

**NOHSAC**

National Occupational Health  
and Safety Advisory Committee  
*Komiti Tohitohu Mahi A-Motu Hauora me te Haumanu*

**METHODS AND SYSTEMS USED TO**

# **MEASURE AND MONITOR OCCUPATIONAL DISEASE AND INJURY**

**IN NEW ZEALAND**

**NOHSAC TECHNICAL REPORT 2**

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SECTION ONE

EXECUTIVE

# SUMMARY

The National Occupational Health and Safety Advisory Committee (NOHSAC) commissioned Health Outcomes International to conduct a review of methods and systems used to measure and monitor occupational disease and injury in New Zealand. This is NOHSAC's second project designed to provide an independent evidence-based assessment of some of the measures that would deliver the greatest benefit for the prevention of occupational injury and disease in New Zealand.

Diseases and injuries that occur due to work have long-term consequences and represent significant costs, in social and economic terms, to workers, employers, government, and the economy. Occupational disease and occupational injury surveillance plays a vital role in estimating the incidence, prevalence, trends, and distribution of occupational disease and injury. In so doing, it facilitates the identification of priority areas and risk factors and is thus an essential precursor to the development of effective prevention strategies.

There is no comprehensive database for work-related disease in New Zealand, and work towards a comprehensive database for work-related injury has only recently commenced. New Zealand has a wide range of data sources that could potentially contribute to occupational disease and injury surveillance, including death records, hospital records, ACC claims, cancer registry records, occupational safety and health notifications, and systems that focus on specific industries or hazards.

The organisations that collect this data do so for a range of purposes, which support occupational disease and injury surveillance objectives to varying degrees. There are inconsistencies in the data collected by the various agencies, and gaps and duplication in coverage. Moreover, the diffusion of responsibility for data collection among the various organisations increases the potential difficulties in improving data collection to support surveillance of occupational disease and injury in New Zealand. These observations are not new and have been documented in a number of other reports over the last six years.

This review addresses the following research questions:

- What types of methods and systems are currently used to measure and monitor the prevalence and incidence, trends, and distribution of both occupational disease and occupational injury in New Zealand?
- Are there any future plans in place to develop/improve individual occupational disease and injury surveillance systems?

It also gives consideration to the following issues:

- What are the strengths and weaknesses that exist in methods and systems used for the surveillance of occupational disease and injury in New Zealand, and are there any gaps in these surveillance systems?
- What opportunities are there to improve the administration/management, data collection, accuracy, and timeliness of existing occupational disease surveillance systems?
- What are the barriers to effective surveillance of occupational disease and injury in New Zealand?

The review combines two key sources of information: a search and review of relevant New Zealand literature, and consultation with organisations that have systems in place for measuring and monitoring occupational disease and injury.



## 1.1 OCCUPATIONAL DISEASE

Occupational disease accounts for greater mortality and morbidity than occupational injuries, but is harder to diagnose, measure, and monitor for a range of reasons, including long latency periods after exposure, difficulties distinguishing occupational diseases from non-occupational diseases, and a lack of awareness about the occupational origins of some diseases. Consequently, there are no comprehensive sources of routinely-collected data on mortality or morbidity due to occupational disease in New Zealand. The following potential sources of occupational disease data were reviewed.

### DEATH CERTIFICATES AND CORONERS' REPORTS

Medical certificates of causes of death and coroners' reports are reported to the Births, Deaths and Marriages (BDM) electronic database of causes of death. The database is complete for all deaths occurring in New Zealand and records detailed information about direct, antecedent, and underlying causes of death. However, the medical certificate does not collect any information on whether or not the death is work-related, and the recording of occupation is unstructured.

Coroners' reports include data obtained from many sources and represent a potentially rich source of information on the nature and circumstances of some deaths. The recording of occupation involves the use of a free-text field asking for "usual occupation, profession, or job" of the deceased. However, coroners are more likely to investigate deaths due to occupational injury than those due to occupational disease. Coroners' findings are not directly recorded electronically, and this represents a major barrier to the efficient retrieval of surveillance information.

### MORTALITY COLLECTION

The New Zealand Health Information Service (NZHIS) maintains the Mortality Collection, which classifies the underlying cause of death for all deaths registered in New Zealand. It integrates data from a range of sources including BDM, coroners' findings, and postmortem and toxicology reports. The National Health Index (NHI) number is used as a unique identifier on the Mortality Collection, facilitating linkage with other data sets.

Occupation and work-relatedness data are inadequate for the surveillance of occupational disease. The recording of occupation involves the use of a free-text field. Little guidance is given to funeral directors who complete the occupation details on the notification of death registration form. Although there is a work-relatedness flag on the database, it is only used where the cause of death was related to an accident at work.

### NEW ZEALAND CANCER REGISTRY (NZCR)

The NZHIS maintains the New Zealand Cancer Registry (NZCR), which records all primary malignant diseases diagnosed in New Zealand, excluding squamous cell and basal cell carcinomas of skin. It provides full coverage of cancer incidence since 1994, when compulsory reporting by laboratories was introduced, virtually complete (>90%) coverage since 1972, and partial coverage as far back as 1948. The NHI number is included as a unique identifier on the NZCR, facilitating linkage with other data sets.

Occupation details on the NZCR are inadequate for occupational disease surveillance, being sourced from the National Minimum Data Set (NMDS) of hospital discharges, where it is poorly recorded and uses free text.

Moreover, since 1 July 1994, the occupational information from the NMDS has not been routinely imported into the NZCR. There is no indicator of work-relatedness on the NZCR.

#### **NATIONAL MINIMUM DATA SET (NMDS)**

The NMDS is a national collection of public and private hospital discharge information, including clinical information, for inpatients and day patients. It is maintained by NZHIS. A particular strength in the data set, aside from its completeness for public hospital discharges and near completeness for private hospital discharges, is the strong coding of diagnosis and severity, using the International Classification of Diseases (ICD). The NMDS includes two unique identifiers, which would facilitate linkage with other data sets. These are the patient's NHI number and, where applicable, their ACC claim number.

The recording of occupation is inadequate for the surveillance of occupational disease, being under-recorded and restricted to free text and an occupation code. The hospitals may report either (or both) the code and the free-text field. There is no work-relatedness indicator on the NMDS. However, the potential to identify work-related diseases and injuries using E codes has been improving with successive upgrades of the ICD-10-AM system, in particular the 3rd Edition, which is used in New Zealand from 1 July 2004.

#### **NOTIFIABLE OCCUPATIONAL DISEASE SYSTEM (NODS)**

The Notifiable Occupational Disease System (NODS) is a voluntary reporting scheme whereby health professionals and other individuals can notify a health-related condition that is suspected to arise from work. NODS is administered by the Department of Labour (and formerly by the Occupational Safety and Health Service (OSH) within the Department).

NODS was designed to supplement the statutory requirement for employers to notify serious harm and fatalities, by providing a vehicle for voluntary notification of suspected occupational diseases. However, the notification card implicitly restricts data collection to those occupational diseases included in the legislative definition of "serious harm" used by OSH.

The key strengths of NODS are that it was introduced specifically to record occupational diseases and that anybody can make a notification. However, NODS currently has a low potential to contribute to the surveillance of occupational disease. Key problems include poor diagnosis and under-reporting of occupational diseases to OSH, a system design that does not lend itself well to the aggregation of data for surveillance purposes, a low state of readiness of the data for integration with other data sets, and work practices that are intended to support efficient investigations and are not always consistent with the recording of high-quality data.

NODS notifications tend to contribute to the prevention of the recurrence of harm through the identification of learnings from individual cases rather than aggregated data.

#### **OSH PANELS**

There are currently four panels, comprising medical and non-medical specialists, which were established to review and monitor specific occupational diseases and extend the evidence bases relating to the occupational origins of these diseases. These are the Cancer Panel, the Respiratory Diseases Panel, the Solvent Panel, and the Chemical

Panel. These panels are linked to the NODS system, and cases of occupational disease identified by these panels are entered into the NODS system.

### **Cancer Panel**

The Cancer Panel endeavours to review all cases of selected cancer sites reported to the New Zealand Cancer Registry, to identify possible occupational causes. Currently, the sites under review are bladder cancer, non-Hodgkins lymphoma, and leukaemia; it is proposed that, in 2005, the review of cases from these sites will end, and the focus will be on lung cancer for the next two years.

Unlike the other OSH panels, the Cancer Panel is not solely reliant on notifications made to OSH. Instead, it has the significant benefit of access to New Zealand Cancer Registry data, covering all new cancers diagnosed in New Zealand. This represents a significantly different approach in that the panel takes a “top down” approach and starts with all cases of the cancer sites under review and then determines which cases are work-related (and which are not). Thus, it can, in theory, identify all of the work-related cases for these sites. This differs from the other panels and the rest of the NODS system, which use a “bottom up” approach that is reliant on individual voluntary notifications.

The demographic and diagnostic information provided by the Cancer Registry is combined with detailed occupational and exposure histories gathered through interviews with individual patients. Approximately 60–70% of all new cases of these cancers have been reviewed in the last three years. The Cancer Panel has successfully demonstrated that the incidence of these cancers from occupational causes in New Zealand is similar to that in other Western countries and has published a study on bladder cancers, with non-Hodgkin’s lymphoma and leukaemia being the subject of two future reports currently in preparation.

### **Respiratory Diseases Panel**

The Respiratory Diseases Panel was established to review and monitor occupational respiratory disease notifications, including asbestos-related diseases, occupational asthma, and other respiratory diseases. It was formed out of two previous OSH panels in 2001: the Asbestos Panel and the Asthma Panel. The Asbestos and Asthma Panels contributed to the body of knowledge about asbestos-related diseases and occupational asthma, through annual reports and ad hoc studies. However, notifications to the Respiratory Diseases Panel have declined in recent years, and staff turnover and vacancies at OSH are said to have resulted in the panel being poorly supported by head office. It is understood that few respiratory diseases, other than asbestos-related diseases, have been reported to the panel. The Asbestos Diseases Register covers an estimated 30% of mesotheliomas and a very small proportion of other asbestos-related diseases. Electronic recording of asbestos exposure and disease reports is understood to have ceased in the mid 1990s, when OSH transferred to a new computer system and problems were encountered transferring the data to the new system. It is understood that the data from the previous databases was subsequently lost or destroyed.

### **Solvent Panel**

The Solvent Panel has been successful in demonstrating the existence and importance of chronic organic solvent neurotoxicity as an occupational illness, particularly within certain industries. Although only a small proportion of all cases are believed to be reported to OSH, they are probably among the more severe cases. The number of notifications has declined in recent years, however, and this is believed to be principally due to a decline in notifications from GPs. There has been no analysis of solvent neurotoxicity data in recent years.

### **Chemical Panel**

The Chemical Panel was established to review and monitor notifications relating to diseases originating from chemical toxicity. The Chemical Panel has not convened in the last two years, due to non-reporting of cases. In contrast, ERMA New Zealand data recorded 57 cases of poisonings or toxic effects as a result of workplace

exposure to hazardous substances in 2003/04, with chemicals and chemical products being the most common substances associated with such incidents.

#### **HEALTH AND SAFETY ACCIDENT RECORDING DATABASE (HASARD)**

The Health and Safety Accident Recording Database (HASARD) records serious harm notifications made to OSH. The legislative definition of serious harm includes certain occupational diseases which, when notified to OSH, are recorded in the NODS system as described above. The instances of serious harm recorded by the HASARD system are principally occupational injuries. Therefore, HASARD has a low potential to contribute to the surveillance of occupational disease.

#### **ACCIDENT COMPENSATION CORPORATION (ACC) CLAIMS DATABASE**

ACC administers New Zealand's Accident Compensation Scheme, which provides personal injury cover for all New Zealand citizens, residents, and temporary visitors to New Zealand. ACC collects levies, determines eligibility of claims, and provides entitlements, including compensation payments, cover for medical fees and other care, and rehabilitation services. The ACC claims database provides a record of all cases that meet the criteria for compensation and for which compensation is claimed.

The ACC scheme provides cover for occupational diseases specified in legislation. Coverage is very specific and includes certain occupational diseases, linked to specific exposures, and other diseases that meet the legislative definition of a "personal injury caused by a work-related gradual process, disease, or infection". Although there is a financial incentive for individuals to submit claims, it is unclear how comprehensively the database reflects the true incidence of the diseases covered by the scheme.

The structure and coding systems of the ACC database are, in many respects, well-suited to the surveillance of occupational disease. For example, the database records the ACC claim number and, where available, the claimant's NHI number, facilitating record linkage to NZHIS databases. Occupation and industry are coded according to the standard Statistics New Zealand classification systems. There is a specific indicator for work-relatedness, although its usage is incomplete. Latterly, work-related injuries (excluding motor vehicle traffic crashes) can be identified, since they are paid from the Employer and Self-Employed accounts. The diagnosis field accommodates both ICD-10 and Read codes, and ACC routinely maps Read codes to ICD-10. The database records robust and objective cost information, including time off work.

However, the overriding functions of the ACC database have been administrative, such as determining eligibility for a claim, determining which ACC account should fund the claim, facilitating case management, and providing data to inform the setting of levies. These administrative objectives are not always consistent with surveillance imperatives. In particular, these objectives do not always require complete and accurate data on occupation.

#### **EPISURV**

EpiSurv records all notifiable diseases that have been reported to Medical Officers of Health. Reporting of these diseases is mandatory, and there is a strong emphasis on completeness and accuracy of data entry. Coverage is variable by disease type, depending upon the proportion of total cases that result in a GP visit. Detailed information is recorded on the diagnosis and the basis of diagnosis. Exposure information is also captured where available.

There is a free-text field for recording occupation and, although it is under-utilised overall, it is fairly well completed for work-related cases. The database includes patients' NHI numbers, facilitating linkage to NZHIS data sets.

#### **ENVIRONMENTAL RISK MANAGEMENT AUTHORITY (ERMA)**

ERMA New Zealand's mission is to achieve effective prevention or management of risks to the environment, public health and safety associated with importing or manufacturing hazardous substances and introducing new organisms, and their use.

ERMA has a specific mandate to measure and monitor impacts of the legislation governing hazardous substances and new organisms on health and the environment. The workplace is a major source of exposures to hazardous substances. Substances are still being transferred into the new legislative regime from previous pieces of legislation, and ERMA is in the process of developing its surveillance capability.

Current data analysis is based on aggregated and confidentialised data from a range of sources, including the NMDS, Fire Service, HASARD, and some directly received reports of hazardous substance incidents. The Ministry of Health is also working with the Institute of Environmental Sciences and Research to facilitate progress toward the development of a Chemical Injuries Surveillance System. Technical and process issues identified to date suggest that implementation of such a system may be a few years away and not necessarily on a full national scale.

#### **INDUSTRY-SPECIFIC SURVEILLANCE SYSTEMS**

This review included data collections maintained by the Civil Aviation Authority (CAA), Maritime New Zealand (MNZ), the Land Transport Safety Authority (LTSA), and the Forest Research Centre for Human Factors and Ergonomics (COHFE). The surveillance systems operated by these organisations are principally applicable to the surveillance of occupational injury, although they may detect cases of stress and fatigue to the extent that these were contributing factors to an injury.

#### **STRENGTHS, WEAKNESSES, AND GAPS**

The key strengths across the systems are:

- the complete capture of fatalities, cancers, and hospital admissions (notwithstanding the inability to identify work-related disease cases within these data sets)
- the existence of two unique identifiers (NHI number and ACC45 claim number) that can facilitate the linkage of all of the five most promising data sets in terms of coverage (Mortality Collection, Cancer Registry, NMDS, ACC, and EpiSurv)
- the use of ICD-10 as a common coding standard across four of the five most promising data sets (although some concordance issues between different versions of ICD-10-AM must be acknowledged)
- ready access to timely data and advice on its interpretation.

Key weaknesses include:

- the inability to identify (either positively or probabilistically) most occupational disease cases, due to poor coding of occupation and work-relatedness and limited capture of exposure to known risk factors

- under-reporting of occupational disease, including the under-reporting of work-related cancers
- poor coding of industry and ethnicity in most databases
- very little information on the costs of work-related disease
- the low potential of New Zealand's only purpose-built occupational disease recording system to contribute significantly to occupational disease surveillance, due to under-reporting and shortcomings in system design.

Gaps have been considered along three dimensions:

- Vertical – cases not captured by the systems: Cases of occupational disease that are non-cancerous, have not resulted in a hospital admission or death, are not covered by ACC, and are not a notifiable communicable disease, will only be captured if they are reported to OSH and recorded in the NODS system. Occupational diseases affecting volunteers and bystanders will also be under-recorded or under-identified across the systems.
- Horizontal – missing information about cases: The principal gap in data collection is the lack of standardised coding of occupation in the three NZHIS databases, the NODS system, and EpiSurv. Other important gaps include work-relatedness, industry, and ethnicity.
- Temporal – coverage and consistency over time: Data should be relatively consistent across the main data sets since 2000. Key changes in the data sets over time are identified within the review.

#### OPPORTUNITIES FOR IMPROVEMENT

A range of opportunities for improvement have been identified. Similar findings can be seen in a range of previous reports over the last few years. The following opportunities have been identified purely with regard to their desirability from an occupational disease surveillance perspective and without consideration of legislative, policy, or budgetary implications:

##### **Administration and management**

- Put someone in charge at a national OSH level with the appropriate qualifications and support staff, to coordinate and improve the quality of all-cause occupational disease surveillance, working in collaboration with a range of agencies and independent researchers.
- Ensure someone is responsible within each of the relevant organisations, with a specific mandate and appropriate resources to ensure the capture of high-quality occupational disease data.

##### **Data collection**

- Take deliberate steps to increase reporting of suspected cases to NODS, including targeted work with employees, unions, employers, and GPs, to raise awareness and fill knowledge gaps; and provide feedback to promote the value of NODS data.
- Continue and enhance those aspects of NODS that are currently working well, including the work of the OSH Cancer Panel.
- Improve recording and investigation of the work-relatedness of disease, including modifying death certificates to capture the certifying doctor's opinion as to whether the disease was work-related; amending the BDM database to capture this information; broadening the definition of work-relatedness associated with the corresponding indicator in the Mortality Collection, to include suspected occupational disease; expanding the role of the Coroner's Court to include inquiry into suspected cases of occupational disease; and establishing a coronial database to enable surveillance and systemic learnings from coronial findings, with a specific module for work-related deaths.

- Improve recording of occupation in NZHIS data, including introducing the standard Statistics New Zealand coding system into the Mortality Collection, NZCR, and NMDS; coding the backlog of occupation using methods recently recommended in another study; including occupation in the NHI database; and opportunistically recording longitudinal occupation information on the NHI database each time a patient presents.
- Extend and improve the coding of industry in NZHIS and OSH data, in order to add depth to the information captured in the occupation field, by including industry as a variable in the Mortality Collection, NZCR, and NMDS using the standard Statistics New Zealand classification system; and aligning the industry classification system in NODS/HASARD with the Statistics New Zealand system.
- Collect additional information on work-relatedness, occupation history, and exposure history by developing a common definition of work-relatedness for OSH and NZHIS; a staged indicator for work-relatedness (e.g. confirmed/suspected/not); common definitions and fields for recording current occupation, usual occupation, and occupation history; common definitions and identify or develop a classification system for coding exposure history from patient case notes; and an exposures database to collect denominator information on exposures to risk factors by integrating data from a range of primary and secondary sources.

#### **Accuracy**

- Improve the use of the work-related E codes in ICD-10-AM 3rd Edition.
- Code work-relatedness and occupation for all ACC claims.
- Ensure ACC claim data is updated on the database (e.g. following a change in diagnosis).
- Review the classification and field structures in NODS/HASARD for recording occupation, industry, diagnosis, agent, and mechanism, with a view to aligning these with standard classification and coding systems and using hierarchical pick-lists for data entry.
- Ensure NODS data is updated upon completion of each investigation.

## **1.2 OCCUPATIONAL INJURY**

The workplace is a significant contributor to injuries and injury fatalities in New Zealand. However, the systems currently in place for collecting and coding occupational injury surveillance data suffer from a number of limitations that hamper efforts to quantify the nature and extent of occupational injury. Four significant initiatives have explored the feasibility of merging injury data sets from various agencies, each project building upon the learnings from the previous one. In doing so, these studies have reached conclusions about the strengths, weaknesses, and gaps of the various data sources and begun to strengthen New Zealand's occupational injury surveillance capacity. These are the Work-Related Fatal Injury Study, the Accident Insurance Regulator, the New Zealand Injury Data Review, and the Injury Statistics Project Pilot. The latter is described below and is followed by a summary of the systems covered by this review.

### **INJURY INFORMATION MANAGER**

The Injury Information Manager role was established to produce coherent injury statistics in New Zealand, by collecting and aggregating injury-related information. Statistics New Zealand was appointed Injury Information Manager in June 2002. The Injury Information Manager is directly accountable to the Ministers of Statistics and ACC. The Ministers purchase outputs from the Information Manager, but do not control the methodology used to produce the results or the manner of their publication and dissemination. The Ministers also receive advice from a Ministerial Advisory Panel, which provides advice on the data sets, reporting, and the direction and strategy of the injury surveillance model.

Development of the new injury statistics system began in August 2002 and was expected to span three years. In the first year of the project, a trial integration (pilot) stage was carried out using ACC and NMDS data (which represent the bulk of the available injury information). The primary objective of the pilot study was to establish the feasibility of integrating the two primary sources of data. The feasibility report from the pilot study was submitted in May 2004.

The feasibility report concluded that ACC and NZHIS data can be integrated to a suitable level of quality and that confidentialised versions of the NZHIS and ACC unique identifiers are suitable for completing the record linkage process to an acceptable level of accuracy for statistical purposes. The creation of an injury database, based on the pilot prototype, is considered to be feasible.

Occupational diseases have been specifically excluded from the project, at least for the time being. The Injury Data Review recommended that, in principle, occupational disease should be included in the definition of injury. However, it was excluded from the project until a clear picture of the incidence of occupational injuries in New Zealand is obtained, the surveillance systems measuring occupational disease can be improved, and further research can be undertaken to decide the most appropriate means of occupational disease surveillance. As a result, the project has taken deliberate measures to identify and exclude occupational disease cases. This is appropriate since the systems and methods required for surveillance of occupational disease differ from those required for surveillance of occupational injury. It is therefore important that systems and methods appropriate for occupational disease surveillance are developed and strengthened (as identified above), and it is inappropriate to simply “add on” surveillance of occupational disease to the work of the Injury Information Manager.

The next stages of the project will progressively extend the coverage of the injury database to further data sources. Statistics New Zealand plans that, by December 2005, it will have satisfactorily completed basic spreadsheets combining all available data. Providing improved access to the data will then become a priority, including a view to providing access to the data via the internet during 2006.

Once numbers of injuries have successfully been established using all available data sources, other measures will be developed, including determining the number of injured persons and developing time-based risk indicators related to various exposures, occupations, and other factors.

Part of the Injury Information Manager’s role is to identify information gaps and system solutions to create a robust and complete view of injury in New Zealand. Therefore, it is anticipated that the Injury Information Manager may at some point, seek to influence the way data is collected by the source agencies.

#### **DEATH CERTIFICATES AND CORONERS’ REPORTS**

Most occupational injury deaths, apart from motor vehicle accidents and bystander deaths, would be investigated by the coroner. As noted earlier, coroners’ findings are not recorded electronically, and this represents a major barrier to the efficient retrieval of surveillance information. Medical certificates of causes of death do not include an indicator of work-relatedness.

#### **NATIONAL MINIMUM DATA SET (NMDS)**

The NMDS records hospital inpatient and day patient discharges. As noted earlier, the recording of occupation is inadequate for the surveillance of occupational injury, as it is under-recorded and is restricted to free-text information.



#### HEALTH AND SAFETY ACCIDENT RECORDING DATABASE (HASARD)

HASARD records serious harm notifications received by OSH. Occupational health and safety legislation requires employers to notify OSH about workers who suffer serious harm as a result of their work.

HASARD currently has a low potential to contribute to the surveillance of occupational injury. Key problems include under-reporting of serious harm by employers, a system design that does not lend itself well to the aggregation of data for surveillance purposes, a low state of readiness of the data set for integration with other collections, and work practices that are intended to support efficient investigations and do not always support the recording of high-quality data.

Serious harm notifications to OSH tend to contribute to the prevention of the recurrence of harm through the identification of learnings from individual investigations, rather than aggregated data.

#### ACCIDENT COMPENSATION CORPORATION (ACC) CLAIMS DATABASE

The ACC claims database provides the most complete available coverage of most types of injury and is the only major source of statistics on “minor” occupational injury, due to its comprehensive coverage of work-related injuries. The financial incentive for individuals to claim also facilitates a high level of capture, but by no means guarantees complete capture of eligible cases. However, there are some gaps in coverage. For example, the scheme excludes incapacity during the first week of a work-related injury (for which the employer must compensate the employee), and fatal accidents (unless a claim is made for funeral expenses or support for dependants).

The structure and coding systems of the ACC database are, in many respects, well suited to the surveillance of occupational injury, including fields which can be used to capture unique identifiers, occupation, work-relatedness, industry, diagnosis, and costs. However, the overriding functions of the ACC database have been administrative and have therefore not always been consistent with surveillance needs. In particular, claims administration and case management do not require complete and accurate data on occupation and require only partial use of the work-relatedness flag (which positively identifies most occupational injuries, apart from motor vehicle accidents). Also, the scheme’s eligibility rules may lead to distortions in the coding of diagnoses.

#### NATIONAL POISONS CENTRE

The National Poisons Centre (NPC) is based within the University of Otago and aims to provide information and advice, 24 hours a day to health professionals, organisations, and the general public about the toxic effects of chemicals. The NPC logs all calls it receives in a database. The database provides the most comprehensive available coverage of poisoning events. However, occupational details are not recorded, and the personal information recorded, such as name and telephone number, are insufficient to enable linkage with other data sets at a micro level.

#### ENVIRONMENTAL RISK MANAGEMENT AUTHORITY (ERMA)

ERMA is developing its surveillance capability. Current data analysis is based on aggregated and confidentialised data from a range of sources, including the NMDS, Fire Service, HASARD, and some directly received reports of hazardous substance incidents. A Chemical Injuries Surveillance System is under development.

#### **CIVIL AVIATION AUTHORITY (CAA)**

The Civil Aviation Authority (CAA) establishes civil aviation safety and security standards and monitors adherence to those standards. The principal function of the CAA is to promote safety at reasonable cost. The CAA carries out accident and incident investigations and collates findings to establish an industry-wide safety picture. From May 2003, the CAA has also been mandated to receive serious harm notifications and undertake occupational safety and health investigations in relation to aircraft as workplaces.

By definition, agencies such as the CAA cover a small percentage of the population of work-related deaths and injuries. Nevertheless, these agencies may identify deaths and injuries which are not recorded by ACC or OSH. CAA data is structured around events (rather than individuals). Limited and broadly-categorised injury details are captured. Pilots' and crew members' names are recorded. Identifying details of passengers are not recorded. Serious harm reports are not copied to OSH for inclusion on the HASARD database.

#### **MARITIME NEW ZEALAND (MNZ)**

The principal objective of Maritime New Zealand (MNZ) is to undertake its safety, security, marine protection, and other functions in a way that contributes to the aim of achieving an integrated, safe, responsive, and sustainable transport system. The Accident Investigation Division of MNZ maintains a database to record and analyse common causes of accidents. From May 2003, MNZ has been designated under the HSE Act to receive serious harm notifications and undertake occupational safety and health investigations in relation to ships as places of work. Prior to that time, occupational safety and health for crew on board commercial ships was covered under Part II of the Maritime Transport Act.

As a specialist agency, MNZ covers a small percentage of the population of work-related deaths and injuries, but may be able to identify some deaths and injuries not recorded by ACC or OSH. The database records identifying details of injured people and, where the injured person is a seafarer, details of their occupation. Injury type, site, and seriousness of the injury are categorised at a broad level. Serious harm reports are not copied to OSH for inclusion on the HASARD database.

#### **LAND TRANSPORT SAFETY AUTHORITY (LTSA)**

The Land Transport Safety Authority (LTSA) existed to promote land transport safety at reasonable cost. The LTSA monitored and analysed data relating to road and rail accidents and incidents, and maintained a database of traffic crash reports recorded by police when they attend crashes. The database has been used to manage, analyse, and map traffic crash and related data, which helps to determine road safety funding allocations, targeting of road safety programmes, and monitoring of their performance. The government's recent Transport Sector Review resulted in the creation of a new Crown entity called Land Transport New Zealand to undertake the activities of Transfund NZ and the LTSA other than policy advice functions, which transferred to the Ministry of Transport. Transfund NZ and LTSA were disestablished. Some, but not all, of the LTSA functions relating to crash monitoring and analysis have transferred to the Ministry.

Crash reports include details of who was involved, where the crash occurred, when and how it happened, the type of vehicles involved, the people who were not in vehicles, information about the crash environment, and a crash diagram. Occupational details are not categorised in routine crash reports. Work-relatedness is not recorded.

The Commercial Vehicle Investigation Unit (CVIU) of the New Zealand Police investigates accidents involving heavy vehicles, and this data is also forwarded to LTSA. Therefore, the occupational group involved in road transport

using heavy vehicles is covered. However, other occupational groups in the transport industry (such as couriers) and the many other occupations that involve regular road travel, are not identified.

#### FOREST RESEARCH CENTRE FOR HUMAN FACTORS AND ERGONOMICS (COHFE)

The Forest Research Centre for Human Factors and Ergonomics (COHFE) maintains an accident reporting scheme for the forestry industry which contains 20 years' data on logging injuries, including details of injuries sustained, days of work lost, and near miss events. Reporting is voluntary, but the 16 largest forestry companies participate, together accounting for an estimated 60–80% of the forestry workforce. There is also an exposures database which records total hours of work per month for the reporting companies, providing denominator data for analysis of injury rates. COHFE enjoys strong credibility within the industry, with support from all of the largest employers, and goodwill developed through COHFE fostering networks within the companies, which provide regular feedback on the data. As a result, the data is highly complete and accurate (for the participating companies) and is valued by those who contribute injury information.

#### STRENGTHS, WEAKNESSES, AND GAPS

The key strengths across the systems are:

- the positive progress being made by the Injury Information Manager toward making the best use of the available data and producing a comprehensive database of injuries in New Zealand
- the high level of capture of occupational injuries within the ACC claims database (due to comprehensive personal injury cover and financial incentives to claim), some of which are positively identified as being work-related
- the existence of two unique identifiers (NHI number and ACC45 claim number) which the Injury Information Manager has shown can effectively facilitate the linkage of the ACC and NMDS data sets and should work with a similar degree of success for the Mortality Collection
- the use of ICD-10 as a common coding standard across all three of the most promising data sets (in terms of their coverage)
- sufficient coding of industry, occupation, activity, and mechanism data within the ACC database, to facilitate some analysis of risk factors and contributing factors and help identify priority areas for further research
- ready access to timely data and advice on its interpretation.

Key weaknesses include:

- poor coding of occupation, industry, work-relatedness, and ethnicity in most databases
- a lack of capture of occupational history and inability to determine the victim's current occupation at the time of the injury or death
- very little information on the costs of occupational injury in New Zealand (other than ACC data)
- the low potential of the HASARD system to contribute significantly to occupational injury surveillance, due to under-reporting and weaknesses in system design.

Gaps have been considered along three dimensions:

- Vertical – cases not captured by the systems: Occupational injuries that do not result in an ACC claim will only be captured if they are positively identified as being work-related in the Mortality Collection, reported to OSH and recorded in the HASARD system, or can be identified in the NMDS on the basis of E codes. ACC data provides limited coverage of work-related fatalities and does not reliably record work-relatedness against

injuries to commuters, bystanders, or volunteers. Another potential gap is minor injuries that result in no treatment costs and/or less than one week off work.

- Horizontal – missing information about cases: The principal gap in data collection is the lack of standardised coding of occupation in the Mortality Collection, NMDS, and, to a lesser extent, in HASARD.
- Temporal – coverage and consistency over time: Data should be relatively consistent across the main data sets since 2000. Key changes in the data sets are covered within the review.

#### **OPPORTUNITIES FOR IMPROVEMENT**

A range of opportunities for improvement have been identified purely with regard to their desirability from an occupational injury surveillance perspective, and without consideration of legislative, policy, or budgetary implications:

##### **Administration and management**

- Continue the work of the Injury Information Manager to maintain and enhance New Zealand's ability to make use of the available injury data, through the production of a comprehensive database of injuries.

##### **Data collection**

- Take deliberate steps to increase reporting of suspected cases to HASARD, including research on barriers and enablers to occupational injury reporting, and education/marketing campaigns to address the barriers and enablers.
- Improve recording of occupation in NZHIS data, including introducing the standard Statistics New Zealand coding system into the Mortality Collection, NZCR, and NMDS; coding the backlog of occupation using methods recently recommended in another study; including occupation in the NHI database; and opportunistically recording longitudinal occupation information on the NHI database each time a patient presents.
- Extend and improve the coding of industry in NZHIS and OSH data, in order to add depth to the information captured in the occupation field by including industry as a variable in the Mortality Collection, NZCR, and NMDS using the standard Statistics New Zealand classification system; and aligning the industry classification system in NODS/HASARD with the Statistics New Zealand system.
- Collect additional information on work-relatedness and occupation history, by developing a common definition of work-relatedness for OSH and NZHIS; and developing common definitions and fields for recording current occupation, usual occupation, and occupation history.

##### **Accuracy**

- Improve the use of the work-related E codes in ICD-10-AM 3rd Edition.
- Code work-relatedness and occupation for all ACC claims.
- Review the classification and field structures in NODS/HASARD for recording occupation, industry, agent and mechanism, with a view to aligning these with standard classification and coding systems and using hierarchical pick-lists for data entry.
- Ensure NODS data is updated upon completion of each investigation.

# INTRODUCTION



Diseases and injuries that occur due to work have long-term consequences and represent significant costs, in social and economic terms, to workers, employers, government, and the economy<sup>1</sup>.

Occupational disease and occupational injury surveillance plays a vital role in estimating the incidence, prevalence, trends, and distribution of occupational disease and injury. In so doing, it facilitates the identification of priority areas and risk factors and is thus an essential precursor to the development of effective prevention strategies.

The World Health Organization has identified two main problems in measuring and monitoring occupational disease and injury: an unwillingness to recognise the causes of occupational injury and disease, and failure to report cases even when recognised<sup>2</sup>. The history of occupational disease is that of a struggle between workers fighting for protection and preventative measures or compensation, and their employers seeking to deny or reduce their liability for work-related diseases and injuries. This conflict has greatly influenced statistical reporting. Because no one person experiences or accounts for the full consequences of a workplace injury or illness, the full depth and breadth of the costs and consequences are not often measured or recorded anywhere<sup>3</sup>.

A symposium on Priorities in Occupational Health and Safety was held in Wellington in September 2002. The proceedings of the symposium<sup>1</sup> made the following observations about the surveillance of occupational disease and injury in New Zealand:

- The field of occupational injury had received more attention in New Zealand than that of occupational disease. However, even in relation to occupational injury, there was “a long way to go even to be able to identify the size and nature of the problems, let alone to develop effective interventions”.
- There was a striking lack of adequate statistics that would enable the major problems to be identified and the effectiveness of regulatory changes to be monitored.
- There was a distinct lack of data on occupational injury and illness in Māori.
- Although the burden of occupational injury in New Zealand remained largely unaddressed, there was a much greater burden of occupational illness (including cancer, respiratory disease, and effects of fatigue), which had received little attention in recent years.

These observations were not new. They echoed those of previous reports and studies including the *New Zealand Injury Data Review April 2000–December 2001*<sup>4</sup>, the Work-Related Fatal Injuries Study<sup>5</sup>, an *Independent Review of Occupational Injury and Illness Statistics* conducted for the Department of Labour in 1998<sup>6</sup>, a 1996 governmental *Inquiry into the Administration of Occupational Safety and Health Policy*<sup>7</sup>, a 1988 Law Commission report on ACC<sup>8</sup>, and a 1987 report on unintentional injury<sup>9</sup>.

More recently, the first report of the National Occupational Health and Safety Advisory Committee, *The Burden of Occupational Disease and Injury in New Zealand*<sup>10</sup>, noted that incidence and mortality rates from occupational diseases and injuries often could not be estimated from New Zealand data, requiring estimates to be derived from overseas data. The report also noted that there was no valid data on the costs to New Zealand of these deaths, injuries and illnesses.

Historically, New Zealand has used a wide range of data sources from a number of different organisations, including death records, hospital records, ACC claims, cancer registry records, workplace records, surveys, and sentinel reports, to estimate the type and extent of work-related mortality and morbidity<sup>11</sup>.

These organisations collect data for a range of purposes, which support occupational disease and injury surveillance objectives to varying degrees. There are inconsistencies in the data collected by the various agencies, and some potential information sources are under-utilised.

While the volume of data varies considerably across agencies, no agency records all cases of occupational disease or injury, nor does any agency collect all of the data surrounding a disease or injury event. For example, ACC has the greatest volume of injury records, but does not record every injury fatality<sup>4</sup> and has limited coverage of occupational disease. The Land Transport Safety Authority (LTSA) collects information on motor vehicle crashes, but does not provide information on the diagnosis of the injury or whether it is work related. Poor recording of occupational details on many of the databases restricts the potential to evaluate occupational risk factors and examine the relationship between occupation and health in New Zealand<sup>12</sup>.

The diffusion of responsibility for data collection among the various organisations is itself a barrier to the collection of effective surveillance data, as “no agency has responsibility for the production of comprehensive statistics”<sup>6</sup>. The multi-agency environment also increases the potential difficulties in improving data collection to support surveillance of occupational disease and injury.

The *New Zealand Injury Data Review* noted that: injury data is under-reported and fragmented across governmental and non-governmental reporting agencies; agencies use different standards, definitions, or classifications for collecting similar information, based on their operational needs; there are gaps and duplication in coverage; the quality of the data routinely collected by agencies is incomplete or inaccurate; and agencies vary in their data management practices, which can make comparison difficult<sup>4</sup>. These observations are equally (or even more) applicable to occupational disease.

The problems caused by this fragmentation and under-reporting of work-related injury were exemplified in a study of *Work-Related Fatal Injuries in New Zealand, 1985–1994*<sup>5</sup> which found that, of 820 reported work-related deaths, the Occupational Safety and Health Service (OSH) had recorded 40%, ACC had recorded 63%, and other agencies held 10% of records. When consolidated, this data accounted for less than three quarters (73%) of the 820 reported deaths. The other 27% could only be accounted for by reading paper files at the Coroners’ Court.

These issues limit opportunities to analyse and monitor the incidence, prevalence, trends, and distribution of occupational diseases and injuries, and make it difficult to estimate the burden of occupational disease and injury in New Zealand<sup>5</sup>. This, in turn, increases the difficulty of making occupational health a political and policy priority<sup>13</sup>.

The Injury Statistics Project (launched in August 2002, by Statistics New Zealand as Injury Information Manager) has begun to address some of these issues in relation to injury data, but currently excludes occupational diseases. The implementation of amendments to health and safety in employment legislation in May 2003, including broadening the work situations covered and recognising stress and fatigue as potential work hazards, potentially broadens the collection of statistics on occupational disease and injury, although subsequent improvements in this regard are not strongly evident.

