (odds ratio of 3.75, and a much higher rate than women of the same age reporting anxiety-related problems).¹¹² Of interest was the small difference in labour force participation by mature age men reporting cancer (NILF odds ratio of 1.09, versus 1.47 for women); and the increasing likelihood of non-participation *per se* by mature age men since the base year of 1989-90 (NILF odds ratio of 1.10 in 1995 and 1.29 in 2001). Non-participation by mature age women also declined over the same period (NILF odds ratio of 0.66 in 1995 and 0.61 in 2001).

Cai and Kalb, using data from the HILDA Survey, found that while there were minor differences between the labour force participation rates of people reporting 'excellent', 'very good' or 'good' health, those with 'fair' or 'poor' health had much lower rates of participation, with this trend being:

- (1) more pronounced in older age groups; and
- (2) more pronounced in women than in men.²⁴

Overall more than one third of working age males who were not employed gave illness or disability as their reason for leaving their last job; this proportion rose from 29% of those aged 15-49 years, to 39% of those aged 50 to 64 years.²⁴ The proportions were lower in females (14% of

females aged 15-49 years and 21% aged 50-60 years; different age range for the older female group as the age pension was paid to women at a younger age than men).

As would be expected, the impact of health status on labour force participation increased with age. For the group of older men a decline in health from 'good' to 'fair' reduced the likelihood of participation in the labour force by almost 7% versus a reduction of less than 1% for younger males (the impact was slightly larger for females).²⁴

Murphy concluded a paper for the Australian Government Treasury with a plea to ramp up health promotion activities to reduce the prevalence of risk factors that were among the principal causes of chronic disease and contributed to reduced labour force participation and productivity although they were common and preventable (e.g., tobacco-smoking, risky alcohol use, poor diet, excess weight, insufficient exercise).¹⁷⁶ As these risk factors were known to be unequally distributed across different socio-economic groups in the working age population (see Table 2), there is a further need for public policy strategies to target the areas of greatest socio-economic inequality in health.⁸⁴

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5 Impact of mental health conditions

The impact of mental health on work, and conversely the impact of work, and of work together with other competing demands on mental health (e.g., managing a family, caring for children and others), were variously studied and reported. The chronic mental health disorders most often studied were: depression, followed by anxiety, with few studies of bipolar disorder, post-traumatic stress disorder, panic disorder, phobia, and personality disorders.

Depression and anxiety

“Depression and anxiety disorders are important through high prevalence in the community, comorbidity with other health conditions, and a substantial proportion remaining undetected and untreated. Furthermore, when diagnosed, these disorders may not receive optimal treatment. When effective treatments are provided, these can increase employment outcomes and reduce work loss, even offsetting the costs of assessment and treatment.”

Source: Waghorn & Chant (2006).^{177:898}

The prevalence of mental health disorders in the working population was examined in several countries including Australia, with depression and simple phobia found to be most prevalent.⁵⁷ Depression and anxiety were more consistently associated with presenteeism (lost productivity while at work) than with absenteeism. Mental health disorders were more prevalent in some sub-populations: analysis of the 1997 National Survey of Mental Health and Wellbeing found that one-quarter of all income support recipients had experienced substantial levels of psychological distress in the previous four weeks and nearly one in three had had a diagnosable mental disorder during the previous 12 months.⁸³ .

The effects of anxiety and depression on decreased work performance in Australia, based on analyses of the 1998 Survey of Ageing, Disability and Carers (SDAC) by Waghorn and Chant, were consistent with previous findings that depression produced greater work performance impairments than did anxiety disorders.¹⁷⁷ Their findings included that:

- depression was associated with a 46.4% reduction in labour force participation in males, and 28.6% in females, compared to healthy controls;
- anxiety disorders were associated with a decline in labour force participation of 27.8% in males, and 24.2% in females, compared to healthy controls;
- the range in the proportions of people reporting reduced work accomplishment was large: from 4.2% in those with depression and no employment restrictions, to 78.5% in those with depression and severe to profound employment restrictions; for anxiety this ranged from 3.6% of those with anxiety and no employment restrictions, to 68.9% of those with anxiety and severe to profound employment restrictions;
- contra to the standard hypothesis, receiving treatment was not associated with improved work performance.¹⁷⁷

An earlier study by Waghorn and Chant, using SDAC data, also showed the substantial impact of depression and anxiety disorders on labour force activity and identified the need for more intensive and continuous forms of assistance.¹⁷⁸ A significantly larger proportion of those receiving mental health treatment for anxiety and depression were not in the labour force at all.¹⁷⁸

In an observational study of 15% of the Dutch working population (2002 to 2005), workers with depressive symptoms were absent for a longer time (mean of >200 days in both sexes), with older employees absent for longer durations.⁶⁴ Depressive symptoms had an estimated rate of chronicity (1 year of absence) of 24%. The development and application of tools for recognising employees at risk for chronic depression was recommended.

A number of studies have examined the impact of various attributes of work on mental health, using psychological distress as the main indicator. A series of Finnish studies looked at the impact of health on perceptions of job security, finding that low perceived employment security was associated with poor health in all indicators (self-rated health, chronic disease, and psychological distress), and relatively high levels of psychological distress were found in women (only) in certain employment types.⁹⁰

5.1 General impact of stress

Parental economic stress was associated with statistically significant low self-rated health (after accounting for employment status and foreign origin) in a Swedish study which suggested that economic stress should be considered as a public health risk factor in families.¹⁷⁹ A US survey found that participants who reported high work-family conflict (WFC) had significantly higher prevalence of mental and/or substance use related disorders in the past month; neither working hours nor domestic roles impacted on the association between WFC and mental disorders, regardless of sex.⁹⁵

Men and women exposed to high levels of work stress *and* family demands were found to be at high risk for mental health problems, particularly depression, in a French longitudinal study.¹⁸⁰ A study examining whether the effect of multiple roles on mental health differed between industrialised countries with various state welfare arrangements and social norms found that both work-to-family and family-to-work conflict affected the mental health of men and women in three different countries (the UK, Finland and Japan).¹⁸¹

Work stress has also been found to be an independent risk factor for the development of major depressive episodes in the working population (Wang 2005). Policies to improve working environments are needed to keep workers mentally healthy and productive.

Changes in the nature of work have led to increased psychological demands and job instability.¹⁸² Although economic output has risen steeply over recent decades, life satisfaction has not and depression and distrust have increased substantially in the same period.¹⁸³

Rapid changes in work practices and decreasing job security

“There have been many recent changes in the nature of work in Western industrial societies. Increasing deregulation, downsizing of companies, increasing job insecurity, the ever-present spectre of long-term unemployment and the impact of technology have changed the character of work and the workplace.¹⁸⁴ Many of these changes are potentially threatening to workers and might be expected to have an impact on health, especially on mental health.”

Source: Stansfeld et al. (1997).^{185:73}

6 Stress in the workplace

A rapidly growing number of studies examine work-related, occupational, or job stress, and job strain, in relation to:

- more general life stresses;
- particular life stresses such as juggling work with family management and caring for children or others;
- particular occupational types (e.g., truck drivers) and professions (e.g., nursing); and
- in its own right, especially in relation to the changes in working conditions and work organisation that have occurred since industrialisation, and the more recent changes.

In relation to modern work practices and conditions in the more developed or post-industrialised countries, it has been asserted that occupational stress is rapidly becoming the single greatest cause of occupational disease.^{42,186}

Job or occupational stress and job strain

Occupational stress occurs when external demands and conditions do not match a person's needs, expectations or ideals or exceed their physical capacity, skills, or knowledge for comfortably handling a situation.¹⁸⁷ For employees, chronic exposure to stressful situations such as work overload, poor supervisory support and low input into decision-making have been cross-sectionally and prospectively linked to a range of debilitating health outcomes, including depression, anxiety, emotional exhaustion, immune deficiency disorders and cardiovascular disease.^{188,189} **Stressful working conditions** can indirectly impact employee wellbeing by limiting their ability to make positive changes to 'lifestyle' behaviours (e.g., smoking, sedentary behaviour) or by directly contributing to negative health behaviours (Landsbergis et al. 1998). **Chronic job stress** is also considered to be a major barrier to effective organisational functioning. Occupational stress contributes to a number of outcomes that are critical to organisational success, including absenteeism, labour turnover and job performance.

Job strain is a concept employed in the Karasek 'demand-control' model of work-related stress and relates to both burnout and depression. In the demand-control model, job strain is defined as a combination of (high) job demands and (low) decision-making latitude (or control over workload), both of which can be 'objectively' derived from self-reported descriptions of the nature of work. High job demands (e.g., volume of work, speed of work, lack of time, conflicts over different types of work required at the same time) create a state of arousal in the worker, typically shown by faster heartbeat and higher blood pressure. In a high control job, the worker has the latitude to develop a coping response to reduce the arousal level. In a low control job, their ability to do so is constrained; arousal levels build up and eventually become evident as heart disease, emotional exhaustion, depression or other stress-related disorders. The model has been expanded to include social support because it is a major determinant of behavioural responses to stress and provides a buffering mechanism between the individual and stressors.

Sources: Adapted from Noblet & LaMontagne (2006)^{42:346}; and Tennant (2001) citing Karasek (1979); Karasek, Triantis & Chaudhry (1982).^{2:698,190,191}

'Essential hypertension', that is, persistently elevated high blood pressure with no apparent cause (also known as the 'silent killer') has been identified as a disease of industrialised society.^{69,168,192} The increasing prevalence of essential hypertension in modern times has been blamed on the style and nature of modern work and the dramatic changes in work that have occurred since the industrial revolution.^{69,86,168,192} These changes in work practices and organisation include: work structured around assembly-line principles, skilled craft work replaced by lower-skilled piece work, longer working hours, less control over and an intensification of work, an accelerating pace of work, and less leisure time including the intrusion of work into leisure or home time. Various biologically plausible mechanisms have been advanced as to how essential hypertension arises, the causative contribution of persistent occupational stress or job strain to hypertension, and the pathways that lead to cardiovascular disease and contribute to premature death.^{94,169,170,193-195}

The Tokyo declaration on work-related stress and health (1998), a manifesto for action produced by occupational health experts from the European Union, Japan and the US in 1998, identified the health risks posed by modern work trends.¹⁹⁶ The declaration was referenced in a review of available knowledge together with a detailed agenda for research and development for the US National Institute for Occupational Safety and Health.⁶⁹

The Tokyo declaration on work-related stress and health

Neuroscience and stress science have elucidated the links between social structures and processes and how these interact – between the central nervous system and other organ systems – to promote or counteract workers' health, based on a "bio-psycho-social approach ... to the man-environment ecosystem and its dynamics. These dynamics include organizational restructuring, mergers, acquisitions and downsizing, the frantic pace of work and life, the erosion of leisure time and/or the blending of work and home time. Most of these developments are driven by economic and technological changes aiming at short-term productivity and profit gain. ... Production practices are increasingly 'leaner'. New employment practices such as use of contingent workers are increasingly adopted. Concurrently, job stability and tenure is decreasing. There is also a trend toward increasing information (cognitively demanding) and service work [increasing direct contact with customers, clients or patients]. We have a rather limited understanding of the effects of these trends on job characteristics and on workers' health and wellbeing.

"New management models are introduced with more teamwork, just-in-time, and TQM (Total Quality Management). The workforce is getting older with an increasing proportion of women workers, and with employees more likely to work on fixed term or temporary contracts. ... This rapid change, combined with both over- and under-employment, is likely to be highly stress provoking. Occupational stress-related mental and psychosomatic complaints are very common in all 15 EU Member States."

Specific proposals "for healthier work in healthier workplaces" included:

- **Implementation** of the body of current information on prevention measures to reduce stress related illness and injury in the workplace and promote the health and wellbeing of workers; **research** to address knowledge gaps.
- **Surveillance** at individual workplaces and **monitoring** at national and regional levels, to identify the extent of work-related stress health problems and provide baselines for the evaluation of amelioration efforts.

Source: Extracts from The Tokyo declaration on work-related stress and health in three postindustrial settings – the European Union, Japan and the United States (1998).¹⁹⁶

Earlier studies debated whether a causative relationship between occupational or work-related stress (as opposed to other life stresses or individual vulnerability) and health consequences could be proven.^{2,40,197} Briner concluded that longitudinal evidence-based studies were required, with the object of study the extent to which causal associations between work conditions and individual wellbeing were common (i.e., not everyone is positively affected by the same degree of job control or autonomy) together with the implications for interventions.⁴⁰

Tennant's review focused on prospective studies (to reduce reporting bias) and found that specific acute work-related stressful experiences contributed to depression; a finding that was consistent with general life event stress research.² Structural factors, primarily lack of control over work, were also predictive of depression and burnout. There was evidence of reciprocal relationships, with depression and burnout affecting workers' experience and perceptions of work stressors. Both social support and the support of colleagues and supervisors had a protective function. Conflicting demands, whether job demands or the demands of family life, added to the risk of individuals suffering psychiatric morbidity (primarily depression and anxiety) and corresponding work absences^{197,198}, with those in the 'helping professions' also at risk of burnout.^{44,46,73,199}

Burnout is an extreme emotional state characterised by emotional exhaustion, a diminished sense of personal accomplishment, and cynicism. Originally identified in social workers as a condition of mental and physical exhaustion caused by overwork or over-exposure to stress in the workplace, the concept is now applied more widely. The construct of burnout used in research studies involves three clusters of symptoms: emotional exhaustion, depersonalisation (negative, insensitive attributes to clients) and a sense of reduced personal accomplishment

Sources: Maslach & Jackson (1982); Glass & McKnight (1996); Tennant 2001.^{2,199:698,200}

Although occupational stress, job strain and the consequences of modern work organisation have not been well studied in Australia, there is some evidence supporting the negative consequences for health. A recent analysis of the impact of health on labour force participation and vice versa in four groups of differently aged males and females of working age (using the HILDA Survey data), found that the effect of labour force participation on health was not unreservedly positive across all groups.²⁰¹ Indeed, in younger males (aged 15 to 49 years), labour force participation was calculated as having a significant negative impact on their health status (whereas the impact – although estimated as negative – was not statistically significant for older males and younger females). For older females the effect was found to be positive and significant. These findings led the authors to suggest that “bad work conditions” or “work stress” effects were larger than any positive effects of labour force participation on health for the group of younger males.^{201:264}

The weight and strength of the evidence being provided in compelling reviews, together with greater understanding of the underlying clinical mechanisms have advanced the plausibility of work-related stress and job strain as an occupational health hazard.^{69,168,169,193,202} Modern work-related exposures additional to job strain include:

- effort-reward imbalance;
- shift work;
- long work hours;
- threat-avoidant-vigilant work (high risk groups include bus and truck drivers);
- physical factors (e.g., exposure to noise, heat, cold); and
- chemical factors (e.g., exposure to lead, carbon monoxide, other toxins).

Long working hours and sudden death are most likely related, but not yet well studied, except in Japan where the syndrome has been labelled ‘karōshi’ (literally: death from overwork).^{171:625} The Japanese are working to establish both a more appropriate compensation system for karōshi, and preventive measures for overwork-related health problems.⁸⁵ Around 300 cases of “brain and heart diseases” between 2002 and 2005 have been recognised as “labour accidents” resulting from overwork (karōshi) by the appropriate Ministry.^{85:537} The major medical causes of karōshi deaths are heart attack and stroke due to stress.

A review of 17 longitudinal studies found that the evidence, particularly in men, was strong and consistent that an association existed between exposure to job strain and risk of cardiovascular disease via the mechanism of hypertension.^{168,192} The association was likely to be significantly under-estimated. Consequences, in terms of economic costs, included:

- lost time from work due to illness;
- lost time from work due to disability as a consequence of stroke and heart attacks;
- cost of treating a substantial labour force with hypertension and cardiovascular disease with medications and health care services; and
- cost of treating the population at retirement with illnesses caused in large part by work.

6.1 Occupational stress in health care professionals

Healthcare professionals, like those in the other 'helping' professions, are known to be vulnerable to higher rates of occupational stress and psychiatric disorder than the general population, as could be expected given the demanding nature of their jobs.^{2,199,203} The consequences and impact on others, such as their patients, is not as well known or studied.⁷³ There was a relative lack of Australian material, although there have been sporadic studies.^{72-74,204}

Occupational stress in the health care sector

"Job stress is a particular concern in the health sector as (1) health care professions are frequently identified as high stress occupations and (2) prolonged stress can not only impair individual wellbeing, but can also reduce the health professional's capacity to provide high quality care."

Source: Noblet, Cooper, McWilliams & Rudd (2007).^{205:40}

In New Zealand, two representative surveys with solid response rates of around 70% or more (one of surgeons, physicians, and community pharmacists; the other of GPs) both in 1999, identified high levels of psychological morbidity in these professional groups.^{70,206} Around one third or more in each group had scores suggesting a significant level of psychological symptoms (pharmacists had the highest number of cases), and around 10% in each group described a level of symptoms associated with more severe psychological disturbance ('caseness'). There was little difference in the rates of GPs in NZ (31.4%) when compared to GPs in a similar Australian study (30.7%).^{70,72} These results were in line with other studies examining the prevalence of psychological caseness in: junior, and senior, hospital doctors; GPs; and hospital managers; with rates of between 22% and 47%.^{70,71,207-209} Significantly higher proportions of medical professionals had much higher levels of depression, anxiety, and psychiatric symptoms, and were 'probable cases', than was found in the general population.²⁰⁸ The effects of poor mental health in medical professionals identified in these and other studies included:

- neglect of personal physical health;
- substance abuse;
- psychiatric problems;
- professional misconduct; and
- inadequate patient care.²⁰⁸

A review by Van Ham and colleagues of 24 job satisfaction studies in GPs found that the influencing factors mentioned most frequently were:

- factors increasing job satisfaction:
 - ◆ diversity of work;
 - ◆ colleague relations and contact; and,
 - ◆ being involved in teaching medical students;
- factors decreasing job satisfaction:
 - ◆ low income;
 - ◆ too many working hours;
 - ◆ administrative burdens;
 - ◆ heavy workload;
 - ◆ lack of time; and
 - ◆ lack of recognition.²¹⁰

Frustrations with bureaucracy, government reforms, and overwhelming paperwork were high in all the professional groups studied in NZ.⁷⁰ Significant numbers in each professional group had often contemplated leaving their profession. The study warned of further deterioration in recruitment, retention and patient care unless stressors could be addressed. As the problems were systemic it was likely that solutions that were systemic would be found to reduce the administrative and bureaucratic workload across the health sector.

In relation to causal ascertainment, Weinberg and Creed used a case control design in a workplace study of UK doctors, nurses, administrative and ancillary healthcare staff to test the hypothesis that stress outside of work would be the main difference between 'cases' (of anxiety and depressive disorders) and non-distressed controls.¹⁹⁷ Although cases and controls were demographically similar, worked similar hours and had similar job responsibility, cases were less likely to have a confidant, more likely to have had a previous episode of psychiatric disorder, and had also had a greater number of objective stressful situations (both in and out of work) as well as significantly more objective work problems than controls. After taking the effects of personal vulnerability into account, stressful situations at work clearly contributed to anxiety and depressive disorders. The authors concluded that both stress at work and stress outside of work, contributed to the anxiety and depressive disorders experienced by healthcare staff.¹⁹⁷

One of few Australian studies examining occupational stress looked at community health services in 2004 after a series of reforms including the introduction of casemix funding. conditions that were predictive of employee stress were identified as: job control, and, to a lesser extent, social support.²⁰⁵ The results were interpreted as suggesting that improvements in working conditions that were amenable to change (e.g., job control, social support, and resource-related stressors) could enhance the wellbeing of community health service personnel. Although not in healthcare professionals, a study of employees from the Reserve Bank of New Zealand outlined two possible responses for employers to reduce job strain: either enrich jobs or reduce workload.²¹¹

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7 Ageing workers, older workers and workers with disabilities

A growing literature focuses on the ageing of workers. Ageing by itself, as a non-preventable risk factor, increases the likelihood of being affected by one or more chronic diseases. Some of the literature located also dealt with the workplace characteristics that need to change to accommodate and maximise the workforce participation and productivity of ageing workers. This literature is especially pertinent for various industries in Australia that have ageing workforces, including those of healthcare, teaching and mining, among others.

While the effect of health on the labour market activities of older workers has been extensively studied in the US and Europe, research on this issue in Australia is limited.²¹²⁻²¹⁴ One of a very few studies, using data from the HILDA Survey (cross-sectional as only one wave of data was available), found that modelled estimates confirmed the previous findings of other researchers that health had a significant effect on labour supply.²¹⁵ From a policy perspective, these results showed that the indirect costs to employers of employee health problems were probably underestimated. The larger cost estimates derived from a more efficient model, supported additional investment in policies aimed at improving workforce health, especially the health of older workers.

A large, cross-sectional Australian study of around 9% of workers in the coalmining industry in Queensland and New South Wales (n=1,803 direct and contract employees at 22 mine sites, 97.3% participation rate), examined age-related changes in work ability in depth, using the Finnish Work Ability Index (WAI).⁶¹ The WAI has been used in Finland in the largest longitudinal study of the influence of ageing on work ability in people aged 45 to 65 years.^{213,214,216,217} The Finnish research showed that work content, work organisation, and work environments are significant factors in declines in work capacity, and increased rates of retirement of people in the second half of their working life due to disability. Individual differences in functional capacity increased with age, and older workers were generally more vulnerable to stress from excessive physical demands, poor work postures, night work, shift work, high work rates and poor work environments.

