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ORIGINAL ARTICLE

Surveillance of working conditions and the work environment: development of a national hazard surveillance tool in New Zealand

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Abstract
Objectives Changes to work and the impact of these changes on worker health and safety have been significant. A core surveillance data set is needed to understand the impact of working conditions and work environments. Yet, there is little harmony amongst international surveys and a critical lack of guidance identifying the best directions for surveillance efforts. This paper describes the establishment of an instrument suitable for use as a hazard surveillance tool for New Zealand workers.
Methods An iterative process of critical review was undertaken to create a dimensional framework and select specific measures from existing instruments. Pilot testing to ascertain participant acceptability of the questions was undertaken.
Results The final questionnaire includes measures of socio-demographic characteristics, occupational history, work organisation, physicochemical, ergonomic and psychosocial hazards. Outcome measures were also included.
Conclusion A robust New Zealand hazard surveillance questionnaire comprehensively covering the key measures of work organisation and work environments that impact upon worker health and safety outcomes was developed. Recommended measures of work organisation, work environment and health outcomes that should be captured in work environment surveillance are made.

Keywords Population surveillance · Workplace · Questionnaire · Occupational health · Work organisation

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Introduction

Research in occupational health is currently challenged by rapid and continuous change in work, work environments and employment patterns shaped by political, economic, technological and social change in modern industrialised societies. It is widely recognised that many of the changes in work are quite fundamental, producing a new profile of work hazards and new patterns of work-related illness (Rantanen 1999; Sauter and Murphy 2003). These changes have clear potential to impact upon workers' health and safety, and warrant significant occupational health and safety concerns (National Institute for Occupational Safety and Health 2002; MacDonald et al. 2008).

To understand the extent of change in the world of work surveys of work organisational aspects and known hazardous workplace exposures have occurred on a regular basis, with several long standing cross-sectional national surveys (Sauter and Murphy 2003). The surveillance of working conditions (also referred to as the "quality of work" and "organisation of work") as a field of research has no agreed definition, therefore, each survey differs in

the range of data collected covering varying aspects of working conditions and work environments. Despite calls for harmonisation of content in this field of research to allow for direct international comparisons of trends, little progress has been made to date (Sauter and Murphy 2003). Increasingly, there are also calls for the addition of outcome variables to capture the health and safety consequences of poor working conditions (Paoli 2003).

New Zealand (NZ) has been no different from any other market economy with rapid change having occurred in workplace organisation and work environments (Feyer and Lilley 2003). Very little is known about the nature, or distribution of work-related hazards, or their likely impact on worker health in NZ (Pearce et al. 2004). With no previous occupational hazard surveillance, a critical need exists within NZ for surveillance of work-related exposures at the population level to understand the implications of changing workplaces for worker health and safety, and to allow for the identification of areas for targeted interventions (Feyer and Lilley 2003).

With no standard tool, or approach, for collecting data available internationally, this study aimed to develop a robust population level survey tool to collect surveillance data on working conditions, work environments and potential health and safety outcomes appropriate for use primarily in the NZ workforce. This paper presents the results of the development of the survey tool and provides guidance to those wishing to undertake similar survey efforts. Further adaptation of a culturally appropriate form and content has also been undertaken for the indigenous Maori population; the latter study will be reported separately elsewhere.

Methods

The questionnaire development took part in two stages using a mixed method approach. The first stage involved the creation of a key dimensional framework and the second stage a critical review of potential measures for the questionnaire.

The creation of the key dimensional framework (stage 1) was undertaken in two phases. Phase 1 involved a comprehensive review of prospective epidemiological data identifying aspects of work currently considered of sufficient threat to worker health and safety to warrant inclusion in a surveillance system. Strength of evidence was assessed based on three criteria: temporality, strength and consistency of association across studies (Linton 2001). The broad dimensional areas for surveillance data collection were identified from this review.

In the second phase, international worker surveys were identified and reviewed to identify the key dimensions measured in these existing surveys. Surveys were mainly sourced from the databases of

- European Foundation for the Improvement of Living and Working Conditions (www.eurofound.eu.int/ewco/surveys/national/index.htm);
- European Union Risk Observatory (http://riskobservatory.osha.eu.int/systems/osm/reports);
- European Health and Safety Database HASTE (www.occuphealth.fi/Internet/partner/Haste).

Surveys were included in the review if they fulfilled the following criteria, were undertaken on a national basis across all occupational groups, focused on working conditions or certain aspects of working conditions, were conducted at regular intervals, used the employee as the main source of data, and were available in English.