The role of the Injury Information Manager, which involves collecting and aggregating injury-related information to produce coherent injury statistics, is consistent with the principles that “the integration and dissemination of the best available data (however imperfect) offers the best opportunity for informed debate and evidence-based policy advice”<sup>13</sup> and “the extent of work-related deaths, injury and disease and insight into possible causes can only come from utilising information from a range of sources”<sup>14</sup>. Integration of data helps to identify gaps and overlaps in coverage of injuries by the various agencies and enriches the individual data sets by linking them to new pieces of information. This technique recognises that some agencies already collect information that is of a high standard that can be used for statistical purposes.

## 2.1 OBJECTIVES AND SCOPE OF THE REVIEW

The National Occupational Health and Safety Advisory Committee (NOHSAC) commissioned this review of the methods and systems used to measure and monitor occupational disease and injury in New Zealand. This is NOHSAC's second project designed to provide an independent evidence-based assessment of some of the measures that would deliver the greatest benefit for the prevention of occupational injury and disease in New Zealand.

The objective of this project is to provide a thorough and critical review of methods and systems used to measure and monitor occupational disease and injury in New Zealand and to identify strengths, weaknesses, and gaps that exist across the systems overall. To be able to accurately determine the extent of occupational disease and injury in New Zealand and the cost of injury to society and the economy, it is necessary to identify the different methods and systems used to measure and monitor occupational disease and injury in New Zealand, and determine the ability of these surveillance systems to effectively support such measuring and monitoring. It is hoped that this review will lead the way for future studies by providing a point of reference for identifying issues and priorities for research and inter-agency collaboration.

The review addresses the following research questions:

- What types of methods and systems are currently used to measure and monitor the prevalence and incidence, trends, and distribution of both occupational disease and occupational injury in New Zealand?
- Are there any future plans in place to develop/improve individual occupational disease and injury surveillance systems?

It also gives consideration to the following issues:

- What are the strengths and weaknesses that exist in methods and systems used for the surveillance of occupational disease and injury in New Zealand, and are there any gaps in these surveillance systems?
- What opportunities are there to improve the administration/management, data collection, accuracy, and timeliness of existing occupational disease surveillance systems?
- What are the barriers to effective surveillance of occupational disease and injury in New Zealand?

The primary audience for this report is NOHSAC. Other audiences may include the Minister of Labour, policy analysts, researchers, and health and safety professionals.

## 2.2 METHODOLOGY

This review combines two key sources of information: a search and review of relevant New Zealand literature, and consultation with organisations that have systems in place for measuring and monitoring occupational disease and injury. All major occupational disease and occupational injury surveillance systems in New Zealand, compulsory and voluntary, existing as at September 2004, have been reviewed.

The main literature search was restricted to a six-year timeframe of 1998 to 2004, so that data obtained would build upon the *Independent Review of Occupational Injury and Illness Statistics*<sup>6</sup> which was published in August 1998. A wide variety of academic, industry, and government literature was accessed through library resources, electronic databases, and the internet.

In addition, consultation with NOHSAC and other stakeholders identified key documents to be reviewed, including the following which are referenced throughout this review:



- Centre for Public Health Research (CPHR). *Occupation in Routinely Collected Health Data. Draft Report.* May 2004. Centre for Public Health Research for the New Zealand Health Information Service, Wellington.
- Department of Labour and Statistics New Zealand. *New Zealand Injury Data Review April 2000–December 2001.* 2002. The Department of Labour and Statistics New Zealand, Wellington.
- Langley J, Feyer A, Wright C, et al. Work-Related Fatal Injuries in NZ: Can a reliable electronic work-related fatality “register” be established? *J Occup Health Safety – Aust NZ* 2000, 16(2): 145-53.
- Malcolm M, Wilson N, Baker M, Weinstein P. *Independent Review of Occupational Injury and Illness Statistics. Report to the Labour Market Policy Group, Department of Labour.* 1998, Department of Public Health, Wellington School of Medicine, Wellington.
- Pearce N, McLean D, Berry R (Eds). *Priorities in Occupational Health and Safety. Proceedings of the Second Annual CPHR Symposium in Health Research and Policy, Wellington, 4th September 2002.* 2003. Occasional Report Series No 3. Centre for Public Health Research, Wellington.
- Statistics New Zealand. *Injury Statistics Project Pilot: Feasibility Report.* May 2004. Statistics New Zealand, Wellington.

Consultations were carried out with the organisations and agencies that maintain the data sets, to extend the existing base of published information regarding the methods and systems currently used to measure and monitor the prevalence, incidence trends, and distribution of occupational disease. The interview schedule used in these consultations is appended.

The following organisations and individuals were consulted, and their cooperation is gratefully acknowledged:

- Accident Compensation Corporation: Tim Boyd-Wilson, Darrin Goulding, Dr Kevin Morris
- Births, Deaths and Marriages: Vaughan Millar
- Centre for Human Factors and Ergonomics (COHFE): Richard Parker
- Centre for Public Health Research: Andrea Mannetje
- Civil Aviation Authority: Peter Nalder, Dr Dougal Watson
- Commercial Vehicle Investigation Unit: Inspector Ian James
- Environmental Risk Management Authority (ERMA): Donald Hannah, Ingrid Toleman
- EpiSurv: David Phillips
- Injury Prevention Research Unit, Otago University: Professor John Langley
- Land Transport Safety Authority: Wayne Jones
- Maritime New Zealand: Sharyn Forsyth
- New Zealand Health Information Service: Chris Lewis, Tracey Vandenberg
- Occupational Safety and Health Service, Department of Labour: Mike Cosman, Frank Darby, Evan Dryson, Bill Glass, Rex Moir, Rod Nicholson, Carol Slappendel, Chris Walls
- Statistics New Zealand as Injury Information Manager: Paul Brown, Darren Evans, Jenny Mason.

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#### DISCLAIMER

The analysis contained in this report relies significantly on information provided by stakeholders. Health Outcomes International has not audited or otherwise checked the veracity of the information provided to us. While we have conducted analysis and commented on such information in this report, we have assumed the accuracy of all information provided to us during the course of the project.

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### 2.3 SURVEILLANCE

Surveillance is defined as “the ongoing systematic collection, analysis, and interpretation of health data for purposes of improving health and safety. Key to public health surveillance is the dissemination and use of data to improve health. Occupational health surveillance can be viewed as the tracking of occupational injuries, illnesses, hazards, and exposures. Occupational surveillance data are used to guide efforts to improve worker safety and health, and to monitor trends and progress over time”<sup>15</sup>.

Surveillance makes a crucial contribution to injury and disease prevention by identifying patterns across timespans, geographic areas and population sub-groups that cannot be discerned through casual observation. This is important because “apparently unrelated events assume a different character when looked at collectively”<sup>16</sup>.

Malcolm and colleagues<sup>6</sup> identified the common uses for occupational disease and injury statistics as:

- monitoring the incidence or distribution of events and identifying trends
- identifying emerging health and safety hazards, including clusters of events and outbreaks
- assessing the impact of health events and setting priorities
- identifying risk factors for events or hazards
- evaluation of prevention and control activities.

Routine statistical data collections are an important source of surveillance information. Although these data collections may not provide sufficient data to satisfy all research needs, they play an important role in research by informing hypothesis development and identifying areas that warrant more detailed investigation<sup>6</sup>.

Problems such as under-reporting and limited coverage can be reduced by linking different sources to make a more complete data set. This aspect of the use of routinely collected data for surveillance is of particular interest in the context of this review. However, it needs to be acknowledged that integrating data sources is only part of the solution.

The interpretation of surveillance data requires statistics on both the absolute number of cases (numerator data) and statistics on the general population in which they occurred and the hazards to which they were exposed (denominator data). In the case of occupational health statistics, population denominators may include a particular occupational group, a sector of the economy, or the entire workforce<sup>6</sup>, and exposure denominators can include factors such as duration, frequency, and intensity of exposure.

Using numerator and denominator data, rates can be calculated which express the relativity of absolute numbers to the underlying population or exposure (e.g. construction deaths per 100,000 construction workers per year, or per 100,000 hours worked). Rates enable consistent comparisons to be undertaken across groups or through time, taking into account differences or changes in the size of the population(s).

This review focuses on systems that primarily collect numerator data. However, for completeness, it is important to note that defining or quantifying the denominator population is of equal importance to the surveillance of

occupational disease and injury and, depending upon the population of interest, can be equally problematic. The most commonly used source of population denominator data is Statistics New Zealand, which produces a range of statistics on employment, industries, and occupational groups, on a whole-population basis with the five-yearly census and less comprehensively through quarterly surveys<sup>6</sup>. This makes it crucial that systems that collect numerator data use the same occupational classification as is used in the denominator data produced by Statistics New Zealand. Little exposure data is captured either overseas<sup>17</sup> or in New Zealand<sup>10</sup>. This report outlines the nature and extent of exposure data capture within the systems reviewed.

The systems covered in this review have in common that they focus primarily on counting illnesses and/or injuries that have already occurred. Systems that count “failures” can make a valuable contribution to surveillance by identifying key problem areas and trends over time. Ideally, however, prevention programmes should focus on identifying risks before illnesses or injuries occur, so that action can be taken to mitigate adverse health consequences.

For example, there is some experimental evidence that carbon fibre exposure can lead to similar health problems to those caused by asbestos. A surveillance system that is too reliant on counting past exposures risks focusing on the “old” problem of asbestos exposures whilst paying insufficient attention to the emerging problem related to carbon fibre exposures. Forward-looking approaches that focus on emerging risks have been described as “health and hazard surveillance”<sup>6, 17</sup>. Hazard surveillance will be the subject of the third NOHSAC report and is outside of the scope of the current report.

A range of techniques have been developed which, although outside the scope of this review, would contribute to occupational health and hazard surveillance by utilising and augmenting routinely collected statistics on occupational injuries and diseases. Examples of these techniques include:

- surveys (e.g. of targeted population groups or new types of cases)
- computer-assisted expert judgement<sup>17</sup>
- capture-recapture methods, which estimate true incidence by comparing the degree of overlap between samples<sup>6</sup>
- sociotechnical probabilistic risk assessment, which involves modelling combinations of technical failures, human error, and risk behavioural norms and recovery opportunities through the use of fault trees<sup>18</sup>.

## 2.4 DEFINITIONS

Different organisations use different definitions of “work-related”, “occupational injury”, and “occupational disease”, and conduct surveillance for a range of purposes, reflecting their legislative mandates, core objectives, and organisational cultures. The lack of consistency in definitions used creates difficulties for those who attempt to integrate occupational disease and injury data across multiple data sets. Some of the confusion and controversy in occupational disease and occupational injury research may be attributed to the lack of clearly defined terms and concepts<sup>19</sup>.

Inconsistencies impact on data quality at multiple levels. Within an organisation, terminologies must not only be clearly defined, but must be applied consistently. This principle also applies to coding systems used for recording characteristics such as diagnosis and occupation. Even where a system has good internal data quality, however, there may be difficulties integrating or comparing its data with data from other systems if the various systems use different definitions and coding systems. Similarly, international comparisons are made more difficult where the comparator countries’ systems record data in a variety of ways. Consistent definitions and coding are also important for establishing trends over time.

Often, problems caused by inconsistent definitions are not insurmountable and can be addressed if the differences are well-defined. For example, gaps and overlaps in occupational disease and injury definitions can be identified and allowed for during analysis. Different coding systems can sometimes be mapped onto one another. Greater difficulties arise where definitions are applied haphazardly, or where data on a key variable (such as work-relatedness) is missing.

Malcolm and colleagues<sup>6</sup> noted that, “regardless of the definition used, it is likely that a small proportion of cases will be difficult to classify. However, for practical purposes, if a standard definition is adopted, the proportion of questionable cases will be small”. They also suggested that, although no single definition is likely to satisfy all users of occupational disease and injury data, a consistently-applied and explicit set of criteria should make it easier for all users to interpret the data and should minimise any inaccuracy or ambiguity compared to a situation where no standard definition is used.

Because this review includes analysis of gaps in relation to the surveillance of occupational disease and injury, it was necessary to define “work-related”, “occupational injury”, and “occupational disease” so that each system could be evaluated against a common base. These definitions were made deliberately broad to facilitate comprehensive gap analysis. The following paragraphs provide working definitions for the purposes of this review.

#### WORK-RELATED

There is no universally accepted definition of what constitutes a “work-related” injury or illness, as opposed to a non-work-related one. Generally, injuries sustained while carrying out paid employment or while at the person’s place of paid employment are included. The work-relatedness of diseases can be more difficult to establish (as discussed under the definition of occupational disease below) and is often defined in terms of the presence of a disease together with the presence of an associated exposure in the workplace.

Common grey areas include impacts on people carrying out voluntary/unpaid work, bystanders who are not involved in the work activity at all but are affected by it, and people commuting to/from their place of work. For the purposes of this review, the broadest definition has been adopted, which includes all of these situations.

The first NOHSAC report<sup>10</sup> notes that there is very little New Zealand information on bystanders but that they are “an important group to consider, especially in some specific work situations, such as farming, where the occupational and non-occupational environments often overlap and where children are often affected; and on the roads where there appears to be a high number of deaths (and so presumably also non-fatal injuries) each year as a result of traffic crashes involving working and non-working people”.

#### OCCUPATIONAL INJURY AND OCCUPATIONAL DISEASE

It has been argued that there is no scientific basis for making a distinction between injury and disease. However, despite this, the *New Zealand Injury Data Review* argued that such a distinction is convenient for statistical purposes<sup>4</sup>. Malcolm and colleagues<sup>6</sup> argued, “Although the distinction between injury and disease is not always clear-cut, the classification is useful because the work-relatedness of injuries can more often be attributed for individual cases than can that of diseases... Injuries are commonly discrete events with immediate effects, and are related to current work practices... By contrast, cases of occupational disease occurring today may reflect the prevalence of exposure to workplace hazards many years (even decades) ago”.

This accords with the way the ILO distinguishes occupational disease from occupational injury. It defines occupational disease as “disease contracted as a result of an exposure over a period of time to risk factors arising from work activity”<sup>4</sup>. Thus, the illness has occurred because of the work environment or conditions and is distinguished from injury, which is a specific incident, by exposure over time. The ILO distinction has been adopted for the purposes of this review.

## **2.5 DATA ELEMENTS AND CODING STANDARDS**

This review focuses primarily on the following data elements which are of particular relevance to the surveillance of occupational disease and injury in New Zealand and the linking of data sets to support this surveillance.

### **UNIQUE IDENTIFIERS**

Unique identifiers provide a means for identifying individuals, events, or other denominators within a data set in a consistent way. This can facilitate data set integrity (e.g. by providing a guard against double counting), privacy (e.g. by enabling identifying characteristics such as name and address to be removed without losing the ability to identify records pertaining to the same individual), and data set linkage (where more than one data set uses the same unique identification system). Unique identifiers commonly in use in the data sets covered by this review include the National Health Index (NHI) number and ACC45 claim number.

NHI numbers are intended to provide a unique identifier for every person who has accessed health care services in New Zealand. They are primarily used by the New Zealand Health Information Service (NZHIS) across a range of data sets, including the Mortality Collection, New Zealand Cancer Registry, and National Minimum Data Set. In recent times, other organisations (such as ACC) have also started to record the NHI, where available.

The presence of duplicate records on the NHI has been a significant problem, with approximately 7 million NHI numbers recorded at one stage (in comparison to New Zealand’s population of around 4 million). Hospitals routinely search the NHI to link newly admitted patients to their existing NHI numbers. However, due to the sometimes ambiguous and changeable nature of patient details (e.g. maiden names versus married names, nicknames, abbreviations, changes of address), new records are often created for patients with existing NHI numbers. Efforts have been made to detect and clean duplicate records on the NHI. As a result, the problem has diminished but will always remain to some extent.

ACC45 numbers are used by the Accident Compensation Corporation to uniquely identify every claim made to ACC. (An individual can have several ACC45 numbers, each relating to a different claim.) Once a claim has been lodged with ACC, all further financial transactions relating to that injury are recorded under the same claim number. The claim is never closed, so further treatment can be obtained at any stage. The ACC45 number is also recorded by NZHIS on the National Minimum Data Set, where applicable and available.

### **ETHNICITY**

Māori people and Pacific peoples are over-represented at the adverse end of measures of occupational class, as well as income, wealth, unemployment, welfare benefit use, education, housing, crime, and health status. Therefore, patterns of occupational disease and occupational injury will probably differ between Māori, Pacific, and non-Māori non-Pacific populations.

If the government is to effectively monitor and make policy decisions on occupational disease and injury in New Zealand, the surveillance systems must be able to identify prevalence and incidence, trends, and distribution of occupational disease and injury in culture-specific terms. Accordingly, this review of the strengths, weaknesses, and gaps in current surveillance systems includes consideration of strengths, weaknesses, and gaps in the measurement and monitoring of occupational disease and injury by ethnicity.

Injury statistics for 2001/2002 published by Statistics New Zealand show that incidence rates for occupational injuries were similar for the European/Pakeha and Pacific people's ethnic groups, at 129 and 125 injuries per 1,000 equivalent fulltime (EFT) workers respectively. A higher rate among Māori workers, of 175 injuries per 1,000 EFT, was strongly influenced by the predominance of Māori in occupations that had the highest injury rate, namely elementary occupations (318 injuries per 1,000 EFT), agriculture and fishing (246), and machine operation and assembly (245)<sup>20</sup>.

Surveillance data on occupational injury and disease among Māori is severely limited due to the problem of ethnicity classification in most New Zealand data collections<sup>21-23</sup>. McCracken<sup>24</sup> identifies the following factors with regard to ethnicity classification that make Māori occupational injury difficult to study:

- Ethnicity questions have changed in the past five Censuses, making it difficult to monitor trends over time.
- In the mid to late 1980s, there was a general change toward self-identified ethnicity classifications. Different government agencies use different definitions, although there have been efforts toward standardising these.
- Ethnicity is not collected on the OSH serious harm notification form.
- The accuracy of ethnicity data is, to a certain extent, unknown when it is compared against death registrations, coronial files and ACC claims.

Despite these issues surrounding ethnicity classification, time-consuming studies have been undertaken that investigated Māori occupational injury, which identified a higher overall rate for Māori of 11 per 100,000 workers per year as compared to 8.3 per 100,000 workers per year in non-Māori workers<sup>25</sup>.

In June 2004, Statistics New Zealand released its report on a *Review of the Measurement of Ethnicity*. The review considered the ways in which ethnicity is defined, collected, and organised. The results from the review will guide how ethnicity data is collected and output in the next census and, in time, all other statistics that are part of New Zealand's system of official statistics. The main review recommendations relate to the need to<sup>26</sup>:

- ensure consistency in the measurement of ethnicity in official statistics
- recognise "New Zealander" type responses as a valid ethnic group in the classification
- discontinue publication of prioritised data as a standard form of ethnicity output in official statistics
- develop a programme of research to address issues that require further investigation.

The 2006 Census will repeat the 2001 Census ethnicity question, ensuring that ethnic data is collected consistently over time.

## OCCUPATION

The standard system for coding occupation in New Zealand is the New Zealand Standard Classification of Occupations (NZSCO), maintained by Statistics New Zealand. Under NZSCO, occupation is a hierarchical classification with five levels. There are nine major groups, 25 sub-major groups, 99 minor groups, 260 unit groups, and 567 occupations. The major groups are:

1. Legislators, administrators and managers
2. Professionals
3. Associate professionals and technicians
4. Clerks
5. Service and sales workers
6. Agriculture and fishery workers
7. Trades workers
8. Plant and machine operators and assemblers
9. Elementary occupations (including residuals categories).

The NZSCO uses the International Standard Classification of Occupations (ISCO) as its structural base. ISCO provides a base for member countries of the International Labour Organization (ILO) to compare statistics on occupational groups. NZSCO is directly linked to ISCO and uses ISCO's structure modified to New Zealand conditions. Both classifications use the same concepts and definitions, as well as using skill level to differentiate between the major groups<sup>26</sup>.

Unfortunately, many of the surveillance systems covered in this review do not use the NZSCO for coding occupation, and this represents a key impediment to the surveillance of occupational disease and injury in New Zealand.

## INDUSTRY

The New Zealand Standard Industrial Classification (NZSIC), maintained by Statistics New Zealand, is the standard system in New Zealand for the collection, compilation, and publication of statistics relating to industry. The classification was developed as part of an integrated statistical system and provides a standard framework for classifying business statistical units by industry in official statistics. This ensures that each unit is classified to the same industry in all statistical collections in which it is included and that industry statistics are comparable across surveys.

Businesses are assigned to an industry according to their predominant economic activity.

A five-level hierarchical structure is used in NZSIC87, consisting of 9 major divisions, 35 divisions, 100 major groups, 279 groups, and 536 sub-groups. The major divisions are<sup>26</sup>:

1. Agriculture, hunting, forestry and fishing
2. Mining and quarrying
3. Manufacturing
4. Electricity, gas, and water
5. Construction
6. Wholesale and retail trade, restaurants and hotels
7. Transport, storage, and communication
8. Finance, property, and business services
9. Community, social, and personal services.

Unfortunately, many of the surveillance systems covered in this review do not use the NZSIC for coding industry.

## **WORK-RELATEDNESS**

In general, the vast majority of occupational injuries and a few occupational diseases can be positively identified as work-related, while some other occupational diseases could be identified in terms of their likelihood of being work-related (e.g. in the opinion of a medical practitioner). In other cases, occupational diseases cannot be identified as being work-related at an individual level, despite the existence of an association between an occupational group and the prevalence of a disease.

Although only useful in some instances, a flag that indicates whether a disease or injury is work-related is a desirable feature of a surveillance system that records occupational disease or injury cases. Therefore, this review considers the presence or absence of such an indicator, and the extent to which it is used, for each of the systems reviewed.

## **DIAGNOSIS AND SEVERITY**

The classification system most commonly used for the recording of diagnosis and severity in New Zealand is the International Classification of Disease (ICD), Australian Modification (AM). ICD coding systems are continually being updated, which affects the longitudinal specificity of data and the comparability of data between data sets. The NZHIS adopted ICD-10-AM 3rd Edition for use in its data sets from 1 July 2004 (but continues to map this back to previous versions of ICD-10 and ICD-9). ACC currently uses the 2nd Edition. The specificity of ICD coding systems has improved over time, for example, mesothelioma is identified in ICD-10 but not ICD-9. Another diagnosis classification system, used primarily in general practice, is the Read code system.

## **SITE, AGENT, AND MECHANISM**

Where applicable, it is desirable that occupational disease and injury surveillance systems record details of the site (body part) affected by the injury or disease, the agent (object, machinery, substance, animal, etc which caused the disease or injury), and the mechanism by which the injury or disease occurred (e.g. ingestion, collision, etc).



SECTION THREE

OCCUPATIONAL

# DISEASE



Most estimates indicate that occupational disease accounts for far greater mortality than occupational injuries<sup>6, 10, 27–30</sup>. The first NOHSAC report<sup>10</sup> estimated that, each year in New Zealand, there are approximately 700–1,000 deaths from occupational disease (compared to 100 deaths from occupational injury), particularly cancer, respiratory disease, and ischaemic heart disease; and 17,000–20,000 new cases of work-related disease.

There are reasons for expecting the contribution of workplace exposures to morbidity and mortality to increase in the future. The World Health Organization predicted in 1989 that, as a consequence of globalisation, many industrialised countries would see a declining morbidity in such traditional diseases as chemical poisonings and noise-induced hearing loss, while the incidence of work-related diseases would increase<sup>30</sup>. For example, a new onset of occupational disease is arising from environmental air pollution, and hypersensitivity diseases are one of the fastest growing groups of occupational disease<sup>31</sup>. These factors all increase the psychological load of working peoples and may lead to stress reactions, a consequence of the overuse of human capacities at work. This increasing incidence makes the need for adequate surveillance of occupational disease an increasingly important public health issue.

Unfortunately, occupational diseases are more difficult to track than occupational injuries. Occupational injuries are relatively unambiguous to define and detect on an individual basis, and the major impediments to their surveillance are under-reporting of occurrences together with inadequacies in surveillance systems, such as poor recording of occupation and work-relatedness. Occupational diseases, meanwhile, suffer equally from these problems along with the additional significant problem of under-diagnosis. Consequently, there are no comprehensive sources of routinely collected data on mortality or morbidity due to occupational disease in New Zealand.

Many occupational diseases have a long latency period after exposure. This can cause significant lags between an exposure occurring and its consequences being detected. It can also make it hard to assess the effectiveness of any prevention strategies implemented<sup>32</sup>. There are also difficulties distinguishing occupational diseases from non-occupational diseases. For example, lung cancer caused by asbestos exposure does not have a unique pathology that differentiates it from lung cancer caused by cigarette smoking<sup>33</sup>.

A range of other factors have been identified that contribute to under-diagnosis and under-reporting of occupational disease. Physicians have documented their lack of knowledge about conditions that must be reported<sup>34</sup> and most receive limited training in occupational medicine at medical school<sup>33</sup>. Moreover, patients and physicians may be reluctant to report illnesses for fear of adverse impacts on their reputation, lifestyle, or livelihood. Administrative barriers, lack of adverse consequences for under-reporting, and the absence of positive reinforcement for reporting also contribute to under-reporting<sup>35</sup>.

The challenges associated with measuring and monitoring change over time for occupational disease are also complicated by the degree of statistical uncertainty, especially in population-based surveys, and by concerns surrounding the stability of data sources in terms of their consistency of coverage, timeliness, frequency, and securing the flow of data in the longer term<sup>32</sup>.

Darby<sup>36</sup> makes the following observations about occupational disease in contrast to occupational injury. These observations highlight the extra challenges to measuring and monitoring occupational disease, in addition to those which apply to occupational injury. In particular, the case history becomes a much more important data requirement for both diagnosis and surveillance, necessitating the collection of longitudinal data on occupation and exposure to risk factors.

<b>TABLE 3.1</b>		General differences between health and safety	
<b>SAFETY/INJURIES</b>		<b>HEALTH/DISEASE</b>	
Data is better		Data is poorer	
Risks are usually immediate		Risks are often delayed (due to latency)	
Injuries are visible		Ill health or disease may be less visible	
The focus of a lot of effort		Often put in the “too hard” basket	
Interventions can have a quick, positive result		Interventions are less likely to have a quick, positive result	
Usually a clear link to one employer		The impact of the employment history on causation is greater	
Clear compensation cover		The onus of proof is more of an issue	
The medical history of the victim is usually less relevant		Medical history is a significant part of assessment	
On investigation of incidents, obscurity may develop because of complex interactions between system components		On investigation of disease, obscurity may develop because of the complexity of the body and the interaction of mind and body	
The OSH investigation is usually only into the event itself		The OSH investigation needs to confirm a diagnosis and establish (or not) a link to workplace exposure	

*Source: Darby F. OSH's priorities for occupational health. in Pearce N, McLean D, Berry R (Eds) Priorities in Occupational Health and Safety: Proceedings of the Second Annual CPHR Symposium in Health Research and Policy. Occasional Report Series, No 3. 2003. Centre for Public Health Research, Wellington.*

No single method of monitoring occupational disease can provide all the answers. Surveillance systems need to include the pooling of data from different sources to enable an accurate assessment of exposures<sup>37</sup>. For example, if studies of diesel emissions and lung cancer risk are examined separately, they would not necessarily provide conclusive evidence that diesel emissions are carcinogenic. If these same studies are pooled or combined together, the overall evidence gives a clear indication that diesel emissions are associated with an increased risk of lung cancer<sup>38</sup>.

The *New Zealand Injury Data Review* acknowledged the potential benefits of collating and disseminating occupational disease information in New Zealand. However, work on an occupational disease data set has been put on hold until a clear picture of the incidence of occupational injuries in New Zealand is obtained and the surveillance systems measuring occupational disease can be improved.

This section provides an inventory and gap analysis of systems that could potentially contribute to occupational disease surveillance in New Zealand.

### 3.1 DEATH CERTIFICATES AND CORONERS' REPORTS

A full analysis of coroners' reports has been included in the occupational injury section of this report. The legislative definition of cases that must be reported to the coroner is much more likely to result in coronial investigations of deaths from occupational injury than occupational disease, although they do not specifically exclude the latter. It has been suggested that New Zealand should move toward a system of coronial inquiry that specifically includes suspected occupational diseases.

Because coroners' reports include data obtained from many sources, they generally represent a rich source of information for determining the nature and circumstances surrounding some deaths<sup>5</sup>. However, coroners' findings are not recorded electronically, and this represents a major barrier to the efficient retrieval of surveillance information<sup>5</sup>. This is both symptomatic of, and probably contributes to, the Coroners' Court's tendency to report findings on a case-by-case basis rather than aggregating findings to identify issues and trends. The Law Commission<sup>16</sup> has identified this as a major weakness.

Medical certificates of causes of death are reported to the Births, Deaths and Marriages electronic database of causes of death. This database is used by the New Zealand Health Information Service (NZHIS) to compile the Mortality Collection, which is discussed below. The database is complete for all deaths occurring in New Zealand, and records detailed information about direct, antecedent, and underlying causes of death. However, the medical certificate of causes of death does not collect any information on whether or not the death is work-related, and the recording of occupational details is unstructured.

### 3.2 NEW ZEALAND HEALTH INFORMATION SERVICE

The New Zealand Health Information Service (NZHIS) within the Ministry of Health is responsible for the collection and dissemination of health-related data. NZHIS has, as its foundation, the goal of making accurate information readily available and accessible in a timely manner throughout the health sector, to support the sector's ongoing effort to improve the health status of New Zealanders<sup>39</sup>.

NZHIS has responsibility for:

- the collection, processing, maintenance, and dissemination of health data, health statistics, and health information
- the ongoing quality improvement of data entering the national health information systems
- the continuing maintenance and development of the national health and disability information systems
- the provision of appropriate databases, systems, and information products
- the development and provision of health and disability information standards and quality-audit programmes for data
- coordination of ongoing national health and disability information collections and proposals for their development
- analysis of health information, performance monitoring, benchmarking, and advice on the use of information obtained from NZHIS.

NZHIS holds 16 data collections, three of which are of central relevance to the surveillance of occupational health in New Zealand: the Mortality Collection, the New Zealand Cancer Registry, and the National Minimum Data Set which covers hospital events.

#### 3.2.1 MORTALITY COLLECTION

The Mortality Collection classifies the underlying cause of death for all deaths registered in New Zealand. It provides data for public health research, policy formulation, development and monitoring, and cancer survival studies. A complete data set of each year's mortality data is sent to the World Health Organization to be used in international comparisons of mortality statistics<sup>39</sup>.

#### Synopsis

The Mortality Collection covers all registered deaths in New Zealand and holds data from 1974, while the Ministry (formerly Department) of Health has been responsible for collating cause of death information since 1948, allowing comparisons to be made. The Mortality Collection integrates cause-of-death data from a range of sources, including Births, Deaths and Marriages registration data, coroners' findings, medical certificates of cause of death, and postmortem and toxicology reports, *inter alia*.

Occupation and work-relatedness data are inadequate for the surveillance of occupational diseases. The recording of occupation, in response to the question, “What is the deceased’s usual occupation, profession or job?”, involves the use of a free-text field on both the death registration form and the database, with little in the way of guidance to funeral directors who complete the occupation details on the notification of death registration form, or data quality checks.

There is a work-relatedness flag on the database. However, the definition of work-relatedness is whether the cause of death “was related to an accident while the deceased was working at their place of paid employment”. Therefore, work-relatedness is not recorded for occupational disease deaths.

The database records individuals’ NHI numbers, enabling linking of individual records to other data sets that also use the NHI. Data quality issues with the NHI (in particular, duplicate NHI numbers) must be acknowledged, although efforts are being made to address these issues.

### **Background**

The Ministry of Health took over responsibility for the Mortality Collection from the Department of Statistics in 1948. Occupation has been recorded (as free text) on the notification of death registration form (BDM28) since 1948<sup>12</sup>. Mortality Collection data has included National Health Index (NHI) numbers (intended to provide a unique identifier for health care users) since 1988. The current mortality database contains data from the registration year 1988 to the present.

### **Purpose of the surveillance**

The Mortality Collection was established to provide data for public health research, policy formulation, development and monitoring, and cancer survival studies. The data housed within the Mortality Collection is used in a range of studies, including monitoring specific causes of death in the New Zealand population and calculation of mortality rates in various occupational groups.

### **Population covered**

The Mortality Collection covers all deaths registered in New Zealand, including all registered foetal deaths (stillbirths). New Zealand law requires that all deaths in New Zealand are registered within three working days after the burial or cremation of a body. Foetal and infant data is a subset of the mortality collection. Extra variables such as gestation and birth weight are collected for these records.

### **Method and frequency of data collection**

For each death, a notification of death registration form (BDM28) is completed by the funeral director or undertaker. The funeral director also receives the medical certificate of causes of death (BDM50) from the certifying practitioner<sup>12</sup>. Foetal and neonatal deaths are recorded using the medical certificate of causes of foetal and neonatal death (BDM167). The applicable forms in each case are sent to Births, Deaths and Marriages (BDM).

BDM provides monthly electronic death registration and electronic stillbirth data, for the previous month’s registrations, to NZHIS. At NZHIS, a National Health Index (NHI) number is assigned and domicile and ethnicity are coded. This pre-processed file is loaded into the Mortality Collection. Clinical coders at NZHIS then code underlying cause of death<sup>12</sup>. Additional information on underlying cause of death is obtained from electronic hospital discharge data from the National Minimum Data Set (NMDS) and private hospital discharge returns, Coroners’ findings, postmortem reports, the New Zealand Cancer Registry (NZCR), the Department for Courts, the Police, the Land Transport Safety Authority, Water Safety NZ, Media Search, and from writing letters to certifying doctors, coroners, and medical records officers in public hospitals<sup>39</sup>.

The mortality statistics are compiled according to the year the death is registered. Causes of deaths for data before 2000 are recorded in ICD-9-CM-A and have not been mapped forward to ICD-10-AM.

### **Completeness of coverage**

A key strength of the Mortality Collection is that it captures all registered deaths in New Zealand. However, due to lags in the receipt and processing of some data, the completeness of coverage of the cause of death information increases with the age of the data. Most causes of death are included on the database within a few months of registration. However, lengthy delays can occur where the cause of death is unclear or under investigation by the coroner. In particular, there are still outstanding coroners' reports from 2001/02. Therefore, for particular causes of death (e.g. suicides), data may be several years old before its coverage is complete.

### **Completeness and accuracy of data**

Mortality data in New Zealand is maintained to a high standard, due largely to the cooperation of doctors in providing accurate particulars of causes of death and responding to NZHIS queries relating to death documentation<sup>40</sup> and NZHIS's thoroughness in verifying any ambiguous or incomplete information by referring to original documents and cross-referencing with other NZHIS databases<sup>5</sup>. However, while the data set comprehensively covers all deaths and clinical causes of death, occupation is poorly recorded. Key fields of interest are summarised in the following paragraphs.

#### *Identifying and demographic details*

The Mortality Collection records the deceased's given and family names (including up to one alias), date of birth, sex, "usual home address", place and country of birth, date of death, place of death, age at death, BDM registration number (the unique identifier assigned to the deceased by BDM), and the deceased's NHI number.

#### *Ethnicity*

Ethnic group is entered on the BDM28 by the funeral director in consultation with the family. It is coded by NZHIS using the Statistics New Zealand (Level 2) classification. Up to ten ethnicities can be provided. During the loading process, these are automatically prioritised using a Statistics New Zealand algorithm and only three are stored<sup>41</sup>. Completeness of this field has improved over time, with the majority of records including an ethnicity code in recent years. However, the accuracy of ethnicity as recorded on the BDM28 is still unknown.

There is also a separate Māori descent indicator based on the question: "Was the deceased descended from a New Zealand Māori?" (Yes, no, don't know)<sup>12</sup>.

#### *Occupation*

Currently the free-text occupation information recorded on the BDM28 is not coded in the Mortality Collection. The reasons for this have recently been documented by Pearce and Mannetje<sup>12</sup>. Prior to 1998, the BDM records were sent to Statistics New Zealand who coded ethnic group, country of birth, occupation, and domicile before sending the data to NZHIS. Occupation was coded using the New Zealand Standard Classification of Occupations (NZSCO-68) until 1991 and subsequently NZSCO-90. From 1998, the BDM files were sent directly to NZHIS, which took over responsibility for coding domicile, ethnicity, and country of birth but never reinitiated coding of occupation. Thus, since 1998, only free-text occupation is available in the Mortality Collection. Although researchers wanting to include occupation as a variable could do so by undertaking their own coding, this can only be done at a substantial extra cost to researchers. Furthermore, standardisation of such "informal" coding is a major problem. The current lack of coding of occupation therefore presents a major impediment to research on associations between occupation and mortality in New Zealand.

No data quality check currently exists for the free-text occupational information, and there is little guidance given to funeral directors regarding the nature of information sought. The question on occupation on the BDM28 is "Usual occupation, profession or job of the deceased?". This question can be ambiguous as it does not necessarily capture the main occupation/profession/job of the deceased during his/her working life. For example, an individual who spent most of his working life as a farmer could be recorded as retired or unemployed<sup>12</sup>.

Pearce and Mannelje cite several one-off studies that used occupation from the Mortality Collection and provided indications of the completeness of the field. One study found that mortality records from 1991–1994 had occupation recorded for 83.1% of males and only 19.0% of females, aged 15 and older<sup>42</sup>. Another study found that the completeness of occupational data for males in the Mortality Collection had declined from 92% in 1975–77 to 81% in 1985–87 and 69% in 1996, a finding which was partly attributed to the striking increase in unemployment over that period<sup>43</sup>.

An additional problem in the quality of occupational information in the mortality collection was observed in a recent record linkage study<sup>42</sup>. It was found that the NZSCo90 codes for deaths in 1991 were not necessarily correct due to the methodology used in transitioning from NZSCo68 to NZSCo90 codes.

### ***Industry***

Industry is not recorded. Researchers wanting to include industry as a variable must first select their cohort and then request the appropriate records from the Mortality Collection.

### ***Work-relatedness***

There is a work-relatedness flag on the database. This field was introduced for 2000 registration year data onwards. However, the definition of work-relatedness is whether the cause of death “was related to an accident while the deceased was working at their place of paid employment”<sup>41</sup>. Specifically excluded are “deaths caused by medical conditions whilst at work, for example, heart attacks”.

### ***Cause of death***

The main sources of cause of death information are the medical certificates of causes of death (BDM50), completed by the certifying medical practitioner, and the coroners’ findings<sup>44</sup>. NZHIS receives the medical certificates and coroners’ findings from BDM and assigns the underlying cause of death using ICD-10-AM 2nd Edition code classification and the World Health Organization (WHO) Rules and Guidelines for Mortality Coding<sup>12</sup>. Additional information on underlying cause of death is obtained from a range of other sources as already discussed<sup>39</sup>.

In 2001, the NZHIS issued guidelines to doctors and coroners to assist in the correct reporting of the underlying cause of death. The underlying cause of death is defined by WHO as “the disease or injury which initiated the train of morbid events leading directly to death or the circumstances of the accident or violence which produced the fatal injury”<sup>44</sup>.