Work ability is a dynamic process that changes greatly throughout an individual's work life for many reasons. One of the main factors inducing change is ageing and its effects on human resources. The other large source of change that ageing workers face is changes in the nature of work. Work organisation, work methods and tools, and workloads are now changing faster than human resources can easily adapt.

Source: Ilmarinen (2001).^{216:548}

In Australia, around 60% of the coalmining workforce is over 40 years of age.⁶¹ Analyses of the data on coalminers showed a clear reduction in WAI across age groups (20-29, 30-39, 40-49 and 50-59 years), and a significantly lower WAI in underground and more physically demanding operations than in open-cut operations.⁶¹ The size of the WAI reduction was likely to be underestimated due to the cross-sectional nature of the study. Injury was the most commonly reported condition. Around one fifth had one or more current injuries (21%), and nearly as many reported a musculoskeletal disorder that had been diagnosed by a doctor (18%). Of those respondents reporting a current injury, almost half had an injury involving the back (48% of the 21% with a current injury). Respiratory, sensory (primarily hearing loss/ injury), and cardiovascular conditions (primarily hypertension) were also among the top conditions reported (by 12%, 10% and 8%, respectively).

Also in Australia, a study using cross-sectional data from the 1998 Survey of Disability, Ageing and Carers found that 17.9% of males and 16.7% of females of working age (15-64 years) reported a disability.⁸⁷ Although less than a tenth of those aged 15-24 years reported a disability compared

with over one-third of those aged 55-64 years, it was not simply a phenomenon of old-age as all age groups had significant numbers of people reporting disability. Over half reported the onset of their disability after age 30, and there was evidence that later onset adversely affected labour force participation. The policy message derived from the study was the need to improve labour market outcomes by getting people with disability into jobs, as well as improving outcomes for those already in jobs.

A further notable finding was evidence that disability primarily acted to reduce labour supply rather than labour demand.⁸⁷ This was apparent from the absence of increases in unemployment associated with disability, and the observation that increased severity was associated with both an increased likelihood of part-time employment (at the expense of full-time employment) and a decreased probability of unemployment. Additional evidence supports this finding: a Netherlands study that quantified the prevalence of return-to-work after major trauma (severely injured adult trauma survivors aged 16 years and over who were full-time employed at the time of the injury) found that around 60% returned to their pre-injury work status.²¹⁸ Another study found that after controlling for the confounders of age, sex, and education, the labour force participation of patients with the debilitating condition of rheumatoid arthritis was only marginally lower than that of the general population.²¹⁹

In Europe around 15% of the working-age population was estimated to be managing a chronic illness or disability.³¹ A major study of ageing workers across the European Union found that an average of one in five workers aged 45 years and over reported that their work ability was impeded by chronic disease: country-wide rates ranged from 10% in Denmark and Sweden to 30% in Germany, Austria and Finland.²²⁰ While these rates are higher than those current for Australia, it can be anticipated that the Australian working-age population is heading in this direction.

A review of current knowledge on changes in physical and mental functions during ageing in younger people (i.e. those around 30-65 years old), concluded that because workers become physically weaker but mentally stronger with advancing age, their work life should also become less physically demanding and include more of the mental characteristics that improve during their career.²¹⁶ Mental characteristics that improve with age, based on the findings from cognitive and other studies, include:

- wisdom;
- sharp wittedness;
- ability to deliberate;
- ability to reason;
- ability to comprehend the whole;
- better verbal command;
- better control over life;
- stronger commitment to work;
- more loyalty to employer;
- less absence from work;
- greater work experience; and
- higher motivation to learn.^{216:548}

The concept of 'work ability', introduced by the Finnish Institute of Occupational Health and described by Ilmarinen and others, was partly derived from the results of an 11 year follow up study of over 6,500 blue and white collar workers.^{216,221} It emphasises that individual work ability is a process of human resources in relation to work (Figure 2).

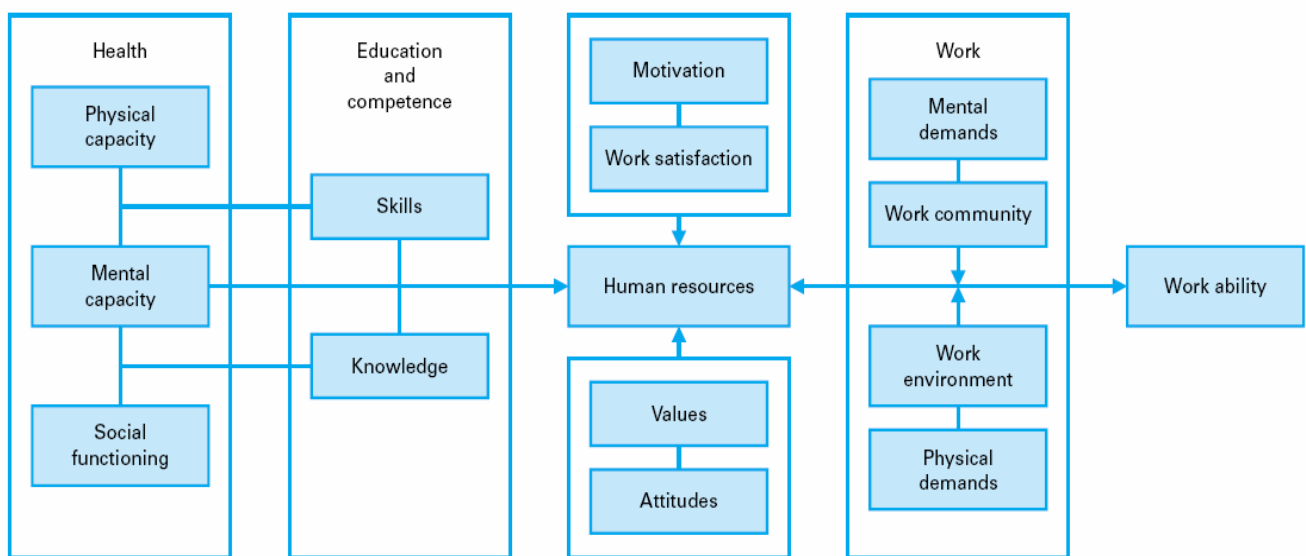
Human resources are described by:

- (1) health and functional capacities (physical, mental, social);
- (2) education and competence;
- (3) values and attitudes; and
- (4) motivation.

The outcome is 'individual work ability' when this comprehensive set of individual factors is related to:

- (5) work demands (physical, mental);
- (6) work community and management; and
- (7) work environment.²¹⁶

Figure 2: Concept of work ability, emphasising individual work ability as a process of human resources in relation to work



Source: Ilmarinen (2001).^{216:549}. Reproduced with the permission of the author.

Work ability is a dynamic process that changes throughout an individual's work life for many reasons including ageing and the effects of ageing on human resources.^{61,159,216} Workers of all ages will face many changes in the nature of work over the course of their working lives. Modern work organisation, work methods and tools, workloads and pace, are changing faster than human resources can easily adapt.²¹⁶ The dynamics that are needed to 'fit' human resources to the new work demands have not been developed yet, causing many older workers to be displaced from the labour market on the grounds that their competency is insufficient and their experiences are invalid. Ilmarinen argues, however, that the major reason for the displacement of older workers is the uncontrolled changes occurring in work organisation and the lack of adaptation to human work abilities.²¹⁶ He suggests that as labour force supply problems become acute, the 'blame the worker' attitudes towards ageing workers will change and work adjustments will be demanded.

Research and action in the late 1990s focussed on identifying the key issues of the adjustments needed, and developing and testing processes to make work life a success for ageing workers.²¹⁶ The results of follow up studies and experiences since then have shown that the following single actions can improve work ability during ageing:

- training supervisors for age management (see box following);
- implementation of age-related ergonomics;
- worksite exercise programs; and
- tailored training in new technology.²¹⁶

Better results can be achieved when several actions are integrated and implemented at the same time. Improved work ability is measurable in increased work productivity and quality of work, and in better wellbeing and quality of life for ageing workers (“a better third age quality”).^{216:549}

Age management

The term ‘age management’ is used in a variety of contexts, refers to a range of issues, and is linked to other concepts including: demographic change or ageing, active ageing, management of all ages, diversity management, and anti-discrimination. Age management can be described at three different levels: individual, enterprise, and labour market policy or framework.

At the individual level, it encompasses measures specifically targeted at individuals to remain employable, open and adaptive in the labour market by continuously updating their skills and attitudes in older age. Age management at the individual level concerns not only those who are employed, but also those who are unemployed who have the potential to (re)integrate into the labour market. In the EU, a significant ‘target group’ for age management measures is older unemployed people (e.g., those who have been made redundant, retired early, or been long-term unemployed since their youth).

At the enterprise level, company-specific reasons for making age management a key issue include cost pressures, consumer demands, flexible production needs, competition for and retention of skilled labour, and changing social values within a company. Age management measures undertaken by companies include manager and employee awareness-raising, implementing age-positive policies, schemes for inter-generational learning, addressing health and safety issues, and a holistic approach to human resource planning in general. Changing worker attitudes, flexible working practices, ergonomics and job redesign can all be achieved with a focus on the whole working life and all age groups not simply older workers.

At the labour market level, age management can be addressed on various political scales, from international organisations to local government strategies. An overall framework for age management, interlinking all levels is essential given the complexity of the issue and the challenges of the ageing population.

Source: Adapted from EQUAL (2007).^{222:14-15}

Although the basic concept of promoting work ability is the same for all age groups, the particular adjustments needed and actions carried out will be age dependent, and tailoring based on the effects of ageing on work ability is therefore needed.²¹⁶ Ilmarinen concludes that changes in the age structure of the labour force can become a fruitful challenge in enterprises and societies all over the world.

Age management training is described by JobWise (an Australian Government site dedicated to promoting mature age employment) as providing line managers with practical solutions to implement age positive workplace practices to help them attract and retain experienced workers and maintain an age balanced workforce.

Source: JobWise.²²³

8 Conclusions

In conclusion, the studies identified and described in this literature review on health status and labour force productivity and participation with regard to chronic disease, confirm some protective effect of employment on health, but show that not all jobs are equal: there are good jobs that are health-protective and bad jobs that are not. There is some evidence that work is losing its protective effect in the modern, developed, 24-hour economy.^{13,93,101,201} Health inequalities that grade across employment types and conditions need to be better determined together with policies to address them, and job insecurity needs to be better studied.^{69,94,107,185,224}

The impact of depression, anxiety, and mental stress generally appears to be rising, but whether (or the degree to which) this is artefactual (more and better studies) or 'real' probably needs to be confirmed. Studies identified the need for health care professionals to better address the employment needs of those most at-risk of mental stress and disorders, and employer interventions to assist early detection, treatment and other assistance for those affected to remain productive.^{50,51,56-58,78}

The impact of parental work and health-related practices and family type on the health of children; and the impact of children in poor health, with chronic disease and/or disability on parental employment type, participation and productivity, also need to be better investigated and the negative effects addressed. Similarly negative effects in older people of working age, and in males and females of working age, need to be better investigated for those who are in and not in the labour force, as important gender differences have been determined.^{14,53,225,226} In addition, there is a need to study the impact on participation and productivity arising from concurrent needs to care for aged parents and older relatives.^{59,80}

Harmful exposures, including industrial exposures (e.g., chemicals, toxins), occupational exposures (e.g., bad indoor air, 'cardionoxious' environments), and exposure to work stress generally (e.g., in call centres, low control jobs, precarious employment) together with those resulting from toxic work and management structures and practices (e.g., Taylorism, bullying, overwork) need to be better determined together with policies to address, and wherever possible, to prevent, their negative effects on health.^{14,69,85,86,92}

Primary prevention

"The benefits of primary prevention by improving worker strength and/or health have also been investigated. In one of the earliest studies (1979), Cady et al. used five measures of fitness and conditioning to classify fire-fighters into least-fit, middle-fit, and most-fit categories. Their results showed a graded and statistically significant protective effect for added levels of fitness and conditioning for back injuries (least-fit, 7%; middle-fit 3%; and most-fit 1%). It was concluded that physical fitness and conditioning were preventive for back injuries in this population."

Sources: Musich, Napier & Edington (2001).^{29:534-541,227}

Examining changes in the prevalence of mental health conditions in people in the labour force, as reported in the National Health Survey, over time, could be important to better understand the impact of these conditions on the population by age and sex cohorts, taking into account socio-economic and employment status (e.g., part-time, full-time, and non-standard work such as shift work). This would enable confirmation or otherwise of a number of disparate findings that have been reported in this review, including the rise of occupational stress in relation to forms of modern work organisation.^{69,216} A variety of other findings could be clarified. For instance, females are reported to suffer more psychological distress when employed full-time (as opposed to part-time), while shift workers are reported to have higher prevalence of mental health conditions and cancer.^{23,61,203,228}

Finally, a previous analysis of the 2001 National Health Survey could be recalculated on later data now available, to estimate population rates by quintiles of disadvantage for working-age Australians in different age groups (e.g., ages 25-44 and 45-65 years) for selected chronic diseases, and, where numbers permit, high prevalence co-morbidities.⁸⁴ According to data from the 2004-05 NHS, there were large proportions of people with high prevalence chronic diseases who were also affected by co-morbid conditions.²²⁹ For example, arthritis affected an estimated 119,000 people, or 48.1% of those with heart, stroke and vascular disease in the age range of 45-64 years; and 247,300 people, or 24.7% of those with asthma in the age range of 25-64 years. Similarly, there were large proportions of working-age people with chronic diseases who also suffered mental health problems (an estimated 290,400 or 16.3% of those aged 25-64 with arthritis, 165,900 or 16.6% of those aged 25-64 with asthma, and more than 20% of those aged 45-64 years with heart, stroke and vascular disease, and with cancer, respectively).²²⁹

Prevention in the work environment

The “enhancement of psychological wellbeing at work” has been described as one of the “most significant issues of the times”, with UK and US government agencies recognising that mental health problems are among the most frequent of work-related conditions.^{230:94,231} A public health approach suggests that preventive activities should be developed. Price and colleagues have identified three types of health prevention: primary, secondary, and tertiary.²³²

Primary prevention seeks to eliminate causal factors in the development of problems. In a work context, preventive interventions to improve psychological wellbeing seek to change job characteristics that are causally related to psychological distress. Theoretically, opportunities to improve psychological wellbeing might include reducing excessively high workloads, improving poor shift systems, or increasing employees’ control over their work.

Secondary prevention activities aim to reduce the severity or duration of disorders and to avoid the development of more serious, chronic, or disabling conditions. Occupational stress interventions of this type might include stress management training programs, whereby ‘at-risk’ employees are taught a range of strategies that they can then use to cope better with demands of their work.

Tertiary prevention activities deal directly with existing disorders or problems, for example, to limit the extent to which a chronic disorder is disabling or restricting for the individual. Services such as counselling and psychotherapy which are provided within workplaces or the provision of debriefing sessions for staff who have been exposed to extreme, traumatic experiences are examples of tertiary prevention activities in work settings.

Source: Adapted from Reynolds (1997).^{230:94}

The term ‘triple jeopardy’ was used in *Section 1* above to describe the situation of those people whose socio-economic status is low, who are not in the labour force, and whose health is poor. While acknowledging that not all of those who are affected by chronic disease are also not in the labour force and/ or of low socio-economic status, there are good equity reasons for prioritising measures that address those people who are suffering this triple jeopardy.

The emphasis needs to be both on getting people into the labour force, where possible; and enabling and assisting those who are in the labour force, including those with chronic diseases, to remain in the labour force and to work more productively. This literature review has identified a range of studies that inform and can contribute potential ways and means of addressing both these objectives.

References and sources

1. Council of Australian Governments (COAG). Human capital reform: Report by the COAG National Reform Initiative Working Group. Canberra: COAG, 2006.
2. Tennant C. Work-related stress and depressive disorders. *Journal of Psychosomatic Research* 2001; 51(5):697-704.
3. Hakim C. *Work-lifestyle choices in the twentyfirst century*. Oxford: Oxford University Press, 2000.
4. Reich R. *The future of success: Work and life in the new economy*. London: William Heinemann, 2001.
5. Pocock B, van Wanrooy B, Strazzari S, Bridge K. *The work/ life collision: What work is doing to Australians and what to do about it*. Sydney: Federation Press, 2001.
6. Australian Health Ministers' Conference (AHMC). *National health workforce strategic framework*. Sydney: AHMAC, 2004.
7. Productivity Commission. *Australia's health workforce*. Melbourne: Productivity Commission, 2005.
8. Schofield DJ, Passey ME, Earnest A, Gloor IC, Shrestha R. Are we getting healthier as we grow older?: Implications for babyboomer labor force participation. *Annals of the New York Academy of Science* 2007; 1114:230-240.
9. Kendig H. *South Australian Ageing Project*. Adelaide: The Ageing Project, South Australian Health Commission, 1985.
10. National Health Priority Action Council (NHPAC). *National Chronic Disease Strategy*. Canberra: Department of Health and Ageing, 2006.
11. Mathers CD, Schofield DJ. The health consequences of unemployment: The evidence. *Medical Journal of Australia* 1998; 168(4):178-182.
12. Harris A. Chronic disease and labour force participation in Australia: An endogenous multivariate probit analysis of clinical prevalence data. *Centre for Health Economics research papers*. No. 25/08. Melbourne: Monash University, Centre for Health Economics, 2008.
13. Dollard MF, Winefield AH. Mental health: Overemployment, underemployment and healthy jobs. *Australian e-Journal for the Advancement of Mental Health* 2002; 1(3).
14. Korda RJ, Strazdins L, Broom DH, Lim LL. The health of the Australian workforce: 1998-2001. *Australia & New Zealand Journal of Public Health* 2002; 26(4):325-331.
15. Bardana EJ. Occupational asthma. *Journal of Allergy and Clinical Immunology* 2008; 121(2):S408-S411.
16. Malo JL. Future advances in work-related asthma and the impact on occupational health. *Occupational Medicine* 2005; 55(8):606-611.
17. Vandenas O, Henneberger PK. Socioeconomic outcomes in work-exacerbated asthma. *Current Opinion in Allergy and Clinical Immunology* 2007; 7(3):236-241.
18. Dimich-Ward H, Camp PG, Kennedy SM. Gender differences in respiratory symptoms - Does occupation matter? *Environmental Research* 2006; 101(2):175-183.
19. Gun RT, Pratt N, Ryan P, Roder D. Update of mortality and cancer incidence in the Australian petroleum industry cohort. *Occupational and Environmental Medicine* 2006; 63(7):476-481.
20. Gun RT, Pratt NL, Griffith EC, Adams GG, Bisby JA, Robinson KL. Update of a prospective study of mortality and cancer incidence in the Australian petroleum industry. *Occupational and Environmental Medicine* 2004; 61(2):150-156.
21. Bouchardy C, Schuler G, Minder C, Hotz P, Bousquet A, Levi F, et al. Cancer risk by occupation and socioeconomic group among men - a study by The Association of Swiss Cancer Registries. *Scandinavian Journal of Work Environment & Health* 2002; 28(suppl. 1):1-88.
22. Pukkala E, Aspholm R, Auvinen A, Eliasch H, Gundestrup M, Haldorsen T, et al. Cancer incidence among 10,211 airline pilots: a Nordic study. *Aviation Space and Environmental Medicine* 2003; 74(7):699-706.
23. Straif K, Baan R, Grosse Y, Secretan B, El Ghissassi F, Bouvard V, et al. Carcinogenicity of shift-work, painting, and fire-fighting. *Lancet Oncology* 2007; 8(12):1065-1066.
24. Cai L, Kalb G. Health status and labour force participation: Evidence from the HILDA data. Melbourne Institute working paper. No. 4/04. Melbourne: Melbourne Institute of Applied Economic and Social Research, The University of Melbourne, 2004.