Of 21 national surveys identified, 7 met the criteria (Table 1). A number of longitudinal studies were also considered (Table 1) even though they did not fit all our initial criteria they offered well-tested, reliable and valid scales that had potential for inclusion.

The key dimensions identified from each survey questionnaire were critically compared to identify the key potential risk and protective workplace factors covered by the majority of surveys (e.g. work schedules, physico-chemical and psychosocial hazards). A list of common dimensions covered was generated by identifying areas of consensus (where four or more surveys collected data on the same dimension) across surveys.

A dimensional framework for the NZ questionnaire was created by amalgamating the findings of the literature review (phase 1) and international survey review (phase 2). The framework was reviewed by the research team to identify additional areas for inclusion. Additional variables were added to make the data more useful in a NZ context. Consultation with potential governmental end-users and researchers in NZ was also undertaken.

Table 1 Surveys and longitudinal studies meeting inclusion criteria

Survey name	Country of origin
Workplace and employee survey	Canada
Danish work environment survey	Denmark
European survey on working conditions	European Union
Finnish quality of work life survey	Finland
Survey of living conditions	Sweden
Self-reported working conditions survey	United Kingdom
Quality of work life survey	United States of America
Longitudinal studies	
British household panel survey	Britain
Whitehall II study	Britain
Californian work and health study	United States of America

A critical review of potential measures for inclusion in the NZ questionnaire then followed (stage 2). Questions were considered for inclusion if they fulfilled the following criteria based on previously published indicator selection criteria (Rantanen et al. 2001), were of a known reliability and validity, provided the opportunity of comparison to international data, and offered a standardised response format. Additional considerations for inclusion were the availability of NZ population normative data, particularly for health outcomes, and the measure has shown good predictive validity in previous epidemiological studies. Reliability was assessed using the published internal consistency reliability (Cronbach's α) in the first instance and test–retest reliability in the second instance. Validity was assessed using the three main forms of validity: face, content and construct validity. Where a number of questions fitted the criteria, the specific wording, sentence structure, language and context of the question were investigated to select a question appropriate in the NZ context. Questions selected were either part of a scale measuring a key dimension or an individual question measuring a key descriptive variable.

Pre-testing was undertaken in a convenience sample of workers from various occupational groups. The length of the questionnaire was comparable to other national health surveys in NZ at approximately 40–60 min in duration.

Pilot testing using both telephone and face-to-face interviewing was undertaken in 292 participants (53% male, 47% female) randomly selected from the NZ electoral roll. Analysis of patterns of missing questions and qualitative feedback from participants and interviewers was used to assess the suitability of the questions within the NZ context. Questions were evaluated as being one of three types: adequate (question delivered and answered without problems), problematic (question answer needed clarification or correction), and inadequate (question wording and answer needed correction and/or clarification or answer consistently missing) (Presser et al. 2004). Any difficult questions identified as being "problematic" or "inadequate" were reviewed by the authors and inadequate questions were replaced with more suitable questions. Ethical approval for the pilot study was obtained from relevant regional ethical committees.

The study was designed to include an integrated sample of Maori workers. Maori workers make up 9.6% of the NZ workforce (Statistics New Zealand 2008). The research team included Maori members at all levels and some Maori-specific questions were included in the schedule (Cunningham et al. 2003; Stevenson 2005). The pilot sample included 15 Maori participants. A separate analysis of Maori data together with a companion Maori-specific survey will be reported elsewhere.

Results

Creation of the dimensional framework

The literature review identified occupational hazards currently considered to be of sufficient threat to worker health and safety to warrant inclusion in a surveillance system. Table 2 outlines the broad occupational hazards identified for inclusion from the literature review in relation to the strength of the evidence for an association with health and safety outcomes.

The systematic breakdown of international survey content allowed for the common dimensional areas of data collection under each occupational hazard type to be identified. Table 3 presents the key dimensions identified from the review. This review formed one part of the framework on which the NZ questionnaire was designed with the literature review forming the initial broad hazard framework. Following review by the authors, additional variables were included to make the data more relevant in a NZ context including an occupational history, health-related behaviours, cultural identity, and health outcome variables of disability and doctors visits.