There is also a free-text “clinical notes” field used to provide supplementary information concerning the cause of death if the coded information requires clarification or elaboration<sup>41</sup>.

### ***Agent/mechanism***

External causes of injury are recorded using E codes<sup>41</sup>. The external cause is analogous to the agent (e.g. it is the car accident, rather than the head injury resulting from the car accident, that is recorded).

### **Data integration methods**

In compiling the Mortality Collection, NZHIS routinely integrates electronic death registration data, medical certificates and coroners’ findings from the BDM registry with NHI numbers and, in about 8% of cases, postmortem and toxicology reports from laboratories. Where there is insufficient information from these sources, NZHIS seeks information from other sources, including the Cancer Registry, National Minimum Data Set of hospital events, coroners’ files held by the Ministry of Justice, letters to GPs and hospitals, Land Transport Safety Authority, Water Safety NZ, and Media Search<sup>44</sup>.

### **Types of surveillance, data analysis, and interpretation used**

Cause-of-death statistics are used extensively in health status measurement, policy formulation, and monitoring, and for international comparisons<sup>44</sup>.

NZHIS publishes two annual report series: *Mortality and Demographic Data* and *Foetal and Infant Deaths*. The recently published *Mortality and Demographic Data 2000* (May 2004)<sup>44</sup> does not specifically include analysis of occupational disease or injury as causes of death.

NZHIS makes customised data sets or summary reports available to researchers on request. The NZHIS Analytical Services team offers a range of services to ensure that NZHIS data is reported appropriately when published by other organisations, including assisting researchers to define the specifications for a request, providing advice on the strengths and weaknesses of the data, and peer reviewing papers.

The Ministry of Health is required to ensure that the release of information is in accordance with legislation related to the privacy of health information, in particular the Official Information Act 1982, the Privacy Act 1993 and the Health Information Privacy Code 1994. Information available to the general public is of a statistical and non-identifiable nature. Researchers requiring identifiable data usually need approval from an Ethics Committee.

As a result of the current lack of occupational and work-relatedness information in the Mortality Collection, the Work Related Fatal Injury Study had to extract this information from coronial files, which proved to be a very time-consuming process<sup>5</sup>.

### **How information is disseminated and/or integrated into policy making**

The Chief Analyst reports interim updates of provisional mortality data of interest to various groups within the Ministry of Health.

### **Future plans for development/improvement**

The NZHIS contracted the Centre for Public Health Research (CPHR) to review the role of occupation in the data collections of death registrations, cancer registrations, and hospital discharges<sup>12</sup>. The CPHR has made recommendations on how occupation can be routinely collected, coded, and analysed in order to maximise the use of occupation in NZHIS data collections for the public good, including recommending that NZHIS acquire a computer-assisted occupation coding tool such as that used at Statistics New Zealand, which can be used to code the backlog of occupation in the Mortality Collection.

## **3.2.2 NEW ZEALAND CANCER REGISTRY (NZCR)**

The New Zealand Cancer Registry (NZCR) records all primary malignant diseases diagnosed in New Zealand, excluding squamous cell and basal cell skin cancers. Data is used in research, and in monitoring and evaluating cancer screening programmes<sup>39</sup>.

### **Synopsis**

The NZCR provides full coverage of cancer incidence in New Zealand since 1994, virtually complete (990%) coverage since 1972, and partial coverage as far back as 1948. There is detailed recording of each new tumour, including its diagnosis, site, histology and extent of disease, test results, and other information. Unique identifiers enable cancers to be identified at the level of the individual patient or the individual tumour. Ethnicity data is imported from the NHI and is based on self-identification.



Occupation details on the NZCR are inadequate for occupational disease surveillance purposes. Occupation in cancer registrations is sourced from the NMDS, where it is poorly recorded and uses free text. Moreover, since 1 July 1994, the occupational information from hospital discharges has not been routinely imported into the NZCR from the NMDS. There is no indicator of work-relatedness.

The registry records individuals' NHI numbers, enabling linking of individual records to other data sets that also use the NHI. Data quality issues with the NHI (in particular, duplicate NHI numbers) must be acknowledged, although efforts are being made to address these issues.

### **Background**

The NZCR was established in 1948, primarily using public hospital discharge information on the NMDS. The Cancer Registry Act 1993 and Cancer Registry Regulations 1994 were introduced to increase reporting of primary cancers in New Zealand. From 1 July 1994, pathologists were given responsibility for ensuring that all specified primary cancer cases are reported. Laboratory pathology reports became the principal source of data for the NZCR. Since the Regulations came into effect, the data quality and completeness have significantly improved.

### **Purpose of the surveillance**

The NZCR was established to provide a population-based register of all primary malignant diseases diagnosed in New Zealand, excluding squamous cell and basal cell skin cancers. Data is used in research, and in monitoring and evaluating cancer screening programmes.

### **Population covered**

All cancers diagnosed in New Zealand are required to be reported to the NZHIS.

### **Method and frequency of data collection**

Laboratories are the primary source of cancer notifications registrations to the NZCR. Laboratories are required by law to report any new diagnosis of cancer in New Zealand, excluding squamous and basal cell skin cancers, within 21 days after the end of the calendar month in which the diagnostic test was carried out. Laboratories provide pathology reports to the NZHIS in either hard copy or electronic form.

Because pathology reports do not contain all of the information required by the NZCR (such as ethnicity or extent of disease), section 6 of the Act authorises the NZHIS to seek additional information from medical practitioners, medical certificates of causes of death, coroners' findings, hospital discharge data on the NMDS, and private hospital discharge returns.

Data is loaded from the NMDS monthly. Information from pathology reports is updated manually on an ongoing basis.

### **Completeness of coverage**

The NZCR covers all cancers, except squamous and basal cell skin cancers. Due to lags in the receipt and processing of some data, the data set provides good coverage within 12 months of diagnosis, with only minor updates being made to data over one year old.

Data collected prior to 1 July 1994 (when compulsory reporting by laboratories commenced) should not be relied upon for completeness.

Some types/sites of cancer are of particular interest to researchers and the processing of these cancers is treated as a priority. These include melanoma, prostate, breast, cervix, colorectal, and childhood cancers. The processing of data for these priority cancers is kept up to date within three months of receipt of laboratory reports<sup>39</sup>. Cancers first diagnosed upon death (data sourced from the Mortality Collection) takes the longest to be included on the registry because this collection takes longer to become complete.

### **Completeness and accuracy of data**

The Cancer Registry Regulations 1994 set out the variables to be reported to the NZCR. Variables of particular relevance to this report are summarised in the following paragraphs.

#### ***Identifying and demographic details***

The NZCR is able to record a range of identifying details including the person's given and last names, date of birth, country of birth, age at diagnosis, sex, usual residential address, date of diagnosis, and date of death.

A number of unique identifiers can also be recorded including a unique cancer record ID (a unique number assigned by the Cancer Registry system when the record is first registered and loaded), cancer registration number (a unique number for each registered tumour), death registration entry number, NMDS event ID (a unique identifier of an event recorded on the National Minimum Data Set of hospital events), and NHI number. The issue of duplicate NHI numbers applies as described earlier for the Mortality Collection.

Because the NZCR is a database of new cancers, registered in the first year of diagnosis, an individual person can have multiple records on the database where more than one distinct cancer is diagnosed during their lifetime.

#### ***Ethnicity***

Ethnicity is sourced from the National Health Index and relevant NMDS events<sup>46</sup>. (The Cancer Registry Regulations also provide for ethnicity to be reported by laboratories "where available", but ethnicity is usually not known to pathologists at the laboratory.) The NHI uses the Statistics New Zealand (Level 2) classification. From 1 July 1996, up to three ethnic group codes can be collected for each health care user. Where more than three ethnic group codes are reported, the Statistics New Zealand prioritisation algorithm is used to report only three values. Because ethnicity is self-identified, it can change over time. However, the NHI does not include historical data<sup>47</sup>.

#### ***Occupation***

The principal source of occupation information for the NZCR is the NMDS. However, because laboratories do not see the patient, occupation is not asked and not included in the pathology report that is sent to the NZCR. This is also the case for other patient information, such as country of birth and extent of cancer disease code. The NZHIS is therefore authorised to seek additional information from medical practitioners and hospitals, as well as from medical certificates of causes of death, coroners' findings, and hospital discharge data on the NMDS. Of these data sources, it is the NMDS that contains information on current occupation. For deceased cancer patients, occupation can also be extracted from the BDM28 (through the Mortality Collection)<sup>12</sup>.

The coding of occupation on the NMDS is discussed in the NMDS section of this report. Because occupation was included in the hospital separations data from 1972, occupation is only available in the NZCR from that year. Similarly, the completeness and quality of occupation in cancer registrations is limited to the completeness and quality of occupation in hospital discharge data (which is poor). Moreover, since the Act and Regulations came into force on 1 July 1994, the occupational information from hospital discharges has not been routinely copied into the NZCR from the NMDS. As Pearce and colleagues note, it would be possible to include this data without any changes to the systems or data collections at NZHIS<sup>12</sup>.

As a result of the poor recording of occupation on the NZCR, it would be problematic to identify possible new associations between occupation and cancer in New Zealand using this data source. The researcher would first have to identify the cohort of interest and then request the NZCR data.

#### ***Industry***

Industry is not coded. Researchers wanting to include industry as a variable must first select their cohort and then request the appropriate records from the NZCR.

### ***Work-relatedness***

There is no indicator of work-relatedness on the NZCR (as associations between occupations and cancers are usually identified at population level rather than individual level). Similarly, details such as length of exposure are not recorded on the NZCR but may be incorporated in research as data from other sources.

### ***Diagnosis and site***

In accordance with the Regulations, laboratories include, where applicable, in their reports to the NZCR:

- a full description of the pathological nature of the cancer
- in the case of melanoma, the thickness of the tumour and extent of tumour invasion
- the stage of the cancer (where available)
- the histology of the primary lesion (or in the absence of a known primary lesion, the metastases)
- cytology, haematology, or both
- specific biochemical or immunological test, or both
- autopsy with concurrent or previous histology
- a description of the anatomical site from which the sample was obtained
- whether that site is the primary or secondary site of the cancer indicated by the test.

Any information that is initially unavailable, must be transmitted to NZCR if it subsequently becomes available.

The information is coded at NZHIS. The NZCR classifies tumours using the WHO International Statistical Classification of Diseases and Related Health Problems (ICD) and the WHO International Classification of Diseases for Oncology (ICD-O).

### ***Agent/exposure***

The NZCR does not record possible agents or exposures that might be related to the malignancy.

### **Data integration methods**

As described above, the NZCR incorporates data from laboratory reports, the NHI and NMDS, as well as a range of other sources where necessary including information from medical practitioners and hospitals, Medical Certificates of Causes of Death, Coroners' Findings, and hospital discharge data on the NMDS.

### **Types of surveillance, data analysis, and interpretation used**

NZHIS publishes an annual report, *Cancer: New Registrations and Deaths*. This publication contains detailed information on numbers and rates of cancers according to year of registration. Associations between occupation and cancer are not explored, however.

More timely, provisional cancer data for the priority sites is posted on the NZHIS website.

Data from the NZCR is regularly used in cancer studies. A leading example in the context of occupational cancer is a project commenced in 2001 by the OSH Cancer Panel, which is described within the section on the Cancer Panel.

### **How information is disseminated and/or integrated into policy making**

NZHIS also makes customised data sets or summary reports available, on request, and offers analytical support and peer review services through its Analytical Services team.

### **Future plans for development/improvement**

The recent review for NZHIS by the Centre for Public Health Research (CPHR)<sup>12</sup>, of the role of occupation in the data collections of death registrations, cancer registrations and hospital discharges, recommended that the NZHIS use the existing link between the NMDS and NZCR to routinely transfer occupation code and occupation free text from the NMDS to the NZCR, providing the possibility to code the backlog of occupation in cancer registrations.

### 3.2.3 NATIONAL MINIMUM DATA SET (HOSPITAL EVENTS) (NMDS)

The National Minimum Data Set (NMDS) is a national collection of public and private hospital discharge information, including clinical information, for inpatients and day patients. It provides statistical information, reports, and analyses about trends in the delivery of these hospital services, both nationally and on a provider basis.

#### **Synopsis**

The NMDS provides complete coverage of public hospital inpatient and day patient discharges, and fairly complete coverage of discharges from private hospitals. Particular strengths in the data set, aside from its completeness, include strong coding of diagnosis and severity (using ICD).

However, the recording of occupation is inadequate for the surveillance of occupational diseases, as it is under-recorded and is restricted to free-text information only.

There is no work-relatedness indicator on the NMDS. However, the potential to identify work-related diseases and injuries using E codes has been improving with successive upgrades of the ICD-10-AM system, in particular the 3rd Edition which is used in New Zealand from 1 July 2004.

The NMDS records individuals' NHI numbers, enabling linking of individual records to other data sets that also use the NHI. Data quality issues with the NHI (in particular, duplicate NHI numbers) must be acknowledged, although efforts are being made to address these issues. The ACC claim number is also recorded for the majority of discharges, enhancing the utility of the data set for use in conjunction with ACC data.

#### **Background**

The current NMDS was introduced in 1999. The original NMDS was implemented in 1993 and back-loaded with public hospital discharge information from 1988. The NMDS has undergone many changes over the years. Some data subsets have been removed and are now held in separate collections (Cancer Register and the Mortality Collection). In other cases, additional fields have been included and events are reported in more detail than in the past<sup>39</sup>.

Data has been submitted electronically in an agreed format by public hospitals since 1993.

The private hospital discharge information for publicly funded events, e.g. birth events and geriatric care, has been collected since 1997. Other data is being added as it becomes available electronically<sup>39</sup>.

#### **Purpose of the surveillance**

The NMDS provides statistical information, reports, and analyses about trends in the delivery of hospital inpatient and day patient health services, both nationally and on a provider basis. It is used for policy formation, performance monitoring, research and review, and funding purposes.

#### **Population covered**

The NMDS covers all hospital discharges for people who have been inpatients and day patients in general public hospitals, maternity hospitals, and registered private hospitals in New Zealand. Accident and emergency, and outpatient services are not included. Since only hospitalised cases are recorded, less severe cases, or conditions not frequently requiring hospitalisation (e.g. OOS), are not well covered<sup>6</sup>.

#### **Method and frequency of data collection**

A hospital discharge form needs to be completed after a patient is discharged, transferred, or has died. The form should be completed for inpatients, day patients and any patient who dies while in hospital<sup>12</sup>. Clinical coders employed by the hospitals review discharge forms and other medical records, and code the records as documented in the Ministry's Operational Policy Framework (OPF).

Hospitals generally provide data to NZHIS in an electronic file format. Some of the smaller private hospitals provide paper forms and a cut-down electronic file format. Publicly-funded hospital events are required to be loaded into the NMDS within 21 days after the month of discharge.

Diagnoses are recorded in the NMDS retrospectively, after the patient has been discharged. This is the opposite of the ACC and OSH databases (described later in this report) which record the diagnosis made at the initial consultation with the treatment provider.

### **Completeness of coverage**

An advantage of the NMDS is that it does not suffer from under-reporting (for the defined range of events covered). According to the NZ Injury Data Review, 105,000 hospital records were reported to the NMDS in 2000.

If the records submitted by hospitals are not fully compliant with the NMDS, they are not included in the NMDS but are returned to the hospital for further review. Thus, there may be some minor additions to the database over time. On the whole, there is a very high rate of compliance and, after six months, the NMDS is generally close to 100% complete.

All public hospitals and most private hospitals (understood to be around 90%) submit data to the NMDS. As the private hospitals that do not submit data tend to be the smaller hospitals, over 90% of private hospital separations would be covered by the NMDS. As private hospital records are lower priority than public hospital data for entry in the NMDS, there may be time lags associated with the inclusion of private hospital data on the NMDS, especially where paper returns are provided.

### **Completeness and accuracy of data**

For public hospital discharges, data recorded includes a wide range of demographic, clinical, and circumstances of disease/injury information<sup>48</sup>. For private hospitals, the range of information collected is often significantly reduced. For example, the ICD E codes (external cause of injury and poisoning) are absent from some private hospital data<sup>49</sup>. The following paragraphs summarise key fields of interest.

#### ***Identifying and demographic details***

The NMDS records a range of identifying details, including the patient's date of birth, age at admission and at discharge, sex, and usual residential address.

All records must have a valid NHI number. (Note, however, that the issue of duplicate NHI numbers applies as described earlier for the Mortality Collection.) The ACC claim number is also recorded where applicable.

Because the NMDS is a database of hospital separations, an individual patient can have multiple records on the database where they have been admitted to hospital more than once in their lifetime. As patients can be admitted multiple times for one disease or injury, these records need to be grouped in order to count diseases or injuries.

#### ***Ethnicity***

Ethnicity is coded according to the Statistics New Zealand (Level 2) classification. From 1 July 1996, up to three ethnic group codes can be collected for each health care user and each event. Where more than three ethnic group codes are reported, the Statistics New Zealand prioritisation algorithm is used to report only three values. Because ethnicity is self-identified, it can change over time. For this reason, the NMDS records ethnicity for each event, rather than relying on the ethnicity data in the NHI<sup>47</sup>.

The completeness and accuracy of the ethnicity field has improved over time, and most entries are now thought to reliably represent patients' self-identified ethnicities. However, inaccuracies remain. For example, the category "other" is coded 2% of the time, whereas it has been estimated that it should be coded approximately 0.05% of the time.

### ***Occupation***

Information is collected by a hospital clerk at admission and covers the patient's current occupation at the time of admission or their previous occupation if they are retired at the time of admission. From 1972 to 1992, occupation was collected for all hospital events. In 1992, the data set was reviewed by a working group, which concluded that significant use was not being made of occupation descriptions at national level<sup>50</sup>. Consequently, from 1992 onwards, it is mandatory for hospitals to provide occupation only for cancer patients.

Between 1993 and 1999, the coding of occupation (for cancer patients) was the responsibility of the hospital clerks, who used the 4-digit NZCO code. During this period, only the occupation code was recorded in the NMDS (and not free text). Since 1999, free-text occupation is again available in the NMDS: code is no longer required and free text occupation is preferred. Currently, nobody is responsible for the coding of the occupation free text on hospital discharges for cancer patients<sup>52</sup>.

Occupation from hospital discharges was used in studies up to 1998 but does not appear to have been used since it became part of the NMDS<sup>52</sup>. A study using Cancer Registry data for the period 1972–1998 used the brief description for occupation from hospital discharge data. This information was coded at the National Centre for Health Statistics using the New Zealand Standard Classification of Occupations (NZSCO-80). Information was available on occupation for 88% of males, and only 28% of females aged 20–64; nearly three-quarters of females in this age group had occupation classified as missing, unknown or “housewife”<sup>51</sup>. In a Cancer Registry study for the period 1980–1984, 80% of men aged 20 or older had coded occupational information available<sup>52</sup>.

In the absence of published studies identifying the completeness or quality of occupation in hospital discharge data after 1998, Pearce and colleagues conducted a quick review of the current NMDS and found that, between 1988 and 1999, depending on the year, only 0.2–8.8% of the hospital discharges had an occupation code. After 1999, 50–60% of all NMDS entries had a non-empty text field for occupation and around 20% had a non-empty code field for occupation<sup>52</sup>.

The 1992 decision to stop recording occupation for all hospital admissions, except cancer admissions, has removed the possibility of using the NMDS to monitor occupational disease that requires hospitalisation. If mandatory occupation recording for all hospital admissions were re-included, the NMDS would provide a valuable data source for the surveillance of occupational disease in New Zealand.

### ***Industry***

Industry is not coded. Researchers wanting to include industry as a variable must first select their cohort and then request the appropriate records from the NMDS.

### ***Diagnosis and severity***

The NMDS records details relating to the reasons for admission to hospital, procedures carried out while in hospital, and incidental or concurrent diseases that were a factor in the treatment. It also records information about accidents that caused health events or occurred during a health event, including adverse reactions<sup>47</sup>.

The nature and circumstances of diseases and injuries are coded according to the International Classification of Disease (ICD), Australian Modification (AM). The ICD consists of tabular lists and indices of diseases, procedures, and Australian Coding Standards for the selection of codes. The disease component is based on the World Health Organization's ICD codes and uses an alpha-numeric coding scheme for diseases, which is structured by body system and aetiology<sup>53</sup>.

ICD coding systems are continually being updated, which affects the longitudinal specificity of data. For example, from 1 July 1995, the maximum number of codes that could be recorded was increased from four diagnoses and three procedures, to 25 diagnoses and procedures in total. As a result, the number of diagnoses and procedures

recorded on the NMDS increased substantially from this date. More recently, the maximum number of codes was increased to 99, but this does not appear to have impacted on the data collected.

To facilitate longitudinal data analysis, diagnoses and procedures are held in multiple versions of ICD. Up until 30 June 1995, ICD-9-CM was used. From 1 July 1995, all codes were mapped to ICD-9-CMA, with information gathered prior to this date also mapped forward, and this has remained the coding system common to all NMDS records<sup>49</sup>. Subsequent updates, and the periods to which they apply, are summarised in the following table.

EVENT END DATE	ICD-9-CMA	ICD-10-AM 1ST EDITION	ICD-10-AM 2ND EDITION	ICD-10-AM 3RD EDITION
1 July 1995 – 30 June 1999	✓			
1 July 1999 – 30 June 2001	✓	✓		
1 July 2001 – 30 June 2004	✓	✓	✓	
1 July 2004 onwards	✓	✓	✓	✓

*Source: NZHIS National Minimum Data Set (Hospital Events) Data Dictionary Version 6.4, August 2004. Ministry of Health, Wellington.*

The specificity of ICD coding systems has improved over time. For example, mesothelioma is identified in ICD-10 but not ICD-9. Thus, caution must be exercised when analysing trends in certain occupational diseases based on ICD codes.

### ***Work-relatedness***

There is no indicator of work-relatedness on the NMDS. This has been a major weakness in the data set when it comes to the surveillance of occupational disease and injury. However, the potential to identify work-related diseases and injuries using external cause codes (E codes) has been improving with successive upgrades of the ICD system.

For many years, work-related injury was not covered by ICD. Categories were available in ICD-9 to identify a few types of case, such as events involving railway workers, and the “place of occurrence” classification gave some clues (e.g. trade and service area, industrial and construction area, farm).

A substantial improvement came with the introduction of the ICD-10 “Activity” classification, which included a new category titled “injury while working for income”. The ICD-10-AM 3rd Edition, introduced in New Zealand from 1 July 2004, takes this capability a step further by providing sub-categories for work-related cases occurring in eight major industry sectors, including mining, construction, and health services. This will make information based on hospital separations data substantially more useful for purposes of occupational health and safety<sup>54</sup>.

NZHIS advised that, where the clinician has documented well the type of work the person was involved in during the injury/disease, or the ACC form is well completed, the work-related codes will be coded accurately on the NMDS. However, the use of this code for occupational diseases may be less reliable if work-relatedness is not mentioned by clinicians in the documentation of the episode of care the patient received at hospital.

### ***Agent and mechanism***

Agent and mechanism are not explicitly recorded on the NMDS, but E codes can provide some clues regarding some of the circumstances surrounding the injury (including place of occurrence and activity). There is also an “event supplementary information” field that can be used to record additional information about the accident location<sup>49</sup>.



### **Data integration methods**

The NMDS integrates data provided by all public hospitals and most private hospitals in New Zealand into a single, comprehensive data set of admitted patient hospital events.

### **Types of surveillance, data analysis, and interpretation used**

NMDS data is regularly used in studies of health care utilisation and patterns of morbidity. NMDS data is used for policy formation, performance monitoring, research and review, and funding purposes.

NZHS publishes an annual report, *Selected Morbidity Data for Publicly Funded Hospitals*. This publication contains summary NMDS information for a financial year. No specific analysis is provided of occupational diseases in this report. However, some diseases commonly associated with occupation can be identified by their three-character ICD code in tables of hospital discharges (e.g. coalworker's pneumoconiosis, pneumoconiosis due to asbestos and other mineral fibres).

### **How information is disseminated and/or integrated into policy making**

NZHS also makes customised data sets or summary reports available, on request, and offers analytical support and peer review services through its Analytical Services team.

### **Future plans for development/improvement**

The recent study undertaken for NZHS by the Centre for Public Health Research (CPHR)<sup>12</sup> to review the role of occupation in the data collections of death registrations, cancer registrations, and hospital discharges, has recommended that occupation be included in the NHI database (this was also included in the NOHSAC report) and that NZHS data collections be analysed routinely over regular time intervals to study the relation between occupation and health in New Zealand. Possible impediments to including occupation in the NHI include the necessity of training all relevant hospital staff in the use of the new codes and consumer advocacy concerns regarding privacy.

## **3.3 OCCUPATIONAL SAFETY AND HEALTH SERVICE (OSH)**

The Occupational Safety and Health Service (OSH) of the Department of Labour (DoL) is responsible for the operation and enforcement of the Health and Safety in Employment (HSE) Act 1992, the principal legislation for ensuring workplaces are safe and healthy. It requires employers to:

- provide and maintain a safe work environment
- provide and maintain facilities for the safety and health of employees at work
- ensure that machinery and equipment in the place of work is designed, made, set up, and maintained to be safe for employees
- ensure that employees are not exposed to hazards in the course of their work
- develop procedures for dealing with emergencies that may arise while employees are at work.

OSH administers the Health and Safety Accident Recording Database (HASARD), which records serious harm notifications (mainly from employers) and information from compliance assessment cases (from OSH inspectors). It also contains a module called the Notifiable Occupational Disease System (NODS), which records occupational disease notifications (mainly from health professionals).

The following sections describe the systems used for recording occupational disease (NODS) and serious harm (HASARD) respectively.



### 3.3.1 NOTIFIABLE OCCUPATIONAL DISEASE SYSTEM (NODS)

The Notifiable Occupational Disease System (NODS) is a voluntary reporting scheme whereby health professionals and individuals can notify a health-related condition which is suspected to arise from work<sup>55</sup>.

#### Synopsis

NODS was designed to supplement the statutory requirement for employers to notify serious harm and fatalities, by providing a vehicle for the voluntary notification of suspected occupational diseases. However, the notification card implicitly restricts its data collection to those occupational diseases included in the HSE Act's definition of serious harm. From mid-October 2005, the NODS card has been changed to include all of the ILO list of occupational diseases.

The key strengths of NODS are that it was introduced specifically to record occupational diseases and that anybody can make a notification. Employers were not specifically required to notify an occupational disease because it was judged that, in most instances, they would not be aware of one in an employee. However, NODS currently has little potential to contribute to the surveillance of occupational disease. Key problems include:

- severe under-reporting, which may be attributed to a range of factors, including non-recognition of the possibility of an occupational disease by the person affected, under-diagnosis of occupational diseases by medical practitioners, a lack of awareness of the system by all parties, and few incentives to report including a lack of feedback to doctors and others
- a data collection system design (HASARD) that does not lend itself well to the aggregation of data for surveillance purposes, including difficulties in inputting data, a record structure centred on events rather than individuals, the use of pick-lists that present hierarchical classification systems in a non-hierarchical way and include overlapping categories, and low specificity in the coding of diagnoses
- a low state of readiness of the data set for integration with other key data collections, such as NZHIS and ACC data, due to a lack of compatible unique identifiers (such as NHI number or ACC number), and the use of non-standard coding systems for fields such as diagnosis, occupation, and industry
- work practices that are intended to support efficient investigations rather than the recording of high-quality data, including the filtering and prioritisation of notifications for investigation, which results in limited registration of low priority notifications, the entry of data based on the initial notification that is not necessarily updated at the end of the investigation, and day-to-day work pressures that provide stronger incentives for speed than accuracy of data entry.

NODS notifications tend to contribute to the prevention of the recurrence of harm through the identification of learnings from individual cases, rather than from aggregated data.

#### Background

Reporting of notifiable occupational diseases originated with the passage of the Health Act 1956. It is widely acknowledged that this system did not work well, even though medical practitioners were paid a (small) sum for each notification. Responsibility for recording of occupational diseases transferred from the Ministry of Health to the Department of Labour with the commencement of the HSE Act on 1 April 1993.

NODS was formed in 1992 as a response to the identified need for an occupational disease and injury data collection system. OSH had originally intended to create a single central notification system in which data collected would be distributed to relevant bodies. It was envisaged that the Accident Compensation Corporation (ACC) would be the overseeing body, responsible for the collection and distribution of notification data. However, ACC was unwilling to support this system for a number of reasons and, as a result, NODS was introduced as a voluntary notification system.

NODS began as a stand-alone database and, under the care of a dedicated Registrar, was able to provide summary reports at two-monthly intervals for feedback to medical practitioners and others. It was incorporated into HASARD in June 1998, together with other databases such as the separate Asbestos Register, which OSH had previously used. The amalgamation of NODS with the other databases was intended to align notifiable conditions with international classifications to allow comparison with international data. The amalgamation, together with associated organisational changes, was accompanied by a decline in the completeness and accuracy of NODS data as detailed below.

### **Purpose of the surveillance**

NODS was designed to supplement the statutory requirement for employers to notify serious harm and fatalities, by providing a vehicle for the voluntary notification of suspected occupational diseases.

NODS objectives are:

- enabling OSH to become aware of work-related health problems (in effect, identifying a “sick workplace” on the basis of “sick workers”) and thence to pursue improvements with employers
- at the national level:
  - assisting OSH to plan and implement health promotional and intervention strategies
  - allowing OSH to monitor trends in occupational disease patterns – in time, this was intended to permit an evaluation of the effectiveness of promotional and intervention strategies
- raising awareness among health professionals about an individual’s occupation being an important determinant of disease
- assisting workers and managers to recognise more clearly harmful or dangerous work situations or work practices
- providing a database for the development of applied research.

The principal purpose of reporting to NODS is to prevent ongoing harm by reducing recurring exposures and incidents in workplaces. In practice, OSH has tended to focus on identifying lessons from individual cases that may be applied to the workplace involved or the industry more broadly, rather than the collection of detailed, analysable data to facilitate the detection of national issues and trends, and this is reflected in the design and operation of NODS. At the time of the system’s formation, it was accepted that NODS would record only sentinel data. The data collected on the system would enable OSH to address three fundamental questions about a notification: What is the disease? What is the exposure? Are the two connected?

### **Population and diseases covered**

The legislative boundaries of the HSNO Act provide some clues to the intended coverage of NODS. The Act defines hazards and harm “in a comprehensive way so that all hazards and harm are covered, including harm caused by work-related stress and hazardous behaviour caused by certain temporary conditions”. The definition of hazard includes anything “that is an actual or potential cause or source of harm”. Harm is defined as “illness, injury, or both”, and “includes physical or mental harm caused by work-related stress”. These definitions indicate that all occupational diseases fall within the boundaries of the Act.

The legislation requires only “accidents and serious harm” to be reported to OSH. Therefore, the NODS notification card includes only those occupational diseases that fall within the legislative definition of “serious harm”. The definition, set out in Schedule 1 to the Act, includes any of the following where they amount to or result in “permanent loss of bodily function, or temporary or severe loss of bodily function”: respiratory disease, noise-induced hearing loss, neurological disease, cancer, dermatological disease, communicable disease, musculoskeletal disease, illness caused by exposure to infected material, decompression sickness, poisoning, and vision impairment (in addition to a range of occupational injuries). In practice, a decision was made to exclude musculoskeletal disorders (including lower back pain) from NODS coverage as it was anticipated that this would

result in a high volume of notifications where it would be difficult to attribute causality to work. In addition, many acute back injuries are reported as serious harm.

The principal object of the Act is “to promote the prevention of harm to all persons at work and other persons in, or in the vicinity of, a place of work”. Thus, it includes both workers and bystanders. The Act also recognises that “volunteers doing work activities for other persons should have their health and safety protected” and covers volunteers doing work on an ongoing and regular basis that is an integral part of the business (but not, for example, volunteer fundraising for a sports club or school).

A “place of work” includes any place where any person works for gain or reward; where the employee may come to eat, rest, get first-aid or pay, report in or out, get instructions, deliver goods or vehicles; or through which the employee must pass to reach a place of work. Such a place may form part of a building, structure, or vehicle, but excludes domestic accommodation provided by the employer for the employee. This definition includes car travel by mobile workers but not by commuters.

### **Method and frequency of data collection**

Notifications to NODS are voluntary and supplement mandatory notifications under the HSE Act (which requires employers to notify OSH about workers who suffer serious harm as a result of their work). The steps in the notification and data collection process are described in the following paragraphs.

#### ***Notification***

A range of informants can notify OSH of a health condition that is suspected to arise from work. NODS notifications are received from general practitioners, occupational health nurses, occupational physicians, medical specialists, other health professionals, and individuals who have a health problem that they suspect has been caused by work. Most notifications are made by GPs. Notification requires patient consent.

The notification takes the form of a card, filled out and forwarded to OSH, to present the suspicion of an occupational disease, and signed by the patient. In order to minimise the work load for GPs, the notification card has been designed so that the practice nurse can enter demographic details and the GP simply records the diagnosis.

When the NODS notification card reaches the regional branch of OSH, an assessment of the case is made and, if appropriate, an investigation is initiated.

#### ***Data entry***

Cases are first entered on NODS on the basis of the information provided on the notification card. Data entry (into HASARD) has been carried out at OSH regional offices since 1998. Notifications were previously made to a centralised system to ensure consistency and data quality. This change occurred in the broader context of changes in the OSH workforce (with occupational health nurses becoming health and safety inspectors during the years following their transfer to OSH from the Ministry of Health in the early 1990s), and increased staff workloads (due to broadened responsibilities and increased notifications of serious harm).

Decentralised recording of NODS notifications, together with workload pressures that may have provided a stronger incentive for speed over accuracy of data entry, and organisational priorities focused more heavily on investigation than data collection, are said to have contributed to a decline in the data quality on NODS in the HASARD database.

Also impacting on data quality and coverage was the introduction of the filter-prioritise-investigate (FPI) system in which notifications are triaged into category A (the highest priority), category B, and limited response. OSH does not investigate every event reported to it, targeting most of the resources available for investigation to the more serious events<sup>56</sup>. In selecting which events to investigate, and in deciding the level of resources to be used, OSH considers factors such as severity and scale of potential or actual harm; seriousness of any potential breach of the

law; knowledge of the workplace's past health and safety performance; enforcement priorities; practicality of achieving results; and wider relevance of the event, including serious public concern.

Since limited response cases are usually not followed up, only the information provided in the initial notification is recorded on NODS. It is understood that some limited response notifications may not be entered on NODS at all, due to more pressing work priorities for inspectors, or responses to initial telephone enquiries that act to discourage a formal notification. Moreover, there is the possibility of notifications being wrongly identified as limited response on the basis of incomplete information.

Notifications that are investigated are not necessarily updated on NODS following the initial entry of information received on the notification card. This is understandable in the context of inspectors' day-to-day work priorities in an organisational culture focused on investigating notifications, together with a lack of feedback demonstrating any results or the value of NODS data.

### ***Investigation***

In suspected or confirmed cases of occupational illness or disease, OSH usually investigates the place of work. As a result of the investigation, OSH may recommend changes in facilities or work practices.

OSH uses a team approach to the investigation of occupational disease, and the consequent intervention in the workplace. Investigating teams may include a departmental medical practitioner (DMP), an inspector (some with specialised health knowledge), an industrial hygienist, and an accident prevention consultant. An inspector, assisted by an industrial hygienist, usually carries out the first stage in an investigation. This first stage may involve the notifier completing a standard questionnaire with the help of the GWI, monitoring of the workplace, and a visit to the workplace by a specialist. Once the investigatory process has been completed (which, on occasions, may require other medical specialist input), the details are referred to the DMP or to a specialist panel.

### ***Verification***

The DMP considers the information gathered by the GWI and makes an assessment as to whether the disease is a result of workplace exposure.

OSH also uses specialist panels, comprising medical and non-medical specialists, which were established to review notifications and monitor specific diseases of concern, including occupational cancer, chemical and solvent related diseases, and respiratory diseases (including asbestos-related diseases). Relevant notifications are reviewed by the appropriate panel, using a range of questionnaires and considerations specific to the disease being reviewed. Panels convene periodically once a sufficient number of cases (15–20) for consideration have accumulated.

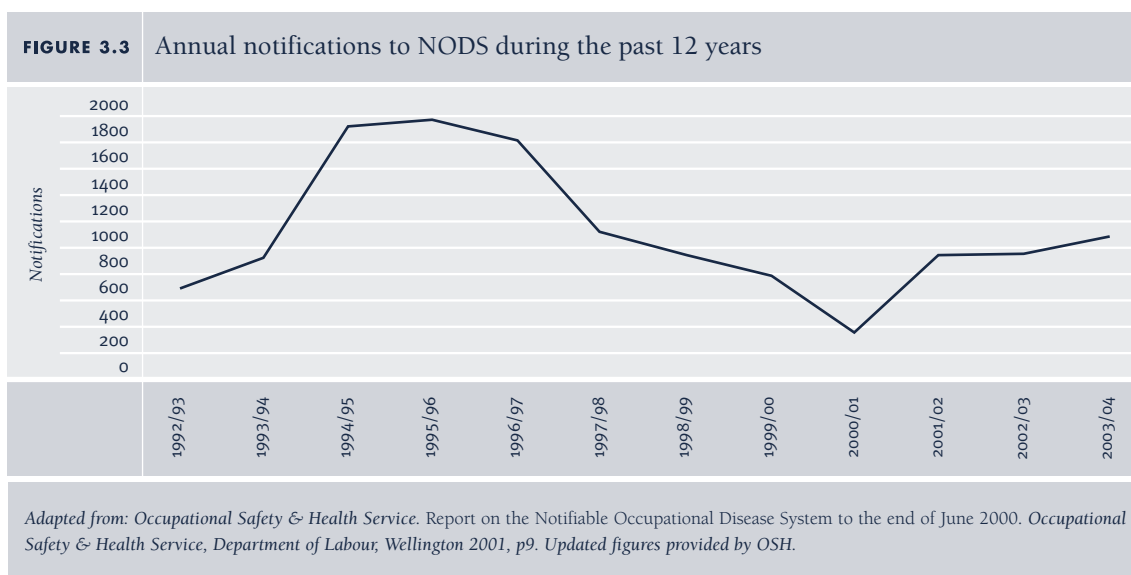
### ***Intervention***

An intervention is the end point in the process and is undertaken to prevent other workers from suffering the same consequences as a reported case. Interventions include working with employers to achieve voluntary compliance (through the use of strategies such as engagement, education, and enablement) and use of OSH enforcement powers (including written warnings, compliance orders, and prosecutions, *inter alia*).

### **Completeness of coverage**

The completeness of the NODS database is dependent on the number of people who make notifications. Any person can make a notification to NODS, but the predominant notifiers are GPs. The proportion of GPs notifying has decreased in recent years. The reasons for the declining number of GPs who make notifications to NODS are unclear, but may include a lack of awareness of the NODS system, a lack of training in or limited awareness of occupational diseases, latency in disease development after exposure, a lack of interest in causation as distinct from treatment and compensation, and the lack of any incentive for GPs to report (including a lack of feedback on the value of reporting).