25. Dunstan D, Zimmet P, Welborn T, Sicree R, Armstrong T, Atkins R, et al. Diabetes & associated disorders in Australia 2000, the accelerating epidemic: Australian diabetes, obesity & lifestyle report (AusDiab). Melbourne: International Diabetes Institute, 2001.
26. Hunink M, Gazelle G. CT screening: a trade-off of risks, benefits, and costs. *Journal of Clinical Investigations* 2003; 111(11):1612-1619.
27. Musich SA, Schultz AB, Burton WN, Edington DW. Overview of disease management approaches: Implications for corporate-sponsored programs. *Disease Management and Health Outcomes* 2004; 12(5):299-326.
28. Burton W, Morrison A, Maclean R, Ruderman E. Systematic review of studies of productivity loss due to rheumatoid arthritis. *Occupational Medicine* 2006; 56(1):18-27.
29. Musich SA, Napier D, Edington DW. The association of health risks with workers' compensation costs. *Journal of Occupational & Environmental Medicine* 2001; 43(6):534-541.
30. Schultz AB, Lu CF, Barnett TR, Yen LT, McDonald T, Hirschland D, et al. Influence of participation in a worksite health promotion program on disability days. *Journal of Occupational & Environmental Medicine* 2002; 44(8):776-780.
31. Munir F, Yarker J, Haslam C, Long H, Leka S, Griffiths A, et al. Work factors related to psychological and health-related distress among employees with chronic illnesses. *Journal of Occupational Rehabilitation* 2007; 17(2):259-277.
32. Ohta M, Takigami C, Ikeda M. Effect of lifestyle modification on worker's job satisfaction through the collaborative utilization of community-based health promotion program. *International Congress Series* 2006; 1294:123-126.
33. Gemson DH, Commisso R, Fuente J, Newman J, Benson S. Promoting weight loss and blood pressure control at work: Impact of an education and intervention program. *Journal of Occupational & Environmental Medicine* 2008; 50(3):272-281.
34. Schilling J, Faisst K, Lee C-Y, Candinas B, Gutzwiller F. The Check Bus project and its effectiveness on health promotion at work. *Journal of Occupational Health* 2005; 47(2):136-142.
35. Yancey AK, McCarthy WJ, Taylor WC, Merlo A, Gewa C, Weber MD, et al. The Los Angeles Lift Off: A sociocultural environmental change intervention to integrate physical activity into the workplace. *Preventive Medicine* 2004; 38(6):848-856.
36. Higginbotham N, Heading G, McElduff P, Dobson A, Heller R. Reducing coronary heart disease in the Australian Coalfields: Evaluation of a 10-year community intervention. *Social Science & Medicine* 1999; 48(5):683-692.
37. Goetzel RZ, Ozminkowski RJ. The health and cost benefits of work site health-promotion programs. *Annual Review of Public Health* 2008; 29(303-323).
38. Linnan L, Weiner B, Graham A, Emmons K. Manager beliefs regarding worksite health promotion: Findings from the Working Healthy Project 2. *American Journal of Health Promotion* 2007; 21(6):521-528.
39. Mills PR, Kessler RC, Cooper J, Sullivan S. Impact of a health promotion program on employee health risks and work productivity. *American Journal of Health Promotion* 2007; 22(1):45-53.
40. Briner RB. Improving stress assessment: Toward an evidence-based approach to organisational stress interventions. *Journal of Psychosomatic Research* 1997; 43(1):61-71.
41. Noblet A. Building health promoting work settings: Identifying the relationship between work characteristics and occupational stress in Australia. *Health Promotion International* 2003; 18(4):351-359.
42. Noblet A, LaMontagne AD. The role of workplace health promotion in addressing job stress. *Health Promotion International* 2006; 21(4):346-353.
43. Couser GP. Challenges and opportunities for preventing depression in the workplace: A review of the evidence supporting workplace factors and interventions. *Journal of Occupational & Environmental Medicine* 2008; 50(4):411-427.
44. Le Blanc PM, Hox JJ, Schaufeli WB, Taris TW, Peeters MCW. Take care! The evaluation of a team-based burnout intervention program for oncology care providers. *Journal of Applied Psychology* 2007; 92(1):213-227.
45. Fritz C, Sonnentag S. Recovery, health, and job performance: Effects of weekend experiences. *Journal of Occupational Health Psychology* 2005; 10(3):187-199.
46. Iwasaki Y, Mannell RC, Smale BJA, Butcher J. Contributions of leisure participation in predicting stress coping and health among police and emergency response services workers. *Journal of Health Psychology* 2005; 10(1):79-99.

47. Schaufeli WB, Buunk BP. Burnout: An overview of 25 years of research and theorizing. In Schabrac MJ, Winnubst JAM, Cooper CL, eds. *The handbook of work and health psychology*. Chichester, England: John Wiley & Sons, 2002. p. 383-425.
48. Halbesleben JRB, Buckley MR. Burnout in organizational life. *Journal of Management* 2004; 30(6):859-879.
49. Schull MJ, Ferris LE, Tu JV, Hux JE, Redelmeier DA. Problems for clinical judgement: 3. Thinking clearly in an emergency. *Canadian Medical Association Journal* 2001; 164(8):1170-1175.
50. Lim D, Sanderson K, Andrews G. Lost productivity among full-time workers with mental disorders. *The Journal of Mental Health Policy and Economics* 2000; 3(3):139-146.
51. Stewart WF, Ricci JA, Chee E, Hahn SR, Morganstein D. Cost of lost productive work time among US workers with depression. *Journal of the American Medical Association* 2003; 289(23):3135-3144.
52. Levin-Epstein J. *Presenteeism and paid sick days*. Washington, DC: Centre for Law and Social Policy (CLASP). 2005.
53. Munir F, Pryce J, Haslam C, Leka S, Griffiths A. Gender differences in managing chronic illness at work: Exploring predictors for disclosure. *Journal of Vocational Rehabilitation* 2006; 25(3):173-180.
54. Munir F, Jones D, Leka S, Griffiths A. Work limitations and employer adjustments for employees with chronic illness. *International Journal of Rehabilitation Research* 2005; 28(2):111-117.
55. Escorpizo R, Bombardier C, Boonen A, Hazes JMW, Lacaille D, Strand V, et al. Worker productivity outcome measures in arthritis. *Journal of Rheumatology* 2007; 34(6):1372-1380.
56. Adler DA, McLaughlin TJ, Rogers WH, Chang H, Lapitsky L, Lerner D. Job performance deficits due to depression. *American Journal of Psychiatry* 2006; 163(9):1569-1576.
57. Sanderson K, Andrews G. Common mental disorders in the workforce: Recent findings from descriptive and social epidemiology. *Canadian Journal of Psychiatry* 2006; 51(2):63-75.
58. Wang J-L, Afifi TO, Cox B, Sareen, J. Work-family conflict and mental disorders in the United States: Cross-sectional findings from The National Comorbidity Survey. *American Journal of Industrial Medicine* 2007; 50(2):143-149.
59. Lilly MB, Laporte A, Coyte PC. Labor market work and home care's unpaid caregivers: A systematic review of labor force participation rates, predictors of labor market withdrawal, and hours of work. *Milbank Quarterly* 2007; 85(4):641-690.
60. Lyonette C, Yardley L. Predicting mental health outcomes in female working carers: a longitudinal analysis. *Aging & Mental Health* 2006; 10(4):368-377.
61. Parker T, Worringham C, Greig K, Woods S. *Age-related changes in work ability and injury risk in underground and open-cut coal miners*. Brisbane: School of Human Movement Studies, Queensland University of Technology, 2005.
62. Akinci F, Healey BJ, Coyne JS. Improving the health status of US working adults with type 2 diabetes mellitus: A review. *Disease Management and Health Outcomes* 2003; 11(8):489-498.
63. Sullivan PW, Ghushchyan V. Cardiovascular risk factor clusters and employment in the United States. *Value in Health* 2007; 10(suppl. 1):S52-S58.
64. Koopmans PC, Roelen CAM, Grootho JW. Sickness absence due to depressive symptoms. *International Archives of Occupational and Environmental Health* 2008; 81:711-719.
65. Kavanagh T, Yacoub MH, Kennedy J, Austin PC. Return to work after heart transplantation: 12-year follow-up. *The Journal of Heart and Lung Transplantation* 1999; 18(9):846-851.
66. Vijan S, Hayward RA, Langa KM. The impact of diabetes on workforce participation: Results from a national household sample. *Health Services Research* 2004; 39(6 Pt 1):1653-69.
67. Kessler RC, Maclean JR, Petukhova M, Sarawate CA, Short L, Li TT, et al. The effects of rheumatoid arthritis on labor force participation, work performance, and healthcare costs in two workplace samples. *Journal of Occupational & Environmental Medicine* 2008; 50(1):88-98.
68. Shanahan EM, Smith M, Roberts-Thomson L, Esterman A, Ahern M. Influence of rheumatoid arthritis on work participation in Australia. *Internal Medicine Journal* 2008; 38(3):166-173.
69. Landsbergis PA. The changing organization of work and the safety and health of working people: A commentary. *Journal of Occupational and Environmental Medicine* 2003; 45(1):61-72.
70. Dowell AC, Westcott T, McLeod DK, Hamilton S. A survey of job satisfaction, sources of stress and psychological symptoms among New Zealand health professionals. *New Zealand Medical Journal* 2001; 114(1145):540-543.

71. Appleton K, House A, Dowell AC. A survey of job satisfaction, sources of stress and psychological symptoms among general practitioners in Leeds. *British Journal of General Practice* 1998; 48(428):1059-1063.
72. Schattner PL, Coman GJ. The stress of metropolitan general practice. *Medical Journal of Australia* 1998; 169(3):133-137.
73. Willcock S, Daly M, Tennant C, Allard B. Burnout and psychiatric morbidity in new medical graduates. *Medical Journal of Australia* 2004; 181(7):357-360.
74. Bruce CT, Sanger MM, Thomas PS, Petkus JR, Yates DH. Factors affecting female or male consultant stress in an Australian teaching hospital [Letter]. *Medical Journal of Australia* 2003; 179(1):174-175.
75. Leigh JP, Waehrer G, Miller TR, Keenan C. Costs of occupational injury and illness across industries. *Scandinavian Journal of Work Environment & Health* 2004; 30(3):199-205.
76. Mancuso CA, Rincon M. Impact of health literacy on longitudinal asthma outcomes. *Journal of General Internal Medicine* 2006; 21(8):813-817.
77. Munir F, Yarker J, Haslam C. Use of prescribed medication at work in employees with chronic illness. *Occupational Medicine* 2007; 57(7):480-487.
78. Wang J-L. Work stress as a risk factor for major depressive episode(s). *Psychological Medicine* 2005; 35:865-871.
79. Thyen U, Kuhlthau K, Perrin JM. Employment, child care, and mental health of mothers caring for children assisted by technology. *Pediatrics* 1999; 103(6 Pt 1):1235-1242.
80. Thomas C, Benzeval M, Stansfeld SA. Employment transitions and mental health: an analysis from the British Household Panel Survey. *Journal of Epidemiology and Community Health*, 2005; 59(3):243-249.
81. Hirst M. Carer distress: a prospective, population-based study. *Social Science & Medicine* 2005; 61(3):697-708.
82. Danziger SK, Kalil A, Anderson NJ. Human capital, physical health, and mental health of welfare recipients: Co-occurrence and correlates. *Journal of Social Issues* 2000; 56(4):635-654.
83. Butterworth P. The prevalence of mental disorders among income support recipients: An important issue for welfare reform. *Australian and New Zealand Journal of Public Health* 2003; 27(4):441-448.
84. Glover JD, Hetzel DMS, Tennant SK. The socioeconomic gradient and chronic illness and associated risk factors in Australia. *Australia and New Zealand Health Policy* 2004; 1(8).
85. Iwasaki K, Takahashi M, Nakata A. Health problems due to long working hours in Japan: Working hours, workers' compensation (karōshi), and preventive measures. *Industrial health* 2006; 44(4):537-540.
86. Landsbergis PA, Cahill J, Schnall PL. The impact of lean production and related new systems of work organization on worker health. *Journal of Occupational Health Psychology* 1999; 4(2):108-130.
87. Wilkins R. The effects of disability on labour force status in Australia. *Australian Economic Review* 2004; 37(4):359-382.
88. Crotty M, Giles LC, Cameron ID, Brooks PM. Musculoskeletal disability, chronic disease and labour force participation in Australia. *International Journal of Disability, Community & Rehabilitation* 2002; 3(2).
89. Virtanen P, Liukkonen V, Vahtera J, Kivimäki M, Koskenvuo M. Health inequalities in the workforce: The labour market core-periphery structure. *International Journal of Epidemiology* 2003; 32(6):1015-1021.
90. Virtanen P, Vahtera J, Kivimäki M, Pentti J, Ferrie J. Employment security and health. *Journal of Epidemiology & Community Health* 2002; 56(8):569-574.
91. Benavides FG, Benach J, Diez-Roux AV, Roman C. How do types of employment relate to health indicators? Findings from the second European survey on working conditions. *Journal of Epidemiology & Community Health* 2000; 54(7):494-501.
92. Kim IH, Muntaner C, Khang YH, Paek D, Cho SI. The relationship between nonstandard working and mental health in a representative sample of the South Korean population. *Social Science & Medicine* 2006; 63(3):566-574.
93. Burnay N, Kiss P, Malchaire J. Sociability, life satisfaction, and mental health according to age and (un)employment status. *International Congress Series* 2005; 1280:347-352.
94. Ferrie JE, Shipley MJ, Newman K, Stansfeld SA, Marmot MG. Self-reported job insecurity and health in the Whitehall II study: Potential explanations of the relationship. *Social Science & Medicine* 2005; 60(7):1593-1602.
95. Wang J-L. Perceived work stress, imbalance between work and family/personal lives, and mental disorders. *Social Psychiatry and Psychiatric Epidemiology* 2006; 41(7):541-548.

96. Griffiths A. Work design and management: The older worker. *Experimental Aging Research* 1999; 25(4):411-420.
97. Naumanen P. The health promotion of aging workers from the perspective of occupational health professionals. *Public Health Nursing* 2006; 23(1):37-45.
98. Gringart E, Helmes E, Speelman CP. Exploring attitudes toward older workers among Australian employers: An empirical study. *Journal of Aging & Social Policy* 2005; 17(3):85-103.
99. Chapman S, Borland R, Scollo M, Brownson RC, Dominello A, Woodward S. The impact of smoke-free workplaces on declining cigarette consumption in Australia and the United States. *American Journal of Public Health* 1999; 89(7):1018-1023.
100. Bauer E, Hyland A, Li Q, Steger C, Cummings KM. A longitudinal assessment of the impact of smoke-free worksite policies on tobacco use. *American Journal of Public Health* 2005; 95(6):1024-1029.
101. Benach J, Gimeno D, Benavides FG, Martínez JM, Torné Mdel M. Types of employment and health in the European Union: Changes from 1995 to 2000. *European Journal of Public Health* 2004; 14(3):314-21.
102. Earle A, Heymann SJ. What causes job loss among former welfare recipients: The role of family health problems. *Journal of the American Medical Women's Association* 2002; 57(1):5-10.
103. Evans MDR, Kelley J. Trends in women's labour force participation in Australia: 1984-2002. Melbourne Institute working paper. Melbourne: Melbourne Institute of Applied Economic and Social Research, The University of Melbourne, 2004.
104. Kuhlthau KA, Perrin JM. Child health status and parental employment. *Archives of Pediatrics & Adolescent Medicine* 2001; 155(12):1346-1350.
105. Smith LA, Hatcher JL, Wertheimer R. The association of childhood asthma with parental employment and welfare receipt. *Journal of the American Medical Women's Association* 2002; 57(1):11-15.
106. Schmier J, K., Manjunath R, Halpern MT, Jones ML, Thompson K, Diette GB. The impact of inadequately controlled asthma in urban children on quality of life and productivity. *Annals of Allergy Asthma & Immunology* 2007; 98(3):245-251.
107. Strazdins L, Korda RJ, Lim LL, Broom DH, D'Souza RM. Around-the-clock: Parent work schedules and children's well-being in a 24-h economy. *Social Science & Medicine* 2004; 59(7):1517-1527.
108. Wyman PA, Moynihan J, Eberly S, Cox C, Cross W, Jin X, et al. Association of family stress with natural killer cell activity and the frequency of illnesses in children. *Archives of Pediatrics and Adolescent Medicine* 2007; 161(3):228-234.
109. Brown S, Birtwistle J. People with schizophrenia and their families. Fifteen year outcome. *British Journal of Psychiatry* 1998; 173:139-144.
110. Livingston G, Manela M, Katona C. Depression and other psychiatric morbidity in carers of elderly people living at home. *British Medical Journal* 1996; 312(7040):153-156.
111. Ciurej M, Kumar A. Characteristics of mature people not in the labour force. *Australasian Journal on Ageing* 2004; 23(suppl. 1):A18-A20.
112. Jose A, Ravindiran R, Abello R. Health status labour force non-participation nexus: Evidence from pooled NHS data. In *Population and society: Issues, research, policy* [Australian Population Association 12th biennial conference], Canberra, 2004: Australian Population Association. <http://www.apa.org.au/upload/2004-3B_Jose.pdf>
113. Goetzel RZ, Long SR, Ozminkowski RJ, Hawkins K, Wang S, Lynch W. Health, absence, disability, and presenteeism cost estimates of certain physical and mental health conditions affecting U.S. employers. *Journal of Occupational & Environmental Medicine* 2004; 46(4):398-412.
114. Mattke S, Balakrishnan A, Bergamo G, Newberry SJ. A review of methods to measure health-related productivity loss. *American Journal of Managed Care* 2007; 13(4):211-217.
115. Econtech Pty Ltd. Economic modelling of the cost of presenteeism in Australia [Report prepared for Medibank Private], 2007.
116. Australian Bureau of Statistics (ABS). Casual employees. In *Australian social trends*, June 2009. ABS cat. no.4102.0. Canberra: ABS, 2009. p. 18-23.
117. Australian Bureau of Statistics (ABS). Casual employment (Jul, 1999). In *Labour Force, Australia* ABS cat. no.6203.0. Canberra: ABS, 1999.
118. Buchanan J. Paradoxes of significance: Australian casualisation and labour productivity. In *Work interrupted: Casual and insecure employment in Australia* [ACTU, RMIT and The Age Conference], Hotel Sofitel, Melbourne, 2004. Sydney: acirrt, University of Sydney. <<http://www.wrc.simply.com.au/documents/WP93.pdf>>

119. Australian Bureau of Statistics (ABS). Measures of casual employment. In Australian Labour Market Statistics. ABS cat. no.6105.0. Canberra: ABS, 2008.
120. Australian Bureau of Statistics (ABS). Changes in types of employment in Australia, 1992-2003. In Australian Labour Market Statistics. ABS cat. no.6105.0. Canberra: ABS, 2004.
121. Schultz AB, Edington DW. Employee health and presenteeism: A systematic review. *Journal of Occupational Rehabilitation* 2007; 17(3):547-579.
122. Davis K, Collins SR, Doty MM, Ho A, Holmgren A. Health and productivity among U.S. workers. *Issue Brief (Commonwealth Fund)* 2005; 856:1-10.
123. Miller P, Rossiter P, Nuttall D. Demonstrating the economic value of occupational health services. *Occupational Medicine* 2002; 52(8):477-483.
124. Uegaki K, de Bruijne MC, Anema J, R., van der Beek AJ, van Tulder MW, van Mechelen W. Consensus-based finding and recommendations for estimating the costs of health-related productivity loss from a company's perspective. *Scandinavian Journal of Work, Environment and Health* 2007; 33(2):122-130.
125. Gibson TB, Ozminkowski RJ, Goetzel RZ. The effects of prescription drug cost sharing: A review of the evidence. *American Journal of Managed Care* 2005; 11(11):730-740.
126. Goldfarb NI, Weston C, Hartmann CW, Sikirica M, Crawford A, He H, et al. Impact of appropriate pharmaceutical therapy for chronic conditions on direct medical costs and workplace productivity: A review of the literature. *Disease Management* 2004; 7(1):61-75.
127. Wang PS, Beck AL, Berglund P, McKenas DK, Pronk NP, Simon GE, et al. Effects of major depression on moment-in-time work performance. *American Journal of Psychiatry* 2004; 161(10):1885-1891.
128. Hawthorne G, Cheok F, Goldney R, Fisher L. The excess cost of depression in South Australia: A population-based study. *Australian and New Zealand Journal of Psychiatry* 2003; 37(3):362-373.
129. Ozminkowski RJ, Burton WN, Goetzel RZ, Maclean R, Wang SH. The impact of rheumatoid arthritis on medical expenditures, absenteeism, and short-term disability benefits. *Journal of Occupational & Environmental Medicine* 2006; 48(2):135-148.
130. Laplagne P, Glover M, Shomos A. Effects of health and education on labour force participation. [Productivity Commission] Staff Working Paper. Melbourne: Productivity Commission, 2007.
131. O'Brien E. Employers' benefits from workers' health insurance. *Milbank Quarterly* 2003; 81(1):5-43.
132. Prasad M, Wahlqvist P, Shikar R, Shih Y-CT. A review of self-report instruments measuring health-related work productivity: A patient-reported outcomes perspective. *Pharmacoeconomics* 2004; 22(4):225-244.
133. Lofland JH, Pizzi L, Frick KD. A review of health-related workplace productivity loss instruments. *Pharmacoeconomics* 2004; 22(3):165-184.
134. Segal L. Developing a strategy for preventative health: A framework. Centre for Health Economics Research Papers. No. 15/06. Melbourne: Monash University, Centre for Health Economics, 2006.
135. Wang PS, Beck A, Berglund P, Leutzinger JA, Pronk N, Richling D, et al. Chronic medical conditions and work performance in the health and work performance questionnaire calibration surveys. *Journal of Occupational & Environmental Medicine* 2003; 45(12):1303-1311.
136. Burney P, Potts J, Ait-Khaled N, Sepulveda RMD, Zidouni N, Benali R, et al. A multinational study of treatment failures in asthma management. *International Journal of Tuberculosis and Lung Disease*, 12 2008; 1:13-18.
137. Burton WN, Connerty CM, Schultz AB, Chen CY, Edington DW. Bank One's worksite-based asthma disease management program. *Journal of Occupational & Environmental Medicine* 2001; 43(2):75-82.
138. Joshi AV, Madhavan SS, Ambegaonkar A, Smith M, Scott V, Dedhia H. Association of medication adherence with workplace productivity and health-related quality of life in patients with asthma. *Journal of Asthma* 2006; 43(7):521-526.
139. Mancuso CA, Rincon M, Charlson ME. Adverse work outcomes and events attributed to asthma. *American Journal of Industrial Medicine* 2003; 44(3):236-245.
140. Yelin E, Henke J, Katz PP, Eisner MD, Blanc PD. Work dynamics of adults with asthma. *American Journal of Industrial Medicine* 1999; 35(5):472-480.
141. Taylor B, Mannino D, Brown C, Crocker D, Twum-Baah N, Holguin F. Body mass index and asthma severity in the National Asthma Survey. *Thorax* 2008; 63(1):14-20.
142. Vortmann M, Eisner MD. BMI and health status among adults with asthma. *Obesity* 2008; 16:146-152.