Selection of specific measures

The key dimensions and the sources of the questions or scales included in the final questionnaire are presented in Table 4. The final questionnaire took 30–40 min to

Table 2 Occupational hazards identified from prospective epidemiological evidence for inclusion in a surveillance tool

Strength of evidence for poor health and safety outcomes	Occupational hazards
Strong evidence	Physical, chemical and biological hazards
	Hazardous ergonomic positions
	Psychosocial work conditions
	Occupational violence
	Job insecurity
	Long working hours
	Shift work
Moderate evidence	Job satisfaction
Inconsistent evidence but sufficient concern	Occupational intimidation
	Compressed working week and irregular working hours
	Work–family conflict

Strong evidence: consistent findings (>75% agreement) in three or more prospective studies; moderate evidence: consistent findings (75–50% agreement) in two or more prospective studies; inconsistent evidence: a few studies with mixed findings or less than 50% agreement in findings

Table 3 International consensus areas as identified by systematic review of existing surveys

Key dimensions	Sub-dimensions	Examples of variables
Socio-demographics	Socio-demographics	Age, sex, level of education
Workplace factors	Occupational characteristics	Occupation, tasks, multiple jobs
	Work scheduling	Hours of work, overtime, shift work
	Remuneration	Pay method, fringe benefits, income
	Work establishment	Industry, size of establishment
Physical hazards	Physical and chemical hazards	Vibration, noise, fumes
	Ergonomic stressors	Working positions, posture, exertion
Psychosocial hazards	Work demands	Time demands, pace of work
	Skill discretion	Learn new things, variety in work
	Decision authority	Amount of say, flexibility
	Support at work	Co-worker and supervisor
	Physical violence	Physical violence, harassment, intimidation
Workplace climate	Workplace change	Changing methods, personnel, redundancies
	Workplace climate	Trust management, safety a priority with management
	Job insecurity	Threat of job loss, prospects
Health and family outcomes	Physical health	General health status, physical functioning
	Mental health	Stress, mental functioning
	Job-life satisfaction	Satisfied with life, job, committed to job
	Injury	Time off in last 12 months
	Illness	Sickness absence, checklist of symptoms experienced
	Pain	Checklist of sites of musculoskeletal pain
	Work-life balance	Conflict with leisure, child and household responsibilities

administer. The logic underpinning the selection of measures for the key dimensions is outlined below.

Work organisation and working time characteristics

There is a large amount of variability in the coverage of measures to capture occupational and work organisational details. An amalgamated measure was created using 10 items collecting occupation, work tasks, industry, status within the workforce (ie. employee, self-employed), work location, contract type, expectation of contract renewal, and union membership data. The three remuneration items measured type and level of remuneration, and employment benefit entitlements. Work establishment was collected using two items on employment sector and enterprise sizes obtained from the European Union (EU) survey. The psychometric properties of these measures are not specifically reported; however, many of the variables chosen come from large, long standing surveys that display good stability over time.

Similar to the work organisational dimension, there is a lot of variation in work scheduling measures. Comprehensive information from the EU and Canadian surveys served as the basis for the question battery with single items on paid and unpaid overtime, variable daily hours, work time schedule, shift work patterns, working time preferences, commuting time and a four-question measure of non-standard working time. Additional items on hours of work, hours per day and flexible work time were added from other sources. Similar to the work organisation dimension, the psychometric properties of these measures are variable; however, many of the variables chosen come from large, long standing surveys displaying good stability over time.

Psychosocial exposures

There is much discussion around how best to measure psychosocial factors in the workplace (Rick et al. 2001). Review of international survey coverage of psychosocial factors revealed considerable variation in the measures used to obtain a measure of work stress. Many of the international surveys reviewed use elements of the Job Control Demand (JCD) model (Karasek et al. 1998) and calculate JCD model quadrants (i.e. sub-measures) for job demand, control and support dimensions. Thus, a number of approaches were readily available for collecting these data, adding weight to the strength of measures based on a theoretical model and allowing for a common set of constructs to be compared across countries.

The measure included in the NZ questionnaire is the British adaptation of the JCD model (Bosma et al. 1997).