The following graph shows the number of notifications to NODS each year since 1992/93. Notifications were at their highest during the three-year period from mid-1994 to mid-1997 then fell sharply in 1997/98. With the 1998 amalgamation of NODS with HASARD, the NODS notifiable conditions were aligned with international classifications to allow comparison with international figures. The new classifications incorporated the previous NODS classification but allowed for a wider range of occupational diseases to be recognised<sup>57</sup>. Despite this, notifications to NODS continued to decrease, to less than 400 in 2000/01. Notifications have subsequently climbed to around 1,000 notifications in each of the last three years. The number of cases dealt with by the OSH panels has similarly decreased in recent years compared to the mid-1990s.



The proportion of total occupational disease incidence and prevalence captured on NODS is unknown, as the total population (and sub-groups) of people affected by occupational disease is unclear. Nevertheless, Figure 3.3 strongly suggests that NODS coverage of occupational disease is poor.

Acute conditions are more likely to be notified to NODS than chronic conditions, as the link between the condition and occupation is more likely to be obvious. The level of GP knowledge about links between chronic conditions and occupations is likely to be variable. Moreover, the triaging of notifications under the FPI system places some reliance on inspectors' abilities to distinguish work-related from non work-related diseases. Stakeholders suggested that the OSH workforce has, in aggregate, struggled to keep abreast of medical knowledge in this area and, as a result, may be less able to distinguish cases at the margin. Consequently, it was suggested, the notifications process may have increasingly become focused toward cases which have an obvious cause and a clear investigation outcome.

OSH activities may contribute to skews in reporting rates by different types of employer, by raising awareness in a particular industry. For example, it was suggested that OSH targeting of solvents used in the boat building industry has probably contributed to an increase in notifications from this industry. Thus, an increase in the rate of notifications to NODS for a particular occupational disease or industry may indicate an increased awareness rather than increased incidence of the disease.

Low rates of reporting may be symptomatic of low rates of compliance with the HSE Act more broadly. Walls and Dryson<sup>58</sup> conducted a study to audit the degree of compliance with the HSE Act in a typical cross-section of New Zealand manufacturing industries and found that, five years after enactment, only 44% of those sampled had undertaken the most fundamental step of hazard identification, which is a legislative requirement and the

framework upon which self-management is supposed to occur<sup>59</sup>. The study also revealed that only 50% of enterprises visited provided occupational health and safety information to employees, another requirement under the Act. The authors concluded that, if the results of the survey were representative of the situation nationally, then the majority of enterprises, regardless of size, would not be compliant with the minimum legislative standards of health and safety<sup>58</sup>.

The risks of occupational injury and occupational disease in smaller companies may be higher than in the big companies due to lack of specialised resources<sup>31</sup>. Small businesses are less likely to have the resources or the inclination to seek expensive medical or technical advice. However, larger companies are more efficient targets for regulators in terms of the numbers of employees who stand to benefit per intervention. Therefore, there is a risk of regulators preaching to the converted when undertaking health and safety regulatory initiatives.

### **Completeness and accuracy of data**

Many of the fields on the HASARD system, of which NODS is a part, are mandatory. As a result, fields such as agency, mechanism, ethnicity, occupation, shift, employment, time employed, body part, and injury type are completed 100% of the time. However, the accuracy of some of these fields may be poor because, in the absence of accurate data readily to hand, the incentive to complete the task quickly by “guesstimating” field entries where the pick-list is long, or using default codes, may outweigh any incentive to ensure data accuracy.

Most of these fields contain categorical data, with the applicable category being selected by the user from pick-lists. These pick-lists are not organised hierarchically in HASARD, although, in some cases, a hierarchical list is displayed in non-hierarchical form. For example, the industry categories of “construction” and “road construction” are presented within a single level. This increases the likelihood of inconsistencies in data entry.

The completeness and accuracy of NODS data is said to have deteriorated since its amalgamation into the HASARD system, for the range of reasons mentioned earlier. The aggregate impacts of these changes include a dissipation of responsibility for ensuring data quality, a decline in the perceived value of NODS data by those responsible for data entry, and a reduction both in the use of some fields and in the recording of limited response cases in the context of increasing workloads and the implementation of work practices to prioritise resource utilisation.

Data tends to be entered as the notification is received, and there is little incentive to update the NODS record following an investigation. Both system design and work practices contribute to this issue. For example, once a notification has been triaged as category A, B, or limited response, the priority level cannot be changed on NODS if it is subsequently revised. In the case of limited response notifications, details cannot be updated on the system if they are not followed up.

### ***Identifying and demographic details***

NODS records the first name, last name, gender, age (in whole years, using a scroll box), address, phone and fax numbers of the affected individuals (or “victims” in NODS vernacular). Of these, names and age are mandatory.

The HASARD system builds a separate record around each case (rather than each individual). OSH indicated that it would not be easy (and may be impossible) to identify individuals with more than one NODS/HASARD record, neither does NODS record any unique identifiers that would readily enable record linkage with other databases, such as NHI or ACC claim numbers.

### ***Ethnicity***

Ethnicity is a mandatory field on NODS. The field contains nine categories: European, Māori, Pacific Island, Asian, European/Māori, Māori/Pacific Island, European/Pacific Island, other, and unknown.

### ***Occupation***

The occupation field uses a classification system based on a pre-1998 version of the New Zealand Standard Classification of Occupations (NZSCO). Several departures from the standard classification system must be noted, however. Firstly, NZSCO numeric codes are not included. Secondly, while NZSCO is hierarchical, NODS presents 263 occupation categories within a single level. Thirdly, while these appear to correspond reasonably closely to NZSCO “unit groups” (the third level in the NZSCO hierarchy), we were advised that they may not perfectly concord with NZSCO, as some alterations may have been made to suit NODS purposes.

The NODS notification card contains a short box requesting a “description of work area”. Occupation is coded by the inspector on the basis of the information provided on the card. This may be clarified through follow up with the notifier or the victim. However, a lack of incentive to code NODS entries accurately carries a risk of entries being made on the basis of inspectors’ guesstimates if the details provided on the notification card are unclear.

Occupational histories entered on the standard questionnaires referred to earlier are not recorded in HASARD but are kept in a paper file.

### ***Employer***

Employer name and address are recorded on the NODS notification card. The NODS system records a client name (the name of the employer) and workplace (an individual department and/or location within a large employer).

The HASARD system (of which NODS is a part) is employer-focused; notifications are linked primarily to the employer and workplace, rather than the employee. However, some employers have multiple client names on the system, leading to difficulties linking all applicable workplaces to a single employer.

The victim’s employment history is not recorded in HASARD. There is a field on NODS to record the period of employment in the current job, but this information is not requested on the notification card. Employment histories entered on the standard questionnaires referred to earlier are kept in a paper file.

### ***Industry***

The industry field uses a standard classification based on the Australian and New Zealand Standard Industrial Classification (ANZSIC). Several departures from the standard classification system must be noted, however. Firstly, ANZSIC numeric codes are not included. Secondly, while ANZSIC is hierarchical, NODS presents 438 industry categories within a single level. Thirdly, we were advised that the classification used by NODS may not perfectly concord with ANZSIC, as some alterations may have been made to suit NODS purposes.

Industry is coded by the inspector, on the basis of the employer details and “description of work area” field on the notification card. This may be clarified through follow up with the notifier or victim. However, a lack of incentive to code entries accurately carries a risk of entries being made on the basis of inspectors’ guesstimates if the details provided on the notification card are unclear.

### ***Work-relatedness***

There is no specific indicator of work-relatedness on the NODS system. In theory, this should not be necessary; since the purpose of NODS is to record occupational disease cases, all cases entered on the system should be work-related. In practice, there may be some exceptions to this rule, as notifications entered on NODS and subsequently found not to be work-related would generally remain on the system. There is a field that requires the Inspector to enter “valid”, “not valid”, “unproven”, or “incomplete information”.

### ***Diagnosis***

The NODS notification card provides a series of tick boxes for the following categories of occupational diseases, based on the HSE Act definition of “serious harm”:



- Occupational respiratory diseases
  - Occupational asthma
  - Asbestos-related disorders
    - Mesothelioma
    - Asbestosis
    - Lung cancer
    - Pleural plaques
    - Pleural thickening
    - Other asbestos-related (specify)
- Occupational disease from chemical exposure
  - Illness due to chemical exposure, including lead
  - Occupational solvent-induced neurotoxicity
- Other occupational diseases
  - Occupational cancer
  - Occupational infectious disease (specify nature of infection)
  - Occupational noise-induced hearing loss
  - Other occupational disease e.g. OOS, occupational dermatitis (specify).

From the information provided on the notification card, the NODS system records an “injury type” as a categorical field, with the user selecting the applicable category from a pick-list. The classification is very general. There are only 19 categories including “other”. The classification system has been criticised for not providing a more robust or detailed classification of disease (e.g. by reference to ICD-10 or the ILO list of Occupational diseases). It is difficult to envisage this classification system being useful for monitoring occupational diseases other than at the level of the broad categories set out above, unless augmented by more detailed data for a pre-determined population (as has been done by the Cancer Panel as discussed elsewhere).

Analysis of 1,808 NODS cases entered between 1 January 2003 and 19 August 2004 found that the predominant three injury types recorded, accounting for three-quarters of the NODS cases recorded during that period, were “occupationally acquired noise-induced hearing loss” (48% of cases), “occupationally caused cancer” (19%), and “other” (8%).

### ***Severity***

NODS does not record the severity of an occupational disease. However, in theory, diseases notified to OSH should meet the definition of serious harm, including permanent or temporary severe loss of bodily function.

### ***Site***

NODS has a “body part” field with eight categories: arms, head, legs, multiple locations, neck, systemic, trunk, and unknown. This information is not recorded on the notification card but may be obtained through follow up with the victim or notifier. The body part field is mandatory, carrying a risk of entries being made on the basis of inspectors’ guesstimates if done prior to the investigation.

Analysis of 1,808 NODS cases entered between 1 January 2003 and 19 August 2004 found that the predominant body parts recorded, accounting for 92% of the NODS cases recorded that year, were head (including eye injuries and hearing loss) 47% of cases, systemic (internal organs, including respiratory) 37%, and unknown 8%.

### ***Agent***

The “agency” field in NODS uses a classification system which evolved out of a paper-based system that had been used at OSH prior to the implementation of NODS and was originally based on the Worksafe Australia Type of Occurrence Classification System. A total of 544 agency categories are displayed non-hierarchically and are not mutually exclusive. For example, there are categories labelled “chemicals and chemical products”, “materials and



substances”, “other chemical products (not specified)”, “mixed organic solvents”, “other organic solvents (not specified)”, as well as other related fields.

Information about the agent is not directly captured in the notification card but may be obtained through follow-up with the notifier or victim. The agency field is mandatory, carrying a risk of entries being made on the basis of inspectors’ guesstimates if done prior to the investigation.

Analysis of 1,808 NODS cases entered between 1 January 2003 and 19 August 2004 found that the predominant agency types recorded were machinery and (mainly) fixed plant (31% of cases), chemicals and chemical products (18%), and other (8%).

### ***Mechanism***

NODS records 47 categories of mechanism within a single, non-hierarchical list. The categories are not mutually exclusive. For example, there are categories labelled “being hit by moving objects”, “being hit by moving objects (not elsewhere classified)”, and “hitting moving objects”.

The mechanism is not captured in the notification card but may be obtained through follow-up with the notifier or victim. Mechanism is a mandatory field, bringing a risk of entries being made on the basis of inspectors’ guesstimates if done prior to the investigation.

Analysis of 1,808 NODS cases entered between 1 January 2003 and 19 August 2004 found that the predominant mechanism categories recorded were long term exposure to sounds or noise (45% of cases), chronic, multiple/long term contact with chemical or other substances (18%), and other or unsuspected mechanism of injury (7%).

### ***Length of exposure***

NODS does not directly record the length of exposure (or previous occupations or exposures that may have contributed to the disease). There is a field for “time employed”, and a free-text notes field which may, on occasions, include known details about the length of exposure and other causal factors that may have contributed to diseases. These details are not captured in the notification card, however, so would require entry of information on the system after the investigation has occurred.

### **Data integration methods**

At present there is no systematic integration of external data into the NODS system. It makes sense to integrate NODS data with data from other agencies, such as ACC and NZHIS, in order to better establish rates of incidence and prevalence of occupational disease by capturing cases recorded on other systems but not notified to OSH. Integrating data is also likely to be more efficient than duplication of data collection across agencies. For example, cooperation between OSH and ACC would rationalise the level of data collection required from GPs. This might facilitate an increase in the reporting rate.

It was originally envisaged that NODS notifications would be combined with ACC data, but this was not approved when NODS was established. Recently, however, ACC has been involved in trial data-merging exercises with OSH, contributing various data sets for integration with OSH data. A 2003 agreement between the Department of Labour and ACC allowed the transfer of information regarding claims for occupational diseases from ACC to OSH. This included diseases related to asbestos, lead, and solvent exposures; leptospirosis; and asthma. However, due to privacy and funding concerns, the transfer of information has not continued. Legislative changes scheduled for early 2005 were expected to resolve the relevant privacy issues.

### **Types of surveillance, data analysis, and interpretation used**

The primary purpose of NODS is to prevent the recurrence of harm. As such, a notification is used primarily as an indicator of a workplace hazard. The ultimate end point of the notification process is intervention to prevent other

workers from suffering the same consequences of work circumstances. In this context, the predominant use of NODS data has been for sentinel purposes (e.g. alerting to a run of leptospirosis cases).

Little analysis of NODS data has been carried out in recent years, reflecting the poor quality of the data recorded on the system as well as difficulties extracting data in readily analysable form (e.g. an inability to track individuals, difficulties linking multiple workplaces to a single employer or industry, and an inability to obtain reports on specific diseases or exposures).

The current low capacity of NODS data to be analysed and fed back to GPs and others is likely to contribute to ongoing low rates of notification (and a total lack of notification by some GPs). This is an issue that OSH acknowledges and is keen to address.

NODS data lends itself primarily to counting notifications, rather than converting data into information which can be used in reports to reflect with precision occupational health status in New Zealand. The capacity of NODS data to indicate incidence of occupational diseases is very limited, because:

- NODS is reliant on receiving notifications as the sole source of information on new cases
- notification rates are low, as discussed above
- there are potential biases in notification, e.g. toward the better-known categories of occupational disease and, in particular, those categories listed on the notification card.

Consequently, the available data can be assumed to be unrepresentative of occupational disease in New Zealand. This also makes it impossible to interpret trends in notifications. For example, an increase in notifications of occupational asthma over time may be due to a real increase in occupational asthma, or reflect an increase in doctors' diligence in reporting the condition or recognising its work relatedness<sup>6</sup>. Similarly, NODS has a lack of capacity to identify possible associations between diseases and exposures at a population level. Therefore, aggregate statistics based on NODS notifications are of limited value.

#### **How information is disseminated and/or integrated into policy making**

Until 2001, NODS produced annual reports, which were distributed to GPs and health care professionals. The purposes of NODS reports were to alert the wider occupational health community to both specific case studies and to more general lessons that were learnt from the NODS system, thereby raising general awareness. Since the merger of NODS into HASARD, NODS has deteriorated in its ability to report, and annual reporting has ceased. The last report released was the *Report on the Notifiable Occupational Disease System to the end of June 2000*, published in 2001. There have, however, been some sentinel-based reports more recently.

Prior to 2001, despite the acknowledged limitations of NODS in terms of its capability to provide an accurate depiction of occupational disease in New Zealand, the yearly reports were regarded by the occupational health and safety community as important in tracking trends over time. Reports from the asbestos registers were internationally recognised at the time, as being produced from the only disease notification system in the world assessing disease and occupational exposure.

#### **Future plans for development/improvement**

The limitations of the current system are widely acknowledged and OSH is keen to increase the level of notifications and provide analysis and feedback of NODS data to notifiers.

The HASARD system is currently being incorporated into the Workbench system, which OSH also administers. There will be a significant overhaul of the current databases to progress from a system which records transactions toward a system with some capacity to facilitate data analysis. The new system is expected to deliver better functionality in terms of trend analysis (through the automated generation of pivot tables for certain queries) and better longitudinal tracking of individuals and workplaces.

The implementation of Workbench is taking place in three stages as follows:

- Phase One (completed December 2003) – Consisted of matching all employers by ACC employer number.
- Phase Two (completed July 2004) – Consisted of building capacity and new reporting tools and functions that are able to aggregate information by individual and by workplace.
- Phase Three (scheduled for completion in May 2005) – Full implementation of Workbench.

### 3.3.2 OSH CANCER PANEL

The Cancer Panel is one of four panels, comprising medical and non-medical specialists, that were established to monitor specific occupational diseases. These panels are linked to the NODS system, and cases of occupational disease identified by these panels are entered into the NODS system.

#### **Synopsis**

The Cancer Panel endeavours to review all cases of selected cancer sites reported to the New Zealand Cancer Registry to identify possible occupational causes. Currently, the sites under review are bladder cancer, non-Hodgkins lymphoma, and leukaemia; it is proposed that, in 2005, the review of cases from these sites will end, and the focus will be on lung cancer for the next two years. The demographic and diagnostic information provided by the Cancer Registry is combined with detailed occupational and exposure histories gathered through interviews with individual patients. Approximately 60–70% of all new cases of these cancers have been reviewed in the last three years. The Cancer Panel has successfully shown that the incidence of these cancers from occupational causes in New Zealand is similar to that in other Western countries.

#### **Background**

Occupational cancer causes greater mortality than any other occupational disease. However, there has been a lack of data in New Zealand linking occupational exposures with cancer incidence. The Cancer Panel was established in 2001 to address this information gap. The Cancer Panel comprises two occupational disease physicians and three epidemiologists.

#### **Purpose of the surveillance**

The purpose of the Cancer Panel's activities is to identify occupational causes of cancers and causative agents in workplaces, which will lead to the elimination or reduction of these causative agents from workplaces and thus reduce future incidence of occupational cancer.

#### **Population covered**

The Cancer Panel has initially restricted its activities primarily to three sites: bladder cancer, non-Hodgkin's lymphoma, and leukaemia. However, it is intended that the sites that are under review will change regularly. The review of these three sites will end by December 2005, and the focus will be on lung cancer during 2006–2007. The panel endeavours to follow up every new case of these diseases and to determine whether, on balance of probabilities, the cases are work-related. Within the selected disease groups, the population includes all patients aged 25–70. The panel also maintains a paper file on all new cases of mesothelioma but currently does not investigate these.

#### **Method and frequency of data collection**

Unlike the other OSH panels, the Cancer Panel is not solely reliant on notifications made to OSH. Instead, it has the significant benefit of access to New Zealand Cancer Registry data, covering all new cancers diagnosed in New Zealand. This represents a significantly different approach in that the panel takes a “top down” approach,

starting with all cases of the cancer sites under review and then determining which cases are work-related (and which are not). Thus, it can, in theory, identify all of the work-related cases for these sites. This differs from the other panels, and the rest of the NODS system, which uses a “bottom up” approach that is reliant on individual voluntary notifications.

Under an agreement with NZHIS (permitted under the Cancer Registry Act for research purposes), NZHIS copies laboratory forms to the convenor of the Cancer Panel, providing each patient’s name, age, and details of histology and diagnosis. The Cancer Registry does not record detailed occupation data, however, and the Cancer Panel collects this information through interviews with individual patients.

The panel writes to the treating oncologist to request contact details for the patient’s GP, then writes to the GP to request contact details for the patient. Where the patient can be contacted and agrees to participate, OSH staff administer a questionnaire to gather details about the patient’s occupation, exposure history, and other relevant factors.

The panel then considers the available information in relation to each case to determine whether, on balance of probabilities, the disease is likely to be caused by occupational factors. A relative risk is obtained from the published research literature for the type and duration of exposure. From this, the probability that the person’s exposure caused their cancer is calculated, with a probability of over 50% being recorded as “probable occupational cancer”. Where the disease is considered to be occupational, the panel writes to the patient, GP, oncologist, and OSH branch manager to advise of their finding. Findings are recorded in a research database.

### **Completeness of coverage**

The Cancer Panel has been able to achieve a high coverage of the selected cancer sites in the New Zealand population because of its access to Cancer Registry records. In approximately 90% of cases, the oncologist and GP agree to provide the requested contact information, and the panel is able to trace the patient. Most patients, once contacted, are willing to be interviewed. As a result, the Cancer Panel has amassed detailed data on an estimated 60–70% of all new cases of the selected cancers over the last three years.

Had the Cancer Panel been reliant solely on notifications to NODS, it would not have been able to achieve anywhere near this level of coverage. For example, OSH received only 11 notifications of occupational cancer between 1992 and 1997, excluding those related to asbestos<sup>60</sup>.

### **Completeness and accuracy of data**

The Cancer Panel collects basic demographic (e.g. age, sex, location) data as well as detailed data on the diagnosis, occupational, and exposure history. The questionnaire goes into some detail regarding the nature of the occupation and substances to which patients have been exposed. In general, all fields are completed, with diagnoses being highly accurate, and occupational and exposure history information being accurate to the extent that patients are able to provide detailed responses to the questionnaire.

### **Data integration methods**

As described above, the Cancer Panel combines Cancer Registry data with primary data collection.

### **Types of surveillance, data analysis, and interpretation used**

The Cancer Panel has successfully shown, through analysis of the occupational cancer cases it has identified, that New Zealand is similar to other Western countries in terms of the incidence of occupational bladder cancer, non-Hodgkin’s lymphoma, and leukaemia. For the next two years, the focus will be on occupational causes of lung cancer.

### **How information is disseminated and/or integrated into policy making**

All cases that are considered to be work-related are entered into the NODS system and require NODS investigations, although in many cases this is impractical, since the case may no longer be working at the same job and the relevant workplace may even have closed. The panel also writes back to all cases that are interviewed and informs them as to whether or not their cancer is considered to be work-related. The Cancer Panel has published a study on bladder cancers<sup>61</sup> with non-Hodgkin's lymphoma and leukaemia being the subject of two future reports currently in preparation.

### **Future plans for development/improvement**

It is understood that OSH intends to review the panels, and the NODS system more generally, in the near future. The current work of the Cancer Panel has been successful in identifying occupational causes of cancers and causative agents in workplaces. The panel's contribution to the evidence base surrounding occupational bladder cancer, non-Hodgkin's lymphoma, and leukaemia, and the proposed work on lung cancer, has the potential to reduce future incidence of these cancers if appropriate exposure avoidance measures are implemented. OSH should therefore continue and enhance the work of the OSH Cancer Panel.

In the future, it may be possible to broaden the panel's focus to other cancer types of interest. The panel's work has the potential both to document the importance of known occupational causes of these cancers in New Zealand, as well as potentially to identify new occupational causes of cancer.

### **3.3.3 OSH RESPIRATORY DISEASES PANEL**

The Respiratory Diseases Panel was established to review and monitor occupational respiratory disease notifications, including asbestos-related diseases, occupational asthma, and other occupational respiratory diseases.

#### **Synopsis**

The Respiratory Diseases Panel was formed out of two previous NODS specialist panels, which focused on asbestos-related diseases and asthma respectively. The (former) Asthma and Asbestos Panels contributed to the body of knowledge about occupational asthma and asbestos-related diseases through annual reports and ad hoc studies. However, notifications to the Respiratory Diseases Panel have declined in recent years, and staff turnover and vacancies at OSH are said to have resulted in the panel being poorly supported by head office. It is understood that few respiratory diseases, other than asbestos-related diseases, have been reported to the panel. The Asbestos Diseases Register covers an estimated 30% of mesotheliomas and a very small proportion of other asbestos-related diseases. Electronic recording of asbestos exposure and disease reports is understood to have ceased in the mid 1990s.

#### **Background**

The Asbestos Panel had been established to maintain the Asbestos Exposures Register and Asbestos Disease Register, which were established in 1992 following recommendations made to the Minister of Labour by an Asbestos Advisory Committee. This followed increasing public concern about the past and present effects of asbestos on workers, former workers, and their families<sup>62</sup>.

The Asthma Panel was established in the mid-1990s to address a lack of information on the incidence and prevalence of occupational asthma in New Zealand. At the time the panel was established, there was a lack of agreement within the occupational health community about the extent of this occupational disease. The data reviewed and gathered by the panel over a period of several years demonstrated that the incidence and prevalence of occupational asthma in New Zealand was at a similar level to that found in other Western countries.

The Asthma Panel was discontinued in 2001, and the role of the Asbestos Panel was broadened to include all other respiratory diseases of occupational origin that were notified to NODS.

### **Purpose of the surveillance**

The purpose of the Respiratory Diseases Panel is to review and monitor occupational respiratory disease notifications and to maintain the Asbestos Exposures Register and Asbestos Disease Register.

The purpose of the Asbestos Exposures Register is to record notifications from people who have been exposed to asbestos, or people acting on their behalf. The purpose of the Asbestos Disease Register is to record notifications from medical practitioners of cases of asbestos-related diseases.

Notifications to the Asbestos Exposures Register were to provide exposure information that could be linked to the Asbestos Diseases Register, where a person recorded on the former was subsequently found to have developed an asbestos-related disease. However, in the twelve years since the registers were established, this has never happened.

### **Population covered**

The Respiratory Diseases Panel is intended to review all cases of respiratory disease notified to OSH (and attributed to work).

### **Method and frequency of data collection**

The intended process is that OSH reports all notifications of occupational respiratory disease to the panel. OSH staff then interview the patient using a questionnaire to gather information on relevant factors, such as occupational exposures and smoking history. Where appropriate, workplace visits may be made and measurements of peak flow, lung function, etc taken in the work environment. The panel then considers all of the available information to determine whether the respiratory disease has occupational causes. However, few notifications have been received by OSH and/or reported by OSH to the panel in recent years.

### ***Asbestos Disease Register***

In the case of asbestos-related diseases, OSH reports notifications to the panel. Once consent has been gained from the patient, relevant medical records and a full occupational history are obtained via an interview conducted by an OSH nurse. The data collected includes a medical history, an occupational history, chest x-ray, CT scan where available, lung function tests, and pathology reports<sup>63</sup>. However, notifications received by OSH, and/or reported by OSH to the panel, have fallen away over the last two or more years.

The panel reviews the information obtained on each notification, calculates an exposure index, and correlates the medical data. The exposure index incorporates variables on years of asbestos exposure, intensity of exposure (according to job category), and frequency of exposure. On the basis of the exposure index and medical data, the cases are placed into primary diagnostic categories (i.e. mesothelioma, lung cancer, asbestosis, pleural abnormalities, other cancers, obstructive lung disease without x-ray changes).

The medical panel fills out a summary sheet. Prior to the merger of the NODS system with HASARD, the information from the summary sheets was recorded on a stand-alone computerised database. However, it is understood that electronic recording ceased in the late 1990s when OSH transferred to a new computer system and problems were encountered transferring the data to the new system.

### ***Asbestos Exposures Register***

The intention is that when a person notifies OSH that they have been exposed to asbestos, OSH sends them an asbestos exposure registration form. This collects information about the individual, their work exposure to asbestos, and the state of their respiratory health<sup>63</sup>. Up until the late 1990s, the information from the forms was

entered on an electronic database. However, it is understood that electronic recording ceased in the late 1990s when OSH transferred to a new computer system and problems were encountered transferring the data to the new system. New notifications to the Asbestos Exposures Register are stored in paper form only.

#### **Completeness of coverage**

Coverage of respiratory diseases by the panel is currently very low. It is understood that few respiratory diseases other than asbestos-related diseases have been reported to the panel in recent years. The Asbestos Diseases Register covers an estimated 30% of mesotheliomas, together with a very small proportion of lung cancers, asbestoses, pleural plaques and other asbestos-related diseases.

#### **Completeness and accuracy of data**

The data collected for consideration by the panel includes demographic (e.g. age, sex, location) data, diagnostic and medical history data, and occupational and exposure history data. All of these fields are said to be complete and accurate to the extent necessary to make an informed determination of occupational cause.

#### **Data integration methods**

All of the information presented to the panel is sourced from NODS notifications and the panel's data collection processes.

#### **Types of surveillance, data analysis, and interpretation used**

Up until 2001, the Asthma and Asbestos Panels reported annually in the Annual Reports of the NODS System. Currently, no analyses are being undertaken.

#### **How information is disseminated and/or integrated into policy making**

Prior to 2001, the Asthma and Asbestos Panels published a number of papers based on analyses of data from cases reviewed by the panels. Notifications and data quality have declined since this time, and no reports have been produced. However, a report on lung cancer is currently being prepared.

#### **Future plans for development/improvement**

It is understood that OSH intends to review the panels in the near future.

### **3.3.4 OSH SOLVENT PANEL**

The Solvent Panel was established to review and monitor notifications relating to chronic organic solvent neurotoxicity.

#### **Synopsis**

The Solvent Panel has been successful in demonstrating the existence and importance of chronic organic solvent neurotoxicity as an occupational illness, particularly within certain industries. Although only a small proportion of all cases are believed to be reported to OSH, these cases are probably among the more severe cases. The number of notifications has declined in recent years, however, and this is believed to be principally due to a decline in notifications from GPs. There has been no analysis of solvent neurotoxicity case data in recent years.

#### **Background**

When the Solvent Panel was established in the mid-1990s, there was some controversy regarding the existence and importance of chronic organic solvent neurotoxicity as an occupational illness. The work of the Solvent Panel demonstrated the existence and extent of the problem, particularly in specific industries such as spraypainting, boat building, and printing, and contributed to acceptance by the medical and occupational health communities of the condition and rules for its diagnosis, building on a growing international evidence base.



### **Purpose of the surveillance**

The purpose of the Solvent Panel is to review and monitor occupational chronic organic solvent neurotoxicity notifications. The Panel makes two deliberations on each case: whether there is a diagnosis of chronic organic solvent neurotoxicity, and whether it is attributable to work.

### **Population covered**

The intended population to be covered by the panel is all people of working age with suspected illness arising from exposure to solvents in their workplace.

### **Method and frequency of data collection**

OSH reports notifications of chronic organic solvent neurotoxicity to the panel. OSH staff then interview the patient using a questionnaire to gather information on relevant factors such as occupational exposures and medical history. This is usually followed up with a workplace visit and a medical examination.

Chronic organic solvent neurotoxicity usually develops gradually over many years before symptoms are detected. Often, there are confounding factors that make it difficult to determine whether the illness is work-related (e.g. the patient may also be a heavy drinker, have previously suffered a head injury, or be depressed for other reasons). The long latency period also makes it difficult to gather detailed occupational and exposure histories.

### **Completeness of coverage**

It is understood that the cases reviewed by the panel probably represent less than ten percent of all cases of chronic organic solvent neurotoxicity in New Zealand. However, it is likely that they represent the more severe end of the range of cases; often, patients are treated for depression or there is some other crisis (e.g. serious injury or loss of job) before the question of solvent neurotoxicity is raised, and by that stage, the cumulative effects of ongoing exposure to solvents are often substantial.

The cases notified to OSH are also skewed toward larger companies (small employers and the self-employed are less likely to be aware of their OSH obligations or to make a notification) and toward sectors that OSH has targeted (and thus have a greater awareness of the illness), such as the boatbuilding, spraypainting, and printing industries.

There is said to have been a decline in the number of cases reported to the panel in recent years, and this is thought to be principally due to a decline in notifications from GPs.

### **Completeness and accuracy of data**

The data collected for consideration by the panel includes demographic data, diagnostic and medical history data, and occupational and exposure history data. While the demographic and current medical data are generally complete, the ability to gather occupational and exposure history data varies from case to case.

Approximately one-third of the cases reviewed by the panel are found to have strong evidence of chronic solvent neurotoxicity related to work. Approximately one-third are found to have strong evidence that this is not the case. In the remainder of cases, it is not possible to determine whether this is the case on the basis of available data.

### **Data integration methods**

All of the information presented to the panel is sourced from NODS notifications and the panel's data collection processes.

### **Types of surveillance, data analysis, and interpretation used**

No analyses of data from cases reviewed by the Solvent Panel have been undertaken in recent years.



### **How information is disseminated and/or integrated into policy making**

The previous panel convenor published a study based on analysis of data from cases reviewed by the panel and presented the findings internationally.

### **Future plans for development/improvement**

It is understood that OSH intends to review the panels in the near future.

#### **3.3.5 OSH CHEMICAL PANEL**

The Chemical Panel was established to review and monitor notifications to OSH relating to diseases originating from general chemical toxicity, with most of the notifications received being illnesses from lead poisoning and illnesses resulting from the use of glutaraldehyde<sup>64</sup>. The Chemical Panel has not convened for two years due to non-reporting of cases. In contrast, the *ERMA New Zealand Annual Monitoring Report 2003-04*<sup>65</sup> recorded 57 cases of poisonings or toxic effects as a result of workplace exposure to hazardous substances between 1 July 2003 and 30 June 2004, and noted that chemicals and chemical products have been the most common substances associated with such incidents since 2000/01.

Prior to 2002, the panel met approximately 10 times per year (with meetings being convened once sufficient cases had been notified for the panel to review). Notifications were supplemented with occupational and medical data gathered through interviews with patients and workplace visits. It is understood that OSH intends to review the panels in the near future.

#### **3.3.6 HEALTH AND SAFETY ACCIDENT RECORDING DATABASE (HASARD)**

The Health and Safety Accident Recording Database (HASARD) records serious harm notifications made to OSH. The legislative definition of serious harm includes certain occupational diseases which, when notified to OSH, are recorded in the NODS system as described above. The instances of serious harm recorded by the HASARD system fall within the definition of injury used in this report. Therefore, the HASARD system is described in full in the occupational injury section.

### **3.4 ACCIDENT COMPENSATION CORPORATION (ACC) CLAIMS DATABASE**

The Accident Compensation Corporation (ACC) administers New Zealand's Accident Compensation Scheme, which provides personal injury cover (including cover for certain occupational diseases) for all New Zealand citizens, residents, and temporary visitors to New Zealand. ACC is responsible for collecting personal injury cover levies, determining whether claims for injury are covered by the scheme, and providing entitlements to those who are eligible. As well as providing accident insurance cover, ACC provides injury prevention services and case management, purchases medical and other care and rehabilitation services, and advises the government<sup>66</sup>.

#### **Synopsis**

The ACC Scheme covers occupational diseases specified in Schedule 2 to the Injury Prevention, Rehabilitation, and Compensation Act 2001. The ACC claims database only covers cases that meet the criteria for compensation and for which compensation is claimed. There is a financial incentive to submit claims. However, it is unclear how comprehensively the database reflects the true incidence of these conditions.

The structure and coding systems of the ACC database are, in many respects, well-suited to the surveillance of occupational disease. For example, the database records the ACC claim number and, where available, the claimant's NHI number, facilitating record linkage to NZHIS databases. Occupation and industry are coded according to the standard Statistics New Zealand classification system. There is a specific indicator for work-relatedness, although it is not always used. The diagnosis field accommodates both ICD-10 and Read codes, and ACC routinely maps the Read codes provided by primary care treatment providers to ICD-10. The database records robust and objective cost information, including time spent off work.

However, the overriding functions of the ACC database have been administrative, such as determining eligibility for a claim, determining which ACC account should fund the claim, facilitating case management, and providing data to inform the setting of levies. These administrative objectives are not always consistent with surveillance imperatives. In particular, these objectives do not require complete and accurate data on occupation. Also, the scheme's eligibility rules may lead to distortions in the coding of diagnoses. Most importantly, the ACC database is oriented to collecting information on ACC claims and, even in the best of circumstances, is therefore inadequate for surveillance of occupational disease, since there are many occupational diseases for which claims are rarely made, either because the disease is not recognised as occupational, or because the chances of a claim being successful are perceived as being very low. For example, ACC only compensates about four cases of occupational cancer each year, which represents only about 1% of the annual number of cases<sup>10</sup>.

### **Background**

For ACC purposes, "personal injury" includes death, a physical injury or mental injury caused by a physical injury, mental injury caused by a criminal act, or damage to dentures or prostheses that replace a part of the human body<sup>67</sup>. The injury can either be due to an accident or have happened by a gradual process (e.g. hearing loss), disease, or infection.

For funding purposes, injuries are divided into different categories, each funded out of a separate account: work-related injuries (including gradual process) are funded out of the Employer's Account and Self-Employed Work Account and Residual Claims. Other accounts fund claims related to motor vehicle accidents, non-work related injuries (for earners and non-earners), and medical misadventure. Most occupational injuries/diseases that result in an eligible claim are funded out of the work-related accounts. However, claims related to motor vehicle accidents are funded out of the Motor Vehicle Account, whether or not they were work-related.

### **Purpose of the surveillance**

ACC maintains a database of compensated claims. The database is the largest occupational injury and disease surveillance system in New Zealand, covering a substantial proportion of injury cases and many disease cases.

The Injury Prevention, Rehabilitation, and Compensation Act 2001 sets out the purposes for which ACC may collect information. These include maintaining a comprehensive claims database; monitoring and evaluating the nature, incidence, severity, and consequences of injuries; injury prevention; the provision of appropriate compensation, rehabilitation, and treatment; policy development; determining the cost to society of personal injury; levy setting; and scheme management. Despite the inclusion of surveillance purposes within this list, however, the overriding functions of the ACC claims database have been administrative.

### **Population covered**

All New Zealand citizens, residents, and temporary visitors to New Zealand are eligible for personal cover. The ACC database only covers cases that meet the criteria for compensation and for which compensation is claimed<sup>6</sup>. Therefore, ACC has complete national statistics on its compensation claims (covering a substantial proportion of personal injuries in New Zealand) and is a major source of statistics on minor occupational injury and disease.

Coverage of occupational diseases is very specific. Under the Injury Prevention, Rehabilitation, and Compensation Act 2001, the definition of “work-related personal injury” includes “personal injury caused by a work-related gradual process, disease, or infection”. Schedule 2 to the Act sets out certain occupational diseases deemed to meet this definition and linked to specific exposures. These occupational diseases are summarised in the box below.

Any other claim relating to a “personal injury caused by a work-related gradual process, disease, or infection” requires an assessment of causation to determine whether the circumstances in which the injury occurred were that<sup>68</sup>:

- the person performs an employment task, or is employed in an environment that has a particular property or characteristic that a) causes or contributes to the cause of the injury, b) is not found to any material extent in the person’s non-employment activities or environment, and c) may or may not be present throughout the whole of the person’s employment; and
- the risk of suffering the personal injury is significantly greater for persons who perform the employment task than for persons who do not perform it, or is significantly greater for persons who are employed in that type of environment than for persons who are not.