143. Sama SR, Milton DK, Hunt PR, Houseman EA, Henneberger PK, Rosiello RA. Case-by-case assessment of adult-onset asthma attributable to occupational exposures among members of a health maintenance organization. *Journal of Occupational & Environmental Medicine* 2006; 48(4):400-407.
144. Ross DJ, Keynes HL, McDonald JC. SWORD '97: Surveillance of work-related and occupational respiratory disease in the UK. *Occupational Medicine* 1998; 48(8):481-485.
145. Mapp CE, Boschetto P, Maestrelli P, Fabbri LM. Occupational asthma. *American Journal of Respiratory and Critical Care Medicine* 2005; 172(3):280-305.
146. Blanc PD, Cisternas M, Smith S, Yelin EH. Asthma, employment status, and disability among adults treated by pulmonary and allergy specialists. *Chest* 1996; 109(3):688-696.
147. American Diabetes Association. Economic costs of diabetes in the U.S. in 2007. *Diabetes Care* 2008; 31(3):596-615.
148. Caro JJ. Lifetime costs of complications resulting from type 2 diabetes in the U.S. *Diabetes Care* 2002; 25(3):476-481.
149. Ramsey S, Summers KH, Leong SA, Birnbaum HG, Kemner JE, Greenberg P. Productivity and medical costs of diabetes in a large employer population. *Diabetes Care* 2002; 25(1):23-29.
150. Tunceli K, Bradley CJ, Nerenz D, Williams K, Pladevall M, Lafata JE. The impact of diabetes on employment and work productivity. *Managed Care Pharmacy Update* 2006; 4(3):3-8.
151. Von Korff M, Ludman E, Katon W, Oliver M, Lin EHB, Rutter C, et al. Work disability among individuals with diabetes. *Diabetes Care* 2005; 28(6):1326-1332.
152. Boyle JP, Honeycutt AA, Narayan KM, Hoerger TJ, Geiss LS, Chen H, et al. Projection of diabetes burden through 2050: Impact of changing demography and disease prevalence in the U.S. *Diabetes Care* 2001; 24(11):1936-1940.
153. Leigh JP, Seavey W, Leistikow B. Estimating the costs of job related arthritis. *Journal of Rheumatology* 2001; 28(7):1647-1654.
154. Kvien TK. Epidemiology and burden of illness of rheumatoid arthritis. *Pharmacoeconomics* 2004; 22(suppl. 1):1-12.
155. Muchmore L, Lynch W, Gardner H, Williamson T, Burke T. Prevalence of arthritis and associated joint disorders in an employed population and the associated healthcare, sick leave, disability, and workers compensation benefit cost and productivity loss for employers. *Journal of Occupational & Environmental Medicine* 2003; 45(4):369-378.
156. Michaud K, Wolfe F. Comorbidities in rheumatoid arthritis. *Clinical Rheumatology* 2007; 21(5):885-906.
157. Bradley CJ, Bednarek HL. Employment patterns of long-term cancer survivors. *Psycho-Oncology* 2002; 11(3):188-198.
158. Taskila-Abrandt T, Pukkala E, Martikainen R, Karjalainen A, Hietanen P. Employment status of Finnish cancer patients in 1997. *Psycho-Oncology* 2005; 14(3):221-226.
159. Taskila T, Lindbohm ML. Factors affecting cancer survivors' employment and work ability. *Acta Oncologica (Sweden)* 2007; 46(4):446-451.
160. Taskila-Abrandt T, Martikainen R, Virtanen SV, Pukkala E, Hietanen P, Lindbohm ML. The impact of education and occupation on the employment status of cancer survivors. *European Journal of Cancer* 2004; 40(16):2488-2493.
161. Gudbergsson SB, Fosså SD, Borgeraas E, Dahl AA. A comparative study of living conditions in cancer patients who have returned to work after curative treatment. *Supportive Care in Cancer* 2006; 14(10):1020-1029.
162. Bradley CJ, Neumark D, Luo ZH, Bednarek H, Schenk M. Employment outcomes of men treated for prostate cancer. *Journal of the National Cancer Institute* 2005; 97(13):958-965.
163. Short PF, Vasey JJ, BeLue R. Work disability associated with cancer survivorship and other chronic conditions. *Psycho-Oncology* 2008; 17(1):91-97.
164. Kessler RC, Greenberg PE, Mickelson KD, Meneades LM, Wang PS. The effects of chronic medical conditions on work loss and work cutback. *Journal of Occupational & Environmental Medicine* 2001; 43(3):218-225.
165. Ness KK, Mertens AC, Hudson MM, Wall MM, Leisenring WM, Oeffinger KC, et al. Limitations on physical performance and daily activities among long-term survivors of childhood cancer. *Annals of Internal Medicine* 2005; 143(9):639-647.

166. Reynolds MW, Frame D, Scheye R, Rose ME, George S, Watson JB, et al. A systematic review of the economic burden of chronic angina. *The American Journal of Managed Care* 2004; 10(11 suppl.):S347-S357.
167. McBurney CR, Eagle KA, Kline-Rogers EM, Cooper JV, Smith DE, Erickson SR. Work-related outcomes after a myocardial infarction. *Pharmacotherapy* 2004; 24(11):1515-1523.
168. Belkic K, Landsbergis PA, Schnall PL, Baker D. Is job strain a major source of cardiovascular disease risk? *Scandinavian Journal of Work, Environment & Health* 2004; 30(2):85-128.
169. Bosma H, Marmot MG, Hemingway H, Nicholson AC, Brunner E, Stansfeld SA. Low job control and risk of coronary heart disease in Whitehall II (prospective cohort) study. *British Medical Journal* 1997; 314(7080):558-565.
170. Kivimaki M, Virtanen M, Elovainio M, Kouvonen A, Vaananen A, Vahtera J. Work stress in the etiology of coronary heart disease - a meta-analysis. *Scandinavian Journal of Work Environment & Health* 2006; 32(6):431-442.
171. Nishiyama K, Johnson JV. Karōshi - death from overwork: Occupational health consequences of Japanese production management. *International Journal of Health Services* 1997; 27(4):625-641.
172. Toivanen S. Job control and the risk of incident stroke in the working population in Sweden. *Scandinavian Journal of Work Environment & Health* 2008; 34(1):40-47.
173. Rose KM, Newman B, Tyroler HA, Szklo M, Arnett D, Srivastava N. Women, employment status, and hypertension: Cross-sectional and prospective findings from the Atherosclerosis Risk in Communities (ARIC) Study. *Annals of Epidemiology* 1999; 9(6):374-382.
174. Collins JJ, Baase CM, Sharda CE, Ozminkowski RJ, Nicholson S, Billotti GM, et al. The assessment of chronic health conditions on work performance, absence and total economic impact for employers. *Journal of Occupational & Environmental Medicine* 2005; 47(6):547-557.
175. Franssen PML, Bultmann U, Kant I, van Amelsvoort LGPM. The association between chronic diseases and fatigue in the working population. *Journal of Psychosomatic Research* 2003; 54(4):339-344.
176. Murphy J. Health promotion. *Economic Roundup* 2005; Winter 2005:13-38.
177. Waghorn G, Chant D. Work performance among Australians with depression and anxiety disorders - A population level second order analysis. *Journal of Nervous and Mental Disease* 2006; 194(12):898-904.
178. Waghorn G, Chant D. Labour force activity by people with depression and anxiety disorders: A population-level second-order analysis. *Acta Psychiatrica Scandinavica* 2005; 112(6):415-424.
179. Olivius G, Ostergren PO, Hanson BS, Lyttkens C. Parental economic stress: Evidence of an overlooked public health risk among Swedish families. *European Journal of Public Health* 2004; 14(4):354-360.
180. Melchior M, Berkman L, Niedhammer I, Zins M, Goldberg M. The mental health effects of multiple work and family demands: A prospective study of psychiatric sickness absence in the French GAZEL study. *Social Psychiatry and Psychiatric Epidemiology* 2007; 42(7):573-582.
181. Chandola T, Martikainen P, Bartley M, Lahelma E, Marmot M, Michikazu S, et al. Does conflict between home and work explain the effect of multiple roles on mental health? A comparative study of Finland, Japan, and the UK. *International Journal of Epidemiology* 2004; 33(4):884-893.
182. Wang J-L, Adair CE, Patten SB. Mental health and related disability among workers: A population-based study. *American Journal of Industrial Medicine* 2006; 49(7):514-522.
183. Diener E, Seligman MEP. Beyond money: Toward an economy of well-being. *Psychological Science in the Public Interest* 2004; 5(1):1-31.
184. Organisation for Economic Co-operation and Development (OECD). *The OECD jobs study - facts, analysis and strategy*. Paris: OECD, 1994.
185. Stansfeld SA, Fuhrer R, Head J, Ferrie J, Shipley M. Work and psychiatric disorder in the Whitehall II Study. *Journal of Psychosomatic Research* 1997; 43(1):73-81.
186. Leigh J, Schnall P. *Costs of occupational circulatory disease. State of the Art Reviews: Occupational Medicine (Philadelphia, PA)* 2000; 15(1):257-267.
187. French J, Caplan R, Harrison R. *The mechanisms of job stress and strain*. Chichester, England: John Wiley & Sons, 1982.
188. Michie S, Williams S. Reducing work related psychological ill health and sickness absence: A systematic literature review. *Occupational and Environmental Medicine* 2003; 60(1):3-9.
189. Sapolsky R. Taming stress. *Scientific American* 2003; 289:86-95.
190. Karasek R, Triantis K, Chaudhry S. Co-worker and supervisor support as moderators of associations between task characteristics and mental strain. *Journal of Occupational Behaviour* 1982; 3:147-160.

191. Karasek RA. Job demands, job decision latitude and mental strain: Implications for job redesign. *Administrative Science Quarterly* 1979; 24(2):285-308.
192. Schnall PL, Baker D. The role of work in cardiovascular disease [Presentation prepared for the DMEC conference]. In 8th Annual National Disability and Absence Management Conference 2003, Newport Beach, CA, 2003. <www.elvinmiradi.com/topik/occupational+stress+and+health.html#>
193. Marmot MG, Bosma H, Hemingway H, Brunner E, Stansfeld S. Contribution of job control and other risk factors to social variations in coronary heart disease incidence. *Lancet* 1997; 350(9073):235-239.
194. Bosma H, Peter R, Siegrist J, Marmot M. Two alternative job stress models and the risk of coronary heart disease. *American Journal of Public Health* 1998; 88(1):68-74.
195. Steptoe A, Kunz-Ebrecht S, Owen N, Feldman PJ, Willemsen G, Kirschbaum C, et al. Socioeconomic status and stress-related biological responses over the working day. *Psychosomatic Medicine* 2003; 65(3):461-470.
196. The Tokyo declaration on work-related stress and health In three postindustrial settings - the European Union, Japan and the United States. 1998.
197. Weinberg A, Creed F. Stress and psychiatric disorder in healthcare professionals and hospital staff. *The Lancet* 2000; 355(9203):533-537.
198. Holmes S. Work-related stress: A brief review. *Journal of the Royal Society of Health* 2001; 121(4):230-235.
199. Maslach C, Jackson SE. Burnout in health professions. In Sanders GS, Suls J, eds. *Social psychology of health and illness*. Hillsdale, NJ: Lawrence Erlbaum Associates, 1982. p. 227-251.
200. Glass D, McKnight JD. Perceived control, depressive symptomatology, and professional burnout: A review of the evidence. *Psychological Health* 1996; 11(1):23-48.
201. Cai L, Kalb G. Health status and labour force participation: Evidence from Australia. *Health Economics* 2006; 15(3):241-261.
202. Landsbergis PA, Schnall PL, Pickering TG, Warren K, Schwartz JE. Life-course exposure to job strain and ambulatory blood pressure in men. *American Journal of Epidemiology* 2003; 157(11):998-1006.
203. McVicar A. Workplace stress in nursing: A literature review. *Journal of Advanced Nursing* 2003; 44(6):633-642.
204. McGlone SJ, Chenoweth IG. Job demands and control as predictors of occupational satisfaction in general practice. *Medical Journal of Australia* 2001; 175(2):88-91.
205. Noblet A, Cooper C, McWilliams J, Rudd A. Wellbeing, job satisfaction and commitment among Australian community health workers: The relationship with working conditions. *Australian Journal of Primary Health* 2007; 13(3):40-48.
206. Dowell AC, McLeod DK, Hamilton S. Job satisfaction, psychological morbidity and job stress among New Zealand general practitioners. *New Zealand Medical Journal* 2000; 113(1113):269-272.
207. Caplan RP. Stress, anxiety, and depression in hospital consultants, general practitioners, and senior health service managers. *British Medical Journal* 1994; 309(6964):1261-1263.
208. Clarke D, Singh R. Life events, stress appraisals, and hospital doctors' mental health. *New Zealand Medical Journal* 2004; 117(1204):8 p.
209. Kapur N, Appleton K, Neal RD. Sources of job satisfaction and psychological distress in GPs and medical house officers. *Family Practice* 1999; 16(6):600-601.
210. Van Ham I, Verhoeven AAH, Groenier KH, Groothoff JW, De Haan J. Job satisfaction among general practitioners: A systematic literature review. *The European Journal of General Practice* 2006; 12(4):174 - 180.
211. Keeley K, Harcourt M. Occupational stress: A study of the New Zealand Reserve Bank. *Research and Practice in Human Resource Management* 2001; 9(2):109-118.
212. Chirikos TN, Nestel G. Occupation, impaired health, and the functional capacity of men to continue working. *Research on Aging* 1989; 11(2):174-205.
213. Ilmarinen JE. Towards a longer and better working life: A challenge of work force ageing. *La Medicina del Lavoro* 2006; 97(2):143-147.
214. Tuomi K. Eleven-year-follow-up of aging workers. *Scandinavian Journal of Work, Environment & Health* 1997; 23(suppl. 1):1-71.
215. Cai L, Kalb G. Health status and labour force status of older working-age Australian men. Melbourne Institute working paper. No. 9/05. Melbourne: Melbourne Institute of Applied Economic and Social Research, The University of Melbourne, 2005.

216. Ilmarinen JE. Aging workers. *Occupational & Environmental Medicine* 2001; 58(8):546-551.
217. Ilmarinen JE. Physical requirements associated with the work of aging workers in the European Union. *Experimental Aging Research* 2002; 28(1):7-23.
218. Holtslag HR, Post MW, van der Werken C, Lindeman E. Return to work after major trauma. *Clinical Rehabilitation* 2007; 21(4):373-383.
219. Chorus AMJ, Miedem HS, Wevers CJ, van der Linden S. Labour force participation among patients with rheumatoid arthritis. *Annals of the Rheumatic Diseases* 2000; 59(7):549-554.
220. Ilmarinen JE. Ageing workers in the European Union: Status and promotion of work ability, employability and employment. Vantaa, Finland: Finnish Institute of Occupational Health, 1999.
221. Tuomi K, Huuhtanen P, Nykyri E, Ilmarinen J. Promotion of work ability, the quality of work and retirement. *Occupational Medicine* 2001; 51(5):318-324.
222. EQUAL - European Social Fund. A European Age Management Network: The way forward? Preliminary research and analysis (prepared by GHK Consulting Ltd for the European Commission). Brussels: European Commission, 2007.
223. JobWise. JobWise. Australian Government. [An Australian Government site dedicated to promoting mature age employment.]. Viewed 12 March 2008 <www.jobwise.gov.au>
224. Rodriguez E. Marginal employment and health in Britain and Germany: Does unstable employment predict health? *Social Science & Medicine* 2002; 55(6):963-979.
225. Aittomaki A, Lahelma E, Roos E, Leino-Arjas P, Martikainen P. Gender differences in the association of age with physical workload and functioning. *Occupational & Environmental Medicine* 2005; 62(2):95-100.
226. Bonhomme JJ. Men's health: Impact on women, children and society. *Journal of Men's Health and Gender* 2007; 4(2):124-130.
227. Cady LD, Bischoff DP, O'Connell ER, Thomas PC, Allan JH. Strength and fitness and subsequent back injuries in firefighters. *Journal of Occupational Medicine* 1979; 21:269-272.
228. Costa G, Sartori S, Akerstedt T. Influence of flexibility and variability of working hours on health and well-being. *Chronobiology International* 2006; 23(6):1125-1137.
229. Australian Bureau of Statistics (ABS). National Health Survey: Summary of results, Australia - 2004-05. ABS cat. no. 4364.0. Canberra: ABS, 2006.
230. Reynolds S. Psychological well-being at work: Is prevention better than cure? *Journal of Psychosomatic Research* 1997; 43(1):93-102.
231. Keita GP, Hurrell JJ. Introduction. In Keita GP, Hurrell JJ, eds. *Job stress in a changing workforce: Investigating gender, diversity and family issues*. Washington, DC: American Psychological Association, 1994. p. xiii-xix.
232. Price RH, Bader BC, Ketterer RF. Prevention in community mental health: The state of the art. In Price RH, Ketterer RF, Bader BC, Monahan J, eds. *Prevention in community mental health: Research, policy and practice*. Beverly Hills, CA: Sage, 1980. p. 9-20.
233. Organisation for Economic Co-operation and Development (OECD). *Glossary of statistical terms*. Geneva: OECD, 2009.
234. Australian Bureau of Statistics (ABS). *Labour statistics: Concepts, sources and methods*. ABS cat. no. 6102.0.55.001. Canberra: ABS, 2007.
235. Broom DH, D'Souza RM, Strazdins L, Butterworth P, Parslow R, Rodgers B. The lesser evil: Bad jobs or unemployment? A survey of mid-aged Australians. *Social Science & Medicine* 2006; 63(3):575-586.
236. Australian Bureau of Statistics (ABS). National Aboriginal and Torres Strait Islander Social Survey, 2002. ABS cat. no. 4714.0. Canberra: ABS, 2004.
237. Australian Bureau of Statistics (ABS). National Aboriginal and Torres Strait Islander Social Survey, 2008. ABS cat. no. 4714.0. Canberra: ABS, 2009.
238. Australian Bureau of Statistics (ABS). National Aboriginal and Torres Strait Islander Social Survey: Users' guide, 2008. ABS cat. no. 4720.0. Canberra: ABS, 2010.
239. Australian Bureau of Statistics (ABS). National Health Survey: Users' guide - electronic publication, 2004-05. 2006. ABS: Canberra.
<<http://www.abs.gov.au/AUSSTATS/abs@.nsf/allprimarymainfeatures/E88508137A2912FECA25762E0017C550?opendocument>>

Glossary

Chronic diseases (in scope)

The following specific chronic diseases and conditions were identified as in scope: asthma; cancer; diabetes; heart, stroke and vascular disease; osteoarthritis, rheumatoid arthritis and osteoporosis¹⁰; and mental health conditions.

Chronic health conditions

Chronic health conditions are those where the onset is usually insidious, with a gradual progression of symptoms or with problems of a more permanent nature resulting as sequels to a series of acute conditions. Daily activities may or may not be restricted during any given period although there is usually a more general series of limitations of activities.²³³

Economically active population

Commonly, surveys aimed at measuring the economically active population are restricted to the civilian population (other than those living in institutions) above a specified minimum age.²³⁴

Endogenous

The concept of endogeneity is particularly relevant in the context of time series analysis of causal processes. It is common for some factors within a causal system to be dependent for their value in period n on the values of other factors in the causal system in period $n-1$. Suppose that the level of pest infestation is independent of all other factors within a given period, but is influenced by the level of rainfall and fertilizer in the preceding period. In this instance it would be correct to say that infestation is exogenous within the period, but endogenous over time.

Exogenous

Exogenous (or exogeneous) (from the Greek words 'exo' and 'gen', meaning 'outside' and 'production') refers to an action or object coming from outside a system. It is the opposite of endogenous, something generated from within the system. In an economic model, an exogenous change is one that comes from outside the model and is unexplained by the model. For example, in the simple supply and demand model, a change in consumer tastes or preferences is unexplained by the model and also leads to endogenous changes in demand that lead to changes in the equilibrium price. Put another way, an exogenous change involves an alteration of a variable that is autonomous, i.e., unaffected by the workings of the model. In linear regression, it means that the variable is independent of all other response values.

Labour force participation

A participant in the labour force is a person aged 15 years or over, and who is either employed or unemployed (seeking and available for employment).

Labour productivity

Labour productivity is defined as output per unit of labour input.²³³ Economic growth in an economy or a sector can be ascribed either to increased employment or to more effective work by those who are employed. The latter can be described through statistics on labour productivity. The driving forces behind improvements in labour productivity are the accumulation of machinery and equipment, improvements in organisation as well as physical and institutional

infrastructures, improved health and skills of workers (“human capital”) and the generation of new technology. Labour productivity estimates can:

- serve to develop and monitor the effects of labour market policies. For example, high labour productivity is often associated with high levels or particular types of human capital, indicating priorities for specific education and training policies;
- be used to understand the effects of wage settlements on rates of inflation or to ensure that such settlements will compensate workers for realised productivity improvements; and
- contribute to the understanding of how labour market performance affects living standards.

Multivariate

Pertaining to any analytical procedure involving two or more variables.

Univariate

Having or having to do with a single variable.