Table 4 Questionnaire content and sources of questions and scales

Dimension	Items			Source
Work characteristics and organisational	Occupation	Tasks	Industry	Various sources (Lehto and Sutela 1999; Australian Bureau of Statistics 2000; Dr Dorothy Broom, Australian National University, personal communication, 2000; Institute for Health Policy Studies 2000; Statistics Canada 2000; Paoli and Merllie 2001; Statistics New Zealand 2001; Statistics New Zealand 2003) and own questions
	Work responsibilities	Number of workers supervised	Employment status	
	Contract type	Contract renewal	Collective contract	
	Remuneration type	Level of income	Leave entitlement	
	Leave flexibility	Place of work	Employer size	
	Employment sector	Union membership	Multiple job holding	
	Second job details			
Work hours and scheduling	Hours of work	Paid and unpaid overtime	Work hours preference	Various sources (Institute for Social and Economics Research 1991; Australian Bureau of Statistics 2000; Institute for Health Policy Studies 2000; Statistics Canada 2000; Paoli and Merllie 2001) and own questions
	Hours worked last week	Days worked last week	Variable daily hours	
	Flexible work time	Night, evening and weekend work	Working time schedule	
	Shift work	Commuting time		
Physical work environment	Physical hazards	Chemical hazards	Ergonomic stressors	Statistics Sweden (1997a), Paoli and Merllie (2001)
	Personal protective equipment worn	Informed of risks		
Occupational history	Job title	Industry	Period of employment	Own questions
Psychosocial factors	Work demands	Skill discretion	Decision authority	Institute for Social and Economics Research (1991), Bosma et al. (1997), Paoli and Merllie (2001)
	Social support	Violence and bullying	Job satisfaction	
Workplace climate	Management and employee relationship	Safety climate	Job insecurity	Ferrie et al. (2002), National Institute for Occupational Safety and Health (2003)
Health-related behaviours	Physical activity	Smoking	Alcohol consumption	Ministry of Health (1999)

This measure provides good reliability and validity, linkage to ill health outcomes, including physical and mental health functioning, uses language relevant in the NZ context, and identifies potentially amenable characteristics of the work environment. This version of the JCD scales maintains comparability across the various international surveys calculating the JCD model constructs for the job demand, control and support dimensions.

Occupational violence was measured with two items on physical violence and one on intimidation obtained from the EU survey. A validated single question on job satisfaction was also included.

Physicochemical and ergonomic exposures

Lists of potential workplace physical and chemical hazards' exposures are the most common method of collecting data on exposure to physicochemical hazards by the international surveys reviewed. There was considerable commonality in the measures used to collect physicochemical hazards across the European surveys reviewed due to previous work undertaken to establish a common Nordic questionnaire on working conditions (Statistics Sweden 1997a; Wikman 2006). These question sets give an estimation of the frequency of exposure. Comprehensive testing using comparisons of the interview answers with actual work conditions has found that these questions have very good criterion validity (Eklund 2001; Rantanen et al. 2001). An amalgamated set of questions from the EU and Swedish surveys was used in the NZ survey to allow for the broadest range of physicochemical and ergonomic hazards to be surveyed, maintaining comparability with other European data sets. Two items on personal protective equipment use and one item on how well participants were informed about work risks were added.

Other exposures

Workplace health and safety climate was measured using a five-question scale. Workplace climate was not included in all surveys reviewed but was included as a potential risk factor and moderator of effect. At the time of selection, the psychometric properties of this tool were under evaluation. Single item measures of job security and financial security were included from the Whitehall II study. These measures have acceptable psychometric properties and have been

shown to be predictive of health outcomes (Ferrie et al. 2002).

The longitudinal surveys reviewed include measures of life-style behaviours that impact upon health. The health-related behaviours included in our survey measured the frequency and intensity of exposure to the behaviour and were directly comparable with the NZ Health Survey (Ministry of Health 1999) enabling comparisons with population normative data.

A three-item occupational history was included, capturing previous job titles, employers, and duration of employment for all jobs held for longer than 3 months. Initially, this section included more comprehensive occupational exposure measures but pilot testing revealed this to be time consuming. To reduce the length of interview, this section was condensed, with exposure assignment planned post-interview using job exposure matrices.

Socio-demographic factors were measured by a suite of questions from six major NZ surveys as they include comprehensive coverage of aspects of socio-economic status and descriptive demographic variables, providing a comparative source of NZ population normative data. Two additional questions on the number of dependent children and contributors to the household income were added to include household factors. A Maori cultural identity scale was also added to the demographic section to assess biases due to intra-ethnic variation and to allow for the possibility of analyses which account for differing cultural influence within the Maori population. The psychometric properties of this tool are uncertain as the scales are developmental.

Health outcome measures were included on work-related injury, sickness absence, disability, sites of musculoskeletal pain, self-reported health and psychological distress (Table 5). Doctors' visits were included as a measure of service use. Single question measures were selected for work-related and general sickness absence, and disability. Two questions were used for both work-related injury and doctors' visits in the last year the first indicating if the event occurred and the second quantifying the days off work or number of visits.