<b>TABLE 3.4</b>	Occupational diseases covered under Schedule 2 to the Injury Prevention, Rehabilitation, and Compensation Act 2001
1.	Pneumoconioses caused by sclerogenetic mineral dust (silicosis, anthraco-silicosis, asbestosis) and silico-tuberculosis, provided that silicosis is an essential factor in causing the resultant incapacity or death.
2.	Lung cancer or mesothelioma diagnosed as caused by asbestos.
3.	Diseases of a type generally accepted by the medical profession as caused by beryllium or its toxic compounds.
4.	Diseases of a type generally accepted by the medical profession as caused by phosphorus or its toxic compounds.
5.	Diseases of a type generally accepted by the medical profession as caused by chrome or its toxic compounds.
6.	Diseases of a type generally accepted by the medical profession as caused by manganese or its toxic compounds.
7.	Diseases of a type generally accepted by the medical profession as caused by arsenic or its toxic compounds.
8.	Diseases of a type generally accepted by the medical profession as caused by mercury or its toxic compounds.
9.	Diseases of a type generally accepted by the medical profession as caused by lead or its toxic compounds.
10.	Diseases of a type generally accepted by the medical profession as caused by carbon bisulfide.
11.	Diseases of a type generally accepted by the medical profession as caused by the toxic halogen derivatives of hydrocarbons of the aliphatic series.
12.	Diseases of a type generally accepted by the medical profession as caused by benzene or its toxic homologues.
13.	Diseases of a type generally accepted by the medical profession as caused by nitro- and amido-toxic derivatives of benzene or its homologues.
14.	Diseases of a type generally accepted by the medical profession as caused by ionising radiations.
15.	Primary epitheliomatous cancer of the skin diagnosed as caused by tar, pitch, bitumen, mineral oil, anthracene, or the compounds, products, or residues of these substances.
16.	Anthrax infection.

### Method and frequency of data collection

Data collection is carried out as an integral component of ACC claims processing and case management. An ACC claim form (ACC45) is completed at the first visit to a treatment provider for an injury. Treatment providers include registered medical practitioners, acupuncturists, ambulance officers, audiologists, chiropractors, counsellors, dentists, lab technicians, nurses, occupational therapists, optometrists, osteopaths, physiotherapists, podiatrists, and speech therapists.

Treatment providers can lodge forms with ACC either electronically or in paper form. Over 50% of claims are lodged electronically<sup>69</sup>. They are entered in the ACC database at service centres (located in Hamilton and Dunedin). Thus, even if the injury is minor and requires no further treatment, there is still a record of the injury.

Claims are then reviewed by claims assessors, who decide whether to a) grant cover, b) put the claim on hold pending further investigation, c) pass the claim on to the relevant accredited employer, or d) decline the claim<sup>70</sup>.

The assessors then review the claims that have been granted, to establish whether the injuries:

- are low risk (this applies to over 90% of claimants who claim for medical treatment only and do not require any further ACC entitlements),
- require time off work, or
- are high-risk, serious, or complex injuries that may exceed their treatment duration (around 5% of claims).

Claims in the last two categories are then streamed, according to injury type, to either an ACC contact centre (low risk claims) or an ACC branch (high risk claims) for case management.

Every claim lodged with ACC is given an ACC45 claim number as its unique identifier on the claims database. Once a claim has been lodged with ACC, all further financial transactions relating to that injury are recorded under the same claim number. The claim is never closed, so further treatment can be obtained at any stage.

#### ***Occupational disease claims***

Occupational disease claims are processed at Workwise clinics, which assess eligibility based on the criteria that were described earlier. Workwise clinics were originally set up to oversee occupational disease issues and process occupational disease cases, but have now expanded in function to oversee all medical issues. Claimants are referred to one of three Workwise clinics (in Auckland, Wellington and Christchurch) if the claim is complex or needs specialist epidemiological advice. Claims are variously assessed on a face-to-face or written basis<sup>71</sup>.

Workwise clinics are staffed by occupational health physicians, providing professional oversight and training of all branch medical advisors; servicing Case Coordination Panels in branches which oversee and advise on the establishment of Individual Rehabilitation Programmes; conducting examinations of claimants; and providing advice on all work-related injuries, especially “gradual process disease” and “infections (gradual process)” claims<sup>72</sup>.

#### **Completeness of coverage**

The ACC claims database only covers cases that meet the criteria for compensation and for which compensation is claimed. There are many occupational diseases for which claims are rarely made, either because the disease is not recognised as occupational, or because the chances of a claim being successful are perceived as being very low. For example, ACC only compensates about four cases of occupational cancer each year, which represents only about 1% of the annual number of cases<sup>30</sup>.

Occupational diseases covered under Schedule 2 should, in theory, be well covered within the ACC database, to the extent that they are diagnosed and to the extent that patients and doctors are aware that ACC covers them. However, it is unclear how comprehensively the database reflects the true incidence of these conditions. Also, the schedule is updated periodically and this must be taken into account in trend analysis.

Other occupational diseases are not specifically excluded, but are considered on a case-by-case basis by ACC in accordance with the legislative definition of a “personal injury caused by a work-related gradual process, disease or infection”, as discussed earlier.

ACC is the only surveillance system that currently covers diagnoses like low back pain, which are not captured by the NMDS (in the vast majority of cases, since treatment does not involve a hospital admission) and not defined as serious harm by OSH<sup>6</sup>.

Two further issues that impact upon data completeness and timeliness are the ACC Partnership Programme, and third party insurer coverage of work-related injuries during 1999–2000.

The ACC Partnership Programme encourages employers to take responsibility and self-management for their own workplace health and safety, injury management including rehabilitation, and claims management of employees' work injuries. This provides the opportunity for employers to minimise their own costs of work-related injuries and raise their overall level of workplace health and safety management. More than 180 of New Zealand's largest public and private sector organisations participate in the programme<sup>66</sup>.

Employers that become "accredited" to participate in the programme are fully responsible for providing all statutory entitlements in relation to their employees' work-related (as opposed to non-work-related) injuries, and they pay all costs of their employee's claims for a predetermined claims management period. The employer may, subject to ACC's approval, contract a "third party administrator" (TPA) to deliver injury and claim management services to their injured employees<sup>66</sup>.

Accredited employers are required to submit their claims management data to ACC for inclusion in the ACC database. However, it may take longer for claims data from this source to be included on the database than for claims managed directly by ACC. ACC data may be up to 12 months' old before it includes the vast majority of accredited employers' data. Moreover, the cost data received from some accredited employers is incomplete as it excludes weekly compensation payments.

Between 1 July 1999 and 1 July 2000, a 1998 amendment to the Accident Rehabilitation and Compensation Insurance Act allowed private insurers to provide work-related accident insurance within the basic principles of the scheme, opening a competitive market for workplace injury cover. The Office of the Accident Insurance Regulator was established to oversee this market. It was hoped that the new legislation would create more incentives for employers to make workplaces safer and to reduce the cost of injuries to society.

Under the Accident Insurance Amendment Act and Accident Insurance (Transitional Provisions) Act passed in April 2000, the provision of workplace accident insurance returned to ACC. From 1 July 2000, ACC was again the sole provider of accident insurance for all work and non-work injuries for all New Zealanders. Private insurers could not provide insurance to employers after 30 June 2000, but they do continue to manage claims for injuries suffered between 1 July 1999 and 1 July 2000.

Data relating to work-related claims managed by private insurers was to be included in the ACC database via compulsory reporting by each private insurer to the Regulator. However, an apparent dip in ACC data on work-related claims during this period suggests that the process of data collection was not completely foolproof (anecdotal).

### **Completeness and accuracy of data**

The completeness and accuracy of fields in ACC's electronic claim records is highly variable. There are several reasons for this. Firstly, the quantity of information recorded in the ACC<sub>45</sub> claim form is minimal. It is understood that around 85% of all claims are solely for subsidisation of a GP fee. Therefore, the form has deliberately been kept simple in an attempt to make claims user-friendly for treatment providers and claimants. Further details are only obtained through follow-up in those cases where they are required in order to administer the claim.

Secondly, treatment providers only complete the form to the extent that they need to, in order to be reimbursed. Some treatment providers, such as ambulance officers, need not complete every field on the form to receive reimbursement. This affects the completeness of claiming information recorded on the system.

Thirdly, not all claims received by ACC are fully registered on the database. For a minor claim, even where a form has been completed in full, ACC avoids unnecessary data entry costs by only entering the information that is

needed to administer the claim. More detailed data entry is carried out for high-risk, serious and complex claims. Since 1999, this detailed data entry applies to all work-related injuries and motor vehicle accidents.

Fourthly, for the majority of claims there is little incentive for ACC to update incorrect or misdiagnosed claims after the original claim has been entered on the database.

Fifthly, the quality of data collected by ACC also depends on the knowledge levels and business culture among those who enter the data. In an environment where, in the words of one stakeholder, “front line people do not understand the importance of good data and are paid little to enter data quickly”, there is a risk of adverse impacts on data quality, especially in relation to fields requiring transcription and coding based on narrative information and categorical fields where “not defined/not obtainable” is an acceptable entry.

Possible duplicate ACC claims (where the injured person may have reported the same injury to two different treatment providers and ACC has not linked them) have also been identified as a potential problem in the ACC claims database<sup>73</sup>.

In addition, the database structure is geared to recording injury events and is not ideally suited to recording of gradually developed conditions. As a result, ACC data struggles to present occupational disease data in a meaningful way. For example, the ACC database does not specifically identify occupational cancers.

A 1994 report on ACC injury statistics<sup>74</sup> found a number of weaknesses in the ACC data collection and monitoring system. These included a lack of clear principles to guide the system, use of incompatible codes and definitions, a lack of standardised classifications, a lack of education for treatment providers on why the information is useful and feedback from the data collection, and a lack of quality assurance mechanisms, among others. There have been changes to the quality of the ACC data collection since this study was completed. However, there is limited independent information available on the quality of recent ACC data.

Langley<sup>57</sup> suggests that, despite these limitations, the ACC claims database is the best available source of data for determining priority areas for occupational injury problems. Key fields of interest are discussed below.

#### ***Identifying and demographic details***

The database records standard identifying details such as names, date of birth, address, and sex.

A unique identifier, the ACC45 number, is assigned for each claim. The claimant’s NHI number is also recorded where available. (Anecdotally, this is complete for approximately 70% of claims in the last few years.) In theory, this enables linkage of ACC records with NZHIS data surveillance systems as well as enabling analysis to be carried out at the level of the individual and the claim.

It is possible that two claim forms could be completed for the same injury (e.g. first by an ambulance officer and then by Emergency Department staff). ACC attempts to link any doubling up of claims that come to its attention, but may not recognise every occurrence. Therefore, some claims may have two ACC45 numbers, each linked to incomplete details of the claim.

There is no unique identifier for an injury event affecting multiple people. For example, in the case of a train crash, ACC could receive claims from hundreds of people but have no way of associating these claims with the single event.

#### ***Ethnicity***

The ACC45 form contains 16 tick boxes for recording “ethnic background”. The layout of the form has been criticised for possibly biasing responses. It has been suggested that this might account for the low reporting rates of Māori ethnicity compared to the general population. Transcription errors, again due to form design, are also a potential contributor to this problem.

ACC is working towards a re-design of the form in consultation with Statistics New Zealand and NZHIS, based on the standard 2006 Census question. It will be possible to record up to six ethnicities per claimant. ACC proposes to make ethnicity an attribute of the claim rather than the claimant, in order to track transience in self-reported ethnicity.

### ***Occupation***

ACC uses the standard Statistics New Zealand coding system for occupation. This is recorded hierarchically and is said to be fairly robust to one to two digits, but not three to four. Occupation is not viewed as being of critical importance in ACC data collection or reporting requirements, and the field may remain uncompleted in many cases. However, all work-related claims are fully registered, and 96% of “gradual onset” entitlement claims contained an occupation code in ACC injury statistics as at August 2004.

### ***Employer***

Employer details are recorded and are used primarily in determining premium levels. Large companies are able, on a voluntary basis, to have multiple ID numbers corresponding to different divisions of the company (e.g. factory, warehouse, and office). Since these different areas will have different risk ratings, there is a strong incentive for companies to have multiple ACC numbers in order to minimise levies. This fragmentation of employer records makes analysis by employer, or by employer type, problematic. This is further compounded by the inconsistent recording of employer names (e.g. legal entity name versus trading name).

All employers have an employer code, and this is linked to the claim details by ACC staff. In about 10% of cases, the employer is never identified (as this is not relevant to the claim). The employer is recorded, however, for about 99% of claims costing ACC more than \$1,000.

### ***Industry***

ACC uses the Standard Statistics New Zealand coding system for industry. This is recorded hierarchically and is said to be fairly robust to one to two digits, but not three to four. Industry is not collected directly, but is coded with reference to the employer code and the business industry description provided by the employer when they register with ACC. Industry is important for industry risk-rating and the setting of levies, and is well-coded.

### ***Work-relatedness***

The claims database has an indicator which allows for the recording of whether an injury was work-related. A “work-related personal injury” is defined by ACC as an injury that occurs when the employee is at a place for the purpose of working, having a break from work or a meal or a rest at a place of work, in a vehicle provided by their employer to transport staff to and from work, or travelling to/from treatment for a previous work-related personal injury<sup>66</sup>.

The purpose of the work-relatedness indicator is to establish which ACC account funds the claim and for case management purposes. We were advised that the field is complete for records within the work-related accounts (this was not verified) and incomplete elsewhere. This has implications for occupational injury surveillance since motor vehicle accident claims, including work-related MVAs, are covered by the Motor Vehicles Account.

### ***Diagnosis***

The ACC claim form has three fields for recording injury diagnoses, and equal importance is given to each diagnosis provided. The fields are capable of recording several types of diagnosis codes, including ICD-10-AM 2nd Edition and Read codes. Primary care providers (from whom the majority of ACC45 forms originate) record Read codes for all ACC claims. Hospital or secondary care providers usually use ICD-10 codes.

ACC conducts several internal mapping exercises to convert the diagnosis codes to consistent formats. One of these involves converting the Read codes to ICD-10 using a standard mapping system. This is done mainly for the purpose of making comparisons with Australian data. This conversion may lead to errors in diagnosis coding but is understood to be fairly reliable at the more general levels of the ICD-10 hierarchy.



ACC also maps Read codes and ICD-10 codes onto a diagnostic coding system previously used by ACC (which was phased out as the primary coding system from 1999/2000). This system uses broad categories and is of limited value for surveillance. For example, nearly 50% of claims are recorded under this system as “sprain/strain”.

Originally, Read codes were introduced to allow GPs the freedom of medical diagnosis rather than the previously limited claim form categorisation. However, approximately four years ago, ACC started to provide a quick Read code reference list (ACC53), summarising the 200 most common Read codes sorted by type and location of injury. While quick reference codes are a useful tool for GPs, an impact observed in ACC data has been a narrowing in the use of Read codes to the extent that most claim Read codes are now sourced from this list.

Within Read codes, there are multiple fields covering very similar diagnoses. Although hierarchical, these are presented in a non-hierarchical form. For example, burns appear as “burns” and “burns (scald)”; occupational diseases include “occupational disease”, “occupational disease – asbestos”, “occupational disease – asthma”. The reasons for a particular code being used are not clear and it is inevitable that overlapping diagnosis codes are used inconsistently.

It has also been suggested that diagnoses provided for the purposes of an ACC claim may be skewed by incentives inherent in the operation of the scheme. For example, classifying a sprained ankle as a possible broken ankle allows the patient to access a certain number of ACC-funded physiotherapy treatments.

Unlike the NMDS (hospital events) surveillance system, diagnosis is recorded on the ACC45 form during the initial consultation between patient and treatment provider. Therefore, if a possible broken ankle turns out to be a sprained ankle, it is highly likely that the diagnosis would remain incorrectly coded on the database.

### ***Severity***

Severity is not explicitly recorded, beyond what is inherent in the Read/ICD codes and cost/time off work data. These can be unreliable indicators of severity. ACC acknowledges this weakness, and in 2001 stated the following regarding injury coding: “The injury coding used by the ACC is very wide in its categories and of limited use on differentiating the severity of the injury. For example, the injury code “soft tissue injury” covered injuries ranging from sprained ankle to paraplegia and dislocated discs”<sup>75</sup>.

ACC does differentiate between minor and more complex claims (for claim processing and risk management processes), based on the assessment initially made at the time the claim is registered. However, this classification is broad and may be unreliable, being based on the initial information obtained from the ACC45 form.

### ***Site***

The site (body part) of the injury is better recorded than diagnosis, being easier to categorise. It is coded internally based on the description provided in the ACC45 form by the treatment provider. However, this field is of limited use for occupational disease and injury surveillance due to its lack of specificity.

### ***Agent***

The external agent field is only completed if the claim is fully registered. This includes all work-related claims and many motor vehicle accidents.

The ACC45 form captures a limited narrative description of the cause of the injury or disease. The external agent is coded by ACC staff on the basis of the information provided on the form and an internal ACC guide list. The narrative is also recorded in a free-text field. The quality of coding is poor, with inconsistencies originating from the interpretation of the event, first by the treatment provider in consultation with the patient and subsequently by the coder interpreting the treatment provider’s free-text description.



A 1988 study estimated that the accuracy with which the external agent was coded was less than 60%<sup>76</sup>. However, the Injury Prevention Research Unit has recently demonstrated that the free-text field provided additional information that proved useful for targeting prevention activity in the farming industry<sup>57</sup>.

### ***Mechanism***

The mechanism is only recorded if the claim is fully registered. This includes all work-related claims and many motor vehicle accidents. As with the external agent, the mechanism is coded by ACC staff on the basis of the narrative description provided on the ACC45 form. As with the external agent, the quality of coding is poor.

### ***Costs***

The ACC database provides robust and objective cost information (including time spent off work and costs met by ACC).

Also captured are the costs of hospitalisation, through a data transfer from the NMDS. The primary purpose of this data transfer is to inform the calculation of ACC's annual payment to the Crown for public hospital services provided to ACC claimants. Hospital cost data may be incomplete on the ACC database during the first six months following discharge from hospital, as it can take this long for the data to be captured on the NMDS and transmitted to ACC. Completeness is also dependent upon the use of the "ACC flag" by hospital coders, which stood at around 70% in 2002<sup>77</sup> but is said to have improved since then.

As noted earlier, cost data for claims funded by employers under the ACC Partnership Programme may take up to 12 months to be captured on the ACC database, and may be incomplete with regard to weekly compensation costs.

### **Data integration methods**

Historically, ACC had poor information on hospital costs related to ACC claims, but this is now improving with the reporting of hospital discharges from the NMDS as described above.

ACC data is provided to the Injury Information Manager where it is integrated with NMDS and, in future, other data to provide a comprehensive injury database for New Zealand. This is described in detail in the occupational injury section of this report.

### **Types of surveillance, data analysis, and interpretation used**

ACC invests in a range of research and evaluation activities that draw on data from the claims database. ACC also carries out a range of internal analyses for administrative and accountability purposes (e.g. financial accounting, premium setting, and performance reporting). Analysis also contributes to ACC prevention activities.

Analysis of occupational disease is very limited, with analysis being largely confined to minor injuries (which make up the majority of ACC claims). The costs of occupational disease are relatively low to ACC and are therefore a low priority. Moreover, from a broader occupational disease surveillance perspective, occupational disease capture is low.

ACC provides data summaries on request. If extensive work is required to prepare the data, ACC may pass the costs of data preparation on to the user.

### **How information is disseminated and/or integrated into policy making**

The Minister for ACC employs the Department of Labour (DoL) as the government's principal policy advisor on matters relating to ACC. ACC provides quarterly monitoring reports to the Minister of Labour and DoL. These reports cover all aspects of the agreed key performance outcomes set out in ACC's Service Agreement. Weekly reports are also prepared to brief the ACC Minister.

Reports and injury statistics are published annually and are made available through the ACC website. Although reports do not specifically investigate occupational disease and injury, these are included. Occupation is not

viewed as being of key importance in ACC reporting requirements or data collection, as it is a “no fault” system, focusing on compensation eligibility rather than causal factors.

#### **Future plans for development/improvement**

ACC is currently replacing the Pathway Claims Management System in which claims data is held, with attention being paid to improving data quality.

Increasingly, claims are being returned electronically and the indications are that data quality is lower, with more missing fields, more use of other codes, and shorter accident descriptions. Another implication of this trend is that it is becoming increasingly difficult and costly for ACC to make changes to fields and coding systems on its database. This is because such changes require not just amendments to the ACC45 form, but changes to the range of practice management systems used by treatment providers.

### **3.5 EPISURV – NOTIFIABLE INFECTIOUS DISEASES**

The Institute of Environmental Science and Research (ESR) maintains the EpiSurv communicable disease database which records notifications of diseases of public health importance<sup>78</sup>.

#### **Synopsis**

EpiSurv records all notifiable diseases that have been reported to Medical Officers of Health. Reporting of these diseases is mandatory, and there is increasing emphasis on data quality. Notification coverage is variable by disease type, depending largely upon the proportion of total cases that result in a GP visit. The database includes patients' NHI numbers, facilitating linkage to NZHIS data sets. Detailed information is recorded on the diagnosis and the basis of diagnosis. Exposure information is also captured where applicable and available. There is a free-text field for recording occupation and, although it is under-utilised overall, it is fairly well completed for work-related cases.

#### **Background**

Doctors and public health units are required to notify ESR of any cases of notifiable disease under the Health Act 1956.

Notifiable disease surveillance activities in New Zealand are split between local and national authorities. ESR coordinates the operation of the national notifiable disease surveillance database, EpiSurv, on behalf of the Ministry of Health.

#### **Purpose of the surveillance**

Communicable disease surveillance involves continuous monitoring of the frequency and distribution of disease and death due to infections that can be transmitted from human to human, or from animals, food, water or the environment to humans, and the monitoring of risk factors for those infections.

Surveillance is undertaken for a range of purposes, including estimating the magnitude of a problem, determining the geographic distribution of illness, portraying the natural history of a disease, detecting epidemics or defining a problem, generating hypotheses, evaluating control measures, monitoring changes in infectious agents, detecting changes in health practices, and to facilitate planning<sup>78</sup>.

#### **Population covered**

EpiSurv currently covers about 50 notifiable diseases, for which reporting by medical practitioners is mandatory.

### **Method and frequency of data collection**

Notifiable disease information is received primarily through notification by general practitioners to regionally based Medical Officers of Health. The notifications are based primarily upon laboratory confirmation of pathogens but are not notified by the laboratories. In some instances, clinical suspicion is adequate for notification.

Notifications are made using a case report form. A set of case report forms has been developed, building on surveillance models in New Zealand and overseas, to organise the task of collecting appropriate surveillance data for each disease<sup>79</sup>. These forms exist solely to assist local public health unit staff who are investigating notified cases and are not sent to ESR.

The paper forms match a set of data entry screens in the EpiSurv software package. Data collected on the forms, through interviews with patients and their healthcare providers, is entered into the corresponding data screens in EpiSurv for local analysis and use, and it is electronically collated on a weekly basis from the Public Health Services in New Zealand and transmitted to ESR for national analysis.

### **Completeness of coverage**

Coverage of the notifiable diseases varies depending on the nature of the disease. Notification is mandatory, so any case that is of sufficient severity to result in a GP consultation, investigation, and a diagnosis being made is likely to be recorded on the system. Some diseases (such as campylobacter infection) do not always result in a GP visit so are under-recorded. Other diseases (such as AIDS, CJD) have a latency period between infection and clinical presentation so may take some time to be diagnosed and reported.

### **Completeness and accuracy of data**

The following information has been drawn from the *Manual for Public Health Surveillance in New Zealand*<sup>79</sup>.

The case report forms have been designed in a modular fashion. Certain modules are common to all forms, including case identification, case demographics (including occupation), clinical course and outcome, and outbreak details. Disease-specific modules include the basis of diagnosis, risk factors, protective factors, and management. All fields are mandatory, and the manual provides detailed instructions for completing each field. Key fields of interest are summarised below.

#### ***Identifying and demographic details***

EpiSurv records names, current and contact addresses, date of birth or age, and sex. Unique identifiers include the NHI number, an EpiSurv number (an 11-character code automatically created when the case is entered), and an outbreak number, which enables all records that are part of the same outbreak to be identified.

#### ***Ethnicity***

Ethnicity is recorded, by way of five tick-boxes, for NZ Māori, NZ European/Pakeha, Pacific Island, Other European, and Other (specify). The manual specifies that ethnicity data should be collected in the same way as for the Census (self-identification) in order to enable valid comparisons of disease incidence among ethnic groups. All applicable ethnic groups are required to be ticked. EpiSurv records all applicable ethnicities and creates a summary ethnicity field. The level and quality of capture within the field may be variable, however.

#### ***Occupation***

Occupation is recorded on the form as a free-text field. EpiSurv accommodates free-text entry of occupation, but the level and quality of capture is generally fairly low. For a few specific diseases, such as food-borne diseases, occupation is fairly well recorded, sometimes with the assistance of occupation categories selected from a pick-list that covers the most relevant occupational groups.

### ***Industry, employer***

Industry is not recorded. However, EpiSurv contains fields recording the name of the “place of work/school/pre-school” and its address. Up to two places of work or school may be entered.

### ***Work-relatedness***

There is no specific field for the recording of work-relatedness. However, EpiSurv accommodates free-text descriptions of the potential site and source of exposure, providing an opportunity to record a comment on work-relatedness, where relevant.

### ***Diagnosis***

Diagnosis is based on the clinical case definition. A central part of the surveillance process is deciding whether a reported case of disease is a true case. This is more straightforward for some diseases (e.g. salmonellosis) than others (e.g. toxic shellfish poisoning). EpiSurv guides public health workers through the process of gathering data and making decisions about whether reported cases of disease are “confirmed”, “probable”, or “under investigation”, or are in fact “not a case”.

A confirmed case is usually one which is laboratory-confirmed or epidemiologically linked to a laboratory-confirmed case. A probable case generally has the clinical features of an illness, meets a specific set of clinical criteria, and sometimes some laboratory criteria. Medical practitioners are encouraged to report diseases of public health importance on suspicion although, at this stage, it might not be possible to assign a case as either probable or confirmed. In these cases, the category “under investigation” is used. Once the clinical details and/or laboratory results are provided, the category is updated on EpiSurv. Where cases have been investigated and subsequently shown not to meet the case definition, the entry is recorded as “not a case”. This enables these records to be excluded from data analyses but remain on the database for future reference.

There is a “basis of diagnosis” module on each form that provides the investigator with the key clinical, laboratory, and epidemiological criteria by which a reported case can be accepted or rejected as a true case. At the end of this module, the investigator is required to make a decision based on these criteria about the status of the case, with reference to the manual and appropriate case definitions.

EpiSurv also records a range of details about the clinical course and outcome, including date of onset, whether the case resulted in an inpatient hospital admission, date of hospital admission, name of the hospital, date of death, and cause of death (if not the notified disease).

### ***Risk factors and protective factors***

Various details about the exposure are recorded. These include a field for recording whether the case originated from occupational exposure to a disease reservoir and a free-text field to record details of the occupational exposure.

Also recorded are details of the source of the exposure (e.g. a specified person, animal, food, or other source), how the source was implicated, and relevant details of international travel.

Details of appropriate vaccinations of the affected person are also recorded.

### ***Data integration methods***

The Public Health Early Warning (PHEW!) system is designed to improve the use of communicable disease information within the New Zealand public health sector by providing up-to-date, online information about the incidence of notifiable disease in New Zealand. Detailed chronological information from EpiSurv on rates and incidence numbers are available for any of the mapped regions. A first attempt is also made to highlight anomalies in both time series and geographical patterns of communicable disease<sup>80</sup>.

### **Types of surveillance, data analysis, and interpretation used**

In addition to the notifiable disease surveillance, there is also surveillance of non-notifiable diseases (e.g. influenza) plus surveillance of exposure routes and risk factors.

### **How information is disseminated and/or integrated into policy making**

Surveillance data is disseminated electronically (email and website) and in hard copy through monthly, weekly, and annual reports. The data in these reports contributes to the development of policy and intervention initiatives at a national level, as well as providing local authorities with information about diseases of national importance.

### **Future plans for development/improvement**

ESR is implementing a formal quality assurance program, involving feedback to the contributing public health services, to improve data quality in fields such as occupation and ethnicity.

There are also plans to improve the timeliness of data (especially for diseases involving highly pathogenic agents where immediate notification is important, such as SARS). Web-based data entry is being trialled in support of this goal.

Future plans also include increased use of decision-making, analytic, and aberration detection tools to facilitate early identification of issues and trends.

## **3.6 ENVIRONMENTAL RISK MANAGEMENT AUTHORITY**

The Environmental Risk Management Authority was established under the Hazardous Substances and New Organisms (HSNO) Act 1996. The overarching mission of the Authority is to achieve effective prevention or management of risks to the environment, public health, and safety associated with importing or manufacturing hazardous substances and introducing new organisms, and their use. The role of the Authority and its support agency, ERMA New Zealand, includes:

- making decisions on applications under the HSNO Act to import, develop, or field-test new organisms, or to import or manufacture hazardous substances to New Zealand
- promoting compliance with the Act and the Authority's decisions
- promoting public understanding and knowledge of risks associated with new organisms and hazardous substances and how to prevent or manage them
- enhancing the HSNO Act as an effective legislative framework for the prevention or management of HSNO risks.

### **Synopsis**

ERMA New Zealand has a specific mandate to measure and monitor impacts of the HSNO Act on health and the environment. The workplace is a major source of exposures to hazardous substances. Substances are still being transferred into the HSNO Act regime from previous pieces of legislation, and this process is planned to be completed in 2006.

ERMA is developing its surveillance capability. Current data analysis is based on aggregated and confidentialised data from a range of sources, including the NMDS, Fire Service, HASARD, and some directly received reports of hazardous substance incidents.

The Ministry of Health is working with the Institute of Environmental Sciences and Research to facilitate progress toward the development of a Chemical Injuries Surveillance System. The primary statute for this is section 143 of the HSNO Act. The system currently draws upon existing national data sets and includes hospital emergency data

from Public Health Services in Auckland, West Coast, and Hawkes Bay. Technical and process issues identified to date suggest that implementation of such a system may be a few years away and not necessarily on a full national scale.

### **Background**

The HSNO Act was introduced to protect the environment, people, and communities from the adverse effects of hazardous substances and new organisms. The Act has been in force for new organisms since 29 July 1998 and has applied to hazardous substances since 2 July 2001<sup>81</sup>.

Hazardous substances already in New Zealand are being transferred in batches from various older pieces of legislation into the HSNO Act regime by ERMA. This process is planned to be completed in 2006.

As most hazardous substances are sought for their industrial applications (e.g. agriculture, manufacturing), it is to be expected that many exposures to hazardous substances will occur in the workplace. Therefore, ERMA is interested in collecting data that could be used for measuring and monitoring occupational disease and injury.

### **Purpose of the surveillance**

In 2001 a monitoring strategy was developed to enable ERMA to implement one of its functions that is to monitor the effectiveness of the HSNO Act. Section 11(b) of the Act sets out the monitoring function as follows: “To monitor and review the extent to which the Act reduces adverse effects on the environment or people from hazardous substances or new organisms”.

It is important to note, however, that for hazardous substances, the effectiveness of the Act cannot be fully assessed until the end of the transitional period (in 2006) when HSNO controls will apply to all existing hazardous substances. Until the transfer is complete, those hazardous substances not yet transferred will be managed under the requirements of pre-existing legislation, and the HSNO regime will not have a sufficient overall impact on the management of risk. Monitoring data collected on hazardous substances is therefore added to the baseline against which post-HSNO data will be compared. Unfortunately, the pre-HSNO regime saw hazardous substances data only being systematically collected in some areas.

### **Population covered**

ERMA has an interest in monitoring exposures to hazardous substances, new organisms, and their health impacts, and intends to work with other agencies to achieve this.

### **Method and frequency of data collection and data integration methods**

ERMA gathers most of the information for its database on the public health effects of hazardous substances from secondary sources, principally the NMDS and Mortality Collection maintained by NZHIS, where hazardous substance incidents are identified by their ICD-10 codes. ERMA currently accesses NZHIS data once a year. The data is received in aggregated and confidentialised form, which includes demographic (ethnicity, age) data and limited data on cause. ERMA also receives information on an annual basis from the New Zealand Fire Service relating to incidents involving hazardous substances.

In addition, ERMA receives incident reports from HSNO enforcement agencies, other independent agencies, members of the public, and the media. In 2001/02, there were 62 hazardous substance incidents reported where adverse health effects were recorded, and in 2002/03, there were 48<sup>82</sup>. There is a standardised notification form for this purpose.

ERMA also refers to OSH data from the HASARD system, where the effects of hazardous substances on occupational health are measured by the numbers of victims for two types of circumstances: diseases affecting the lungs, and poisonings and other toxic effects<sup>81</sup>. Within these two categories, there are approximately 70 agency type codes

that ERMA has identified as relevant to their monitoring. However, only a few of these substances (or groups of substances) are associated with the majority of cases. (Refer to the section on HASARD for a discussion of the ways data is under-reported and skewed toward particular employers, industries, and occurrences.)

### **Completeness of coverage**

Data ERMA New Zealand receives from various sources predominantly only covers the monitoring of acute hazardous substance incidents. Currently, no mechanisms are in place to detect the chronic effects of hazardous substances, leaving a deficit in the completeness of data in this surveillance system. Furthermore, there are no specific requirements or incentives for notifications by employers.

Because ERMA identifies most adverse health impacts from hazardous substances by referring to secondary sources, the completeness of its data is reliant on the accuracy and specificity of ICD-10 codes in NZHIS data, the details recorded in the Fire Service database, and the completeness of relevant serious harm notifications to OSH.

### **Completeness and accuracy of data**

The completeness and accuracy of data held by ERMA is reliant on the completeness and accuracy of the (mainly secondary) data it receives and the ability of ERMA's systems and processes to effectively integrate the data. Data quality is variable, due to the range of agencies contributing data and a lack of standardisation with regard to definitions, coding systems, and the use of free-text fields.

The ERMA database is principally concerned with incidents rather than individuals. There is no unique identifier of individuals. Occupation data is not specifically recorded, but may in some instances be included in free-text fields. Data imported from the NMDS includes primary cause (ICD-10 code), age, sex, and ethnicity.

### **Types of surveillance, data analysis, and interpretation used**

In the 2002/03 reporting year, monitoring focused primarily on the number, type and effects of incidents involving hazardous substances. In its *Annual Monitoring Report 2002-2003*<sup>82</sup>, ERMA noted that during that year, 55% of hazardous substance incidents reported to ERMA occurred in workplaces and 21% identified adverse human health effects. Serious incidents were mainly associated with substances that were flammable and/or explosive or by caustic industrial substances, LPG being the most common substance involved.

### **How information is disseminated and/or integrated into policy making**

To meet its statutory requirement to report on the effectiveness of the HSNO Act, ERMA produces an annual monitoring report that assesses how effectively the purpose and principles of the Act are being implemented (i.e. the protection of people and the environment from the adverse effects of hazardous substances and new organisms).

In addition, in accordance with section 148(b) of the HSNO Act, the Authority includes in its Annual Report an assessment of the extent to which the Act has contributed to the health and safety of people and the environment, including an assessment of any reduction in the likelihood that hazardous substances or new organisms will adversely affect people or the environment.

### **Future plans for development/improvement**

Section 143 of the HSNO Act states that all hospitalisations from hazardous substance injuries are to be reported via a Medical Officer of Health to the Ministry of Health<sup>83</sup>. To meet these reporting requirements, the Ministry of Health commissioned the Institute of Environmental Sciences and Research (ESR) to develop a national Chemical Injuries Surveillance System (CISS). The system covers substances regulated by HSNO and substances outside of ERMA's jurisdiction (e.g. therapeutic drugs in finished form) to achieve the greatest public health utility.



According to ERMA, a six-month pilot study was carried out in 2001 involving six Public Health Services (PHSs) but was unsuccessful due to a lack of active participation from other PHSs. In early 2003 the system was trialled in the Auckland region and involved the collection and analysis of data from the national Coronial Services Office, the National Poisons Centre, the NZHIS, and the Auckland Regional Public Health Service.

Since then, the system has been further developed and currently draws upon the existing national data sets as well as hospital emergency department notifications to local PHSs in Auckland, West Coast, and Hawkes Bay. Options are being investigated for further extending the system to incorporate more local PHS data and ambulance service data. However, national implementation of CISS may still be a few years away and may not necessarily be on a full national scale. The Ministry of Health noted that the lack of public understanding of the requirements of the HSNO Act, particularly by hospitals, has compounded the problem of implementing a national chemical injuries surveillance system.

### **3.7 INDUSTRY-SPECIFIC SURVEILLANCE SYSTEMS**

The following industry-specific surveillance systems have been included in this review:

- Civil Aviation Authority (air traffic incidents, accidents, and serious harm)
- Maritime New Zealand (incidents, accidents, and serious harm involving ships as places of work)
- Land Transport Safety Authority (road and rail accidents)
- Forest Research Centre for Human Factors and Ergonomics (forestry industry).

The surveillance systems operated by these organisations are detailed within the occupational injury section of this report, as the information they contain is primarily of interest from the perspective of injury surveillance (although they may detect cases of stress and fatigue to the extent that these were contributing factors to an injury). The following observations are made regarding the potential of these systems to contribute to the surveillance of occupational diseases.

#### **CIVIL AVIATION AUTHORITY, MARITIME NEW ZEALAND, AND LAND TRANSPORT SAFETY AUTHORITY**

The surveillance carried out by these authorities is primarily concerned with identifying the causes of “accidents” that have occurred on land, sea, and in the air; identifying risk factors and protective factors to prevent future accidents occurring; and recording evidence which may be used in prosecution<sup>6</sup>. Accidents cause injury or death rather than disease, although disease may be a precipitating factor to some accidents.

The investigations carried out by these authorities are usually focused on the event rather than the individual(s) involved<sup>6</sup> and, although the details of individuals involved may be recorded, these are more detailed for some individuals (e.g. pilots) than others (e.g. passengers). In most cases, it is not specifically recorded whether an event is work-related.

The Health and Safety in Employment Amendment Act 2002 gave the CAA and MNZ jurisdiction to administer the provisions of the Health and Safety in Employment Act 1992 for their respective sectors. Consequently, the CAA and MNZ are the only agencies in New Zealand with legislative requirements to investigate any fatality that occurs in the air or on a ship. These amendments may see an increase in the quality of occupational fatality data in the aviation and maritime sectors. However, a limitation in the changes brought about by the amendments to the HSE Act is that the CAA and MNZ have no arrangement to report their data to OSH, therefore, there are three agencies recording occupational fatalities in New Zealand, with no coordination of data between them.



The Forest Research Centre for Human Factors and Ergonomics (COHFE) maintains an accident reporting scheme (ARS) for the forestry industry that contains 20 years' data on logging injuries, including details of injuries sustained, days of work lost, and near miss events. Reporting is voluntary, but the 16 largest forestry companies participate, together accounting for an estimated 60–80% of the forestry workforce. There is also an exposures database which records total hours of work per month for the reporting companies, providing denominator data for analysis of injury rates.

As such, COHFE provides surveillance data on occupational injury rather than occupational disease. However, three observations about its operation are noteworthy in the context of evaluating systems for the surveillance of occupational disease. The first of these is its credibility within the industry, with support from all of the large employers and goodwill developed through COHFE fostering networks within the companies, which provide regular feedback on the data. As a result, COHFE data is highly complete and accurate (for the participating companies) and is valued by those who contribute injury information. There are lessons here for other agencies that collect disease and injury data, to the extent that regulatory and administrative imperatives and scale considerations permit elements of this approach to be adopted elsewhere.

Secondly, surveillance to prevent injury is COHFE's core goal, and COHFE has been successful in identifying emerging trends in workplace injuries that would not have been obvious on a case-by-case basis and contributing to the reversal of those trends, providing a clear demonstration of the value of purposeful collection and analysis of surveillance data. Thirdly, COHFE collects exposure data, facilitating more accurate calculation of injury rates. Although limited to total hours worked, this nonetheless provides an exemplar for the collection of more complex exposure data for occupational disease surveillance.