Shortened forms

ABS	Australian Bureau of Statistics	NATSISS	National Aboriginal and Torres Strait Islander Social Survey
ALSWH	Women's Health Australia, the Australian Longitudinal Study on Women's Health	NCDS	National Chronic Disease Strategy
AQoL	Assessment of Quality of Life	NHS	National Health Survey
BP	Blood pressure	NILF	Not in the labour force
CI	Confidence interval	NMDS	National Minimum Data Set
CIDI	Composite International Diagnostic Interview	OA	Occupational asthma
CLBP	Chronic low back pain	OECD	Organisation for Economic Co-operation and Development
COAG	Council of Australian Governments	OHS	Occupational health service
DoHA	Australian Government Department of Health and Ageing	OR	Odds ratio
DSM III-R	Diagnostic and Statistical Manual 3rd edition	QIDS	Quick Inventory of Depressive Symptomatology
EU	European Union	QoL	Quality of Life
GDP	Gross Domestic Product	RA	Rheumatoid arthritis
GHQ	General Health Questionnaire	ROI	Return on investment
GP	General Practitioner	SD	Standard deviation
GSS	General Social Survey	SDAC	Survey of Ageing, Disability and Carers
HAQ	Health Assessment Questionnaire	SES	Socio-economic status
HILDA	Household, Income and Labour Dynamics in Australia (HILDA) Survey, the	SF-36	Medical Outcomes Study Short-Form 36
HIV	Human immunodeficiency virus	SMHWB	National Survey of Mental Health and Wellbeing
HPQ	Health and Work Performance Questionnaire,	WFC	Work-family conflict
ICD	International Statistical Classification of Diseases and Related Health Problems	WHO	World Health Organization
ICF	International Classification of Functioning, Disability and Health	WHP	Workplace/work site health promotion
MBI	Maslach Burnout Inventory	WLQ	Work Limitations Questionnaire
NATSIHS	National Aboriginal and Torres Strait Islander Health Survey	WPAI	Work Productivity and Activity Impairment Questionnaire
		WPQ	WHO Health and Productivity Questionnaire

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Appendix A: Literature review search strategy and methods

The search strategy employed was to search major databases through Web of Science, Medline, and other identified gateways; to include on-line searching (e.g., using Google); and to employ snowballing (through reference follow up) to extend the search reach.

The search strategy identified material identified by the conjunction of the following search terms:

health status

AND/ OR

(chronic disease* OR chronic illness OR chronic condition OR noncommunicable disease*)

AND/OR

(asthma OR cancer OR diabetes OR heart disease* OR stroke OR *vascular disease* OR osteoarthritis OR rheumatoid arthritis OR osteoporosis OR mental health OR depression).

AND

(labo* force OR employ* OR work) AND (productivity AND/OR participation).

Searches were made in the following databases and indexed collections:

- Scopus - billed as “the largest single abstract and citation database of the research literature” produced 175 articles in peer reviewed journals plus 78,497 on the web – refined down to 278 by restriction to those including “labour force participation” OR “labour force productivity” AND “Australia” in the search terms.
- ISI Web of Knowledge using “All databases” – includes: Web of Science® (1980-present); Current Contents Connect® (1998-present); CAB Abstracts® (1910-present); MEDLINE® (1950-present); BIOSIS Previews® (1980-present); Web Citation Index (1936-2005); and Journal Citation Reports® (1999-2006) produced more than 200 items with the additional of snowballing techniques.
- PubMed produced six articles, with additional articles located by reference snowballing.

A time limit of the last ten years (1998 to date) was used. It was noticeable that the majority of the findings were recent with the majority occurring in the last five years. Over this period there has been an increased research interest in the area, resulting in a slowly increasing numbers of articles. A selection of key Australian studies identified in relation to the relationship of health status with labour force productivity and participation, particularly with regard to chronic disease is in *Appendix E*. The focus on chronic disease is more recent; in Australia especially, there were few data sources that could provide this level of detail, and these data sources remained largely unanalysed to date.

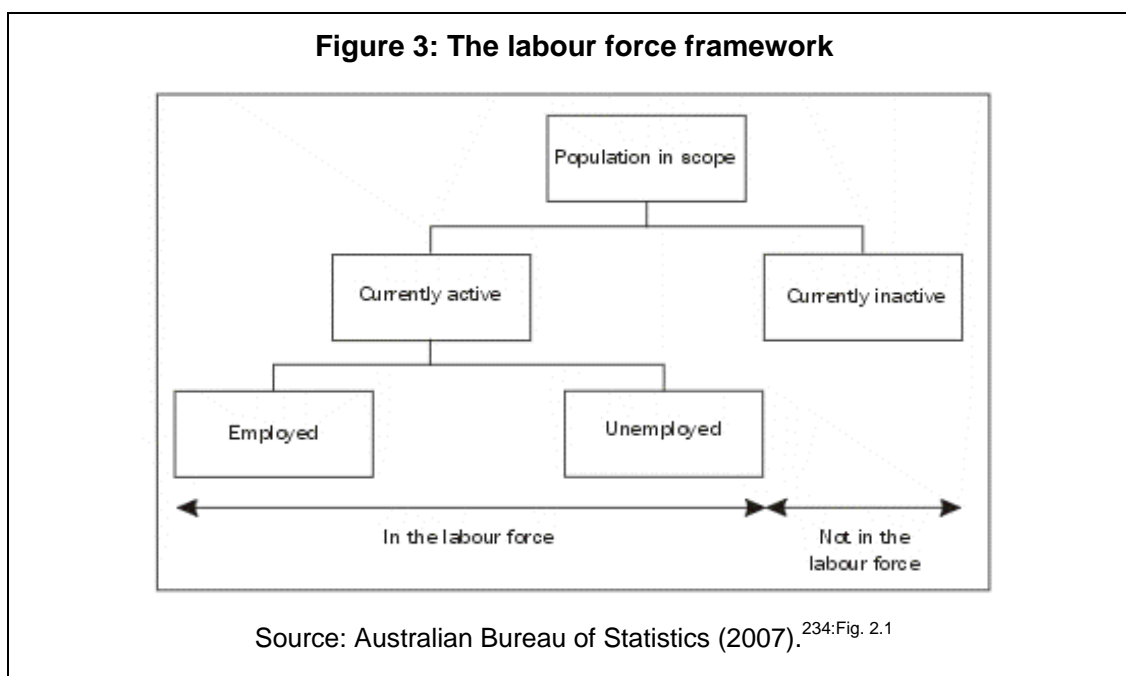
Material identified was analysed for inclusion and relevance to: interventions (whether, and what type of interventions were evaluated or discussed, e.g., worksite health promotion programs, pharmaceutical treatment); chronic diseases (chronic diseases identified as in scope); risk factors (and associated determinants related to the chronic diseases in scope); work-related (labour force participation and productivity, including absenteeism, presenteeism and variant concepts, employment transitions, etc.); costs (direct or indirect); sex, age, education levels and gendered roles (where these were a focus); measures (particular or general measures used, e.g., prevalence estimates, SF-36, Health and Work Performance Questionnaire); country (e.g., Australia, US); and finally, policy and/or research agenda relevance (assessment particularly of high relevance, or any other notes or comments on the usefulness of the material).

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Appendix B: The labour force framework (ABS)

The currently economically active population is also referred to as the labour force. The labour force is conceptually equivalent to the labour supply available for the production of economic goods and services in a given short reference period. The labour force is the most widely used measure of the economically active population. The term 'labour force' as defined in the international standards is associated with a particular approach to the measurement of employment and unemployment. Essentially this approach is the categorisation of people according to their activities during a short reference period using a specific set of priority rules.

The labour force framework classifies the in-scope population into three mutually exclusive categories, at a given point in time: employed; unemployed; and not in the labour force. The employed and unemployed categories together make up the labour force which gives a measure of the number of people contributing to, or willing to contribute to, the supply of labour at that time. The third category (not in the labour force) represents the currently inactive population. Figure 3 illustrates these concepts.



The labour force framework includes rules for sorting the population into the three basic categories. These rules are applied in population surveys through three steps. The first involves identifying the in-scope population. The second involves identifying, within the in-scope population, those people who are engaged in economic activity as defined - either at work or temporarily absent from work. The third step involves identifying, among the remaining people, those people who were actively seeking and available for work, or who were not seeking work because they were waiting to commence a job that they had already found. The labour force framework classifies people identified in the second step as employed, and those identified in the third step as unemployed. The residual population is classified as 'not in the labour force'.

The labour force framework rules have the following features:

- the activity principle, which is used to classify the population into one of the three basic categories in the labour force framework
- a set of priority rules, which ensure that each person is classified into only one of the three basic categories

- a short reference period to reflect the labour supply situation at a specified point in time.

Extensions to the labour force framework

The basic framework as outlined above can be extended to identify various sub-groups of employed (e.g., underemployed, full-time and part-time workers, and self-employed people), unemployed (e.g., long-term unemployed, youth), and people not in the labour force (e.g., people marginally attached to the labour force, discouraged job seekers).

Source: Australian Bureau of Statistics (ABS). Labour statistics: Concepts, sources and methods. ABS cat. no. 6102.0.55.001. Canberra: ABS, 2007, paras 2.13 to 2.15, 2.24, & Fig. 2.1 adapted.

Appendix C: Australian data sources

The main data sources in Australia are the longitudinal surveys:

- the Household, Income and Labour Dynamics in Australia (HILDA) Survey; and
- the Australian Longitudinal Study on Women's Health (ALSWH).

Single year (or pooled) data is available from ABS cross-sectional survey programs which include:

- the National Health Survey (NHS);
- the Survey of Ageing, Disability and Carers (SDAC);
- the General Social Survey (GSS); and
- the National Survey of Mental Health and Wellbeing (SMHWB).

The literature review did not identify any studies that drew on data from the Census of Population and Housing, or the Household Expenditure or Labour Force Surveys, probably because they lack any detailed information on chronic diseases.

A few specialist (non-national) data collections were used for the source data for studies (e.g., the Personality and Total Health (PATH) Through Life Project – a longitudinal community survey of 7,485 people aged 20-24, 40-44 and 60-64 years in the ACT & Queanbeyan, NSW, with each cohort studied every four years for 20 years²³⁵).

Characteristics of available Australian data sources that could sustain analytical work are shown in Table 3.

Note that, although not described in Table 3, data sources could also include:

- the National Aboriginal and Torres Strait Islander Social Survey (NATSISS), with 9,359 Indigenous persons, or about 1 in 30 of the total Indigenous population aged 15 years and over responding in 2002 (the survey also contains some information on children in households) and 7,823 adults responding in 2008.²³⁶⁻²³⁸ Health information content includes health risk (smoking, alcohol consumption, substance use), and some topics are in common with the GSS.

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Table 3: Details of the major data sources available for Australian studies

Data source	Mode	Sample size	Date of collection	Response rate	Coverage	Usefulness
Census of Population and Housing - ABS	Paper & pencil self-complete or (from 2006) computer self-complete (over Internet).	All persons in all dwellings in Australia on Census night.	Every five years since 1961 2006, 2001, 1996, etc.	Census enumeration: 2006: 97.3% 2001: 98.2%	Census of all persons and all dwellings in Australia on Census night.	2006: 'Core Activity Need for Assistance' variable may be of use: developed to measure the no. of people with a profound/ severe disability defined as needing help or assistance in one or more of the three core activity areas of self-care, mobility & communication because of a disability, long term health condition (lasting six months or more), or old age.
General Social Survey (GSS) – ABS See also notes on the NATSISS, above table.	Personal interviews using a Computer Assisted Interviewing (CAI) questionnaire.	2006: fully/ adequately responding households 13,375; 15,307 persons. 2002: fully/ adequately responding households 15,500; 14,503 persons.	Every four years 2006, 2002,	2006: fully/ adequately responding households 13,375 out of 17,700 possible dwellings (75.6%). 2002: fully/ adequately responding households ~15,500 out of 19,500 possible dwellings.	Australia People aged 18 years & over, in private dwellings in non-remote parts of Australia.	Some health and disability content as well as employment, education, income & other personal and household characteristics.
Household, Income and Labour Dynamics in Australia (HILDA) Survey, the - Melbourne Institute	Two part questionnaire: (1) face-to-face interviewer-completed and (2) self-completed, mail-back/ interviewer collected (SCQ). Some telephone interviews (up to 6.5% by Wave 5) where respondents have moved out of the 488 sampled areas.	At Wave 5, 9,311 persons had been interviewed in all waves. 2001 (Wave 1): >7,500 households (6,872 fully and 810 partially responding), 13,969 eligible adults completed the Wave 1 survey.	Funded for 12 waves of data collection: 2007, 2006, 2005, 2004, 2003, 2002, 2001. Data from 2001-2006 (Waves 1 to 6) released February 2008.	2005 (Wave 5): household response rate 78.0%; person response rates: 94.4% of respondents from Wave 4, 14.7% of non-respondents from Wave 4, 74.6% of those aged 15 years old by 30 June previous, & 81.7% of new entrants to participating households. 2001 (Wave 1): household response rate 66%; person response	Coverage based on the ABS Labour Force Supplementary Survey: people in private dwellings in non-remote parts of Australia. This household-based panel survey tracks continuing members aged 15+ years. There are probably sufficient respondents (>750) with the following long-term conditions in Wave 3 for analysis:	Good labour force data including on employment transitions, some health data (varying by Wave & including K10 in Wave 7). SCQ includes health status (SF-36); 'lifestyle behaviours': smoking, exercise & alcohol consumption; social interaction & support; time use; life events; financial stress; & work-family balance. K10 incl. in Wave 7.

Data source	Mode	Sample size	Date of collection	Response rate	Coverage	Usefulness
				rate 92.3%.	asthma, arthritis and high blood pressure.	
Labour Force Survey - ABS	CAPI for first in series, then CATI if mode preferred, otherwise remains CAPI. Panel of households at the sample location.	~30,000 households	Monthly since 1978, Annual Supplementary Survey.	2006-07: 97%, 2005-06: 96%	Australia People aged 15-65 years, in private dwellings in non-remote parts of Australia.	Includes question: What was the main reason stopped working in job/business? with 'Own ill health or injury' as a response.
National Aboriginal and Torres Strait Islander Health Survey (NATSIHS) 2004-05 - ABS	CAPI	2004-05: 10,439 Indigenous Australians	Every 6 years 2004-05, 2001 (small additional sample of NHS),	2004-05: ~85% of in-scope households for the remote community area component; for other areas, ~83%. In non-remote areas, response for the substance use questionnaire was 78%. Response for the women's health questionnaire was 85%.	Indigenous Australians in Private dwellings All ages	Major source of health data.
National Health Survey (NHS) - ABS	CAPI since 2004-05. PAPI from 1989-90 to 2001.	2007-08: 20,788 persons. 2004-05: 6,415 children & 19,501 adults. 2001: 4,467 children 0-6 yrs, 4,478 children 7-17 yrs & 17,918 adults.	Varies (triennial from 2001): 2007-08, 2004-05, 2001, 1995, 1989-90,	2007-08: 90.6% fully/adequately responding households. 2004-05: 89.4% fully/adequately responding households. 2001: 92% fully responding households.	Australia Private households All ages. Excludes very remote areas.	Major source of health data with good data on chronic diseases and conditions, and data on employment and labour force status gained from short forms of the questions used in the Labour Force Survey, which see.
National Survey of Mental Health and Wellbeing (SMHWB) - ABS	CAPI	2007: 8,841 participants. 1997: 13,624 households; 10,641 fully responding participants	2007, 1997.	2007: 59.7% fully responding participants. 1997: 78% fully responding participants.	2007: Australian usual residents as above, aged between 16 and 85 years. 1997: Australian usual residents (including Australian military personnel) aged 18 years and over living in private dwellings. All States & Territories excl. very remote areas.	Good mental health data, previous use for population prevalence estimates.

Data source	Mode	Sample size	Date of collection	Response rate	Coverage	Usefulness
Survey of Ageing, Disability and Carers (SDAC) - ABS	2 components: a) household component CAPI from 1998 - PAPI before 1998 b) cared accommodation component - 1993, 1998, 2003 mail out to establishments - 1981, 1988 PAPI	2003: 36,241 persons for household component 5,145 persons for cared accommodation component	Every 5-6 years 2003, 1998, 1993, 1988, 1981.	2003 89% fully responding household component 92% cared accommodation component	Australia excluding NT remote areas Private and non-private dwellings All ages	Good data on working age people with a disability; major source of information on carers.
Women's Health Australia, the Australian Longitudinal Study on Women's Health (ALSWH) – University of Newcastle*	mailback questionnaire; sub-studies can employ telephone interviewing.	2004-06 (S4): 27,208 female adults in 3 age cohorts: 9,145 Younger (28-33 yrs), 10,905 Mid-age (53-58) & 7,158 Older (79-84). 1996 (S1): >40,000 fully responding: 14,247 Younger, 13,716 Mid-age & 12,432 Older.	longitudinal 20 year follow up from Survey 1 (S1) in 1996; age cohorts sequentially surveyed on a rolling 3-year basis: 1998-2000 (S2), 2002-03 (S3), 2004-06 (S4), 2007-09 (S5), 2010-12 (S6), 2013-15 (S7).	retention rate 2004-06 (S4): 77.6% overall; Younger 67.5%; Mid-age 84.0% & Older 83.9%. 1996 (S1): initial response estimated at >40% overall; Younger 41-42%, Mid-age 53-56% & Older 27-40%.	Australia adult females registered with Medicare, in 3 age cohorts in 1996: Younger 18-23 yrs, Mid-age 45-50 & Older 70-75.	Women only. Good health and labour force data including on employment transitions over time.

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Appendix D: ABS National Health Survey data on employment and labour force status

The ABS National Health Survey includes data on employment and labour force status that were collected using short-form versions of the same questions used in the ABS Monthly Labour Force Survey (use of short-forms may result in small differences in the classification of labour force status and full-time/ part-time employment).

Data are available for the following items^{239:132-135}:

Labour force status (employed, unemployed or not in the labour force) further categorised as:

- employed full-time [usually work 35 hours or more a week (in all jobs)];
- employed part-time [usually worked less than 35 hours a week (in all jobs)];
- unemployed looking for full-time work;
- unemployed looking for part-time work; and
- not in the labour force.

Status in employment – four categories available:

- **Employee:** A person who works for a public or private employer and receives remuneration in wages, salary, a retainer fee by their employer while working on a commission basis, tips, piece-rates or payment in kind, or a person who operates his or her own incorporated enterprise with or without hiring employees;
- **Employer:** A person who operates his or her own unincorporated economic enterprise or engages independently in a profession or trade, and hires one or more employees;
- **Own Account Worker:** A person who operates his or her own unincorporated economic enterprise or engages independently in a profession or trade and hires no employees; and
- **Contributing Family Worker:** A person who works without pay in an economic enterprise operated by a relative.

Working arrangements - working or payment arrangements of the respondent in their current main job:

- unpaid voluntary work;
- contractor/sub-contractor;
- own business/partnership;
- commission only;
- commission with retainer;
- family business without pay;
- payment in kind;
- paid by piece/item produced;
- wage/salary earner; and
- other.

Occupation – classified at the full four-digit level of the Australian Standard Classification of Occupations (ASCO) but for most purposes classified to the eight major groups:

- managers and administrators;
- professionals;
- paraprofessionals;
- tradespersons;
- clerks;
- salespersons and personal service workers;
- plant and machine operators and drivers; and
- labourers and related workers.

Industry of employment - classified to the 3 digit “Group” level of the Australia and New Zealand Standard Industrial Classification (ANZSIC) (1993 edition), but for most purposes classification at the 17 Divisions is the most detailed suitable level:

- Agriculture, Forestry and Fishing;
- Mining;
- Manufacturing;
- Electricity, Gas and Water Supply;
- Construction;
- Wholesale Trade;
- Retail Trade;
- Accommodation, Cafes and Restaurants;
- Transport and Storage;
- Communication Services;
- Finance and Insurance;
- Property and Business Services;
- Government Administration and Defence;
- Education;
- Health and Community Services;
- Cultural and Recreational Services; and
- Personal and Other Services.

Industry sector: Government, Private or Australian Defence Forces.

Hours worked - hours usually worked (in all jobs) per week by persons currently employed, grouped for standard outputs:

- No hours or less than 1 hour,
- 1-15 hours,
- 16-24 hours,
- 25-34 hours,
- 35-39 hours,

- 40 hours,
- 41–48 hours, and
- 49 hours or more.

Type of shift work - persons who reported doing any shift work in their main job, in the four weeks prior to interview. Categories available are:

- Rotating shift which changes periodically,
- Regular evening, night or graveyard shift,
- Regular morning shift,
- Regular afternoon shift,
- Irregular shift,
- Split shift (2 distinct periods per day),
- On call, and
- Other.

Duration of unemployment - derived for persons classified as unemployed at the time of the survey. Long term unemployment is defined as unemployment for a period of 52 weeks or more. Standard output periods are grouped as follows:

- Less than 4 weeks,
- 4 to less than 8 weeks,
- 8 to less than 13 weeks,
- 13 to less than 26 weeks,
- 26 to less than 52 weeks, and
- 52 weeks or more.

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Appendix E: Key Australian studies

A selection of key Australian studies on the relationship of health status with labour force productivity and participation, particularly with regard to chronic disease, are summarised below.