Self-reported physical health was measured with a single global measure of health status shown to be predictive of more serious health outcomes (Idler and Benyamini 1997). Originally, the Short Form-12 questionnaire was used to collect self-reported health data but was removed post-piloting due to time constraints. Psychological distress is measured using the General Health Questionnaire © (GHQ-12) scale which is a well-validated and commonly used instrument (McDowell and Newell 1996) offering potential for comparison to population normative data in NZ. Musculoskeletal pain, a common symptom of musculoskeletal disorders, was measured with questions obtained from the Swedish Work Environment Survey. The five-item measure provides a comprehensive measure of sites of pain and frequency of pain with satisfactory psychometric properties (Statistics Sweden 1997b).

Work-life balance measures were included to investigate the relationship between work–family conflict and adverse worker health outcomes. The measure consists of two five-item sub-scales of "work to family" and "family to work" conflict questions (Netemeyer et al. 1996). The instrument provides the shortest validated (Netemeyer et al. 1996) scale available at the time with the first question of each scale directly comparable to other international surveys.

Pilot study

During pilot testing, few questions were found to be "problematic" or "inadequate". Two questions on job security using American labour-market terms, such as "lay off", were frequently misunderstood by NZ workers. These questions were replaced with two questions of a British origin (Ferrie et al. 2002) to overcome misunderstandings in the NZ context. Pre-testing had already detected this potential for misunderstandings in questions from

Table 5 Health-related outcomes

Dimension	Number of items	Source
Work–family–work conflict	10	Netemeyer et al. (1996)
Lost time injury	2	Institute for Health Policy Studies (2000)
Work-related sickness absence	1	Institute for Health Policy Studies (2000)
Non-work-related sickness absence	1	Own question
Doctor visits	2	Ministry of Health (1999)
Musculoskeletal pain	5	Statistics Sweden (1997b)
Disability	1	Ministry of Health (1999)
Self-reported health status	1	Idler and Benyamini (1997)
Mental health status	12	GHQ McDowell and Newell (1996)

American sources. For example, Karasek's JCQ questions were replaced with the British adaptation of this tool (Bosma et al. 1998). This paper reports the final questions used in the questionnaire. Problematic questions involved difficulties with wording of questions associated with organisational size and sector. Either parts of the response categories were reworded or an example was inserted into the question, to assist in the delivery and understanding of the question. Overall, the questions selected for the NZ questionnaire were found to have good face validity in the NZ context.

Discussion

The key dimensional content of the questionnaire was developed using a mixed method approach including a review of prospective epidemiological literature on the determinants of occupational health and injury, and a review of the dimensional content of international workers' survey surveillance efforts. This mixed method approach addressed the lack of guidance with regard to the recommended dimensional coverage of "quality of work" surveys. The strength of this approach was that the NZ questionnaire included as many measures as possible from the major international surveys to allow for valid comparisons across countries, where possible, in the future. This mixed method approach was based on the premise that developing similar population level data sets in NZ to those of other international survey efforts would lead to a NZ survey capable of yielding a data source comparable to those already in existence in Europe and North America.

A bank of measures offering known reliability and validity, standardised response, potential for international comparison and in some cases, predictive validity was established by reviewing both international surveys and some relevant longitudinal studies. These criteria for the selection of measures and questions were appropriate to minimise threats to the validity of the questionnaire. On the other hand, the critical review identified that many measures were of unknown reliability and validity with these being poorly assessed, or if assessed, the evidence was poorly reported in most surveys reviewed. Where questions of known reliability or validity were unavailable, questions were sourced from the main international surveys displaying stability over collection periods. Definitional issues were also found to be a barrier in selecting measures, with some dimensional concepts, such as work organisation, poorly defined. Different fundamental emphases in question orientation across international surveys were also a barrier to harmonisation of data and international comparability.

The process of identifying and systematically reviewing existing surveys was used to indicate the key data content needed to fully describe workplace exposures and working conditions. This process was also important to allow for selection of questions with direct comparability to other data sources. Harmonisation of data and data comparability in an international context is an important issue, given the current lack of comparability across the various surveillance efforts (Sauter and Murphy 2003). The consultation with local experts on the key dimensions collected internationally also gave the opportunity to make modifications particular to the NZ context. As a case in point, NZ has very poor population level occupational exposure data, so more data were viewed as being essential in order to create a complete profile of potential occupational exposures. The amount and breadth of data collected in this questionnaire are comparable to the European Working Condition Survey which is regarded as being an extremely rich and productive data source for health and safety research (Smulders 2002; Sauter and Murphy 2003; Kreis and Bodeker 2004).