### 3.8 STRENGTHS, WEAKNESSES, AND GAPS

This section provides an assessment of the strengths and weaknesses of the reviewed databases in terms of their potential to contribute to occupational disease surveillance in New Zealand. It also provides analysis of gaps in the coverage of these systems.

The following framework has been used to guide the assessment of strengths, weaknesses, and gaps, adapted from the Institute of Medicine (Washington DC)<sup>84</sup>:

**Completeness:** The extent to which a system reports all diseases. Exceptions should be explicit and may be by diagnosis, severity, industry, occupation, geographic scope, or compliance.

**Standardisation:** Aspects of standardisation include type and scope of data elements reported, mandatory fields, definitional issues, hierarchical organisation of the data elements, coding systems used, and readiness of the data set for matching with other data sets. Includes the degree of standardisation between data sets and within data sets through time.

**Coding accuracy and integrity:** Relates to definitional and concepts of reliability and validity. Whether the system is coded consistently between two coders and whether the code means what it purports to mean. Also relates to the use of multiple sources: whether multiple sources are used to verify the database and original documents are used in the verification process.

**Work-related fields:** Whether the database has an explicit field that codes for work-related injury or disease.

**Timeliness:** Data is reported, analysed, and disseminated in a timely way.

**Accessibility:** Is the data readily accessible to researchers?

**Capacity for learning:** Characteristics of the system that can identify risk factors, contributing factors, and preventative factors.

**Incentives/disincentives:** What are the incentives and disincentives to reporting?

### 3.8.1 COMPLETENESS

The following table summarises the completeness of coverage of each system.

TABLE 3.5		Completeness of occupational disease coverage
DATA COLLECTION	COMPLETENESS OF OCCUPATIONAL DISEASE COVERAGE	
Mortality Collection	All registered deaths in New Zealand, by cause of death. Occupational disease deaths are not explicitly distinguished from other deaths. Occupational information is collected but not coded.	
New Zealand Cancer Registry	All primary malignant diseases in New Zealand except squamous cell and basal cell carcinomas. Occupational cancers are not explicitly distinguished from other cancers. Occupational information is currently rarely included, even though it is often available in related data sets.	
National Minimum Data Set	All public and most private hospital inpatient and day patient discharges in New Zealand. Hospital stays related to an occupational disease are not explicitly distinguished from other hospital stays. Since the mid-1990s, occupational information is rarely collected.	
Notifiable Occupational Disease System (NODS)	Partial and patchy coverage of occupational diseases within the HSE Act definition of “serious harm” and possibly isolated reports of other occupational diseases. The Cancer Panel (currently) and the Solvent, Asthma, and Asbestos Panels (previously) have been successful in providing estimates of the extent of occupational disease in these areas.	
ACC claims database	All ACC claims (and probably a high proportion of diagnosed cases) related to occupational diseases covered in Schedule 2 to the IPRC Act. Possibly some coverage of other diseases individually assessed as being a “personal injury caused by a work-related gradual process, disease, or infection”.	
EpiSurv communicable disease database	all notifiable diseases that have been reported to medical officers of health. Occupational diseases are not explicitly distinguished from other diseases.	
Environmental Risk Management Authority	Partial but growing coverage of the public health effects of hazardous substances. Occupational diseases are not explicitly distinguished from other diseases. Individuals are not identified.	

The following conclusions can be drawn about the completeness of occupational disease coverage across these systems:

- All fatalities, cancers, hospital admissions, and notifiable communicable diseases caused by exposures to risk factors in the workplace are recorded somewhere within one or more of these systems. However, they are not explicitly identified as such and therefore cannot be positively identified. Poor coding of details such as occupation leave few clues even for probabilistic identification of work-relatedness.
- Only one database unambiguously identifies individual cases of occupational disease, and that is the ACC database. However, only certain occupational diseases are “automatically” covered by the ACC scheme, and for many types of occupational disease, the proportion of cases that are identified as occupational where a claim is made to ACC, and the claim is awarded by ACC and appears in the database, is very low.

- The NODS system also records occupational diseases and is the only system that has occupational health and safety data collection as its primary purpose. However, completeness suffers due to under-reporting and under-recording, and it is possible that not all cases recorded are confirmed cases.

### 3.8.2 STANDARDISATION, ACCURACY AND INTEGRITY, AND WORK-RELATED FIELDS

The following table summarises key data elements of interest for each system. The table indicates what data elements are captured within each system, how they are captured, and, where possible, how well they are captured. The assessment of the accuracy and integrity of data capture was made on the basis of the information gathered for the review, and is indicated in square brackets as either high [H], moderate [M], or low [L].

TABLE 3.6 Standardisation of data elements							
DATA ELEMENT	MORTALITY	NZCR	NMDS	NODS	ACC	EPISURV	ERMA
Unique identifiers	NHI, BDM registration number [H]	NHI, NMDS Event ID, record ID, tumour ID [H]	NHI, ACC45	Case ID	ACC45, NHI	NHI, EpiSurv ID, outbreak ID	No
Other identifying and demographic details	Names, age, sex, address	Names, age, sex, address	Names, age, sex, address	Names, age, address	Names, age, sex, address	Names, age, sex, address	Not recorded
Ethnicity	Stats NZ Level 2 [M]	Stats NZ Level 2 [M]	Stats NZ Level 2 [M]	Non-standard coding system [M]	Non-standard coding system [L–M]	Non-standard coding system [M–H]	Not recorded
Occupation	Free text [L]	Free text [L]	Free text [L]	Non-standard coding system [L–M]	Stats NZ [M–H for work-related claims]	Free-text [L]	Not recorded
Occupational history	Not recorded	Not recorded	Not recorded	Not recorded	May give partial longitudinal history	Not recorded	Not recorded
Industry	Not recorded	Not recorded	Not recorded	Non-standard coding system [L–M]	Stats NZ [M–H]	Not recorded	Not recorded
Work-relatedness indicator	No (not for disease; only for injury)	No	E code (since 1 July 2004)	All cases should be work-related	Yes [H – for occ disease]	No	No
Work-relatedness scope	Accident while working at place of paid employment	Not applicable	Injury while working for income	Not applicable	Employee at work (incl in work car), <i>inter alia</i>	Not applicable	Not applicable
Diagnosis	ICD-10-AM [H]	ICD-10 [H]	ICD-10-AM [H]	Non-standard, non-specific coding system [M]	ICD-10-AM and Read codes [M–H]	ICD-10-AM [H]	No
Severity	Not applicable	ICD-10 [H]	ICD-10-AM [H]	Not recorded	ICD-10-AM, Read codes [M]; time off work [H]	ICD-10-AM [H]	No
Site	ICD-10-AM [H]	ICD-10 [H]	ICD-10-AM [H]	Non-standard coding system [M]	Non-standard coding system [H]	ICD-10-AM [H] (where applicable)	No

DATA ELEMENT	MORTALITY	NZCR	NMDS	NODS	ACC	EPISURV	ERMA
Agent/exposure	E codes [L – for occ disease]	Not recorded	E codes [L – for occ disease]	Non-standard coding system [M]	Non-standard coding systems [L]	Risk factors and protective factors [H]	Limited (via E codes in NMDS)
Cost	Not recorded	Not recorded	Relevant (hospital admission) cost weights recorded [H]	Not recorded	Costs to ACC and claimants recorded. Hosp costs imported from NMDS.	Not recorded	Not recorded

The following conclusions can be drawn about the level of standardisation and the accuracy and integrity of data coding and recording across these systems:

- The unique identifiers that hold the greatest potential to facilitate record linkage across data sets are the NHI number and ACC45 claim number. The NHI number is recorded within the Mortality Collection, the New Zealand Cancer Registry, National Minimum Data Set, ACC, and EpiSurv. The ACC45 number is recorded by ACC and, where available, on the NMDS.
- Occupation is, in general, poorly coded. The NZHIS systems use a free-text field, in which occupation is incomplete and ambiguous. NODS uses a non-standard coding system (based on a standard system). ACC uses the Statistics New Zealand coding system and probably has the best recording of occupation among these databases for work-related claims.
- None of the systems can be relied upon to provide occupational histories. The ACC claims database might provide a partial longitudinal history of a claimant’s occupations, if more than one claim has been submitted over time. Similarly, the NMDS should be able to provide a partial history where an individual has been admitted to hospital more than once, but occupation would first need to be better recorded.
- NZHIS and ACC both use ICD-10 to code diagnosis (and other information captured by the classification where relevant, such as cause of death, site, agent, procedures, etc). Although very specific, the information captured by these systems would be insufficient to reliably identify work-related disease cases. However, this may improve with subsequent enhancements to ICD-10, such as the recent addition of work-related E codes.
- Very little exposure data is captured of any description. EpiSurv records risk factors and protective factors relevant to specific notifiable infectious diseases. NODS records of agent and mechanism may also provide some clues for some diseases.

### 3.8.3 TIMELINESS AND ACCESSIBILITY

The following table summarises the timeliness and accessibility of data from each system.

<b>TABLE 3.7</b>		
Timeliness and accessibility		
<b>DATA COLLECTION</b>	<b>TIMELINESS</b>	<b>ACCESSIBILITY</b>
Mortality Collection	Data set accurate within a few months of death, for most deaths. Some coroners' investigations can take longer to complete. Latest report uses 2000 data.	Regular public reporting of summary data. Customised data available on request, subject to privacy and ethical considerations, and may incur a charge.
NZ Cancer Registry	Data set accurate within 3–6 months of diagnosis. Latest report uses 2000 data.	Regular public reporting of summary data. Customised data available on request, subject to privacy and ethical considerations, and may incur a charge.
National Minimum Data Set (NMDS)	Data set accurate within 6 months of discharge. Latest report uses 2000/01 data.	Regular public reporting of summary data. Customised data available on request, subject to privacy and ethical considerations, and may incur a charge.
Notifiable Occupational Disease System (NODS)	Data set fairly complete within a short time of notification. Last report used 1999/00 data.	No publicly available summary of NODS data since 2001. Data extracts available on request, subject to privacy and ethical considerations.
ACC claims database	Data set complete as soon as claims are registered. Some delays for claims management data from third parties and cost data imported from NMDS. Latest injury statistics report uses data as at August 2004.	Regular public reporting of summary data. Customised data extracts available on request, subject to privacy and ethical considerations, and may incur a charge.
EpiSurv communicable disease database	Data set complete within a few days of Medical Officers of Health receiving notification. Monthly surveillance reports use data from the previous month. Latest annual outbreak summary uses 2003 data.	Regular public reporting of summary data. Customised data extracts available on request, subject to privacy and ethical considerations.
Environmental Risk Management Authority	Analysis currently done once a year. The 2003 Annual Report noted that the most recent completed analysis used 2001/02 data.	ERMA monitors the effectiveness of the HSNO Act and provides reports on this to the Minister. The reports are publicly available, on request. The raw data would be available, subject to agreement of the contributing agencies.

As can be seen, most data is collected within a fairly short timeframe and, with few exceptions, data over six months old is unlikely to require further updating. Customised data extracts are generally available on request, provided they comply with privacy and ethics criteria.

#### **3.8.4 CAPACITY FOR LEARNING: CHARACTERISTICS OF THE SYSTEM THAT CAN IDENTIFY RISK FACTORS, CONTRIBUTING FACTORS, AND PREVENTATIVE FACTORS**

The data provided by these data sets is better suited to surveillance of certain recognised occupational diseases with known risk factors than the identification of risk factors or new occupational diseases. There are two key reasons for this:

- The only diseases that can be positively identified as work-related diseases are specific diseases that fall within the coverage of the ACC scheme or the HSE Act definition of serious harm and are recorded on the ACC database or NODS
- Although all fatalities and many acute and chronic occupational disease cases will be recorded somewhere in at least one of the data sets, there is a lack of reliable information on occupation, work-relatedness, and exposures that would enable the identification of new associations between these variables or emerging trends.

However, as the OSH Cancer Panel has shown, the information recorded in routine data sets such as the Cancer Registry provides, by virtue of its full and detailed coverage of cancer incidence in New Zealand, a strong starting point for primary surveillance and research to augment the data set and provide occupational variables that could be used to identify new associations and trends. This study exemplifies the potential value that can be realised from the use of these databases to support a range of focused surveillance and research into occupational disease.

#### **3.8.5 INCENTIVES/DISINCENTIVES**

Reporting of deaths to the Mortality Collection (via Births, Deaths and Marriages), diagnosed tumours to the New Zealand Cancer Registry, public hospital discharges to the National Minimum Data Set, and notifiable diseases to EpiSurv, is compulsory and has high levels of compliance.

There are strong financial incentives to submit a claim to ACC for any occupational disease involving treatment costs or time off work.

There are few incentives to report notifiable occupational diseases to OSH. Disincentives include a lack of feedback to GPs, compounded by a lack of awareness of NODS and of occupational disease, and a primary concern for the treatment rather than the causation of disease.

#### **3.8.6 CONCLUSION: STRENGTHS, WEAKNESSES, AND GAPS**

The key strengths across the systems are:

- the complete capture of fatalities, cancers, and hospital admissions (notwithstanding the inability to identify work-related disease cases within these data sets)
- the existence of two unique identifiers (NHI number and ACC<sub>45</sub> claim number) that should be able to facilitate the linkage of all of the five most promising data sets in terms of coverage (Mortality Collection, Cancer Registry, NMDS, ACC, and EpiSurv)
- the use of ICD-10 as a common coding standard across all of the five most promising data sets (although some concordance issues between different versions of ICD-10-AM must be acknowledged)
- ready access to timely data and advice on its interpretation.

Key weaknesses include:

- the inability to identify (either positively or probabilistically) most occupational disease cases, due to under-reporting, poor coding of occupation and work-relatedness, and limited capture of exposure to known risk factors
- poor coding of industry, work-relatedness, and ethnicity in most databases
- very little information on the costs of work-related disease
- the low potential of New Zealand's only purpose-built occupational disease surveillance system (NODS) to contribute significantly to occupational disease surveillance, due to under-reporting and shortcomings in system design (although some "add on" projects to the NODS system, including the OSH Cancer Panel, are working well and do provide complete data for the diseases that they address).

Gaps have been considered along three dimensions:

- Vertical – gaps in terms of the cases captured/not captured by the systems: Cases of occupational disease (including cancer) that have not (yet) resulted in a hospital admission or death, are not covered by ACC, and are not a notifiable communicable disease will only be captured if they are reported to OSH and recorded in the NODS system. Occupational diseases affecting volunteers and bystanders will also be under-recorded or under-identified across the systems. There are also other potential information systems that were outside the scope of the current study, such as emergency department and ambulance service databases, which represent a potential gap if they cannot contribute to surveillance.
- Horizontal – gaps in terms of the information required on each case: The principal gap in data collection is the lack of standardised coding of occupation in the three NZHIS databases, the NODS system, and EpiSurv.
- Temporal – gaps in terms of coverage or consistency over time: Data should be relatively consistent across the main data sets since 2000. Key changes in the data include the following:
  - ACC data may be incomplete for work-related claims during 1999/00, due to under-reporting by third-party insurers to the Regulator.
  - ACC started using Read codes and ICD-10 from 1999/00.
  - Hospitals have provided data to the NMDS in a consistent electronic format since 1993. However, there have been changes to the NMDS since then, including upgrades of the ICD coding system every few years.
  - It has been compulsory for laboratories to report cancers to the New Zealand Cancer Registry since 1 July 1994. Coverage for earlier years will be incomplete.
  - The NHI number has been recorded on the Mortality Collection since 1988.
  - The highest reporting years to NODS were 1994/95–1996/97. Coverage declined significantly after 1998 and has since recovered to about half the reporting level of its peak in 1995/96.

### 3.9 OPPORTUNITIES FOR IMPROVEMENT

The following paragraphs identify opportunities for improving the administration/management, data collection, accuracy and timeliness of existing occupational disease surveillance systems. It is important to note that many of these opportunities have been identified previously. Similar findings can be seen in a range of previous reports, including the 2004 CPHR report on *Occupation in Routinely Collected Health Data*<sup>12</sup>; proceedings from the 2002 symposium on *Priorities in Occupational Health and Safety*<sup>4</sup>, and the 1999 IPRU *Recommendations on the establishment of ongoing work injury mortality surveillance*<sup>5</sup>, among others.

These opportunities have been identified purely with regard to their desirability from an occupational disease surveillance perspective, and without consideration of legislative, policy, or budgetary implications.

### 3.9.1 ADMINISTRATION AND MANAGEMENT

#### **Appoint a person at OSH national level with appropriate qualifications and support**

Currently, responsibility for collecting occupational disease surveillance data is dispersed. Surveillance objectives are over-ridden by the diverse priorities of individual organisations. While there will always be legitimate and unavoidable reasons for some differences in data collection, other differences may be addressed through better oversight and coordination of data collection.

Responsibility for coordinating and improving the quality of all-cause occupational disease surveillance should be vested in one agency such as OSH. An appropriately qualified individual within that agency (e.g. an epidemiologist) should be appointed as an information manager for occupational disease surveillance. Without prescribing or limiting the scope of this role, key activities might include:

- coordinating a collaborative work programme between a number of agencies to improve occupational disease data collection and surveillance
- compiling and maintaining an occupational disease data set through the integration of data from a number of sources, in order to maximise the coverage and completeness of the available data
- facilitating formal agreements between the various agencies to bring data into a central repository
- conducting regular monitoring and reporting on occupational disease incidence, prevalence, trends, distribution, and data quality
- identifying and progressing priority areas for improving and expanding the numerator data set
- identifying and progressing priority areas for the collection of denominator data
- identifying priority areas for focused studies, using data compiled by the Information Manager together with other primary and secondary sources, and working with external agencies and researchers to undertake the studies.

The establishment of the Injury Information Manager role provides a precedent and a potential management and governance model for an occupational disease surveillance manager. However, given the important differences between occupational disease and occupational injury surveillance techniques and data requirements, consideration needs to be given to the appropriate agency, business model, team composition, and approach to improve occupational disease surveillance.

#### **Put someone in charge within each organisation**

Just as somebody needs to be made responsible for data quality at OSH, a similar need exists within each associated organisation to designate responsibility for ensuring system design, internal work practices, and external communications and relationships support the collection of high-quality data on occupational disease.

Arguably, such a role exists already within each of the agencies discussed in this review – at least with regard to the quality of data overall, if not occupational disease data specifically. Nevertheless, if improving occupational disease surveillance is to be a priority at a national level, it behoves each organisation to examine the effectiveness of its current arrangements using the following questions:

- Who (what position) is responsible for ensuring the collection of high-quality data?
- Is occupational disease surveillance data specifically on the agenda?
- What level of priority does high-quality occupational disease data have within the overall responsibilities delegated to that position?
- Is the position suitably resourced to improve occupational disease data?
- Does the organisation monitor its performance toward the achievement of this goal?



### 3.9.2 DATA COLLECTION

The following opportunities exist to improve occupational disease surveillance, through the collection of additional data and the establishment of additional surveillance systems:

#### **Increase reporting of suspected cases to NODS**

- The Occupational Safety and Health Service taking deliberate steps to increase reporting by general practitioners and others of suspected occupational disease cases. Examples of potential steps include:
  - targeting employees, unions, and employers, and disseminating information about key disease risks (e.g. by industry/occupation) and symptoms to monitor
  - targeting GPs with information about key disease risks, associated symptoms, questions that they could ask their patients to assist in identifying suspected cases, and to raise awareness about NODS reporting
  - providing feedback to GPs and others to promote the value of NODS data (acknowledging the current low base and demonstrating improvement in data capture over time).
- Continue and enhance those aspects of NODS that are currently working well, including the work of the OSH Cancer Panel.

#### **Improve recording and investigation of work-relatedness of disease**

- Modifying death certificates to capture the certifying medical practitioner's opinion as to whether the disease was work-related, amending the BDM database to capture this information, broadening the definition of work-relatedness associated with the corresponding indicator in the Mortality Collection to include suspected occupational disease, and recording the medical practitioner's opinion within the Mortality Collection.
- Expanding the role of the Coroners' Court to include inquiry into suspected cases of occupational disease (as occurs in some other countries including the US, Ireland, and Hong Kong).
- Establishing a coronial database to enable surveillance and systemic learnings from coronial findings, with a specific module for work-related deaths.

#### **Improve recording of occupation in NZHIS data**

- Start coding occupation in the Mortality Collection, NZCR, and NMDS, using the standard Statistics New Zealand classification system, and code the backlog of occupation using methods such as those recently recommended by CPHR<sup>12</sup>.
- Include occupation in the NHI database and record occupation histories of each patient by entering a new occupation and associating it with the admission date each time the patient is admitted to hospital during their lifetime.

#### **Extend and improve the coding of industry in NZHIS and OSH data**

Industry is an important variable as it can add depth to the information captured in the occupation field. For example, people whose occupation is classified as "sales representative" could be exposed to different risk factors depending on whether they sell office equipment, meat packing equipment, or fertilisers. Therefore, opportunities to improve data collection include:

- including industry as a variable in the Mortality Collection, NZCR, and NMDS, using the standard Statistics New Zealand classification system
- aligning the industry classification system in NODS/HASARD with the standard Statistics New Zealand classification system.

#### **Collect additional information on work-relatedness, occupation history, and exposure history**

- Develop a common definition of work-relatedness to apply in the recording of occupational diseases by NZHIS and OSH (not applicable to ACC).

- Develop a staged indicator of work-relatedness, for example, to record whether a case is suspected or confirmed, for use by NZHIS and OSH (not applicable to ACC).
- Develop common definitions and fields for recording current occupation (at time of diagnosis) and usual occupation (if different from current occupation) in order to identify both potential sources of exposure (applicable to all systems).
- Develop common definitions and fields for coding and dating occupation history and encourage the recording of occupation histories in patient case notes where a disease has suspected occupational roots (applicable to all systems).
- Develop common definitions, identify or develop a classification system for coding and dating exposure history, and encourage the recording of exposure histories in patient case notes where a disease has suspected occupational roots (applicable to all systems).
- Develop an exposures database to collect denominator information on exposure to risk factors. Potential data sources (which are not mutually exclusive) include secondary data held by a range of organisations such as Statistics New Zealand, unions, ERMA, National Poisons Centre, AgriQuality and others; and direct measurement through targeted and random sampling of workplaces.

### 3.9.3 ACCURACY

- NZHIS working with hospitals to improve the use of work-related E codes in ICD-10-AM 3rd Edition.
- ACC coding work-relatedness and occupation for all claims.
- ACC ensuring claim data is updated on the claims database (e.g. following a change in diagnosis).
- OSH reviewing the classification systems and field structures used for recording occupation, industry, diagnosis, agent, and mechanism, with a view to aligning these with standard classification and coding systems and using hierarchical pick-lists for data entry.
- OSH ensuring case data is updated on NODS upon completion of each investigation.

### 3.9.4 TIMELINESS

This review found that most data is already captured within the systems in a timely manner. No opportunities were identified to significantly improve the timeliness of data capture.

SECTION FOUR

OCCUPATIONAL

# INJURY



The workplace is a significant contributor to injuries and injury fatalities in New Zealand. The first NOHSAC report<sup>90</sup> notes that, every year, around 207,000 occupational injuries result in ACC claims, corresponding to 12 injuries per 100 workers. However, the systems currently in place for collecting and coding occupational injury surveillance data suffer from a number of limitations that hamper efforts to quantify the nature and extent of occupational injury.

At present, there are no nationally consistent guidelines for defining, reporting, and recording occupational injuries. The various agencies involved with the surveillance of occupational injury in New Zealand interpret their responsibility for recording occupational injury in terms of their own legal definitions of their areas of interest<sup>4</sup>.

Four significant initiatives have explored the feasibility of merging injury data sets from various agencies and, in doing so, have reached conclusions about the strengths, weaknesses, and gaps of the various data sources and begun to strengthen New Zealand's occupational injury surveillance capacity. These are the Work-Related Fatal Injury Study conducted in 1997/98<sup>85</sup>, the data collection and collation carried out by the Accident Insurance Regulator in 1999/2000 and 2000/01<sup>86-87</sup>, the *New Zealand Injury Data Review April 2000–December 2001*<sup>4</sup>, and the Injury Information Manager's *Injury Statistics Project Pilot: Feasibility Report* published in May 2004<sup>73</sup>. These are described below as they provide a useful context for the subsequent inventory and gap analysis of occupational injury surveillance systems.

#### 4.1 WORK-RELATED FATAL INJURY STUDY AND DATA SET

The Work-Related Fatal Injury Study (WRFIS) sought to identify all traumatic work-related fatalities (excluding motor vehicle traffic crashes) that occurred in New Zealand during the period 1985–1994. Potential cases from the NZHIS Mortality Collection were identified by their E-codes, and the circumstances of each fatal incident were reviewed from coronial files. About 20% of all injury deaths were found to be work-related<sup>88</sup>.

The WRFIS provided a reference data set that was subsequently used by Langley and colleagues<sup>85</sup> in a study to determine whether a reliable work-related fatality register could be established by merging the databases of various agencies concerned with work-related injury deaths, with the WRFIS data set.

The study found that the creation of a fatality data file by electronic means underestimated the size of the work-related injury problem by at least 27%. Of the 820 work-related deaths identified by the WRFIS, ACC had the best coverage at 63%, OSH covered 40% of cases, and less than three-quarters (73%) of cases were identified in either ACC, OSH or the data of one or more of the other agencies combined<sup>85</sup>. The results for ACC and OSH were comparable to those obtained in the US<sup>89</sup> and the 59% in Australia<sup>90</sup>.

It was also found that coverage was skewed by industry and by occupation. This means that a more accurate estimate of the number of fatalities could not be derived by applying a multiplier to estimates based on a multi-agency derived file. For example, agriculture and fishery workers comprised the largest industry group within the WRFIS, but were among the more poorly covered in OSH, ACC, and other agencies' databases<sup>85</sup>.

There was minimal coverage of workplace bystander deaths by OSH agencies (and compensation agencies) and no coverage at all of road bystander deaths. This means that an important preventable area where work was having an adverse effect on the community was not being recognised by any occupational injury systems in New Zealand<sup>85</sup>.

The authors argued that the absence of one single agency with a statutory responsibility to record all work-related deaths, irrespective of which Act is intended to prevent them, was a significant barrier to developing a comprehensive occupational fatal injury database<sup>85</sup>.

## 4.2 ACCIDENT INSURANCE REGULATOR

The Accident Insurance Act 1998 established the role of the Accident Insurance Regulator (within the Department of Labour), including responsibility for ensuring that the law and regulations were adhered to in relation to the competitive provision of workplace accident insurance between 1 July 1998 and 1 July 2000<sup>86</sup>. In July 2000, the ACC was reinstated as the sole provider of workplace accident insurance, but continues to report all work-related claims to the Accident Insurance Regulator, as do the seven registered private insurers who continue managing a small number of active claims remaining from 1999/2000<sup>87</sup>.

The introduction of competition for the coverage of workplace accidents enabled the Department of Labour to develop a workplace injury surveillance data set and a data warehouse. This housed not only injury claims but also other essential data, such as profiles of employers and industries; circumstances of work-related injuries; their nature, severity and treatment; and the age and gender of those injured. Injury and illness claim data reported to the Regulator was used to establish the incidence of workplace injuries and illnesses, consequent treatment and rehabilitation, and compensation for loss of earnings<sup>86</sup>.

In addition, in 2000/01, the Department conducted a review of workplace fatality records for the year 1999/2000, integrating data from ACC, OSH, CAA, LTSA, and MNZ. The review identified 113 work-related deaths for the period, but noted that this number under-represented the total number of work-related motor-vehicle fatalities (because work-relatedness could not always be readily identified from ACC and LTSA data) and probably grossly under-represented occupational disease fatalities. The review highlighted the need for quality information to enable government, businesses, and communities to implement strategies aimed at minimising the overall incidence of workplace fatalities and the resulting social and economic costs to the community<sup>87</sup>.

## 4.3 NEW ZEALAND INJURY DATA REVIEW

The Injury Data Review was established in April 2000 to identify:

- a conceptual framework that would provide for a coherent set of statistics and statistical indicators for research database(s)
- a set of statistical indicators that meet the requirement to inform on injuries in New Zealand
- an appropriate approach to manage and report on these indicators.

The Department of Labour and Statistics New Zealand co-managed the review, with the assistance of a project team comprising officials from other relevant agencies. A report of the review was published by the Department of Labour and Statistics New Zealand on 31 October 2002<sup>4</sup>. The following information was sourced from that report.

The review was initiated by the government in response to a need for information to monitor trends in injury events, identify emerging health and safety issues, and determine the cost of injury to society. The under-reporting and fragmentation of injury data across agencies, as evidenced by the earlier studies on work-related fatal injuries<sup>85, 87</sup>, was the primary problem that the review sought to address. It was noted that it was not possible from existing information to ascertain the number of fatal and serious accidents in New Zealand in any given category, such as workplace injuries.

The review sought to improve the quality of data collected, monitoring at a national level, targeting of injury prevention programmes, access to information, and processes involving data providers. It consisted of several sub-projects that addressed these problems. The review produced, and the government agreed to, a conceptual framework for injury data, a data set, a list of indicators of injury, a gap analysis to determine which information agencies held, a model for long-term information management, and a cost-benefit analysis of the chosen model.

## CONCEPTUAL FRAMEWORK AND INDICATORS

A conceptual framework was developed for integrating injury data, based on a model for workplace injuries recommended by the ILO at the 16th International Conference of Labor Statisticians 1998. The framework could be applied across the occupational injury sector and accommodate different degrees of severity, enabling indicators and data to be identified to governmental agencies to meet the objectives of injury prevention and management programmes. The conceptual framework was adapted to show how it could be applied to workplace accidents causing injury.

The framework incorporated the following groups of variables:

- Individual: The characteristics of the person who is injured (e.g. occupation, status in employment, size of employer).
- Activity: Actions being carried out by the person just before they have the injury (e.g. work environment/place of occurrence, work process, specific activity, bystander, travelling to/from work).
- Event/accident: The injury incident or event, including mode and agent of injury.
- Environment and locale: The location and scene for the activity which leads to the injury.
- Injury: Damage to the person/s which result from the event/accident.
- Outcome: The effect of the injury on individuals and society (e.g. social and economic costs).

Indicators were developed to inform each of the elements of the conceptual framework. The indicators were based on key policy and injury prevention questions. A data set of supporting numerator and denominator variables was developed to inform the indicators. Standards and definitions for each of the variables were also developed.

## GAP ANALYSIS

A gap analysis was then undertaken to determine which agencies already collect the supporting variables and to what standard. The analysis found that the volume of data varied considerably across agencies, and no agency recorded all injuries or had all the data about an injury event. This analysis confirmed that fragmentation is a key problem with existing source of injury information. The second major finding confirmed that agencies have inconsistent data standards and, in many cases, use different definitions or classifications to describe the same concept.

## MODEL FOR INFORMATION MANAGEMENT

One of the primary objectives of the review was to develop an approach to manage and report on injury indicators in the interim and the long term. A number of potential models were identified based on legislative and overseas examples. The models were contrasted with the problems that had been identified, and a selection was made on the basis of which model would best solve the problems. The model chosen was an “injury surveillance model”, which creates a data set that allows comprehensive statistical analysis of injury indicators through the integration of data.

A governance and accountability model was also developed, based on similar models in Canada and Australia. The key feature of the model is an Information Manager who integrates and provides access to the data. Another feature of the model is a Ministerial Advisory Panel. The roles of the Injury Information Manager and the Ministerial Advisory Panel are discussed in the following sections.

#### 4.4 INJURY INFORMATION MANAGER

The Injury Information Manager role was established to produce coherent injury statistics in New Zealand by collecting and aggregating injury-related information. The functions of and legislative mandate for the Injury Information Manager are described in Part 8 of the Injury Prevention, Rehabilitation and Compensation Act 2001 and include:

- developing, setting, publishing, and maintaining standards after consultation with others
- collecting and aggregating injury-related information
- facilitating access (including by publishing) to injury-related information and unit record data
- considering and reviewing current and future injury-related information requirements.

Statistics New Zealand was appointed to the role of Injury Information Manager on 19 June 2002, following a Cabinet decision in December 2001. Development of the new injury statistics system began in August 2002 and is expected to extend over three years.

In the first year, a trial integration (pilot stage) was carried out using ACC and NMDS data (which represent the bulk of the available injury information). The primary objective of the pilot study was to establish the feasibility of integrating the two primary sources of injury data. The feasibility report from the pilot study<sup>73</sup> was submitted in May 2004. The following information was sourced from that report and supplemented through consultation with the Injury Information Manager.

##### PURPOSE OF THE SURVEILLANCE

The aim of the Injury Statistics Project is to create a comprehensive injury database by collecting together available administrative sources. The new information is expected to assist to monitor the incidence, trends, and distribution of injury events; identify emerging health and safety hazards, including clusters of events and outbreaks; and determine the cost of injury to society. The programme aims to meet a variety of information needs, ranging from the regular production of official statistics to the provision of ready access to expert users of micro data.

##### POPULATION COVERED

The intended population covered by the database is all injuries reported to the contributing agencies in New Zealand. The database is not exclusive to work-related injuries.

Occupational disease has been excluded from the project, at least for the time being. The Injury Data Review recommended that, in principle, occupational disease should be included in the definition of injury. However, it was excluded from the project until a clear picture of the incidence of occupational injuries in New Zealand is obtained, the surveillance systems measuring occupational disease can be improved, and further research can be undertaken to decide the most appropriate means of occupational disease surveillance. As a result, the project has taken deliberate measures to identify and exclude cases that have characteristics more consistent with occupational disease than occupational injury (for example, by excluding ACC claims related to gradual process injuries).

## DATA INTEGRATION METHODS

The injury surveillance model developed by the Injury Data Review was designed to create a data set by making use of the segregated existing occupational injury data sets. It was recognised that each agency has its own legislation that defines its area of jurisdiction, and that one injury may result in more than one administrative record within an agency (e.g. several hospital discharges). It may also result in a range of records being held by multiple agencies (e.g. a motor vehicle accident could result in an LTSA record of an injury, an admission to hospital, and an ACC claim). These records need to be integrated to form a unifying injury record that contains all of the available information about each injury. This improves occupational injury surveillance by producing a single data set that is as complete as possible<sup>4</sup>.

Vertical integration helps to identify gaps and overlaps in coverage by the various agencies responsible for measuring and monitoring occupational injury in New Zealand. Horizontal integration links the individual data sets to new pieces of information. Thus, better use is made of the data that is already recorded by the various agencies, and no one agency needs to be responsible for collecting the entire data set. In this way, the model builds upon the systems already in place, recognising that some agencies already collect information for their business purposes that can also be used for statistical purposes<sup>4</sup>.

The *Injury Statistics Project Pilot: Feasibility Report* describes the methodologies used in the development of the trial database. Two key activities were involved: data cleaning and transformation, and record linkage.

Data cleaning and transformation tasks involved:

- transforming ACC records from monthly to quarterly records
- grouping the health events related to a single injury into hospital treatment records
- excluding claims, health events, and hospital treatment records that were out of scope
- cleaning the free-text ACC number field on the NZHIS data to identify valid codes
- adding a Statistics New Zealand-assigned unique identifier
- setting invalid codes to missing
- re-formatting fields (e.g. dates) as required
- creating new fields for integration (e.g. phonetic codes for names)
- choosing one version of a field, where more than one was available.

Cleaning and transformation rules were developed, implemented, and tested after extensive study of the unit record data. Once these data preparation steps had been completed, the data was input to a record linkage process.

A probabilistic record linkage methodology was used to match records from ACC data and NMDS data. The most important field for identifying matched records from the two files was the ACC45 number. Nearly 80% of the links made were based on agreement of this field. Other fields used in the linkage were person-level fields (NHI number, given names, surname, birthdate, sex) and injury-level fields (injury date, diagnoses). Full details of the record linkage methodology are documented in another report by the Injury Information Manager: *Injury Statistics Project Pilot: Technical Description of the Record Linkage Methodology*<sup>91</sup>.

It was estimated that the linking process identified about 98% of the true matches. An estimated 0.6% of the links that had been made were false positive links, and 2.2% of the (estimated) number of true matches had been overlooked, i.e. were false negative links. The level of statistical bias resulting from errors in the data linkage was reported as being relatively low and acceptable<sup>73</sup>.

Since the feasibility report was released, a second linking exercise has recently been carried out, using the same data (from the September 2002 quarter).



## COMPLETENESS OF COVERAGE

At this stage of the Injury Statistics Project, there have not been any significant omissions identified in the population covered. The project has, to date, focused on establishing a reliable database of injuries. Subsequent work will focus on establishing the number of injured persons.

The system attributes service use, rather than recording injury where treatment or compensation is not sought. Although this should cover the majority of serious injuries, it is thought that particular socioeconomic groups could be poorly represented if they have not accessed hospital or ACC services. A detailed analysis of poorly-covered population groups will occur in the future.

The results from the trial integration of ACC and NZHIS data found that:

- about 99% of all identified injuries were covered by ACC claims, with the remaining 1% identified from hospital discharge records
- about 5% of all injuries resulted in hospitalisation and, of these, about one-quarter were not covered by an ACC claim
- over 90% of injuries were for relatively minor conditions that required medical treatment only.

## COMPLETENESS AND ACCURACY OF DATA

The feasibility report concluded that ACC and NZHIS data can be integrated to a suitable level of quality, and that confidentialised versions of the NZHIS and ACC unique identifiers are suitable for completing the record linkage process to an acceptable level of accuracy for statistical purposes. The creation of an injury database, based on the pilot prototype, was considered to be feasible.

Approximately 40% of the indicators proposed by the Injury Data Review could be produced from the pilot data, and the feasibility report estimated that it should be possible to bring this figure to 95% of the indicators once outstanding issues had been resolved. A range of issues affect the potential completeness and accuracy of data compiled to date by the Injury Information Manager. These include the following:

- Gaps in the available information (where neither ACC nor NMDS data were able to fully populate all fields): Further work is to be undertaken to identify and resolve gaps in consultation with the data providers.
- Possible duplicate ACC claims (where the injured person may have reported the same injury to two different treatment providers and ACC has not linked them): Further investigation will enable appropriate action to eliminate them from the final data set.
- Use of M codes (musculoskeletal disease) as opposed to S or T codes (injury, poisoning, and certain other consequences of external causes): M codes have been used by some hospitals to diagnose injury, and further investigation is required to assess their ongoing effect on the grouping of health events.
- Various technical issues, including selecting appropriate start and end dates, dealing with records that have been deleted or changed in the NMDS, managing NHI merges and unmerges, and revisions to the health event grouping methodology and record linkage methodology.
- Identification of areas that cannot be well measured from the pilot data.
- Estimating the number of injured persons (as the work to date has focused on compiling a comprehensive database of injuries).

In addition to the issues identified in the pilot database that will be addressed as the project progresses, a number of other factors present an ongoing challenge for the Injury Information Manager, requiring continuous vigilance

to stay up to date with health system changes, in order to interpret changes in the apparent incidence and prevalence of injury in New Zealand. These include:

- changes in service provision (e.g. establishment of a new facility or closure of an existing facility)
- changes in social norms (e.g. a domestic violence campaign increasing awareness and therefore service utilisation)
- administrative and legislative changes affecting numbers of people accessing services (e.g. recent ACC legislation regarding psychological damage from an acute effect)
- changes in data collection systems (including forms, data collection procedures, classification systems and definitions, and databases).