The summaries in Table are set out as follows:

- Publication details and description;
- Analytical methodology used in the study;
- Source data - details of the data source analysed in the study; and
- Other details and comment which includes notes on (where relevant):
 - ◆ interventions;
 - ◆ chronic disease/s (CD);
 - ◆ risk factor/s (RF);
 - ◆ labour force participation/ productivity/ working conditions etc. (LF);
 - ◆ costs (direct, indirect, etc.);
 - ◆ measures or instruments used in the study;
 - ◆ age-sex-SES-education and any other important variables that were examined;
 - ◆ country; and
 - ◆ final notes that may include policy/ research relevance.

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Table 4: Summary details of selected Australian studies

Publication details and description	Analytical methodology	Source data	Other details
<p>Broom DH, D'Souza RM, Strazdins L, Butterworth P, Parslow R, Rodgers B 2006.</p> <p>The lesser evil: Bad jobs or unemployment? A survey of mid-aged Australians. <i>Social Science & Medicine</i>, 63(3):575-586.</p> <p>Paid work is related to health in complex ways, posing both risks and benefits. Unemployment is associated with poor health, but some jobs may still be worse than no job at all. This research investigated that possibility using cross-sectional survey data from Australians aged 40-44 years (n=2,497). Health measures were depression, physical health, self-rated health, and general practitioner visits.</p> <p>Employees were classified according to their job quality (strain, perceived job insecurity and marketability). Employee health was compared to people who were unemployed, and to people who were not in the labour force.</p> <p>Study found that unemployed people reported worse health when compared to all employees. These results confirm the widespread finding of health disadvantage associated with unemployment. However, distinguishing in terms of employee's job quality revealed a more complex pattern: not all working respondents were better off; the health benefits of employment were associated with job quality. Poor quality jobs (characterised by insecurity, low marketability and job strain) were associated with worse health when compared to jobs with fewer or no stressors. Furthermore, people in jobs with three or more of the psychosocial stressors report health that is no better than the unemployed. These findings challenge the assumption that any job is better for health than no job at all, suggesting instead that the quality of work tempers the health benefits of employment. The study established the presence of this pattern cross-sectionally, laying the foundation for longitudinal analyses where causal relationships can be investigated. Health selection is an alternative explanation of the present findings, although other studies suggest that it only partly explains how work and unemployment are related to health.</p> <p>In conclusion, paid work confers health benefits, but poor quality jobs which combine several psychosocial stressors could be as bad for health as being unemployed. Thus, workplace and industrial relations policies that diminish worker autonomy and security may generate short-term economic gains, but place longer-term burdens on the health of employees and the health-care system.</p> <p>The authors note in the discussion that: "the circumstances of the unemployed vary between societies, and jobless people may be more vulnerable to poor health in a regime with a residualist welfare safety net. In those societies (and for certain health measures), it may be that any job is better than no job; elsewhere, unemployment may sometimes be the lesser evil. If this explanation is plausible, Australia's current move toward such a residualist regime may afford opportunities for future research to chart the impact of the change on the health of the Australian labour force" (p. 585).</p>	<p>Analysis involved three steps: (1) compared the health of unemployed, and people not in the labour force, with that of all employees to test Hypothesis 1 that employed people would report better health. (2) examined health of employees according to job quality (0,1,2 or 3 adverse work conditions) to investigate whether people in better jobs report better health (Hypothesis 2); and (3) focused on health of unemployed and employees across four categories of job quality, i.e., on the employment continuum (Hypothesis 3).</p> <p>Analyses compared the associations with health variables, using the optimal job category (employed with no adverse work conditions) as the reference group to test the 3rd hypothesis that compared with people in optimal jobs, those who were unemployed and those in low-quality jobs would experience equally poor health. To permit adjustment for sociodemographic and confounder variables, multivariate logistic analyses were performed and odds ratios (ORs) and 95% CI were used to estimate strength of the association between employment continuum categories and health measures.</p> <p>A wide range of health conditions are associated with work circumstances - this study included 4 measures: self-reported mental health (depression), physical health, overall health (self-rated health), and linked data health service utilisation records (visits to a GP). Depression was assessed using Goldberg's nine item scale dichotomise SF-12 Physical Health Summary Scale is derived from a 12-item subset of the SF-36 assesses physical functioning, pain and impairment.</p>	<p>Data source was the first wave of interviews from the 40-44 year old sample of the Personality and Total Health (PATH) Through Life Project (the only cohort for whom work conditions were assessed). PATH is a community survey of 7,485 people aged 20-24, 40-44 and 60-64 years, in the ACT & Queanbeyan, Australia. Each cohort will be studied every four years for 20 years. The sampling frame was the Australian Electoral Roll; at recruitment in 2000, letters were sent to 9,033 people aged 40-49, inviting participation of people 40-44 years; 2,530 (64.6% of those identified and in scope) were interviewed yielding a final sample of 2,497. Respondents completed the main questionnaire themselves (mostly at home) using a handheld computer.</p>	<p>CD: health</p> <p>RF: poor quality jobs, unemployment</p> <p>LF: participation: employed-unemployed-NILF; job quality (strain, perceived job insecurity & marketability) & effect on health</p> <p>Measures: self-reported mental health (depression), physical health (SF-12), overall health (self-rated health), and linked data health service utilisation records (visits to a GP).</p> <p>Australia</p> <p>Relates health to job quality not just employment.</p>

Publication details and description	Analytical methodology	Source data	Other details
<p>Butterworth P 2003.</p> <p>The prevalence of mental disorders among income support recipients: An important issue for welfare reform. Australian and New Zealand Journal of Public Health, 27(4):441-448.</p> <p>Study objective was to estimate the prevalence of mental disorders and psychological distress among Australian income support recipients.</p> <p>One-quarter of all income support recipients had experienced substantial levels of psychological distress during the previous four weeks and almost one in three had experienced a diagnosable mental disorder during the previous 12 months. Around 45% of unpartnered women with children in receipt of income support payments were identified with a mental disorder. In contrast, around 10% of people not receiving welfare reported substantial psychological distress and 19% had a diagnosable mental disorder. The prevalence of physical and mental disability was also greater among income support recipients. There was no difference in service use between recipients and non-recipients.</p> <p>Mental illness is a significant issue among income support recipients. The presence of a mental disorder is a substantial barrier to work and other forms of social participation. Mental health is an issue with relevance beyond the health portfolio, with implications for many domains of social policy and service delivery. Understanding and better assisting income support recipients with mental health problems will be important in welfare reform and in the introduction of a more active welfare system.</p>	<p>Measures of mental health, disability and use of mental health services were examined, comparing working-age people in receipt of government payments to those with other main sources of income.</p>	<p>Data were sourced from the 1997 ABS National Survey of Mental Health and Wellbeing.</p>	<p>CD: mental disorders, psychological distress, prevalence, mental & physical disability</p> <p>LF: participation-cf non-participation, income support recipients, barriers to work children</p> <p>Australia</p>
<p>Cai L, Kalb G 2004.</p> <p>Health status and labour force participation: evidence from the HILDA data. Melbourne: Melbourne Institute of Applied Economic and Social Research, The University of Melbourne.</p> <p>Results indicated that better health increased the probability of labour force participation for all four (sex-age) groups. As for the feedback effect of labour force participation on health, labour force participation was found to have a significant positive impact on older females' health, and a significant negative effect on younger males' health. For younger females and older males, the impact of labour force participation on health (although negative) was not significant. Based on the joint test, the exogeneity hypothesis was rejected for all four groups.</p> <p>While there were only modest differences between the participation rates of those with excellent, very good or good health, those with fair or poor health had much lower rates of participation, and the trend was (1) more pronounced in older age groups and (2) more pronounced in women than in men.</p>	<p>Simultaneous equation modelling. Potential endogeneity of the health variables, especially self-assessed health, in the labour force participation equation is addressed by estimating the health equation & the labour force participation equation simultaneously.</p> <p>The null-hypothesis of exogeneity of health to labour force participation is tested based on a test of the joint significance of the labour force participation variable in the health equation and the correlation coefficient of the two error terms.</p>	<p>Data sourced from HILDA. The estimation is conducted separately for males aged 15 to 49, males aged 50 to 64, females aged 15 to 49 and females aged 50 to 60.</p>	<p>CD: health</p> <p>LF: participation males, females, younger ages, older ages</p> <p>Australia</p>

Publication details and description	Analytical methodology	Source data	Other details
<p>Cai L, Kalb G 2005.</p> <p>Health status and labour force status of older working-age Australian men. Melbourne: Melbourne Institute of Applied Economic and Social Research, The University of Melbourne.</p> <p>The trend of declining labour force participation by older working-age men, combined with an ageing population, has led many industrialised nations to develop policies encouraging older male workers to remain in the labour force. A better understanding of how their health influences decisions to participate in the labour force among this group of workers would facilitate the development of effective policies.</p> <p>The estimates confirm the finding in the literature that health has a significant effect on labour supply. Results show that controlling for unobserved heterogeneity and the correlation between the two equations is important. That is, the estimated variances of the unobserved heterogeneity terms are significantly different from zero in both equations and the two error terms are correlated. Any restriction on the correlation between the two equations appears to lead to under-estimation of the direct health effects.</p> <p>From a policy perspective, these results show that the indirect costs of health problems may be under-estimated, and that the larger indirect costs of health problems estimated from a more efficient model support investment in policies aimed at improving health, especially older workers' health.</p>	<p>The authors argue that the longitudinal HILDA data allows for better control for unobserved heterogeneity and that more efficient estimates of the direct health effects on labour force participation can therefore be obtained. Unobserved factors are likely to affect both health and labour force status, so the model takes the correlation between the two error terms in the health and labour force status equations into account.</p>	<p>Data were sourced from three waves of the longitudinal Household, Income and Labour Dynamics in Australia (HILDA) survey</p>	<p>CD: health RF: ageing LF: participation costs Measures: endogeneity of health or otherwise in models Australia Almost impenetrable text for a non-modeller.</p>
<p>Cai L, Kalb G 2006.</p> <p>Health status and labour force participation: evidence from Australia. Health Economics 15(3): 241-261.</p> <p>Paper examines the effect of health on labour force participation.</p> <p>The results indicate that better health increases the probability of labour force participation for all four groups. However, the effect is larger for the older groups and for women. As for the feedback effect, it is found that labour force participation has a significant positive impact on older females' health, and a significant negative effect on younger males' health. For younger females and older males, the impact of labour force participation on health is not significant. The null-hypothesis of exogeneity of health to labour force participation is rejected for all groups.</p>	<p>The potential endogeneity of health, especially self-assessed health, in the labour force participation equation was addressed by estimating the health equation and the labour force participation equation simultaneously. Taking into account the correlation between the error terms in the two equations, the estimation is conducted separately for males aged 15-49, males aged 50-64, females aged 15-49 and females aged 50-60.</p>	<p>Data sourced from the Household, Income and Labour Dynamics in Australia (HILDA) Survey.</p>	<p>CD: health LF: participation sex-age cohorts Australia Related to/same as other papers by this author.</p>

Publication details and description	Analytical methodology	Source data	Other details
<p>Ciurej M, Kumar A 2004.</p> <p>Characteristics of mature people not in the labour force. <i>Australasian Journal on Ageing</i>, 23(suppl. 1):A18-A20. Abstract only. [Presented to the Australian Association of Gerontology Conference, Melbourne, 17–19 November 2004.]</p> <p>The number of people who are not in the labour force is of increasing policy concern, particularly the low rate of participation by those of mature age (i.e. those aged 45–64 years). With a large number of people set to retire over the next few decades, and fewer people entering the labour force, governments in Australia and overseas are considering how best to address a possible shortage of labour. An understanding of the characteristics and behaviour of people in this age group is of particular interest, especially among those wanting to target policies aimed at encouraging this group back into the labour force.</p> <p>Using the full data from the ABS 2002 General Social Survey, this study presents results from multivariate analysis that investigated the characteristics of 45-64 years olds outside the labour force. People not in the labour force were found to be older, more likely to be women, have less satisfactory health and lower levels of education, than those in the labour force. The effects of each factor were quantified. Those not in the labour force had higher income, wealth, home-ownership, and lower financial and social stress, than their unemployed counterparts.</p> <p>This study also explored the factors associated with non-participation in the labour force. Results suggested that health was the dominant factor for both men and women.</p>	Multivariate analysis	Data sourced from the ABS 2002 General Social Survey; on 45-64 years olds not in the labour force.	LF: participation: not in LF Australia
<p>Econtech Pty Ltd 2007.</p> <p>Economic modelling of the cost of presenteeism in Australia. [Medibank Private commissioned Econtech to estimate the cost to the Australian economy of productivity losses due to presenteeism in the workplace.]</p> <p>Presenteeism has substantial impacts on productivity and is an economic burden to businesses and the Australian economy as a whole. Presenteeism resulting from 12 different medical conditions (allergies, arthritis, asthma, cancer, depression, diabetes, heart disease, hypertension, migraine/ headache, respiratory disorders, skin conditions & back, neck or spinal problems) was considered. Overall average labour productivity loss caused by presenteeism was estimated at around 2.5%.</p> <p>Direct costs of presenteeism to Australian employers were estimated at around 1.9% of GDP (equivalent to about \$17.6 billion of real GDP in 2005/06, 2004-05 prices). On average, the labour productivity losses caused by presenteeism lead to a long-term decrease in GDP of 2.79%. On an annual basis, this is equivalent to about \$25.7 billion of real GDP in 2005/06 (2004-05 prices).</p> <p>Presenteeism causes private consumption to be 3.3% lower than if presenteeism did not exist. This means that private consumption in 2005-06 was \$17.8 billion lower due to labour productivity losses caused by presenteeism (2004-05 prices).</p>	<p>The economic cost of presenteeism to the Australian economy was estimated using Econtech's MM2 model, a fully integrated macro-industry econometric model which can be used to fully capture both the direct and indirect impacts of presenteeism to the Australian economy over time.</p> <p>The loss in aggregate labour productivity resulting for each medical condition was estimated by applying Australian data on the prevalence of the disease in people of working age to international estimates of the on-the-job productivity losses from the disease and an adjustment factor reflecting the frequency of a presenteeism effect from the disease. The overall average labour productivity loss caused by presenteeism was estimated to be about 2.5%, and this figure was introduced into MM2 to estimate the</p>		<p>CD: arthritis, asthma, cancer, depression, diabetes, heart disease, hypertension, musculoskeletal: back, neck/ spinal problems RF: hypertension LF: productivity: presenteeism costs: direct & indirect (to employers) Australia</p>

Publication details and description	Analytical methodology	Source data	Other details
<p>The negative impact of labour productivity losses stemming from presenteeism flow throughout the economy, leading to a general reduction in the level of exports, imports and investment (all other things being equal). Exports were estimated to be lower by 2.8% (equivalent to about \$4.8 billion of exports in 2005/06, 2004-05 prices) and imports to be lower by 1.99% (equivalent to about \$4.06 billion of imports in 2005/06, 2004-05 prices). Investment was estimated as 2.61% lower - in 2005-06 this was \$3.7 billion lower due to presenteeism (2004-05 prices).</p> <p>The evidence indicates that investments in interventions that improve functioning for individuals with health conditions could have considerable impacts in terms of productivity improvements and on macroeconomic aggregates.</p>	<p>economy-wide impacts of presenteeism in Australia.</p>		
<p>Evans MDR, Kelley J 2004.</p> <p>Trends in women's labour force participation in Australia: 1984-2002. Melbourne Institute working paper no. [not numbered]. Melbourne: Melbourne Institute of Applied Economic and Social Research The University of Melbourne.</p> <p>There is little time trend per se in women's workforce participation. Instead, underlying the apparent shift over time, there are large compositional changes in the female population and a strong "birth cohort" or "vintage" effect. Succeeding cohorts of women have higher propensities to work throughout their lives than did their predecessors. Among the compositional changes, the strong rise in women's educational attainments and the large decline in fertility both exert substantial influences elevating women's workforce participation and hours worked. No evident time effects were associated with particular policy initiatives, but some are too co-linear with time to analyse separately.</p>	<p>Multivariate analysis of IcssA data using recursive models tested many interactions with time to assess whether effects of education & of family situation are declining over time - no significant interactions with time were found.</p> <p>Used the conservative 001 level as the criterion of statistical significance.</p> <p>Estimates were by ordinary least squares regression (for hours worked and other continuous dependent variables) & logistic regression (for labour force participation, a dichotomous dependent variable).</p>	<p>Representative random sample of Australian women; (n=9,412), aged 25-64 years. Data sourced from the IcssA-Pool (the pooled cross-sections of the International Social Science Survey/ Australia) conducted by the International Survey Centre.</p>	<p>LF: participation women, gendered role changes</p> <p>Measures: time trends Australia</p> <p>ABS data also discussed.</p>
<p>Glover JD, Hetzel DMS, Tennant SK 2004.</p> <p>The socioeconomic gradient and chronic illness and associated risk factors in Australia. Australia and New Zealand Health Policy, 1:8.</p> <p>[Public Health Information Development Unit (PHIDU), The University of Adelaide]</p> <p>Study objective was to examine the prevalence of major chronic diseases and their risk factors in different socio-economic groups in the Australian population, in order to highlight the need for public policy initiatives to reduce socio-economic inequalities in health.</p> <p>Significant socio-economic inequalities were evident for many of the major chronic diseases; the largest was for diabetes mellitus (at ages 25 to 64 years); and for many diseases, there was also a strong, continuous socio-economic gradient in the rates. Circulatory system diseases (in particular, hypertensive disease) and digestive system diseases also exhibited a strong differential in the 25 to 64 year age group.</p> <p>A number of risk factors for chronic diseases, namely self-reported smoking, alcohol misuse, physical inactivity and excess weight showed a striking association with socio-economic</p>	<p>Indirectly age-standardised prevalence rates were calculated by broad age group for Australia and for five groups of socio-economic status; rate ratios were calculated to show variations in prevalence between these groups.</p>	<p>Data were provided by the ABS from the 2001 National Health Survey (NHS) for selected chronic diseases and associated risk factors. Conditions selected were the National Health Priority Area (NHPA) conditions (other than injury); plus other 'serious' chronic conditions, in line with the classification developed by Mathers; and for which sufficient</p>	<p>CD: asthma, bronchitis/emphysema, circulatory system diseases incl. hypertension, diabetes, mental & behavioural problems, musculo-skeletal conditions, digestive system diseases</p> <p>RF: smoking, alcohol misuse, physical inactivity, excess weight</p> <p>LF: people of working age with serious chronic diseases</p>

Publication details and description	Analytical methodology	Source data	Other details
<p>status, in particular for people who were smokers and those who did not exercise.</p> <p>This analysis shows that the prevalence of chronic disease varied across the socio-economic gradient for a number of specific diseases, as well as for important disease risk factors. Any policy interventions to address the impact of chronic disease, at a population level, need to take into account these socio-economic inequalities in prevalence. More research is needed to determine which approaches are effective and why others have failed to have the desired impact, particularly for those who are from socio-economically disadvantaged areas. Finally, although rates are generally highest at the oldest ages, the development of risk factors for many chronic diseases occurs early in life, and thus, it is essential those health inequities are addressed right across the life course.</p>		<p>cases were available for analysis by socio-economic status.</p>	<p>age, SES</p> <p>Measures: age standardised prevalence rates</p> <p>Australia</p> <p>Policy rec: interventions to address impact of population CD need to take SES inequalities into account.</p>
<p>Hawthorne G, Cheok F, Goldney R, Fisher L 2003.</p> <p>The excess cost of depression in South Australia: A population-based study. Australian and New Zealand Journal of Psychiatry, 37(3):362-373.</p> <p>Objective was to establish excess costs associated with depression in SA, based on the prevalence of depression (from the Primary Care Evaluation of Mental Disorders (PRIME-MD)) & associated excess burden of depression (BoD) costs.</p> <p>Study found symptoms of major depression in 7% of the SA population, and 11% for other depression. Those with major depression reported worse health status, took more time off work, reported more work performance limitations, made greater use of health services and reported poorer health-related quality-of-life.</p> <p>Using the service provision perspective excess BoD costs were \$1921m p.a. (excluding non-health service & other social costs e.g., family breakdown, legal costs). With the utility approach, using the Assessment of Quality of Life (AQoL) instrument and a very modest life-value (\$50,000), the estimate was \$2,800m. This reflects a societal perspective of the value of illness, hence there is no particular reason the two different methods should agree as they provide different kinds of information. Both methods suggest estimating the excess BoD from the direct service provision perspective is too restrictive, and that indirect and societal costs should be taken into account.</p> <p>Despite the high ranking of depression as a major health problem, it is often unrecognised and under-treated.</p>	<p>Study calculated excess costs using two methods. Method 1 estimated the excess cost based on health service provision and loss of productivity. Method 2 estimated it from loss of utility.</p> <p>Summary cont'd.</p> <p>The findings mandate action to explore ways of reducing the BoD borne by individuals, those affected by their illness, the health system and society generally. Given the limited information on the cost-effectiveness of different treatments, it is important that resources be allocated to evaluating alternative depression treatments.</p>	<p>Data were sourced from the 1988 SA Health Omnibus Survey, a properly weighted cross-sectional survey of SA adults.</p>	<p>CD: mental health: depression costs</p> <p>Measures: prevalence Australia</p>
<p>Higginbotham N, Heading G, McElduff P, Dobson A, Heller R 1999.</p> <p>Reducing coronary heart disease in the Australian Coalfields: evaluation of a 10-year community intervention. Social Science & Medicine, 48 (5):683-692.</p> <p>Coronary heart disease was a leading cause of death in Australia and the Coalfields district of NSW had one of the country's highest rates. Identification of the Coalfields epidemic in the 1970s led to a community awareness program in the late 1980s (the healthy heart support group) followed by a more intense community action program in 1990, the Coalfields Healthy</p>	<p>Descriptive: evaluation of the CHHB program.</p>	<p>Qualitative data.</p>	<p>Interventions: community action program/ healthy heart support group</p> <p>CD: coronary heart disease</p>