This survey was a response to an identified need in NZ for population-based surveillance of occupational hazard exposures. The survey questionnaire focuses on measures of the work environment and work conditions that are known, or suspected, risk factors for adverse heath and safety outcomes and which could be used to monitor work environments and their potential health impacts on NZ workers. As such there are a few dimensions covered by international quality of work surveys that are not included (e.g. technology use, training) in this survey as well as there being a few dimensions included (e.g. occupational histories, health-related behaviours) in this survey that are not covered in other international quality of work surveys. In contrast to other worker's surveys reviewed, the NZ questionnaire also employs a comprehensive range of health outcome measures providing useful intervening measures between workplace exposures and the expression of frank illness which are not available from other occupational health and safety surveillance efforts in NZ. These measures are sensitive to the early signs of the effects of work environment and working conditions which may be damaging to worker health in the long term.

Perhaps one of the key drivers underpinning the development of this and other similar workers surveys internationally has been the recognised need to add value to occupational hazard surveillance by offering the possibility of establishing longitudinal studies/time series data to accurately assess relationships between workers' health and aspects of the work environment. The intention of this survey tool is not only to provide cross-sectional surveillance of working conditions and hazardous occupational exposures, but also to generate hypotheses exploring links

between these exposures and health outcomes. The inclusion of life-style and confounding variables makes the NZ data set that would be yielded by this survey more useful for longitudinal analyses, giving the option of creating a cohort (similar to the Danish Work Environment Cohort Study) to explore possible explanations for poor health and safety outcomes and inequalities in outcomes. As the NZ survey presented here includes both exposure and outcome measures in the one tool, it allows for the consideration of the associations between the two measures. In the absence of the collection of occupational exposure information in NZ, our survey removes the need for the establishment of routine exposure data collection and data matching with national outcome data, where long-term trends are going to be difficult to discern. Therefore, our survey allows for the most value from the data to be obtained in the shortest time in the absence of long-term data, and offers the ability to explore the relationship between work characteristics and poor health and safety outcomes, a feature many existing international surveys are unable to offer.

A list of recommended measures that should be included in surveillance of work organisation, work environment and health outcomes is presented in Table 6. Together, this set of measures can serve as a barometer of workplace change over a broad range of potentially harmful workplace exposures.

This paper presents establishment of an instrument to allow for the systematic capture of workers hazard exposure data at the population level. Development of important processes further down the surveillance chain is required to establish a functional surveillance system including: the establishing relevant dissemination pathways, ensuring the timely application of these data to prevention and control efforts, and establishing mechanisms for regular system review. Future work will establish these surveillance processes.

The workers' survey approach is particularly responsive to changing views and concerns in occupational safety and health, offering considerable flexibility with the dimensional content easily changed as epidemiological understanding of the causes of occupational ill health change. At the same time, it is recognised that the collection of these data needs to be systematic and incremental, with core areas available longitudinally in internationally comparable form. It is the intention of this work to maintain a standardised core of variables that would be collected in a regular cross-sectional nature. This questionnaire also provides the potential for longitudinal studies and their analyses, allowing for more accurate assessment of the various relationships between working conditions and health outcomes. We would consider this questionnaire to be a minimum set of questions to comprehensively investigate work organisation, work environment and health outcomes not only in NZ but also internationally. We hope this paper stimulates further discussion internationally regarding the content of working conditions' surveys and the potential for harmonisation of data collection.

Table 6 Recommended measures for inclusion for cross-sectional surveillance of occupational hazards

Determinants/risk factors	
Demographics and socio-economic status	*Work and organisational characteristics*
Age, sex, and ethnicity	Work responsibilities
Personal and household income	Location of work and employer size
Household ownership	Employment status
Household composition	Contract type and remuneration type
Educational attainment	Employment benefit entitlement
Physical work environment	Union membership
Physical hazards	Sector of employment
Chemical hazards	Multiple job holding
Biological hazards	*Workplace climate*
Ergonomic hazards	Safety climate
Work hours and scheduling	Job insecurity
Work and commuting hours	*Psychosocial work environment*
Work schedule	Job control
Night, evening and weekend work	Job demands
Work preferences	Social support
Shift work	Job satisfaction
	Violence and bullying
Outcomes	
Health	*Work-life balance*
Injury	Work to family conflict
Sickness absence	Family to work conflict
Mental health status	
Physical health status	
Musculoskeletal pain	

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