An issue for the completeness of data received by the Injury Information Manager is that organisations only collect what they perceive as useful. The individual systems are set up to extract only the data needed to fulfil the requirements of the organisation.

### **Identifying and demographic details**

Unique identifiers used to link ACC and hospital data were the ACC45 claim number and NHI number. A range of other variables were used for checking purposes including names, date of birth, and sex.

Because the unit of integration was injuries, it was necessary for record linkage to establish both that ACC and NMDS records were for the same person and for the same injury for that person.

Unique identifiers, names, and addresses were removed from the output data set after linkage. Age, sex, and geographic reference details were retained for use as demographic statistics.

### **Ethnicity**

Examination of ethnicity has shown that the likelihood of agreement between the data sets was low because of misclassification, data collection, and self-reporting practices. Decisions have not yet been made about how this issue will be dealt with. Where the ethnicity codings within the two data sets do not accord, they will not necessarily be prioritised or treated as a “conflict”; it may be that each database provides a different angle on ethnicity. However, if one source is identified as being more reliable, it may be used as the primary source.

### **Occupation**

Occupation is included in the data set, with ACC being the primary source. The quality of the variable for the purposes of the injury database is still being assessed.

### **Industry**

Industry is included in the data set, with ACC being the primary source. The quality of the variable is still being assessed. However, it is based on the Statistics New Zealand classification system, goes down to five digits for work-related claims, and quality is understood to be well-coded.

### **Work-relatedness**

The ACC work-relatedness flag is included where it has been coded. As the flag is only reliably used for claims funded out of the work-related ACC accounts, the Injury Information Manager would prefer to develop a more refined indicator of work-relatedness. Currently, however, the work-related E codes within the NMDS are understood to be poorly populated.

### **Diagnosis**

The trial data set includes diagnosis/injury type codes from both ACC and the NMDS (including ICD and Read codes). Sometimes there are multiple injuries and/or diagnoses, and all are recorded. Ultimately the Injury

Information Manager will be looking to map all diagnoses to a consistent version of ICD-10. There are some concordance issues between the 2nd and 3rd Editions of ICD-10-AM.

#### **Site**

Site coding from the ACC system is included. The quality of this field is still being assessed, including concordance with ICD coding information from NMDS records.

#### **Agent**

Agent coding from the ACC system is included. The quality of this field is still being assessed, including concordance with ICD coding information from NMDS records.

#### **Mechanism**

Agent coding from the ACC system is included. The quality of this field is still being assessed, including concordance with ICD coding information from NMDS records.

#### **Cost**

Cost data is included. It is mainly sourced from the ACC data set. Ultimately, the Injury Information Manager is looking to include hospital data for both admissions and emergency departments.

A limitation with current cost data is related to the period covered by the data set. Because only a three-month period is covered by the current data set, full cost data will not be recorded for episodes that began prior to the three-month period or were still ongoing at the end of the period. The data set will become more complete with regard to costs as it ages.

### **TYPES OF SURVEILLANCE, DATA ANALYSIS, AND INTERPRETATION USED**

The role of the Injury Information Manager is to create a database that can be accessed by researchers and organisations to conduct surveillance and data analysis. As such, the role focuses on information management rather than surveillance or analysis.

### **HOW INFORMATION IS DISSEMINATED AND/OR INTEGRATED INTO POLICY MAKING**

The Injury Information Manager has identified three broad markets for the data:

- Media and education sector – requiring evaluated statistics
- Policy analysts – requiring spreadsheets and possibly micro data
- Academic researchers – requiring micro data.

Statistics New Zealand will provide access to unidentified injury microdata for statistical research purposes, according to its standard microdata protocols. Access to identified microdata may also be approved, in some circumstances, for research purposes. Such access would be subject to stricter conditions, incorporating policy conditions of the providing agencies as well as Statistics New Zealand, and a key requirement will be prior consent from research subjects for release of their information.

Data integration will be conducted quarterly, and it would therefore be possible to report quarterly on the database. However, data will initially be reported on an annual basis.

No ad hoc reports have been produced from the data to date. The Injury Information Manager is keen to disseminate reports which are small, flexible, and responsive to user needs. This could take place in collaboration with other agencies. Collaborative approaches are viewed as an important step in understanding the needs of users.

There is no information available from any current administrative data sources that will support full coverage analysis of injury events, although this may be possible for particular types of injury events. For example, the Land Transport Safety Authority (LTSA) can provide this information for traffic crashes.

#### **FUTURE PLANS FOR DEVELOPMENT/IMPROVEMENT**

Following the successful completion of the feasibility study to link ACC and hospital discharge data, a statistical production system was built to integrate this data on an ongoing basis. At the same time, investigation of the feasibility and value of including other sources was undertaken. As a result, it was decided to include road traffic crash records from the then Land Transport Safety Authority. Other sources were found to be too difficult and costly to integrate or were considered not to add sufficient statistical value to the database.

The statistical production system is now undergoing testing with live production data. Statistics NZ produced an initial statistical report using a selection of unintegrated injury fatality data in October 2005. A more comprehensive report based on integrated data is planned for the second quarter of 2006, when testing and statistical quality assurance is expected to be sufficiently advanced. When this second release has been achieved, Statistics NZ will seek to provide wider access to the database through the publication of statistical data cubes on its internet website and the inclusion of microdata sets in its data lab access service. These developments are scheduled for later 2006, subject to successful release of the integrated data .

#### **4.5 INJURY SURVEILLANCE PANEL**

The Injury Prevention, Rehabilitation, and Compensation Act 2001 provides for a Ministerial Advisory Panel to provide advice on the data sets, reporting, and the direction and strategy of the injury surveillance model. The panel comprises surveillance experts, stakeholder representatives in the injury sector, government agency data providers, and users. It is chaired by the Hon Stan Rodger, a former Minister of Labour. The inaugural meeting of the panel was held in March 2004.

The governance and accountability model proposed by the New Zealand Injury Data Review included a direct line of accountability from the Information Manager to the “Purchase Minister” (the Ministers of Statistics and ACC) and, in addition, for the Minister to receive advice from a Ministerial Advisory Panel. Under this arrangement, the Purchase Minister purchases outputs from the Information Manager but does not control the methodology used to produce the results or the manner of their publication and dissemination. The Information Manager reports directly to the Purchase Minister, and is responsible for achieving the outputs specified in the Purchase Agreement with the Minister<sup>4</sup>.

By directly reporting to the Minister, the Advisory Panel has influence, and key stakeholders who provide data have increased commitment to the successful implementation of the model. The panel encourages the Information Manager to consult with and respond to the concerns of stakeholders and data providers and is a forum to provide the Information Manager with external feedback needed to ensure that the information produced is relevant and effective<sup>4</sup>.

In keeping with the current role of the Injury Information Manager, the role of the panel excludes oversight of occupational disease data integration.

#### **4.6 DEATH CERTIFICATES AND CORONERS' REPORTS**

Under the Births, Deaths and Marriages Registration Act 1995, a doctor who attended the deceased during their illness must, if (and only if) satisfied that the person's death was a natural consequence of the illness, sign a medical certificate of causes of death immediately after the doctor learns of the death. Where a death has occurred in violent, unnatural, or suspicious circumstances or the cause of death is unknown, the death must be reported to the coroner<sup>92</sup>.

When a death is reported, the coroner must establish a cause of death. Under the Coroners Act 1988, the coroner has a wide discretion under the law to make enquiries and publicly investigate deaths, including summoning witnesses, ordering post mortems, and seeking specialist advice from pathologists and others. In many cases the police act as the coroners' officers in carrying out investigations on behalf of the coroner<sup>93</sup>.

#### **SYNOPSIS**

Because coroners' records include data obtained from many sources, they generally represent a rich source of information for determining the nature and circumstances surrounding some deaths from injury in New Zealand<sup>6</sup>. Most occupational injury deaths, apart from motor vehicle and bystander deaths, would be investigated by the coroner.

Coroners' findings are not recorded electronically, and this represents a major barrier to the efficient retrieval of surveillance information<sup>85</sup>. This is both symptomatic of, and probably contributes to the Coroners' Court's tendency to report findings on a case-by-case basis rather than aggregating findings to identify issues and trends. The Law Commission<sup>16</sup> has identified this as a major weakness.

Medical certificates of causes of death provide information for the Births, Deaths and Marriages register and the NZHIS Mortality Collection. All deaths in New Zealand are certified either by a medical practitioner or a coroner. However, the medical certificate of causes of death does not collect any information on whether or not the death is work-related, and the recording of occupational details is unstructured.

#### **BACKGROUND**

The Births, Deaths and Marriages Registration Act 1995 requires all deaths to be notified and registered. The Births, Deaths and Marriages (BDM) office of the Department of Internal Affairs holds records dating back to 1848. Registration of births, deaths, and marriages became compulsory for Pakeha in 1856 and for Māori in 1913. However, it was not until 1961 that registration of Pakeha and Māori births and deaths were combined under one system<sup>94-95</sup>.

New Zealand has had coroners for well over 100 years. Coroners are appointed by the Governor-General and have the powers of District Court judges, including the power to summon witnesses. There are over 70 coroners in New Zealand<sup>93</sup>.

## PURPOSE OF THE SURVEILLANCE

The Registrar-General of Births, Deaths and Marriages is required to keep a register of the causes of all deaths as recorded on each medical certificate or coroners' finding<sup>44</sup>. The register is the key data source used by the NZHIS to compile the Mortality Collection, which is widely used in mortality studies and international comparisons.

The Coroners Act 1988 requires the coroner to establish the fact that a person has died; the identity of the deceased person; and where, when and how the death occurred (s15a). Since 1 January 1989, the coroner has also been required to establish, as far as possible, the circumstances of the death and make recommendations or comments aimed at reducing the chances of similar deaths recurring (s15b).

## POPULATION COVERED

All deaths that occur in New Zealand must be registered with Births, Deaths and Marriages.

The definition of deaths which must be reported to the coroner are set out in section 4 of the Coroners Act 1988 and include:

- every death that appears to have been without known cause, suicide, or unnatural or violent
- every death in respect of which no doctor has given a medical certificate of causes of death
- every death that occurred during or in connection with a medical, surgical, dental, or other similar operation or procedure, or the administration of an anaesthetic
- the death of certain persons under the care or custody of the State, including children in State custody or care, patients undergoing compulsory treatment for a mental health disorder or intellectual disability, patients undergoing compulsory detention and treatment for a drug or alcohol addiction, prison inmates, and persons in police custody.

This definition is much more closely aligned with accidental injury deaths than with deaths from occupational diseases, although it does not specifically preclude a coronial investigation into a death resulting from a suspected occupational disease.

## METHOD AND FREQUENCY OF DATA COLLECTION

The notification of death for registration form (BDM28) is the form that records the basic information required for the Register of Births, Deaths and Marriages. The BDM28 must be accompanied by either a medical certificate of causes of death (BDM50), a medical certificate of causes of foetal and neonatal death (BDM167), or a coroners' certificate.

The BDM50 is provided in 70% of deaths. It was designed in accordance with the international death certificate recommended by WHO, to ensure that the questions asked on death certificates are uniform throughout the world<sup>44</sup>. The certifying medical practitioner completes the BDM50, which is then forwarded to the funeral director. The funeral director completes the BDM28 and forwards both forms to Births, Deaths and Marriages. Information from these forms is entered on an electronic register.

The BDM 167 is provided in 0.01% of deaths, following a similar process to the one described above.

The Coroners' Certificate is provided in 30% of deaths. It sets out the coroners' findings regarding the cause of death and is forwarded to BDM by the Coroners' Court. Initially BDM receives an Order for Disposal, where the cause of

death is registered as “subject to coroners’ finding”. When the outcome of the inquest (if held) is notified to BDM, the cause of death is captured as stated by the coroner and is identified on the system as a “coroners’ finding”.

Coroners’ files are paper-based systems only. Therefore, this information is difficult to use in routine surveillance, as information on work-related deaths can only be obtained through time-consuming and inefficient searches of paper files<sup>96</sup>. Births, Deaths and Marriages captures what is written on the BDM50 and does not truncate or summarise the cause of death. Cause of death is, however, coded in the Mortality Collection, which makes that data set a more suitable source of data for surveillance purposes.

#### COMPLETENESS OF COVERAGE

The Register of Births, Deaths and Marriages is complete for deaths occurring in New Zealand.

Coroners’ files cover all cases referred to the coroner, including most deaths from occupational injury. Coroners’ files are unlikely to cover deaths from occupational disease in any adequate way. An important weakness that limits the usefulness of coroners’ reports for surveillance is that the data collection process does not result in timely information, since coronial inquiries can take months or years to complete. Another major disadvantage of the coronial surveillance system is that coroners’ reports do not record bystander deaths, and capture is poor of work-related motor traffic crashes<sup>96</sup>.

#### COMPLETENESS AND ACCURACY OF DATA

Since 1998, the Register of Births, Deaths and Marriages has recorded all details in the BDM28 (including name, date of birth, address, sex, date and place of death, and if provided, details such as ethnicity and occupation) and key details from the BDM50 (including cause of death, date last seen, and identity of certifying doctor).

Prior to 1998, fewer details were entered on the register and a scanned copy of forms was stored electronically. When pre-1998 registrations require maintenance they are upgraded to full data registrations, but these represent a small proportion of total pre-1998 registrations.

Coroners’ reports may record a great deal of detail regarding the circumstances of the death. Malcolm and colleagues<sup>6</sup> argued that coroners’ reports have considerable potential as a data source for occupational fatality research because of the level of detail that is often collected. However, the lack of electronic, coded information means that the use of coroners’ reports can be resource-intensive. The lack of uniformity between coroners and coronial practices, and therefore the consistency of their reports, is also a disadvantage<sup>16</sup>.

Key fields of interest are summarised below.

#### **Identifying and demographic details**

The Register records names of deceased, date of birth and age, sex, usual home address, date of death, and place of death. It also assigns a BDM registration number as a unique identifier.

#### **Ethnicity**

Ethnicity is entered on the BDM28 by the funeral director. The form provides the following options as tick boxes: NZ Māori, NZ European or Pakeha, Samoan, Cook Island Māori, Tongan, Niuean, Chinese, Indian, Other European (Dutch, English, Scottish, Irish, Australian), Other (specify).

The form also records Māori descent based on the question: “Was the deceased descended from a New Zealand Māori?” (Yes, no, don’t know).

### **Occupation**

The “usual occupation, profession, or job” is recorded on the BDM28 by the funeral director as free text. This question can be ambiguous as it does not necessarily capture the main occupation/profession/job of the deceased during his/her working life, and there is little guidance given to funeral directors regarding the nature of information sought<sup>42</sup>.

### **Industry**

Industry is not recorded.

### **Work-relatedness**

The medical certificate of causes of death (BDM50) does not collect any information on whether or not the death is work-related (whether through occupational disease or occupational injury). Coroners’ findings may attribute work-related factors as causes of death on the coroners’ certificate, but this is not recorded on the Register of Births, Deaths and Marriages.

### **Cause of death**

Cause or causes of death (as specified in BDM50 or the coroners’ certificate) are recorded on the Register as free text. The form elicits hierarchical information about the causes of death at four levels:

- Direct cause (the disease, injury, or complication directly leading to the death).
- Antecedent causes (any morbid conditions giving rise to the direct cause).
- Underlying conditions (if any).
- Other significant conditions contributing to the death, but not related to the disease or condition causing it.

The New Zealand Health Information Service has issued a guide for doctors and coroners<sup>44</sup> to facilitate consistent recording of causes of death.

### **Agent/mechanism**

If the death was the result of an injury, the certifying practitioner records, on the BDM50, a free-text description of how and where the injury occurred. If the death was the result of an infectious disease, the name of the disease is recorded.

Coroners’ reports may contain a detailed description of external agents and mechanisms that contributed to an injury death, depending upon the circumstances of the individual case.

## **DATA INTEGRATION METHODS**

Births, Deaths and Marriages data based on death certificates is routinely batched and transmitted to NZHIS for inclusion in the Mortality Collection.

Coroners’ reports often draw upon multiple sources of information that contribute to an inquiry, such as witness statements and post mortem findings. Coroners’ reports are, in turn, one of the supplementary sources of information used by NZHIS in compiling mortality data in the Mortality Collection.



## TYPES OF SURVEILLANCE, DATA ANALYSIS, AND INTERPRETATION USED

Cause-of-death statistics are used extensively in health status measurement in New Zealand and for international comparisons<sup>44</sup>. The data set used for these purposes is generally the New Zealand Health Information Service (NZHIS) Mortality Collection, which draws data from the Register of Births, Deaths and Marriages and is discussed later.

Coroners are required to determine the circumstances of each death they investigate and, where appropriate, make publicly available recommendations or comments to promote the avoidance of similar circumstances recurring and resulting in further deaths. This is done on a case-by-case basis. A 2000 Law Commission Report<sup>46</sup> pointed out the shortcomings of this approach: “With certain notable exceptions, such as the exemplary report of the Invercargill coroner concerning the Foveaux Strait Air Accident, deaths tend to be considered in isolation. There is no system for appraisal of the background factors contributing to the death to determine whether it is an isolated episode or an example of a deepseated problem. The Commission considers it imperative that an investigation into the possibility of fundamental causes be a regular exercise of the coroners’ function. A true appraisal of apparently insignificant incidents can reveal, and then remove or reduce, the risk of disaster. This is made difficult at present, however, because there is no system for the collation and appraisal of one coroners’ finding in relation to others”.

Coroners’ findings can be used by other parties to identify issues and trends on a population basis. The Work-Related Fatal Injuries Study (WRFIS)<sup>96</sup> created a data set extracted from coroners’ records for all work-related fatal injuries in New Zealand over the decade 1985–94. This data set provides “a uniquely rich and complete set of information on fatal injuries in New Zealand during that period, with a much better capture of cases than all other sources combined”<sup>85</sup>. However, as the WRFIS researchers found, a comprehensive review of coronial files is extremely resource-intensive.

## HOW INFORMATION IS DISSEMINATED AND/OR INTEGRATED INTO POLICY MAKING

Cause-of-death statistics are used extensively in policy formulation and monitoring<sup>44</sup>. The data set used for these purposes is the NZHIS Mortality Collection.

### *Future plans for development/improvement*

It has been proposed that a work-relatedness indicator be recorded in the BDM50. The certifying practitioner would record their opinion that the death had arisen from the deceased’s occupation. This would “greatly facilitate future surveillance and studies of work-related fatal injuries in New Zealand”<sup>96</sup>. However, it may be less effective in detecting cases of occupational disease, especially those with long latency periods. This issue is currently under consideration by an inter-agency working group.

The need for a comprehensive coronial database is well recognised<sup>5, 16, 85</sup>. The Law Commission, in its report on coroners in August 2000<sup>16</sup>, noted that the 1999 Coroners’ Conference had passed a resolution to the effect that: “the Conference agrees with the Law Commission’s view that there is a need for a national collation and appraisal of Coroners’ finding[s] and is of the view that the establishment of a National Coronial/Surveillance System is critical to addressing this and for facilitating the work of individual coroners and further recommends that the National Coronial/Surveillance System be modelled on the Australian one. In particular the system would have a minimum data set; (data elements to be recorded for all events) and that there be modules for specific events such as suicides, firearms, drownings, work related deaths, road deaths, drug related deaths and fire”.

A number of submissions to the Law Commission addressed the need to set up specialist modules of data to complement a core coronial data set, including a module for work-related fatal injuries, among others<sup>46</sup>. The Injury Prevention Research Unit made a similar recommendation in its 1999 report<sup>5</sup>.

#### **4.7 NEW ZEALAND HEALTH INFORMATION SERVICE**

The New Zealand Health Information Service (NZHIS) maintains the Mortality Collection and National Minimum Data Set, which were described in detail in the occupational disease section of this report. The following paragraphs highlight key issues from an occupational injury surveillance perspective.

##### **4.7.1 MORTALITY COLLECTION**

The Mortality Collection covers all registered deaths in New Zealand in a time series dating back well over 100 years. It integrates cause-of-death data from a range of sources including Births, Deaths and Marriages data; coroners' findings; and postmortem and toxicology reports, *inter alia*.

Occupation data is inadequate for occupational injury surveillance. The recording of occupation is weak and involves the use of a free-text field on both the form and the database, with little in the way of guidance to funeral directors who complete the occupation details on the notification of death registration form, or data quality checks.

There is a work-relatedness flag on the database, which was added in 2000. The definition of work-related is whether the cause of death "was related to an accident while the deceased was working at their place of paid employment". NZHIS completes this field based on the information available on death certificates and coroners' reports, but does not conduct any follow-up on this information where it is not provided. Therefore, "yes" indicates a case is work-related but "no" indicates that a case might not be work-related. Under-counting is most likely to occur where it is not obvious that the deceased was at a place of work (e.g. motor vehicle accidents, people working in recreational areas such as ski instructors).

Coronial investigations of some injury deaths take some time to carry out and, as a result, the Mortality Collection data may be 12 months' old or older before it contains complete cause-of-death records on deaths from injury.

The database records individuals' NHI numbers, enabling linking of individual records to other data sets that also use the NHI. Although data quality issues with the NHI (in particular, duplicate NHI numbers) must be acknowledged, efforts are being made to address these issues.

##### **4.7.2 NATIONAL MINIMUM DATA SET (NMDS)**

The NMDS provides complete coverage of public hospital inpatient and day patient discharges, and fairly complete coverage of discharges from private hospitals. Particular strengths in the data set, aside from its completeness, include strong coding of injury type and severity (using ICD).

The recording of occupation is inadequate for the surveillance of occupational injury, as it is under-recorded and is restricted to free-text information only.

There is no work-relatedness indicator on the NMDS. However, the potential to identify work-related injuries using E codes has been improving with successive upgrades of the ICD system, in particular the latest version which is used in New Zealand from 1 July 2004.

Because patients treated in emergency departments but not admitted are not included in the NMDS, there is poor coverage of some “minor” injuries (including, for example, some fractures) which may be of considerable importance from the perspective of occupational injury statistics<sup>6</sup>.

The NMDS records individuals’ NHI numbers, enabling linking of individual records to other data sets that also use the NHI. The ACC claim number is also recorded for the majority of discharges, enhancing the utility of the data set for use in conjunction with ACC data.

#### **4.8 OCCUPATIONAL SAFETY AND HEALTH SERVICE – HEALTH AND SAFETY ACCIDENT RECORDING DATABASE (HASARD)**

The Occupational Safety and Health Service is responsible for the operation and enforcement of the Health and Safety in Employment (HSE) Act 1992, the principal legislation for ensuring workplaces are safe and healthy. OSH administers the Health and Safety Accident Recording Database (HASARD), which records serious harm notifications.

##### **SYNOPSIS**

The HSE Act requires employers to notify OSH about workers who suffer serious harm as a result of their work. The purpose of the HASARD system is to record the details of these notifications and any subsequent investigations carried out by OSH inspectors.

HASARD currently has a low potential to contribute to the surveillance of occupational injury. Key problems include:

- significant under-reporting of serious harm occurrences by employers, which may be attributed to a range of factors including fear of prosecution, lack of awareness of employer’s statutory obligations, and few incentives to report
- a system design that does not lend itself well to the aggregation of data for surveillance purposes, including a record structure centred on events rather than individuals, inability to track individuals in the system, and the use of pick-lists that present hierarchical classification systems in a non-hierarchical way and include overlapping categories
- a low state of readiness of the data set for integration with other key data collections, such as NZHIS and ACC data, due to a lack of compatible unique identifiers (such as NHI number or ACC number), and the use of non-standard coding systems for fields such as diagnosis, occupation, and industry
- work practices that are intended to support efficient investigations rather than the recording of high-quality data, including the entry of data based on the initial notification, which is not necessarily updated at the end of the investigation, and day-to-day work pressures that provide stronger incentives for speed than accuracy of data entry.

Serious harm notifications to OSH tend to contribute to the prevention of the recurrence of harm through the identification of learnings from individual investigations rather than aggregated data.

## BACKGROUND

HASARD was established in 1994 as the database used to house serious harm notifications.

The Civil Aviation Authority (CAA) and Maritime Safety Authority (MNZ) have been designated, since May 2003, as responsible for enforcing the HSE Act with respect to the operation of aircraft and ships respectively. Health and safety inspectors in other workplaces are employees of OSH.

## PURPOSE OF THE SURVEILLANCE

The HSE Act requires employers to notify OSH about workers who suffer serious harm as a result of their work. The Act also requires employees to accept responsibility for their health and safety while at work and make sure that their actions do not harm other workers.

The principal purpose of HASARD is to prevent ongoing harm by reducing recurring incidents in workplaces. As noted previously in relation to NODS, the practical focus has been predominantly on identifying lessons from individual investigations rather than detecting national issues and trends through the collection and analysis of comprehensive data.

## POPULATION COVERED

The HSE Act defines serious harm as death, or harm of a kind or description declared by the Governor-General by Order in Council to be serious for the purposes of the Act. The definition of serious harm as specified in Schedule 1 to the HSE Act includes those occupational diseases discussed in the NODS section, together with the following occupational injuries:

- Any chemical or hot metal burn to the eye, penetrating wound of the eye, bone fracture, laceration or crushing that amounts to or results in permanent loss of bodily function, or temporary severe loss of bodily function.
- Amputation of body part.
- Burns requiring referral to a specialist registered medical practitioner or specialist outpatient clinic.
- Loss of consciousness from lack of oxygen.
- Loss of consciousness, or acute illness requiring treatment by a registered medical practitioner, from absorption, inhalation, or ingestion of any substance.
- Any harm that causes the person harmed to be hospitalised for a period of 48 hours or more, commencing within seven days of the harm's occurrence.

The legislation covers workers, bystanders (in or in the vicinity of a place of work), and volunteers doing work on an ongoing and regular basis that is an integral part of the business (but not, for example, volunteer fundraising for a sports club or school).

A “place of work” includes any place where any person works for gain or reward; where the employee may come to eat, rest, get first-aid or pay, report in or out, get instructions, deliver goods or vehicles; or through which the employee must pass to reach a place of work. Such a place may form part of a building, structure, or vehicle but excludes domestic accommodation provided by the employer for the employee. This definition includes car travel by mobile workers but not by commuters.

Currently the CAA and MNZ are not reporting the serious harm notifications they receive to OSH. As a result, HASARD only covers land-based occurrences of serious harm.

## METHOD AND FREQUENCY OF DATA COLLECTION

The HSE Act requires notification of serious harm and accidents to OSH by employers, principals, and the self-employed. However, any person can make a notification. The Police often notify OSH about work-related deaths. The steps in the notification and data collection process are as follows.

### Notification

Notifications are required to be made to regional OSH offices (by phone or fax) as soon as possible after the occurrences of accidents or serious harm, and followed by written notice of the circumstances within seven days using the Form of register or notification of circumstances of accident or serious harm. The purpose of the initial phone or fax notification is to enable OSH to determine whether or not to investigate the serious harm.

### Data entry

Cases are entered on HASARD on the basis of written notifications of serious harm. Data entry is carried out at OSH regional offices. The extent to which records are updated upon conclusion of the investigation is unclear. However, as with NODS cases, there is little incentive to update records in the context of day-to-day work priorities, which are focused on carrying out investigations, and a lack of feedback demonstrating the value of HASARD data.

### Investigation

When an OSH regional office is advised of an accident, incident, or other occurrence of serious harm, an OSH inspector decides whether the cause should be investigated to determine whether there has been a breach of the Act.

OSH inspectors investigate notifications of serious harm including fatalities. The investigations are undertaken in order to determine causes; whether action has been taken or needs to be taken to prevent recurrence, and to secure compliance with the law; identify lessons to be learned, both in the workplace involved and the industry at large, and to influence the law, health and safety standards, and guidance material; and, if there has been any breach of the law, to determine the appropriate response.

### Intervention

As with NODS notifications, interventions include working with employers to achieve voluntary compliance and use of OSH enforcement powers. The purpose of the intervention is to prevent other workers from suffering the same consequences as a reported case.

## COMPLETENESS OF COVERAGE

HASARD provides incomplete coverage of the incidence of work-related serious harm. For example, OSH coverage of fatalities was found in the Work-Related Fatal Injury Study (WRFIS)<sup>85</sup> to be around 40%, which is similar to comparable agencies in the US<sup>89</sup> and Australia<sup>90</sup>.

Employer notifications are the sole source of data for HASARD. Therefore, completeness of coverage is totally dependent on the number of employers who make notifications. The 1996 Inquiry into the Administration of Occupational Safety and Health Policy states that “OSH itself acknowledges a pathetic level of compliance with statutory duty to report serious harm instances”<sup>7</sup>. There are few incentives for employers to report to HASARD. Disincentives to report include fear of prosecution or investigation. An important strength of the HASARD monitoring system is that anyone can make a notification, which potentially eliminates problems caused by this disincentive<sup>6</sup>. However, in practice, the vast majority of notifications are made by employers.

Large employers are more likely to report than small employers, due to the inclusion of human resources personnel (which may include a dedicated OSH officer) within their business structures and a greater awareness of their obligations under the HSE Act. It is only within the last two years that the self-employed have been required to report serious harm.

A lack of employer knowledge of OSH reporting requirements is thought to be a key obstacle to the collection of data, particularly from small businesses. This issue is substantial, considering 95% of New Zealand businesses are small businesses and 75% of New Zealanders work for a small business. Part of the confusion may stem from a misunderstanding of the relationship between OSH, ACC, and NZ Police. Employers may believe that, if an employee has made a report to ACC, or if the Police have been notified, then the case is known to public authorities and a separate report to OSH is unnecessary.

The lack of confidence in the database is reflected in a 1990 Dunedin-based study which estimated that 70 of 655 occupational injuries that resulted in treatment being sought in a public hospital emergency department should have been reported to OSH, but only 40 injuries were reported for the entire region<sup>47</sup>.

In early 2004, OSH completed a data matching exercise with ACC titled the ACC Notifications Project. ACC provided OSH with the 1000 most severe claims according to a severity index. OSH studied the top 83 of these claims, finding that they all represented “serious harm”. Of those 83, however, only 13 had been notified to OSH – a 16% notification rate. Overall, the ACC work-related account receives approximately 250,000 claims, while the number of serious harm notifications OSH receives is approximately 10,000. This can be partially attributed to the use of different “severity” definitions. However, under-reporting to the HASARD system is also thought to contribute significantly.

Reporting to HASARD is also skewed by industry, with stakeholders noting that there are higher rates of reporting from primary producing and manufacturing than from some of the service industries.

Importantly, from an occupational disease surveillance perspective, data collected by HASARD relates only to acute effects from exposure to hazards in the workplace<sup>81</sup>. There are currently no mechanisms in place to detect chronic effects. This has been highlighted as an area where more comprehensive data is needed.

#### COMPLETENESS AND ACCURACY OF DATA

Many HASARD fields are mandatory. As a result, these fields are 100% complete but may be far from 100% accurate. The problem is compounded by the use of long, non-hierarchical pick-lists, sometimes containing overlapping fields. Data entry by inspectors at OSH regional offices introduces the risk of inconsistent interpretation of notification details. There are no audits or verification of the quality of data being entered.

Consequently, with serious harm notifications, it can sometimes be difficult to differentiate accidents from ill health and disease on the basis of information contained on HASARD. User error can result in serious harm notifications being entered in the NODS system (or occupational diseases being entered on HASARD).

Initial details obtained about an incident may differ from the ultimate findings from an investigation. However, the details recorded on HASARD are not necessarily updated when this occurs. This has obvious implications for the validity of the data.

#### Identifying and demographic details

HASARD records first name, last name, gender, age, address, phone and fax numbers of “victims”. Name and age fields are mandatory. Serious harm notifications are thorough in the recording of personal details.

The HASARD system builds a separate record around each case (rather than each individual). OSH indicated that it would not be easy (and may be impossible) to identify individuals with more than one HASARD record. Neither does HASARD record any unique identifiers that would readily enable record linkage with other databases, such as NHI or ACC claim numbers.

### **Ethnicity**

Ethnicity is not captured on the HASARD notification form. There is, however, a field for recording ethnicity on the HASARD database, and this uses nine categories: European, Māori, Pacific Island, Asian, European/Māori, Māori/Pacific Island, European/Pacific Island, Other, and Unknown.

### **Occupation**

The occupation field uses a classification system based on a pre-1998 version of the New Zealand Standard Classification of Occupations (NZSCO). However, the HASARD occupation list is non-hierarchical, excludes the numeric NZSCO codes, and may not map perfectly onto the NZSCO.

The HASARD notification form includes a field for the “Occupation or job title of injured person”. Occupation is coded on HASARD by the inspector on the basis of the information provided on the form. This may be clarified through follow-up with the notifier or the victim. However, a lack of incentive to code HASARD entries accurately carries the risk of misclassification occurring.

Occupational histories are not recorded.

### **Employer**

Employer name and place of work are recorded on the HASARD notification form. The HASARD system records a client name (the name of the employer) and workplace (an individual department and/or location within a large employer).

HASARD is employer-focused; notifications are linked primarily to the employer and workplace rather than the employee. However, some employers have multiple client names on the system, leading to difficulties linking all applicable workplaces to a single employer.

The victim’s employment history is not recorded. However, the period of employment of the injured person is requested on the notification form and can be recorded on HASARD.

### **Industry**

The industry field uses a standard classification based on the Australian and New Zealand Standard Industrial Classification (ANZSIC). However, as noted in the NODS section, the HASARD industry list is non-hierarchical, excludes the numeric ANZSIC code, and may not map perfectly onto ANZSIC.

Industry is coded by the inspector, on the basis of the employer and occupation details provided on the notification form. This may be clarified through follow-up with the notifier or victim. However, a lack of incentive to code entries accurately carries a risk of entries being made on the basis of inspectors’ guesstimates if the details provided on the notification card are unclear.

### **Work-relatedness**

There is no specific indicator of work-relatedness on HASARD. In theory, this should not be necessary; since the purpose of HASARD is to record workplace accidents and serious harm, all cases entered on the system should be work-related. In practice, there may be some exceptions to this rule, as notifications entered on HASARD and subsequently found not to be work-related would generally remain on the system.

### **Diagnosis**

The serious harm notification form provides tick boxes for 26 categories of injury or disease, as well as a tick box to indicate whether the injury or disease was fatal. The HASARD system, however, records only 19 categories of “injury type” (as well as fatality). According to OSH, it is probable that the HASARD list of injury types has not been updated since its introduction in 1998. This would account for the seven missing categories.

### **Severity**

HASARD does not record any severity information.

### **Site**

HASARD has a “body part” field with eight categories: arms, head, legs, multiple locations, neck, systemic, trunk, and unknown. This information is collected on the serious harm notification form via a series of tick boxes.

### **Agent**

The agency field uses a classification system that evolved out of a paper-based system that had been used at OSH prior to the implementation of HASARD. The 544 agency categories are displayed non-hierarchically but are not mutually exclusive.

The notification form contains tick boxes for nine general categories of agent (e.g. powered equipment, tool or appliance; environmental exposure (e.g. dust, gas); bacteria or virus, etc). As a result, it is likely that notifications are predominantly coded to these nine categories.

### **Mechanism**

HASARD records 47 categories of mechanism within a single, non-hierarchical list. The categories are not mutually exclusive.

The notification form contains tick boxes for nine general categories of mechanism (e.g. fall, trip or slip; sound or pressure; mental stress; etc). As a result, it is likely that notifications are predominantly coded to these nine categories.

### **Length of exposure**

HASARD does not directly record the length of exposure (or previous occupations or exposures that may have contributed to the disease). There is a field for “time employed”, which may include known details about the length of exposure and other causal factors that may have contributed to the accident or serious harm.

## **DATA INTEGRATION METHODS**

ACC legislation provides for ACC to pass on information about work-related injuries to OSH, in a format agreed by the two agencies, to support the administration of the HSE Act. At present, there is no systematic integration of external data into the HASARD system. However, ACC and OSH have recently begun investigating the feasibility of integrating ACC data with HASARD data.

The ACC Notifications Project was completed in early 2004. This involved ACC providing details of high-cost work-related injuries to OSH, which were then compared and matched to notifications in the HASARD system. As a follow-up to the ACC Notifications Project, OSH are currently sampling ACC data in order to gain a better understanding of notification differences between ACC and OSH. OSH have now begun receiving the 20 highest-cost workplace notifications from ACC each week and investigating these at a regional level. All of these cases are coming from the ACC work-related account.



#### TYPES OF SURVEILLANCE, DATA ANALYSIS, AND INTERPRETATION USED

The primary purpose of HASARD is to prevent the recurrence of serious harm. A notification is used primarily as an indicator of a workplace hazard. The ultimate end-point of the notification process is intervention to prevent other workers from suffering the same consequences of work circumstances. In this context, the predominant use of HASARD data has been for sentinel purposes.

Serious harm notifications are not analysed at an aggregate level, reflecting the poor quality of the data recorded on the system as well as difficulties extracting data in readily analysable form. HASARD is able to report on staff members' activities and provide summary information on numbers of notifications. However, as noted in the NODS section, the system is very poor at aggregating information and does not have good querying and reporting tools.

The capacity of HASARD to indicate incidence of serious harm is very limited, because of its total reliance on notifications to indicate the existence of a new case, the low notification rate, and biases in the notification rate by employer size and industry. For similar reasons, HASARD has very limited capacity to identify trends in serious harm or to identify possible associations between incidents and causes at a population level.

#### HOW INFORMATION IS DISSEMINATED AND/OR INTEGRATED INTO POLICY MAKING

HASARD plays a minimal role in policy making as it is essentially an event recording database and is limited (in terms of its structure, its content, and the quality of its data) in its ability to provide insight into the causes of harm. There is no routine or ad hoc reporting, as serious harm cases are not analysed at an aggregate level, and it is acknowledged that HASARD data not provide a true representation of the incidence of serious harm in New Zealand.

#### FUTURE PLANS FOR DEVELOPMENT/IMPROVEMENT

As already noted, the HASARD system is currently being incorporated into the Workinfo system. The new system is expected to deliver a greater capacity to conduct trend analysis and better longitudinal tracking of individuals and workplaces.

### **4.9 ACCIDENT COMPENSATION CORPORATION (ACC) CLAIMS DATABASE**

A full description of the ACC scheme was provided in the occupational disease section of this report. The following paragraphs provide additional information of particular relevance from an occupational injury surveillance perspective.

#### COMPLETENESS OF COVERAGE

The ACC claims database provides the most complete coverage of most types of injury and is the only major source of statistics on "minor" occupational injury. The database only records cases that meet the criteria for compensation and for which compensation is claimed.

The scheme excludes incapacity during the first week of a work-related injury (for which the employer must compensate the employee) and fatal accidents (unless a claim is made for funeral expenses or support for dependants). Therefore, for example, coverage of work-related fatalities in the ACC database is poor<sup>85</sup>.

There is a strong financial incentive to submit claims, and the vast majority of eligible claims should be captured on the database. According to the NZ Injury Data Review<sup>4</sup> ACC received in the order of 1.09 million minor claims (i.e. “treatment only” claims and claims for medical fees) and 104,000 entitlement claims in 2000. The Injury Information Manager found, after integrating ACC and NMDS data for the September quarter of 2002, that fewer than 1% of the injuries identified in the trial data set were not on the ACC database.