Publication details and description	Analytical methodology	Source data	Other details
<p>Heartbeat (CHHB). CHHB was a coalition of community members, local government officers, health workers and University researchers.</p> <p>This study evaluated the CHHB program, examining both the nature and sustainability of heart health activities undertaken, as well as trends in risk factor levels and rates of coronary events in the Coalfields in comparison with nearby local government areas. Process data revealed difficulties mobilising the community as a whole; activities had to be selected for interested subgroups such as families of heart disease patients, school children, retired people and women concerned with family nutrition and body maintenance.</p> <p>Outcome data showed a significantly larger reduction in case fatality for Coalfields men (although nonfatal heart attacks did not decline) while changes in risk factors levels were comparable with surrounding areas. Positive responses to the CHHB by schools, heart attack survivors and women interested in body maintenance were explained in terms of the meaning these subgroups found in health promotion discourses based on actual experiences, such as the traditional communality of mining communities, including responding to crises (e.g., mine disasters).</p>	<p>Summary cont'd.</p> <p>When faced with a threat to personal identity, health discourse suddenly becomes meaningful along with the regimens for health improvement.</p> <p>General public disinterest in heart health promotion is examined in the context of historical patterns of outsiders criticising the lifestyle of miners, an orientation toward communal rather than individual responsibility for health (ie, community 'owned' emergency services and hospitals) and anger about risks from environmental hazards imposed by industrialists.</p>		<p>RF: trends</p> <p>LF: participation, exposures</p> <p>Industry/occupation: Australian coalfields</p> <p>Measures: case fatality, nonfatal heart attacks, risk factor levels</p> <p>men</p> <p>Australia</p>
<p>Jose A, Ravindiran R, Abello R 2004.</p> <p>Health status labour force non-participation nexus: evidence from pooled NHS data. Paper presented at the Australian Population Association 12th biennial conference 15-17 September 2004. [place]: Australian Population Association.</p> <p>Studied analysed three National Health Surveys (1989-90, 1995 and 2001) to derive the odds of non-participation in the labour force of mature aged people (44 to 60 years) with chronic illness or health risk factors.</p> <p>Study results add to information on the health-labour force nexus by incorporating age, period and cohort effects into the analysis, and by considering the effects of specific health conditions (e.g., presence of hypertension, asthma, arthritis, diabetes, cancers and anxiety), risk factors and other socio-economic demographic factors not present in other studies. Odds ratios showed, for example that, among men, those reporting diabetes were 2.47 times more likely not to be in the labour force than men who did not report diabetes.</p> <p>Results included a strong association between labour force non-participation and long-term health conditions, risk factors and health related actions.</p>	<p>Multiple logistic regression framework used to estimate odds of non-participation in the labour force given the set of explanatory variables.</p> <p>Sequential cross-sectional data used in a multivariate logistic regression framework to control for sex, age and birth cohorts when analysing associations.</p> <p>Summary cont'd.</p> <p>Odds ratios suggest that men and women as they grow older are more vulnerable to leave the labour force due to long-term medical conditions and health risk factors.</p>	<p>Data sourced from ABS NHS 1989, 1995 & 2001 pooled data.</p> <p>Conditions examined included hypertension, asthma, arthritis, diabetes, cancer & anxiety; & risk factors include smoking, obesity, lack of exercise.</p>	<p>CD: asthma, arthritis, cancer, diabetes, hypertension, mental health conditions: anxiety</p> <p>RF: smoking, obesity, lack of exercise, hypertension</p> <p>LF: participation, employment transitions</p> <p>Australia</p>

Publication details and description

Laplagne P, Glover M, Shomos A 2007.

Effects of health and education on labour force participation. [Productivity Commission] Staff Working Paper. Melbourne: Productivity Commission.

[Paper forms part of a Productivity Commission research program investigating parameters used in its report *Potential Benefits of the National Reform Agenda* in more detail. The new parameter estimates would alter some of the report's labour market projections but not affect the thrust of the conclusions; while providing a better basis for cost-benefit analyses of potential changes in specific health or education policies.]

Paper reports research results providing new estimates of the effects of (1) changes in the prevalence of health conditions, and (2) changes in educational attainment levels, on the probability of participation in the labour force.

Key findings include confirmation that better health and education can result in substantially greater labour force participation for those affected. Of the six health conditions identified (cancer; cardiovascular disease; mental/ nervous condition; major injury; diabetes, arthritis), a mental health or nervous condition, when averted, has the largest positive impact on labour force participation.

Having a degree or higher qualification has the largest impact on labour force participation, relative to not completing Year 12.

Measurement of these effects is complicated by possible endogeneity bias due to: unobserved characteristics of individuals (e.g., motivation, innate ability or preferences) that may influence health and education as well as the decision to engage in paid work; and, the simultaneous determination of health and labour force participation. Results suggest that unobserved characteristics affect decisions to participate in the labour force; and that health and labour force participation influence each other simultaneously.

Notes that although unsophisticated (single equation) models of labour force participation may conclude correctly that participation is positively associated with health and education, these models are unlikely to produce accurate marginal effects and labour force participation predictions.

Analytical methodology

Three models of labour force (LF) participation were estimated with near-identical variables based on the same dataset. The three models were estimated for men and women separately using identical data.

(1) the 'standard multinomial logit' (standard MNL) model, is used as a benchmark for the other two - one of the most common, but least sophisticated, approaches, as it cannot account for any form of endogeneity bias.

(2) the 'panel multinomial logit' (panel MNL), a variant of the first model designed to account for endogeneity bias due to unobserved heterogeneity (presence of unobserved individual characteristics that may affect participation, but cannot be explicitly included because they are not observed (e.g., when both participation and educational attainment are jointly influenced by a third, unobserved, variable such as motivation).

(3) the 'simultaneous equations' (SE) model designed to test whether summary health measures (e.g., self-assessed health status) are both influencing, and influenced by, LF participation. It can also detect a third source of bias: rationalisation endogeneity bias - when health status is used by a survey respondent to justify a prior decision not to engage in work.

Source data

Data were sourced from the Household, Income and Labour Dynamics in Australia (HILDA) Survey, for 2001-04. HILDA is a rich source of repeated annual observations (panel data) on some of the factors that are frequently found to influence participation in work, although one such factor, the existence and nature of diagnosed health conditions, is not covered comprehensively in all years of HILDA data. A prerequisite of the estimation was therefore, the imputation of detailed health data in years where those data were not available.

Other details

Interventions: work, education
CD: cancer; cardiovascular disease; mental/ nervous condition; major injury; diabetes, arthritis
LF: participation & predictive models
costs: marginal effects, LF participation prediction models
Measures: diagnosed health conditions, education levels, change in Australia
policy relevant

Publication details and description

Lim D, Sanderson K, Andrews G 2000.

Lost productivity among full-time workers with mental disorders. *The Journal of Mental Health Policy and Economics* 3(3):139-146.

Few studies have systematically compared the relationship between lost work productivity (work impairment) and mental disorders using population surveys. This study aimed: (1) to identify the importance of individual mental disorders and disorder co-occurrences (co-morbidity) as predictors of two measures of work impairment over the past month - work loss (number of days unable to perform usual activities) and work cutback (number of days where usual activities were restricted); (2) to examine whether different types of disorder have a greater impact on work impairment in some occupations than others; (3) to determine whether work impairment in those with a disorder is related to treatment seeking.

Depression, generalised anxiety disorder and personality disorders were predictive of work impairment after controlling for impairment due to physical disorders. Among pure and co-morbid disorders, affective and co-morbid anxiety-affective disorders respectively were associated with the greatest amount of work impairment. For all disorders, stronger associations were obtained for work cutback than for work loss. No relationship was found between type of occupation and the impact of different types of disorder on work impairment. Only 15% of people with any mental disorder had sought help in the past month. For any mental disorder, significantly greater work loss and work cutback was associated with treatment seeking, but comparisons within specific disorder types were not significant.

A substantial amount of lost productivity due to mental disorders comes from within the full-time working population. The greater impact of mental disorders on work cutback compared to work loss suggests that work cutback provides a more sensitive measure of work impairment in those with mental disorders. Work impairment was based on self-report only. While there is evidence for the reliability of self-assessed work loss days, no reliability or validity studies have been conducted for work cutback days. The low rates of treatment seeking are a major health issue for the workforce, particularly for affective and anxiety disorders, which are important predictors of lost productivity.

Implications for health policies and further research: Future research should investigate the validity of work cutback, given its importance as a measure of lost productivity in people with mental disorders. Employers need to be aware of the extent to which mental disorders affect their employees so that effective work place interventions can take place. Treatment should be targeted at people with affective and anxiety disorders, particularly where they co-occur.

Analytical methodology

The association of disorder types and their co-occurrences with work impairment was examined using multivariate linear regression. Odds ratios determined the significance of mental disorder prevalence across occupations, and planned contrasts were used to test for differences in work impairment across occupations within disorder types. The relationship between work impairment and treatment seeking was determined for each broad diagnostic group with t-tests.

Source data

Data were based on full-time workers identified by the Australian National Survey of Mental Health and Well-Being, a household survey of mental disorders modelled on the US National Comorbidity Survey. Diagnoses were of one-month DSM-IV affective, anxiety and substance-related disorders. Screening instruments generated likely cases of ICD-10 personality disorders.

Other details

CD: mental health: depression, anxiety & personality disorders, co-morbidity
LF: productivity, work impairment, work loss, work cutback, relation to treatment seeking
occupation type
measures: work impairment: self-assessed work loss days & work cutback days
Australia

Publication details and description	Analytical methodology	Source data	Other details
<p>Musich S, Hook D, Baaner S, Spooner M, Edington DW 2006.</p> <p>The association of corporate work environment factors, health risks, and medical conditions with presenteeism among Australian employees. <i>American Journal of Health Promotion</i>, 21(2):127-136.</p> <p>Study investigated the impact of selected corporate environment factors, health risks, and medical conditions on job performance using a self-reported measure of presenteeism.</p> <p>Increased presenteeism was significantly associated with poor working conditions, ineffective management/ leadership, and work/ life imbalance (adjusting for age, gender, health, risks, and medical conditions). In multivariate logistic regression models, work/ life imbalance, working conditions, life dissatisfaction, high stress, back pain, allergies, and younger age were significantly associated with presenteeism.</p> <p>Although the study has some limitations, including a possible response bias caused by the relatively low participation rate across the corporations, the study does demonstrate significant associations between corporate environment factors, health risks, and medical conditions and self-reported presenteeism. The study provides initial evidence that health management programming may benefit on-the job productivity outcomes if expanded to include interventions targeting work environments.</p>	<p>A cross-sectional survey using health risk appraisal (HRA) data merging with corporate environment factors, health risks, and medical conditions. Self-reported HRA data were used to test associations of defined adverse corporate environment factors with presenteeism. Stepwise multivariate logistic regression modelling was used to assess the relative associations of corporate environment factors, health risks, and medical conditions with increased odds of any presenteeism.</p>	<p>Employees in ten diverse Australian corporations who completed an HRA questionnaire (n = 1,523, participation rate, 19%).</p>	<p>Interventions: targeting work environments</p> <p>CD: health, stress, back pain, allergies</p> <p>RF: health risks, work/life imbalance</p> <p>LF: productivity: job performance, presenteeism, working conditions: poor management, corporate environment</p> <p>Measures: health risk appraisal</p> <p>age</p> <p>Australia</p>
<p>Parker T, Worringham C, Greig K, Woods S 2005.</p> <p>Age-related changes in work ability and injury risk in underground and open-cut coal miners. Brisbane: School of Human Movement Studies, Queensland University of Technology (QUT). [Research project funded by the Australian Coal Association Research Program (ACARP).]</p> <p>The ageing of the Australian workforce poses particular challenges to the coalmining industry, in which 60% of the workforce is over 40 years of age. Preventing injury, reducing its impact, and maintaining the health of an older workforce requires better understanding of the relationships between the capacities of the older worker, the nature of the work demands, and specific injury and health issues. This study is the first to address these issues in the Australian coal-mining industry.</p> <p>In addition to a significantly lower WAI in the underground than the open-cut sector overall, analyses showed a clear reduction in the WAI across age groups (20-29, 30-39, 40-49, & 50-59). The size of this decrease was likely to be an under-estimate because of the cross-sectional nature of the study. The decrease in WAI across the age groups was more pronounced in the underground than the open-cut sector: older underground miners were found to have significantly lower WAI scores than their open-cut colleagues.</p> <p>Mechanics/ fitters, electricians, operator-maintainer/mine-workers, and deputies all had significantly lower WAI scores than professional/administrative staff in the open-cut sector. This was not true for the underground sector.</p> <p>There was a significant overall decrease across age groups in ratings of work ability with respect to the physical demands of work, being more pronounced in underground than in</p>	<p>Study results are drawn from workers' own reports of their working conditions, workplace exposures, the physical and mental demands of their work, and their health status. They provide a snapshot of self-reported prevalence of injuries, musculoskeletal disorders and other health conditions. Differences in work ability and exposure status between injured and injury-free miners aged 45 and over were also examined.</p> <p>Survey results were analysed according to the WAI score, as well as by age group, mine type (open-cut and underground), and job category.</p> <p>The WAI incorporated questions on a range of medical conditions that respondents reported had been diagnosed by a doctor. The number of reported conditions was analysed in relation to age, mine type and job categories. Note however, that self-reported conditions could not be confirmed by objective diagnosis and results should be interpreted with caution.</p>	<p>Data were sourced from a cross-sectional survey among a large representative sample (~9%) of the Qld and NSW coalmining workforces in 2004. Participants were 1,803 workers (direct & contract employees) at 22 mine sites (underground & open-cut operations); 97.3% of those invited agreed to participate. The Work Ability Index (WAI, developed by the Finnish Institute of Occupational Health & validated in international studies in a variety of industries), measured workers' capacity to meet</p>	<p>CD: health status, CDs, injury & ageing; musculoskeletal conditions, respiratory disease, cardiovascular disease, hypertension, mental health conditions, insomnia, sleep apnoea</p> <p>RF: ageing, overweight, sedentariness, hypertension, shift work</p> <p>LF: working conditions, workplace exposures, physical & mental work demands</p> <p>Ind/ occ: coal mining – underground & open-cut mine workers</p> <p>Measures: Work Ability Index, self-reported</p>

Publication details and description

open-cut miners. Differences in the degree of physical activity inherent in the various job categories were reflected in the frequency of reporting of some medical conditions such as cardiovascular conditions.

Those miners 45 years and over with a current injury had a significantly lower WAI than their injury-free counterparts with the difference in WAI scores between injured and injury-free groups being equivalent to 10.2 and 11.7 years of age-related decline in the two samples respectively, when related to the decline observed in the Finnish longitudinal studies. Those with injury rated the intensity and frequency of some tasks higher than those without injury. Injured miners also reported a range of environmental factors that were potentially conducive to injury (e.g., poor visibility, poor illumination, wet conditions and uneven ground) and that were experienced more by injured miners aged over 45 years than by their non-injured counterparts. Injured workers also rated their enjoyment of work lower than injury free workers, and were less likely to rate the quality of management as excellent.

Consistent with industry data, the most commonly reported condition was injury with 20.7% of miners reporting a current injury and with almost half of the respondents indicating injury involving the back. Respiratory (12%), sensory (10%) and cardiovascular conditions (8%) were ranked behind injury and musculoskeletal disorders.

Around 8% of respondents reported one or more diagnosed cardiovascular conditions (CVCs), with hypertension being the most common (~7.6%). There was a clear effect of age, with workers in their 50s reporting more than ten times the rate of those in their 20s. A doctor diagnosis of overweight was reported by 6.5% of respondents. Overall, the sample average BMI (estimated from height and weight data) was 27.5 - in the overweight category.

The number of reported mental conditions also increased significantly with age and almost 3% of workers reported having one or more mental conditions diagnosed by a doctor, however, around three times more mental conditions were reported by miners in their own-opinion (statistically significant, $p < 0.001$), suggesting under-reporting of mental health conditions. Minor disorders (e.g., tension and anxiety) were reported at three times the rate of more serious mental health conditions (e.g., severe depression).

A doctor's diagnosis of insomnia or sleep apnoea was reported by 3% of respondents; more frequently by older workers. As with mental conditions, a significantly higher number reported in miners' own opinion, suggested under-reporting and the need for greater awareness of these issues at the workplace. These findings were consistent with international data and particularly pertinent to shift workers who have been shown to have increased sleep problems and reduced tolerance to night shifts with age.

In summary, the results of the investigation have identified significant age-related differences in work ability in both open-cut and underground mining operations, consistent with findings from other industries that have used the WAI. These differences in work ability reflect age-related declines in functional capacity and a higher number of health disorders with age involving the cardiovascular and musculoskeletal systems, together with an increased reporting of sleep and mental disorders.

Analytical methodology

Summary cont'd.

Perhaps not surprisingly, older workers with a current injury had a work ability score lower than their injury-free counterparts. In addition, injured workers reported greater experiences of adverse conditions with respect to the work environment, work organisation, and opportunities to enhance their work ability. The findings confirm the need for increased awareness of the age-related differences in work ability and factors which may accelerate or delay this decline.

The report includes a series of recommendations in the areas of health, work organisation, work environment, education and training, and research, all aimed at supporting the health and work ability of older miners. Recommendations included (among others):

- * developing a more preventive and proactive approach to health management, consistent with the needs of older workers;
- * incorporating evaluation of psychological and sleep disorders in medical assessments of workers;
- * implementation of a more holistic approach to health care, including measures to promote work ability among older workers; and
- * review the extent to which current regulations provide protection to prevent morbidity in older workers and protect those who stay in the workforce.

Source data

the physical and mental work demands. The Index was supplemented by industry-specific questions on risk factors and exposures.

Other details

doctor-diagnosed & own-opinion medical conditions
Australia
Policy recs: series of recommendations re health, work organisation, work environment, education & training, & research, aimed at supporting the health & work ability of older mine workers.
Study usefully reports a mass of related research material.

Publication details and description

Pocock B, van Wanrooy B, Strazzari S, Bridge K 2001.

Fifty families: What unreasonable hours are doing to Australians, their families and their communities.

[Report commissioned by the Australian Council of Trade Unions.]

Few studies before this one had investigated how long and/or unreasonable hours affected Australians, and even fewer that included information on the ways in which individuals, families, relationships and households are affected, despite the fact that in many households, at least one adult worked unreasonable hours. Little was known about the consequences of these worker hours or how they affected quality of life, and families, communities and children over the longer term. This study undertook a qualitative analysis of personal experiences and the effects of unreasonable hours on personal, household and community relationships.

This study analysed interview data from 54 employees who worked long hours or hours that were 'unreasonable' (e.g., very long hours, changes in time zones, irregular shift work, unpredictable hours, or combinations of these). The study included individuals and, in around two-thirds of cases, their partners.

The results suggest that the majority of employees and their families were negatively affected by unreasonable work hours. Those who worked long hours, or unpredictable long hours and shifts, suffered serious effects from working such hours. Many received no real increase in income for their hours: they worked 'unpaid-unreasonable' hours. Some hoped for long term financial benefit through promotion. Others worked long hours in the hope that their jobs would be protected, and their security assured, that as 'good' workers they would be rewarded by keeping their jobs. Others found personal reward in doing a good job and enjoyed their work. Many felt a commitment to the people they looked after, the children they taught, the lives they saved, the work they supervised or completed, or the animals they loved. The story was often different for their partners and children - some of whom did not love their partner's or parent's jobs. While some were paid well for their unreasonable hours, many were not - either because their pay was low or because their long hours were unpaid - or both.

In the 12 industries examined, long or unreasonable hours - whether paid or unpaid - affected the quality of workers' relationships with partners, children and families; and constrained their participation in communities and as citizens. Some workers - or their employers - were suffering serious consequences or risking them in relation to health, safety, family stability, and the quality of relationships. Many spoke of the negative impact on productivity of their hours of work.

The research found many points of agreement with international findings. It was not only the hours of work that mattered to workers, but the fact that many 'long-hours jobs' were also high stress jobs where they performed multiple tasks, frequently felt their jobs were 'never done', and their time at work had elements of unpredictability. 'Long hours jobs' were often demanding jobs. When working shifts in combination with long hours, the pressure and effects are more extreme.

Analytical methodology

A qualitative analysis of the effects of unreasonable hours of work amongst 54 employees who worked unreasonable hours, based on interviews with each employee, and where possible, separate interviews, conducted separately, with their partners.

Long/ unreasonable hours were defined as those in excess of approximately 48 per week in a 12-week cycle, or of longer hours for shorter periods of time, or hours that created unsafe work or significant loss of amenity to employees.

Interviews were analysed from tapes. Each interview was listened to several times and key sections transcribed. Each interview was thus individually analysed, then each industry group of interviews (workers and partners) was written up as a sectoral case. The overview section was then written, drawing on the sectoral analysis.

Acknowledged limitations included that the interviewees were not selected from a randomly generated sample of employees working long hours due to lack of time to undertake such a method and the need for interviewees to bear some relationship to the awards which were the vehicles of the ACTU test claim on unreasonable hours.

Source data

Data were sourced from 89 interviews conducted over two months from May to June 2001; 54 were with workers identified as working unreasonable hours; 35 were with their partners, some of whom also worked unreasonable hours. Interviewees were selected from lists, generated by Union organisers, of employees working long/ unreasonable hours in the areas of employment covered by ACTU award vehicles.

Interviews lasted an hour on average; most were conducted in person (at home, office or workplace); a few were by telephone. With interviewee permission, almost all interviews were recorded. Separate sets of interview questions were devised for employees and partners, and were designed to elicit general information about hours of work and jobs, effects of job hours on individuals, families and communities, and their ideal hours of work. Questions were nondirective to ensure relatively unstructured

Other details

CD: stress, consequences of work-related injuries & accidents

RF: work-related stress, work-related injuries & accidents

LF: productivity, working conditions, non-standard work

Ind/ occ: engineers, stable hands/ strappers in racing, flight attendants, postal industry, teaching, supervisors in manufacturing, public service, technicians in research facilities, paramedics, miners, doctors, electricians.

Australia

Policy/ research: need for policy watch & further research on long hours & non-standard work incl. effects on families. Rare qualitative study.

Publication details and description**Analytical methodology****Source data****Other details**

The research showed that many who worked long hours felt anxious or regretful about inadequate time with partners and children, and were concerned about the impact of their hours on themselves and on their intimate relationships. Family members were affected by long-hours-workers' bad moods and 'grumpiness', and tiredness, limited time for family, and exhaustion take a toll on relationships.

There was widespread evidence of a culture of long hours in many industries. Such a culture makes resistance to long hours problematic. New standards of the 'proper worker' raise the 'hours bar' for workers, especially those with caring responsibilities. In industry after industry in this study, long hours were identified as unfriendly to caring, especially for women with children, and parents generally. For both sexes, decisions to cut back hours, take a demotion, or work part-time are frequently read as turning away from career. The penalties for the long term equality at work for women are obvious. So are the real costs for men who are carers.

The culture of long hours can be successfully challenged, but it requires concerted effort and enforceable and enforced statutory standards.

New technologies are also changing work/ time relationships. The telephone has long extended work into the home. However, new technologies like mobile phones, laptops and computer technologies, extend work into the car and into the home in new ways that lengthen working days, intensify work, and pull work further into the family setting. Long hours are not a problem only for those in traditional families; people with other kinds of dependents are also affected, and so are single workers because some find themselves being 'leaned on' to work longer hours where those with families are, in some circumstances, 'protected' by their family responsibilities. All women are affected by a new standard that lengthens expectations about hours alongside entrenched expectations that all women will be affected by maternity/ family responsibilities. In this way, long hours affect not just those with children and families but all workers.

Summary cont'd.

The fourteen chapters of this report first provide an overview of the effects of long hours on individuals, families and communities, set out general themes arising from the overall picture; and detail the twelve sectoral studies forming the bulk of the report. The main effects of long/ unreasonable hours for individuals and families, are described on a sector by sector basis. The industry/ occupational sectors reported are: engineers, stable hands/ strappers in the racing industry, flight attendants, the postal industry, teaching, supervisors in manufacturing, the public service, technicians in research facilities, paramedics, miners, doctors, and electricians. Research protocol is included in appendix.

conversation. In a few cases, couples were interviewed together where separate interviews were not convenient.

Publication details and description	Analytical methodology	Source data	Other details
<p>Sanderson K, Andrews G 2006.</p> <p>Common mental disorders in the workforce: Recent findings from descriptive and social epidemiology. <i>Canadian Journal of Psychiatry</i>, 51(2):63-75.</p> <p>Study reviewed the recent descriptive and social epidemiology of common mental disorders in the workplace, including prevalence, participation, work disability, and impact of quality of work, as well as to discuss the implications for identifying targets for clinical and preventive interventions.</p> <p>Depression and simple phobia were found to be the most prevalent disorders in the working population. The limited data on rates of participation suggested higher participation among people with depression, simple phobia, social phobia, and generalized anxiety disorder. Depression and anxiety were more consistently associated with "presenteeism" (that is, lost productivity while at work) than with absenteeism, whether this was measured by cutback days or by direct questionnaires. Seven longitudinal studies, with an average sample size of 6,264, showed a strong association between aspects of low job quality and incident depression and anxiety. There was some evidence that atypical work was associated with poorer mental health, although the findings for fixed-term work were mixed.</p> <p>Mental health risk reduction in the workplace is an important complement to clinical interventions for reducing the current and future burden of depression and anxiety in the workplace.</p>	<p>A structured review of epidemiologic studies in community settings (ie, in the general population or in workplaces). Evidence was restricted to the peer-reviewed, published, English-language literature up to the end of June 2005. Evidence was further restricted to studies that used recent classification systems; then, if evidence was insufficient, we reviewed studies that used standardised psychiatric screening scales. Differs from recent reviews of health and work quality, by a focus on new areas of investigation and new evidence for established areas of investigation: underemployment, organisational justice, job control and demand, effort-reward imbalance, and atypical (non-permanent) employment.</p>	<p>Seven longitudinal studies, with an average sample size of 6,264.</p> <p>Included the 1997 ABS National Survey of Mental Health and Well-Being.</p>	<p>CD: Mental health: depression, phobia, anxiety</p> <p>RF: mental health: workplace risk reduction</p> <p>LF: participation, productivity: absenteeism, presenteeism, employment conditions: low job quality</p> <p>Australia, Canada & other countries</p>
<p>Shanahan EM, Smith M, Roberts-Thomson L, Esterman A, Ahern M 2008.</p> <p>Influence of rheumatoid arthritis on work participation in Australia, <i>Internal Medicine Journal</i>, 38(3):166-173.</p> <p>Study aimed to determine the prevalence of work disability in a cohort of Australians with rheumatoid arthritis (RA).</p> <p>The sex (70% women), age (mean age 51.8 years) and mean disease duration (10.7 years) balance of the sample was considered to be representative of the RA population.</p> <p>Of those employed, 130 (51%) were in full-time employment (≥ 35 hours per week) work and 124 (49%) were in part-time employment (average 20 hours per week). Overall, the observed/expected numbers working were 254/ 316 (relative risk 0.8 (0.69–0.91)). Using a comparator adjusted by removing those on the disability support pension, the relative risk of working was 0.74. The observed/ expected numbers working part time in the study group were 124/ 89 (relative risk 1.4 (1.25-1.65)). Those who continued to work had lower Health Assessment Questionnaire scores, less morning stiffness, superior scores for patient assessed level of function, lower pain scores, lower joint counts, a lower C-reactive protein, better measures of 'patient global assessment' and higher levels of education compared with the group who had ceased work.</p> <p>Overall, of those working at the time of diagnosis, 20% had ceased work within five years and approximately 40% had ceased work by 20 years. Of those who ceased work, the mean</p>	<p>Codified data were entered onto Epidata version 3.0 and transferred to SPSS version 10.1 where most of the analysis was undertaken.</p> <p>Categorical variables were compared between groups using χ^2 tests. As the data from to patient rating scales were invariably skewed, medians and interquartile ranges were presented for these data and group comparisons undertaken with exact Mann–Whitney U-tests. Cox proportional hazards models were used to determine predictors of leaving paid employment.</p> <p>Overall employment rates were compared with ABS employment statistics for the month of May 2003, selected as the mid-point in the sample collection period and representative of Australian employment rates for the study period (note that Adelaide's employment data were similar to the national average with an</p>	<p>Data were sourced from a cross-sectional study of a sample of 497 individuals aged 18-65 years with RA in Adelaide, SA (60.2% participation rate). Patients were randomly selected from rheumatology services, and interviewed over a two-year period; and all sociodemographic areas well represented. The interview process was standardised. Patients were posted questionnaires, the interview was arranged within days, and took approximately</p>	<p>CD: Rheumatoid arthritis, disability</p> <p>LF: participation, work disability, employment status (f-t, p-t), time of diagnosis to work cessation</p> <p>age, sex, education levels</p> <p>Measures: Health Assessment Questionnaire, rapid assessment of disease activity in rheumatology (RADAR) questionnaire, joint count, blood samples C-reactive protein (CRP), rheumatoid factor (RF), patient-</p>

Publication details and description

duration from time of diagnosis to work cessation was seven years with half the subjects who ceased work doing so within four years of diagnosis.

Those who ceased work were more likely to have worked in more physically intensive (semi-skilled or unskilled) jobs such as machine operating, driving or labouring when compared with those who continued to work ($P < 0.005$). Conversely, those who continued working were more likely to be employed in managerial or professional jobs.

The authors discussed the significant disparity in education levels seen between individuals who were working and those were not working. People with RA who were in paid employment were far more likely to have completed a higher level of education, and although the relationship between educational status and work may be confounded by the nature of work (i.e. those with lower education levels are more likely to be in manual jobs and therefore less likely to be able to continue in their position because of RA) other explanations include reduced flexibility of employment as a result of a lower education. The qualitative data revealed that a significant proportion of those maintaining their employment did so by changing the nature of their work. It was also suggested that educational status may act as a surrogate measure for several factors that influence employment such as the ability to access medical services.

The study concludes that work disability associated with RA in Australia is significant and costly. Work disability occurs relatively early in the disease and is associated with several identifiable variables, many of which may be amenable to intervention strategies. It is suggested that these intervention strategies be tested prospectively in a working cohort of RA patients.

Analytical methodology

overall unemployment rate during the period of the study of between 6 and 7%). Indirect standardisation for age (using six age categories) and sex was carried out against this population to generate relative risks (RR). The 95% confidence limits were calculated. Job titles and descriptions were taken and classified according to the ABS Australian Standard Classification of Occupations.

Study limitations discussed included: the focus on paid work to the exclusion of unpaid work - which a similar US study had found was a larger part of the cohort's working week; the cross-sectional nature of the study and the possibility of recall bias in some responses; and the non-inclusion of RA patients who were not managed by rheumatologists. The authors noted that the picture provided by the sample probably reflected the treatment strategies of the previous ten years (ie, largely before the use of biological agents). The sampling strategy, however, was considered to be a particular strength of the study: interviewing patients at times and locations of their choice helped avoid sampling bias by removing financial and time barriers to participation.

Source data

45 minutes to complete, including a joint count and venesection for blood samples. To minimise non-response bias, patients were offered interviews in their specialists' rooms, their own homes or their places of work.

Other details

reported visual analogue (VAS) pain scales, Piper Fatigue Scale, Centre for Epidemiological Studies Depression Scale, & coping strategies questionnaire.
Australia
Policy/ research rel: intervention strategies to reduce early work disability should be tested prospectively in a working cohort of RA patients.

Waghorn G, Chant D 2006.

Work performance among Australians with depression and anxiety disorders - A population level second order analysis. *Journal of Nervous and Mental Disease*, 194(12): 898-904.

Study investigated first and second order correlates of work, accomplishment and care taken at work among people with affective and anxiety disorders (ICD, 10th Revision) in comparison to healthy community residents, as, at a population level, little was known about the impact of anxiety and depression on work performance.

Application of ABS 1999 population weights revealed an estimated 722,520 persons aged 15 to 64 years who met ICD-10 criteria for current anxiety or depression or both that had persisted or was likely to persist for 6 months or more.

Depression produced more work impairment than anxiety, however both had substantial impacts on labour force participation, which varied by disorder type and sex. More males than females with anxiety disorders remained in the labour force, although anxiety disorders had a greater effect on male labour force participation (declined by 27.8% with respect to healthy

Secondary analysis conducted using multiple binary logistic regression.

The secondary sampling strategy captured people of labour market age (15-64 years) in three diagnostic categories: healthy controls (N = 19,956), those with ICD-10 anxiety disorders (N = 716), and those with ICD-10 depression (including 41 people with co-morbid anxiety, N = 370).

Analyses were restricted to people aged 15 to 64 years, with anxiety (N = 716) or depression (N = 370) as the primary underlying ICD-10 conditions in the household component of the survey.

Data source was the confidentialised data files of a large representative sample collected by the ABS in the population Survey of Disability, Ageing and Carers (SDAC) in Australia in 1998. SDAC, used multistage sampling strategies to obtain a household sample of 37,580 working age individuals from an effective sample of 15,316 private dwellings

Interventions: receiving treatment
CD: mental health: depression and anxiety disorders
LF: participation, productivity: work performance/impairment
age, sex, age + sex, employment restrictions
Australia

Publication details and description	Analytical methodology	Source data	Other details
<p>males, and by 24.2% among females). Depression had a greater overall impact on males than females in comparison to healthy controls (associated with a 46.4% reduction in labour force participation among males, and a 28.6% participation reduction among females).</p> <p>First order correlates of work performance were the extent of employment restrictions, mental health status, age, sex, and whether or not treatment was received. The proportion of people reporting reduced work accomplishment (SF-36 variable; another, work care, also reported) ranged from 4.2% in those with depression and no employment restrictions, to 78.5% in those with depression and severe to profound employment restrictions. For anxiety this ranged from only 3.6% of those with anxiety and no employment restrictions to 68.9% of those with anxiety and severe to profound employment restrictions. Healthy controls seldom reported (0.4%) reduced work accomplishment in the past 4 weeks.</p> <p>At the second order level, the effects of mental health status on work performance depended on age, sex, and receiving treatment. The effect of employment restrictions on work performance depended on age and sex only. For example, the impact of mental health status (diagnostic type) on both work care and work accomplishment depended on age. Anxiety had less impact on work performance than depression; a difference that was greatest among those aged 55-64 years. Adverse effect on work performance also depended on whether or not treatment was received, and anxiety had less impact than depression on those not receiving treatment. The impact of both disorders was greater in the group receiving treatment and there were no differences between the two disorders. Depression had a greater adverse effect than anxiety among females; both disorders had similar impact on male work performance.</p> <p>Results were (1) consistent with previous findings that depression produces greater work performance impairments than anxiety disorders. Depression and anxiety disorders impaired self-reported work performance in a context in which level of employment restrictions, age, sex, and treatment received were also important. (2) Inconsistent with previous findings – that receiving treatment for depression or anxiety was paradoxically associated with diminished work care and work accomplishment – a result to be investigated further as it appears inconsistent with previously reported treatment benefits.</p>	<p>Of the variables available in the data set, nine were selected on theoretical grounds for inclusion in four binary logistic regression models using SAS. Two models examined first order effects, and two others examined all possible second order effects. Bonferroni correction to a 99% confidence level accommodated multiple comparisons.</p> <p>Limitations discussed included that mental health disorders were not the primary focus of SDAC 1998 and some relevant population subgroups were not included in the sampling strategy (eg, prisoners, Indigenous communities, residents of psychiatric institutions, and homeless people). Limited information was available on treatment type and nature, and employment assistance obtained. Another limitation was the relatively unknown reliability and validity of the two SF-36 items (work care, work accomplishment) used as key response variables.</p>	<p>(one per 400) & 399 non-private dwelling units (hotels, motels, boarding houses etc.), 93% household response and 94.4% of persons.</p>	
<p>Waghorn G, Chant D 2007.</p> <p>Receiving treatment and labor force activity in a community survey of people with anxiety and affective disorders. <i>Journal of Occupational Rehabilitation</i>, 17(4):623-640.</p> <p>Standard treatments for depression and anxiety disorders are generally expected to benefit individuals, employers, and the wider community through improvements in work-functioning and productivity. Although some evidence supports expectations of treatment benefits, these are rarely examined at a population level.</p> <p>After statistically controlling for eight covariates: extent of employment restrictions; mental health status; age; sex; partner status; country of birth; age left school; and educational attainment; receiving treatment was consistently associated with non-participation in the</p>	<p>Study investigated three variables: receiving treatment, labour force activity, and self-reported work performance among people with ICD-10 affective and anxiety disorders, while statistically controlling for eight covariates: extent of employment restrictions; mental health status (diagnostic type); age; sex; partner status; country of birth; age left school; and educational attainment.</p> <p>A secondary analysis was conducted using</p>	<p>Data source was the ABS population Survey of Disability, Ageing and Carers (SDAC) in Australia in 1998. SDAC used multistage sampling strategies to obtain a household sample of 37,580 working age individuals from an effective sample of</p>	<p>Interventions: receiving treatment CD: mental health: depression, anxiety LF: participation productivity, work functioning Australia</p>

Publication details and description**Analytical methodology****Source data****Other details**

labour force, and was negatively associated with work performance.

Conclusions: At a population level, receiving treatment for anxiety and depression was negatively associated with being employed or looking for work. This could be an unintended side effect of treatment, although other explanations are also possible. These results justify more specific longitudinal investigations into how different forms of mental health treatment influence labour force activity among working age community residents with anxiety and affective disorders.

multiple binary logistic regression.

15,316 private dwellings (one per 400) & 399 non-private dwelling units (hotels, motels, boarding houses etc.), 93% household response and 94.4% of persons.

Wilkins R 2004

The effects of disability on labour force status in Australia. Australian Economic Review, 37(4):359-382.

Study examines the effects of disability on four labour market outcomes: not in the labour force, unemployed, part-time employed and full-time employed. The detailed information on health available in the dataset also facilitated investigation of the dependence of effects on the characteristics of the disability, including severity, impairment type and age of onset.

In 1998 17.9% of males and 16.7% of females aged 15-64 years reported a disability as defined by ABS in SDAC. Less than ten% of those aged 15-24 years had a disability, compared with over one-third of those aged 55-64 years. Disability was not simply an old-age phenomenon as all age groups had significant numbers of persons with disabilities. Over half of all persons reporting a disability reported disability onset after age 30. A significantly higher proportion of disabled males experienced disability onset between the ages of 15-29 years than did disabled females, who reported a correspondingly higher proportion of onset between the ages of 45-64 years. Almost 30% of both male and female persons with a disability reported that onset occurred prior to completing their education. Significant differences were found for this population in general when compared to the non-disabled population, including older average age (>7 years) and lower educational attainment (degree attainment at 50% of the non-disabled rate for males, and 60% for females; proportion not completing high school 16 percentage points higher for disabled males, and 13 percentage points higher for females). People with a disability tended to reside in areas with higher levels of socio-economic disadvantage, as measured by the ABS Socio-Economic Index for Areas (SEIFA).

Disability was found to have substantial effects on labour force status, on average acting to decrease the probability of labour force participation by one-quarter for males and one-fifth for females. For males, the decrease in fulltime employment accounts for almost all of the decrease in labour force participation associated with disability; for females, disability has negative effects on both full-time and part-time employment. Analysis of disability characteristics shows that adverse effects on labour force status increased with the severity of the disability and were worse for those with more than one type of impairment and for those who experience disability onset at older ages. There was evidence that the adverse effects of disability were lower for males who completed their education after the onset of the

Investigation of the effects of disability and disability characteristics on labour force status were undertaken via estimation of multinomial logit models of four outcomes: not in the labour force, unemployed, employed part-time and employed full-time. Several specifications were estimated, but all models included variables for age, highest educational qualification, family type, country of birth, region of residence and index of socio-economic disadvantage for the region of residence.

One of several potential limitations on the study discussed was the likelihood that unemployed persons may tend to report poorer health than employed persons of identical health (since employment is generally regarded to have a protective effect on health), in which case the impact of disability on the likelihood of unemployment would be over-estimated.

Summary cont'd.

Investigation of the nature and sources of the barriers to employment by older persons with a disability, and in particular those with mature-age disability onset, could be an important line of future inquiry. Understanding these barriers will assist in developing appropriate policies to increase employment among mature-age persons with disabilities.

A final notable finding was the prima facie

Data were sourced from the ABS Survey of Disability, Ageing and Carers (SDAC), 1998, a stratified random sample of 15,316 private dwellings, 399 non-private dwellings and 626 'cared accommodation' establishments (0.2% of sample & excluded from this study as lacking data on labour force status), providing information on 43,395 persons aged ≥15 years. It contains detailed information on health status, including, for those who have a disability, the type, extent, underlying condition, age of onset and cause of the disability; as well as current labour force status, occupation, industry, hours worked per week, full-time/part-time employment status, main source of & total weekly income, whether receive pension or benefit, highest educational qualification, age, sex, birthplace and

CD: disability
RF: disability
LF: participation, employment status
age, sex, education level, age of onset of disability
Australia
Policies to improve labour market outcomes of disabled must address issue of getting them into jobs, not only improving outcomes for those in jobs. Research: nature & sources of barriers to employment by older persons with a disability, especially those with mature-age disability onset.

Publication details and description

disability.

The author concluded that a significant proportion of the working-age population in Australia had a disability, and that the implications of disability for the labour market and welfare system therefore mattered a great deal. Disability was associated with significantly lower participation in the labour force, and participation was lower the more severe the disability. The clear message for government policy is that policies to improve the labour market outcomes of the disabled must address the issue of getting the disabled into jobs, and not simply improving outcomes for those already in jobs.

The adverse effects of disability varied considerably with personal and disability characteristics: (1) 'mental' types of impairments were highly detrimental to labour force outcomes (although government policy in relation to disabled people is more focused on physical impairments); and (2) disability onset is more likely the older a person gets, and the employment consequences of disability appear to be worse the older the age of onset.

Analytical methodology

evidence that disability primarily acts to reduce labour supply rather than labour demand. The evidence is the apparent absence of increases in unemployment associated with disability, and the observation that increased severity is associated with both an increased likelihood of part-time employment - at the expense of full-time employment - and a decreased probability of unemployment.

Source data

family structure.
Population examined comprised those aged 15-64 years.

Other details