As discussed in the occupational disease section, data for claims managed by employers under the ACC Partnership Programme, and by third party insurers under the competitive market model that operated during 1999–2000, may be less complete and/or less timely to appear on the ACC database than data captured directly by ACC.

#### COMPLETENESS AND ACCURACY OF DATA

The structure and coding systems of the ACC database are, in many respects, well-suited to the surveillance of occupational injury. For example, the database records the ACC claim number and, where available, the claimant’s NHI number, facilitating record linkage to NZHIS databases. Occupation and industry are coded according to the standard Statistics New Zealand classification system. There is a specific indicator for work-relatedness (although this is not always used). The diagnosis field accommodates both ICD-10 and Read codes, and ACC routinely maps the Read codes provided by primary care treatment providers to ICD-10. The database records robust and objective cost information, including time spent off work.

However, the overriding functions of the ACC database have been administrative, such as determining eligibility for a claim, determining which ACC account should fund the claim, facilitating case management, and providing data to inform the setting of premium levels. These administrative objectives are not always consistent with surveillance imperatives. In particular, these objectives do not require complete and accurate data on occupation, and require only partial use of the work-relatedness flag. Also, the scheme’s eligibility rules may lead to distortions in the coding of diagnoses.

Other factors that impact on the adequacy of data for surveillance include:

- the parsimonious approach to the design of the ACC45 form, with additional details only being obtained through follow up and only when needed to administer the claim
- incomplete completion of ACC45 forms by treatment providers where only partial information is necessary to obtain reimbursement
- partial registration of minor claims on the database (this does not apply to work-related injuries and motor vehicle accidents which are always fully registered)
- a lack of incentive for ACC staff to update incorrect or misdiagnosed claims after the original claim has been entered on the database
- a work environment that provides greater incentives for speed than accuracy of data entry.

Key fields of interest are detailed in the occupational disease section and, for brevity, are not duplicated here. However, the use of the work-relatedness indicator requires further mention in relation to occupational injury.

The purpose of the work-relatedness indicator is to establish which ACC account funds the claim, and for case management purposes. We were advised that the field is fairly complete for records within the work-related accounts (this was not verified) and incomplete elsewhere. Consequently it is not possible to accurately identify the total population of work-related injury claims<sup>85</sup>.

For the Motor Vehicles Account, which funds claims related to all motor vehicle accidents (MVAs) including those which are work-related, the work-relatedness flag is fairly complete and accurate for some sub-groups (e.g. bus drivers) but use of the flag is low for the account as a whole. Work-related fatalities from MVAs have been estimated at 25% of MVA fatalities in the US<sup>89</sup> and 37% in Australia<sup>90</sup>, making them one of the largest categories of occupational death. Anecdotally, Australian experience suggests 15–20% of all (not just fatal) MVAs are work-related. However, ACC data records only 5–10% of MVAs as being work-related.

The Injury Prevention Research Unit recommended that ACC maintain its work-related indicator for all claims, irrespective of which account they are debited to, and that guidelines be issued to those responsible for recording work-relatedness<sup>5</sup>.

#### **4.10 NATIONAL POISONS CENTRE**

The New Zealand National Poisons Centre (NPC) operates within the University of Otago and aims to provide information and advice 24 hours a day to health professionals, organisations, and the general public about the toxic effects of chemicals that may be encountered, in urgent and non-urgent situations<sup>97</sup>.

##### **SYNOPSIS**

The NPC database of calls received provides the most complete coverage of poisoning events. However, occupational details are not recorded. The database records a name and telephone number but these are insufficient for linking NPC data to other data sets.

##### **BACKGROUND**

The NPC responds to enquiries from health professionals and the general public regarding acute poisoning and the toxic effects of chemicals. The service operates 24 hours per day, 365 days per year. The NPC receives approximately 20,000 enquiries per year.

The NPC maintains a computerised database maintained by Cardinal Healthcare, which lists more than 60,000 chemical and medicinal products as well as hazardous plants and venomous animals found in New Zealand. The information available includes New Zealand trade and chemical names, physical properties, emergency action codes, toxicity data, signs and symptoms of poisoning, treatment, occupational safety, environmental data, management of fires and spills, and first aid procedures.

A database of calls made to the centre is also maintained.

##### **PURPOSE OF THE SURVEILLANCE**

The 2000/01 Annual Report of the NPC<sup>98</sup> sums up the purpose of the database of calls when it states: “Poison Centres have a fundamental role in relation to toxicovigilance and poison prevention. Toxicovigilance is a function, which involves the active identification and evaluation of toxic risks and phenomena in the community; an activity, which should result in measures, aimed at reducing the risks. Poisoning statistics form the basis of toxicovigilance; thus it is important that poisoning notifications are comprehensive and accurate”.

Call centre data is also used for administrative purposes such as workload reporting.

#### **POPULATION COVERED**

All calls to the NPC are logged on the database.

#### **METHOD AND FREQUENCY OF DATA COLLECTION**

Calls are logged as they are received.

#### **COMPLETENESS OF COVERAGE**

The NPC is reliant on notifications received by telephone. However, studies have indicated that NPC coverage of poisoning events is more complete than that of other databases in New Zealand. For example, ACC data for 1996/97 showed that 1,321 claims were made for injuries arising from chemical exposure, representing 12.8% of calls to the NPC during that period<sup>99</sup>. Similarly, during 1997/98, only 82 diseases arising from chemical exposure were notified to the Occupational Safety and Health Service (OSH)<sup>60</sup>.

#### **COMPLETENESS AND ACCURACY OF DATA**

Information collected includes the designation of the caller (e.g. health professional), the site of the exposure (e.g. workplace), the substance and its type, form, quantity, and route of exposure. Other details are also captured including name, telephone number, and ethnicity, but the available details would be insufficient for linking NPC data to other data sets. Moreover, occupation, industry, and age details are not captured so the distribution of poisonings with regard to these variables cannot be explored.

#### **DATA INTEGRATION METHODS**

No integration of NPC call data with other data sets is carried out by the NPC.

#### **TYPES OF SURVEILLANCE, DATA ANALYSIS, AND INTERPRETATION USED**

The NPC publishes annual reports on calls logged, including analysis by poison type and other factors. Occupational poisonings are not separately identified in these reports. Centre staff have also had a range of articles published in peer reviewed journals and other publications.

Studies have suggested that data collected by the NPC and similar centres in other countries could contribute to the surveillance of occupational disease and provide data that can give an estimate of the frequency of occupational chemical exposure, which could then be fed back into prevention programmes in workplaces<sup>100-102</sup>.

For example, Firth and colleagues<sup>102</sup> analysed work-related calls to the NPC from 1990 to 1998 and found that 5,340 calls were received regarding 5,940 chemicals. The analysis revealed, *inter alia*, that 16.5% of exposures involved eye contact, suggesting that eye protection was under-utilised in many situations.

Studies in the US have shown that one call to a poisons centre may represent many exposed workers, with one study finding that an average ten workers were involved per call<sup>103</sup>. Blanc and colleagues<sup>55</sup> demonstrated that one-third of work-related calls to a poisons centre represented more than one affected worker in the same incident, and one-fifth of callers reported symptomatic exposures from the same chemical in co-workers in the previous year.

#### HOW INFORMATION IS DISSEMINATED AND/OR INTEGRATED INTO POLICY MAKING

NPC data, as reported in its Annual Reports, is available to researchers and policy makers and is accessed by other agencies with an interest in health and safety.

#### FUTURE PLANS FOR DEVELOPMENT/IMPROVEMENT

The NPC is constantly reviewing the database and looking for ways to improve data quality. Currently, the ethnicity field is being upgraded to the Statistics New Zealand Level 2 classification.

### 4.11 ENVIRONMENTAL RISK MANAGEMENT AUTHORITY

The Environmental Risk Management Authority (ERMA New Zealand) was established under the Hazardous Substances and New Organisms (HSNO) Act 1996. The overarching mission of ERMA New Zealand is to achieve effective prevention or management of risks to the environment, public health, and safety associated with importing or manufacturing hazardous substances and introducing new organisms, and their use. A full description of the current and planned surveillance activities of ERMA is provided in the occupational disease section of this report.

ERMA has a specific mandate to measure and monitor impacts of the HSNO Act on health and the environment. The workplace is a major source of exposures to hazardous substances. Substances are still being transferred into the HSNO Act regime from previous pieces of legislation, and this process is planned to be completed in 2006.

ERMA is developing its surveillance capability. Current data analysis is based on aggregated and confidentialised data from a range of sources, including the NMDS, Fire Service, HASARD, and some directly received reports of hazardous substance incidents.

ERMA is working with the Ministry of Health and the Institute of Environmental Sciences and Research to facilitate progress toward the development of a Chemical Injuries Surveillance System. A pilot study has been carried out but technical and process issues identified through this study suggested that implementation of such a system will be a few years away and may not necessarily be on a full national scale.

## 4.12 INDUSTRY-SPECIFIC SURVEILLANCE SYSTEMS

### 4.12.1 CIVIL AVIATION AUTHORITY (CAA)

The Civil Aviation Authority (CAA) establishes civil aviation safety and security standards and monitors adherence to those standards. The principal function of the CAA is to promote safety at reasonable cost. The CAA carries out accident and incident investigations and collates this material to establish an industry-wide safety picture. This becomes the basis of safety initiatives ranging from education campaigns to increased monitoring and regulatory action.

#### Synopsis

The CAA has only recently been mandated to receive notifications and undertake investigations under the HSE Act in relation to aircraft as workplaces. Data from serious harm notifications is recorded on the existing CAA database which was originally established to record details of air accident and incident reports and investigations.

CAA data is structured around events (rather than individuals). Pilots' and crew members' names are recorded. Identifying details of passengers are not recorded.

By definition, specialist agencies such as the CAA cover a small percentage of the population of work-related deaths and injuries. Nevertheless, these agencies may identify deaths and injuries which are not recorded by ACC or OSH<sup>96</sup>.

#### Background

The CAA carries out two types of safety investigations:

- Accident and incident investigations to provide information that may help to prevent similar accidents and incidents recurring (in accordance with New Zealand's responsibilities as a Contracting State to the Chicago Convention on International Civil Aviation). These are performed by the Safety Investigation Unit of the CAA.
- Investigations under the Health and Safety in Employment Act 2002 for aircraft as workplaces, to promote the prevention of serious harm in the aviation sector, specifically for aircraft while in operation. The Health and Safety in Employment (HSE) Unit of the CAA undertakes investigations where necessary, with similar statutory powers and duties to OSH.

An "accident" is defined in section 2 of the Civil Aviation Act 1990 as meaning "an occurrence that is associated with the operations of an aircraft... in which a person is fatally or seriously injured... or the aircraft sustains damage or structural failure... or the aircraft is missing or completely inaccessible"<sup>104</sup>.

"Incident" is also defined in section 2 of the Act as meaning "any occurrence, other than an accident, that is associated with the operation of an aircraft and affects or could affect the safety of operation"<sup>104</sup>.

"Serious harm" is as defined in Schedule 1 to the HSE Act (as described in the section on the HASARD system).

#### Purpose of the surveillance

The CAA maintains a computer database called the Aviation Safety Monitoring System (ASMS), which records all aviation related occurrences. The principal purpose of the surveillance is to provide information that may help to prevent similar accidents and incidents recurring. This is achieved through analysis of safety related trends so that preventive actions can be taken.

### **Population covered**

The ASMS records all reported air accidents, incidents, and serious harm notifications that occur with New Zealand aircraft. All members of the aviation industry are required to report accidents and incidents to the CAA. Reporting is required immediately after a serious accident or incident. Both aircrew (pilots and attendants) and injured passenger information is recorded.

### **Method and frequency of data collection**

#### ***Safety Investigation Unit***

Accident and incident reports to the Safety Investigation Unit are required to be submitted by telephone, as soon as practicable after their occurrence, and followed up in writing, using the standard occurrence reporting form (CA005) within ten days. Data from the initial phone call and the form are entered into the ASMS database. Based on the occurrence report, the manager of the Investigation Unit determines what level of investigation is appropriate. All accidents and some incidents are investigated. Investigation reports, where required, are completed within 90 days of the accident. All information collected through investigations is entered into the ASMS database.

#### ***Health and Safety in Employment Unit***

Employers, principals, and the self-employed are required to report all serious harm incidents to the HSE Unit by telephone as soon as possible after the incident has occurred. Serious harm notifications are completed using the OSH “Form of register or notification of circumstances of accident or serious harm”.

### **Completeness of coverage**

The level of coverage of notifications to the HSE Unit and Safety Investigation Unit of the CAA are not known. There are few incentives for individuals and operators to report occurrences. Fear of prosecution may act as a disincentive for individuals and businesses (especially small businesses) to notify occurrences of serious harm.

Fear of prosecution may act as a disincentive for individuals and businesses (especially small businesses) to report incidents, particularly where no injuries occurred and no other parties were involved. The CAA does not prosecute for non-reporting of incidents. For these reasons, it is expected that some incidents are not reported by recreational pilots and some small operators (e.g. topdressing pilots). Despite this, it is believed that most serious incidents and the vast majority of accidents are reported.

### **Completeness and accuracy of data**

Serious harm notifications are made using the OSH serious harm notification form. The content of this form was detailed in the section about the HASARD system.

Accidents and incidents are notified using an occurrence report (CA005), which records the date, time, aircraft manufacturer and model, flight details (operational, nature, phase, effect), a free-text description of the occurrence, and the number of injuries. Detailed information is collected during investigations regarding the officer/pilot in charge at the time of the incident, but little information is collected on other crew members and passengers who may have been injured at the time. The information collected in the investigation reports focuses on what caused the accident and does not record ethnicity, age, or details of injuries.

Data on accidents and incidents are recorded on the ASMS. Key fields of interest include:

- Identifying details: Pilots’ and crew members’ names are recorded. Passengers’ identifying details are not recorded. The CAA has indicated that individual companies should keep records of this information.
- Occupation, industry, and work-relatedness: Occupations and industry of the air crew are known. Work-relatedness is a given.

- Injuries: Collecting data on the nature and location of an injury on the body is not considered necessary for CAA purposes. Injuries are recorded using the following categories:
  - Crew/passenger
  - Fatal/serious/minor
  - Number of injuries.
- Agent and mechanism are not coded on the database.

#### **Data integration methods**

Data is not routinely integrated with any other databases. The CAA is currently working with the Injury Information Manager team at Statistics New Zealand toward integrating the CAA's data with other data sources. This has proven difficult due to the lack of identifying information (e.g. names), resulting in a 50% match rate. The potential benefit of integrating this data for the CAA is the ability to benchmark against comparable sectors (e.g. transport industries and occupational groups).

#### **Types of surveillance, data analysis, and interpretation used**

Regular analyses are carried out of aviation safety rates, showing how many accidents and incidents occur per 100,000 flying hours for each sector of the industry<sup>104</sup>.

Because the system relies on receiving accident and incident reports from pilots and operators, there is no way of determining whether a changing trend represents a change in actual safety performance or a change in reporting patterns. The CAA has initiated work to develop a defined level of confidence in the level of industry reporting, which will allow the significance of reporting trends to be determined, allowing appropriate action to be initiated when required<sup>104</sup>.

#### **How information is disseminated and/or integrated into policy making**

The CAA disseminates information based on its data collections in a number of ways, including providing advice on the safety performance of the civil aviation system; preparing an annual safety plan summarising the CAA's safety actions and priorities; providing advice and support to civil aviation participants to assist them to achieve compliance with Civil Aviation Rules and HSE Act; publishing feedback information to the industry in the form of accident briefs, defect summaries and accident and incident trends; and maintaining a website which includes all occurrence briefs, fatal accident reports (on individual incidents and accidents), and quarterly and six-monthly *Aviation Safety Summary Reports*<sup>104</sup>.

#### **Future plans for development/improvement**

No plans for development/improvement were identified at the time the review was conducted.

### **4.12.2 MARITIME NEW ZEALAND (MNZ)**

#### **Maritime New Zealand (MNZ)**

The principal objective of Maritime New Zealand (MNZ) is to undertake its safety, security, marine protection, and other functions in a way that contributes to the aim of achieving an integrated, safe, responsive, and sustainable transport system. The Accident Investigation Division of MNZ maintains a database to record and analyse common causes of accidents. From May 2003, MNZ has been designated under the HSE Act to receive serious harm notifications and undertake occupational safety and health investigations in relation to ships as places of work. Prior to that time, occupational safety and health for crew on board commercial ships was covered under Part II of the Maritime Transport Act.



As a specialist agency, MNZ covers a small percentage of the population of work-related deaths and injuries, but may be able to identify some deaths and injuries not recorded by ACC or OSH. The database records identifying details of injured people and, where the injured person is a seafarer, details of their occupation. Injury type, site, and seriousness of the injury are categorised at a broad level. Serious harm reports are not copied to OSH for inclusion on the HASARD database.

### **Synopsis**

The MNZ has only recently been mandated to receive notifications and undertake investigations under the HSE Act in relation to ships as places of work. Data from serious harm notifications is recorded on the MNZ accident and incident database.

The database records identifying details of injured people and, where the injured person is a seafarer, details of their occupation. Injury type, site, and seriousness of the injury are categorised at a broad level.

By definition, specialist agencies such as MNZ cover a small percentage of the population of work-related deaths and injuries. Nevertheless, these agencies may identify deaths and injuries which are not recorded by ACC or OSH<sup>96</sup>.

### **Background**

Maritime NZ carries out two types of investigations into accidents and incidents:

- Investigations to provide information that may help to prevent similar accidents and incidents recurring.
- Investigations under the HSE Act for work on board ships and for ships as places of work.

Both types of investigation are carried out by MNZ's Maritime Safety Inspectors and Accident Investigators.

The obligation for operators to report accidents, incidents, and mishaps to MNZ applies under both the Maritime Transport Act and the HSE Act. Since the 1993 changes to the HSE Act, MNZ covers not only seafarers, but any person employed or engaged to work on board a New Zealand vessel anywhere in the world, such as pilots, ships' agents, stevedores, provedores, surveyors, and contractors.

Incidents involving seafarers, passengers, and all other persons on board are reported using the "Report of mishap to seafarer or passenger" form (MSA12207). Serious harm notifications are reported using the OSH serious harm notification form. A revised form which adds maritime-related data to the OSH form is currently under development.

An "accident" is an occurrence involving a ship where a person is seriously harmed as a result of being on or around the ship; the ship sustains significant damage or structural, machinery or equipment failure (e.g. affecting its seaworthiness); something happens to the ship's cargo or other property which poses a risk to the ship or other ships; there is a loss or escape of any substance or thing that has either resulted in serious harm to any person, damaged a ship or any property on or off the ship, or poses a risk of any of these things occurring; a person is lost at sea; or the ship is foundering, capsizing, abandoned, stranded, missing, been in a collision, or had a major fire on board<sup>105</sup>.

An "incident" is any occurrence, other than an accident, that is associated with the operation of a ship and affects or could affect the safety of operation<sup>105</sup>.

### **Purpose of the surveillance**

The Accident Investigation Division of MNZ and the accident and incident database exist to prevent accidents and incidents recurring, based on the principle that understanding more about how and why accidents occur may enable more to be done to prevent them.

### **Population covered**

There is a legal requirement for the master of any vessel (recreational or commercial) to report all boating or shipping mishaps resulting in the death of, or serious harm to, a person, or any accident or incident, to the MNZ. Fatalities to foreign seafarers are recorded on the database when they occur in New Zealand waters.

### **Method and frequency of data collection**

To report an accident, incident or mishap, MNZ forms 12307 “Commercial vessel accident & incident report form”, 12207 “Report of mishap to seafarer or passenger” and/or the OSH “Form of register or notification of circumstances of accident or serious harm” are filled in, as appropriate to the circumstances. Notifications of all types are entered into MNZ’s accident and incident database.

Maritime NZ investigates all accidents and some incidents and serious harm notifications, to determine causal factors and whether or not it involved risks or circumstances about which others in the maritime community should be informed so that they can avoid similar accidents. Around 5% of investigations result in prosecution.

### **Completeness of coverage**

Anecdotally, 60–70% of maritime accidents are thought to be reported to MNZ. Many people, especially recreational boaters, may not know that they are required to report, to whom they should report, or how to report. Fear of prosecution may represent a disincentive to report, especially among smaller operators.

### **Completeness and accuracy of data**

Notifications of serious harm are reported to MNZ using the standard OSH notification form. Accidents and incidents are reported using the “Commercial vessel accident and incident report” form (MSA12307) which records the date, time, and location of the accident, details about the ship and its owners, numbers of injuries/fatalities/missing, and the type of accident (foundering, fire, flooding, collision, etc). The “Report of mishap to seafarer or passenger” form (MSA12207) records injury details. A separate form is completed for each injured person.

Details from these forms are entered on the MNZ accident and incident database. The following details of interest to this study are recorded:

- Identifying details: Name, age, and address of injured person. Ethnicity is not captured.
- Occupation, industry, and work-relatedness: Where the injured person is a seafarer, their rating, time at sea, time on present ship, and department are recorded.
- Injury type and site: Injury types are recorded against 13 categories (e.g. drowning, electric shock, laceration, amputation, etc) plus “other (specify)”. Also recorded is the seriousness of the injury, with four categories (death, serious, minor, missing) and “other (specify)”. The injury location is recorded against 14 categories (e.g. head, back, eyes, neck, etc) and “other (specify)”.
- Agent and mechanism are not recorded. However, a free-text description of the accident is recorded, as well as categorical fields detailing whether specific human factors (e.g. operating without authority, operating at improper speed, etc) and/or technical conditions (e.g. defective equipment, insufficient illumination, etc) were involved.

### **Data integration methods**

No integration of data from other systems is carried out at present. MNZ data is included in the list of data sets to eventually be integrated within the Injury Information Manager’s injury database.

### **Types of surveillance, data analysis, and interpretation used**

Maritime NZ produces monthly and annual accident summaries, which are available on the MNZ website, as well as reports on individual accidents. Summary information is made available on request to researchers or interested persons. Maritime NZ also carries out a regular programme of sectoral-based analysis.

### **How information is disseminated and/or integrated into policy making**

All Maritime NZ commercial vessel accident reports are available to the public once they have been finalised and sent to the parties involved. A regular programme of sectoral-based data analysis highlights key causal trends in particular areas, which are used to determine whether a change in focused intervention is required. Ad hoc analysis is also carried out to support policy making identified through other means. Cost benefit analysis carried out as part of the policy making process is supported by information from the database.

### **Future plans for development/improvement**

No plans for development/improvement were identified at the time the review was conducted.

#### **4.12.3 LAND TRANSPORT SAFETY AUTHORITY (LTSA)**

The Land Transport Safety Authority (LTSA) was established in 1993 by the Land Transport Act. It is charged with promoting land transport safety at reasonable cost.

### **Synopsis**

The LTSA monitors and analyses data relating to road and rail accidents and incidents, and maintains a database of traffic crash reports recorded by Police when they attend crashes. The database is used to manage, analyse and map traffic crash and related data, which helps to determine road safety funding allocations, targeting of road safety programmes, and monitoring of their performance.

Crash reports include details of who was involved, where the crash occurred, when and how it happened, the type of vehicles involved, the people who were not in vehicles, information about the crash environment, and a crash diagram. Occupational details are not categorised in routine crash reports. Work-relatedness is not recorded. The Commercial Vehicle Investigation Unit (CVIU) of the NZ Police investigates accidents involving heavy vehicles, and this data is also forwarded to LTSA. Therefore, the occupational group involved in road transport using heavy vehicles is covered.

### **Background**

The LTSA has powers to investigate and review land transport (including road and rail) accidents and incidents, subject to the limitations of the Transport Accident Investigation Commission Act 1990. The LTSA also maintains a database of traffic crash reports and carries out analysis of crash accident trends.

### **Purpose of the surveillance**

The LTSA's Crash Analysis System (CAS) was developed to contribute to efforts to reduce road trauma in New Zealand. CAS is used to manage, analyse, and map traffic crash and related data. The information CAS provides is also used to help determine road safety funding allocations and is used in the targeting of road safety programmes and the monitoring of their performance.

### **Population covered**

CAS captures details of all road crash information reported by the Police to the LTSA. Approximately 30,000 non-injury crashes, 9,000–10,000 injury crashes, and up to 400 crashes involving death are reported each year.

### **Method and frequency of data collection**

The crash data collection is based on the fatal, injury, and non-injury crashes reported by the Police to the LTSA. Police officers complete crash reporting forms when they attend crashes. The LTSA codes this information according to the type of crash movement involved (e.g. overtaking or right-angle intersection collision) and the factors contributing to the crash (e.g. driving too fast for the conditions or failing to stop at a stop sign).

### **Completeness of coverage**

Only crashes reported to the Police are covered. When a motor vehicle accident results in an injury, the law requires the crash to be reported. However, LTSA analysis of NMDS data indicates that only about half of such injury crashes are reported to the LTSA<sup>106</sup>. The most serious under-reporting is amongst single vehicle crashes, motorcycle crashes, and crashes involving alcohol. There is a reporting bias by day of week, hour of day, and by region.

According to the NZ Injury Data Review, the LTSA received in the order of 12,500 crash records in 1999. This is likely to include all crashes involving death, around 50% of crashes involving injury as indicated above, and a lower proportion of non-injury deaths.

### **Completeness and accuracy of data**

Crash reports include details of who was involved, where the crash occurred, when and how it happened, the type of vehicles involved, the people involved who were not in vehicles, information about the crash environment, and a crash diagram. No occupational details are captured in routine crash reports. Work-relatedness is not recorded. Severity is recorded on a four-category scale: fatal, serious, minor, non-injury.

The Commercial Vehicle Investigation Unit (CVIU) of the NZ Police investigates accidents involving heavy vehicles, and this data is also forwarded to LTSA. Therefore, the occupational group involved in road transport using heavy vehicles is covered. However, other occupational groups in the transport industry (such as couriers), and the many other occupations that involve regular road travel, are not identified.

### **Data integration methods**

CAS integrates three primary sources of road safety data: crash reports, diagrams of crashes (from 1996 on), and roading data from the Road Maintenance and Management System (RAMM) used by all roading authorities in New Zealand, which includes road categorisation and traffic flows.

### **Types of surveillance, data analysis, and interpretation used**

Crash data is extensively analysed at national, local, and individual location levels. The information CAS provides is used to help analyse and determine road safety funding allocations. It is also used in the targeting of road safety programmes and the monitoring of their performance. Because it integrates mapping with other functions, CAS represents a significant advance over previous crash analysis systems. A key innovation is the ability to link crash and roading data.

The LTSA analyses hospital admission data related to road crashes, using NZHIS data.

### **How information is disseminated and/or integrated into policy making**

Each year the LTSA produces an annual statistical statement on road crashes in New Zealand. Many other organisations in New Zealand also contribute to improved road safety through road crash prevention. Major users of crash data include the New Zealand Police, Transit New Zealand, Transfund New Zealand, local authorities, engineering consultants, ambulance services, fire services, and road safety coordinators.

### **Future plans for development/improvement**

No plans for development/improvement were identified at the time the review was conducted.

#### 4.12.4 FOREST RESEARCH CENTRE FOR HUMAN FACTORS AND ERGONOMICS (COHFE)

The Forest Research Centre for Human Factors and Ergonomics (COHFE) has a proven track record in improving worker occupational safety, health, and performance through comprehensive research, primarily in the forestry industry<sup>107</sup>.

##### **Synopsis**

The Forest Research Centre for Human Factors and Ergonomics (COHFE) maintains an accident reporting scheme for the forestry industry which contains 20 years' data on logging injuries, including details of injuries sustained, days of work lost, and near miss events. Reporting is voluntary but the 16 largest forestry companies participate, together accounting for an estimated 60–80% of the forestry workforce. There is also an exposures database that records total hours of work per month for the reporting companies, providing denominator data for analysis of injury rates.

##### **Background**

The New Zealand Forest Industry Accident Reporting Scheme (ARS) is a forest industry surveillance system maintained by COHFE to inform its New Zealand forest industry injury prevention and research and development programme. The ARS has been collating industry-wide injury data since 1984, and currently has approximately 11,000 records of logging injury, details of lost time, and minor (less than one day of absence from work) and near miss events.

Information on a further 3,000 silviculture injuries and near misses has also been collected over the past ten years and, more recently, a sawmilling injury database has been piloted.

Currently, COHFE is developing an injury surveillance system for the NZ wood processing industry, which is considered a necessary stage in the development of a strategic programme of ergonomic safety and health research across the wider spectrum of the forestry industry.

There is also an exposures database that records total hours of work per month for the 16 largest forestry companies in New Zealand, providing denominator data for analysis of injury rates.

##### **Purpose of the surveillance**

The system was established to provide COHFE and the industry with an understanding of injury types and causes, and to have evidence to develop interventions to prevent injury. Logging crews are discrete, small, and spread throughout New Zealand. Injuries within these crews are sporadic and, to a casual observer, may look like isolated events. It is only when data on injuries is aggregated at a national level that patterns and trends become evident.

##### **Population covered**

The intended coverage of the ARS is the total population of forestry workers in New Zealand.

##### **Method and frequency of data collection**

Reporting is voluntary, but reporting all accidents has become part of the industry culture within the 16 largest forestry companies. Companies recognise the benefits of having the data to support their health and safety strategies. Companies are given the assurance that the data is only used for research purposes and is aggregated for public consumption.

Participating companies complete a standard form and submit it to COHFE, where it is entered on an Access database. Sometimes COHFE draws on the OSH inspection report, which can provide additional detail about a serious injury.

### **Completeness of coverage**

The 16 largest forestry companies report all of their accidents to COHFE. This is estimated to represent between 60–80% of the total industry. The timely feedback of well-presented and relevant summary injury data has been key to ensuring the widespread industry support for the system<sup>108</sup>.

### **Completeness and accuracy of data**

None of the fields is mandatory, but participating companies tend to submit well-completed forms. In addition, COHFE endeavours to follow up any blank fields. As a result, most fields are highly complete and accurate. Crucial to the success of this system are the longstanding personal relationships between COHFE and the reporting companies, facilitating open communication and the provision of clear information to support the ARS.

The following details are captured on the ARS.

#### ***Identifying and demographic details***

ARS fields record the individual's name, age, and gender. Ethnicity is not recorded.

#### ***Occupation and industry details***

All individuals on the database are forestry workers and all reported accidents are work-related. ARS records the name of the employing company, the individual's qualifications (from a pick-list), and years of experience in the job.

Also recorded are a range of details about the activity the individual was involved in when the accident occurred. The following details are captured in categorical form:

- Type of forestry operation (e.g. clear felling, thinning)
- Part of operation (e.g. cutting off branches, driving machinery)
- Extraction machines used (hauler, skidder, tractor, combo, forwarder).

There is also a free-text field to record details of equipment and vehicles.

#### ***Details about where and when the injury or near miss occurred***

ARS records the time of day, the region of New Zealand where the accident occurred, and environmental factors (in categorical form) such as slope, wind, temperature, and rain.

#### ***Injury type***

ARS records the type of injury according to five categories: bruise, fracture, laceration, multiple, sprain/strain.

#### ***Severity***

Severity is classified into four categories: fatal injuries; lost time injuries (the injury causes the injured person to miss one or more days of scheduled work); minor injuries (an injury occurs, but no lost time); and near miss (the incident could have resulted in an injury, but no injury occurred).

Further indicators of severity are captured for lost time injuries: number of days of work lost, and number of days on restricted or light duties.

#### ***Site***

Part of body is recorded in categorical form (head, eye, hand, arm, shoulder, upper torso, lower torso, upper leg, knee, lower leg, ankle, foot, multiple). Side of body (left, right) is also recorded.

#### ***Agent and mechanism***

The notification form elicits a narrative text description regarding the nature, circumstances, and causes of the accident. Agent and mechanism are captured on the ARS in categorical form, based on COHFE analysis of the narrative text description, using categories applicable to the forestry industry. ARS also records the narrative in a free-text field.

COHFE's report *Analysis of Lost Time and Minor Injuries – 2002 Logging*<sup>109</sup> states that, overall, the quality of the data supplied to the ARS has been improving with each year, but that many accident reports do not state the extraction machine(s) used or environmental factors.

### **Data integration methods**

COHFE draws on data from a range of sources, on a case-by-case basis, to maximise the completeness and accuracy of the data set. For example, COHFE sometimes draws on ACC data to obtain information on costs associated with accidents (for aggregate analyses). ACC won't provide identifying details of individual claimants but will provide dates of incidents, which is usually all that is needed to guarantee a match with COHFE data.

### **Types of surveillance, data analysis, and interpretation used**

As a key element of COHFE's forestry industry strategic ergonomics, safety, and health research programme, the ARS provides indicators to key areas of risk in the logging and silviculture sectors. The scheme also provides a source of reliable baseline and control data and other evaluation measures helpful in intervention research<sup>108</sup>. The ARS allows for evidence-based rather than anecdotally-driven injury prevention research through the COHFE work programme. Regular summary reports and special reports (e.g. targeting task areas and event types) are produced using ARS data.

Examples of COHFE reports can be viewed on the organisation's website: [www.cohfe.co.nz](http://www.cohfe.co.nz). For example, the *Analysis of Lost Time and Minor Injuries – 2002 Logging*<sup>109</sup> provides analysis of trends in injury rates; types of injury; lost time per injury by injury type; injuries by time of day, day of the week, and by month; and logging task, *inter alia*.

COHFE also undertakes contracted studies, drawing on ARS data, for companies and government agencies, sometimes in collaboration with universities.

### **How information is disseminated and/or integrated into policy making**

COHFE provides quarterly and annual summary injury data to forestry company contributors and the wider audience in New Zealand, as well as research reports and injury prevention information, including the identification of key areas of concern regarding safety, such as protective equipment requirements or causative factors in accident events. A range of policy makers and administrators (including OSH and ACC) access COHFE reports. COHFE also writes guidelines for forestry companies and other organisations, and provides presentations and undertakes contracted research for policy makers (all informed by the ARS database).

The injury data received from forest companies enables COHFE to examine trends and patterns in logging industry data and to target their wider ergonomics, safety, and health programme at key risk areas<sup>108</sup>. Since the introduction of the scheme, ARS data has been used productively in the detection of key risk areas and evaluation of interventions. An example, which highlights the value of such an injury surveillance system as part of a strategic programme of industry-specific ergonomics, safety, and health research, is the reduction of slips and falls in logging work. Analysis of six years of ARS data (1985–1992) showed that 17.5% of lost-time injuries resulted from slips, trips, and falls. Of these accidents, 56% occurred in the felling and declimbing phases of logging operation, where just 37% of the workforce is employed. These phases of logging operation occur in steep terrain, exacerbating the risk of slips and falls.

Kirk and Parker investigated the impact of spiked-soled boots on logger workload, productivity, and safety, compared with wearing the traditional rubber-soled boots. They found that the experimental use of the spiked soled boots indicated a reduction in the rate of slipping, and workers reported increased confidence when wearing the boots. Following this study, spiked-soled boots were introduced across the New Zealand logging industry, with ARS data recording a considerable reduction in slipping incidents for subsequent years<sup>110</sup>.

### **Future plans for development/improvement**

The ARS is being evaluated and updated, in order to improve collection and interpretation, and allow electronic capture and interrogation of data. Further work will involve working with forest companies to enhance the process. Priorities for the future include ensuring core fields remain constant to ensure high-quality time series data, and providing access to the database over the internet.

Stability of funding has increasingly become an issue with the withdrawal of the organisation's previous regular funding. Previously, COHFE received funding from the Foundation for Research, Science and Technology (FRST). However, the ongoing management of the ARS fell outside FRST criteria, which are geared toward applied research activities. COHFE now relies on securing one-off grants and contracts to fund its activities.

#### **4.13 STRENGTHS, WEAKNESSES, AND GAPS**

This section provides an assessment of the strengths and weaknesses of the reviewed databases, in terms of their potential to contribute to occupational injury surveillance in New Zealand, and provides analysis of gaps in the coverage of these systems. The following framework has been used to conduct the assessment, adapted from the Institute of Medicine (Washington DC)<sup>84</sup>:

**Completeness:** The extent to which a system reports all injuries. Exceptions should be explicit and may be by injury type, severity, industry, occupation, geographic scope, or compliance.

**Standardisation:** Aspects of standardisation include type and scope of data elements reported, mandatory fields, definitional issues, hierarchical organisation of the data elements, coding systems used, and readiness of the data set for matching with other data sets. Includes the degree of standardisation between data sets and within data sets through time.

**Coding accuracy and integrity:** Relates to definitional and concepts of reliability and validity. Whether the system is coded consistently between two coders and whether the code means what it purports to mean. Also relates to the use of multiple sources: whether multiple sources are used to verify the database and original documents are used in the verification process.

**Work-related fields:** Whether the database has an explicit field that codes for work-related injury or disease.

**Timeliness:** Data is reported, analysed, and disseminated in a timely way.

**Accessibility:** Is the data readily accessible to researchers?

**Capacity for learning:** Characteristics of the system that can identify risk factors contributing factors, and preventative factors.

**Incentives/disincentives:** What are the incentives and disincentives to reporting?



#### 4.13.1 COMPLETENESS

The following table summarises the completeness of coverage of each system.

<b>TABLE 4.1</b>		<b>Completeness of occupational injury coverage</b>	
<b>DATA COLLECTION</b>		<b>COMPLETENESS OF OCCUPATIONAL INJURY COVERAGE</b>	
Injury Information Manager: NZ Injury Database		All ACC claims and all hospital admissions for occupational injury.	
Death certificates, coroners' reports, and Mortality Collection		All registered deaths in New Zealand, by cause of death. Deaths caused by an accident while working may be identified by a work-related flag in the Mortality Collection and in the text of coroners' paper files.	
National Minimum Data Set		All public and most private hospital inpatient and day patient discharges in New Zealand. Hospital stays related to an occupational injury may sometimes be distinguishable from diagnosis and external cause codes.	
Health and Safety Accident Recording Database (HASARD)		Partial and patchy coverage of occupational injuries within the HSE Act definition of "serious harm" and possibly isolated reports of other occupational injuries.	
ACC claims database		All major non-fatal occupational injuries, a large proportion of minor occupational injuries, and a small proportion of fatal occupational injuries. Apart from work-related motor vehicle accidents, the majority of work-related injuries can be identified by the work-related flag.	
National Poisons Centre		A large proportion of poisonings. However, poisonings at work cannot be distinguished from other poisonings. Individuals are not identified.	
Environmental Risk Management Authority		Partial but growing coverage of the public health effects of hazardous substances. Occupational effects are not explicitly distinguished from other effects. Individuals are not identified.	
Civil Aviation Authority (CAA)		Injuries from the vast majority of air accidents, most air incidents, and a proportion of other occurrences of serious harm.	
Maritime New Zealand (MNZ)		A large proportion of injuries to seafarers.	
Land Transport Safety Authority (LTSA)		All motor vehicle accidents involving death and about half of all crashes involving injury. Work-related crashes cannot be distinguished from other crashes.	
Forest Research Centre for Human Factors and Ergonomics (COHFE)		All logging injuries within the 16 largest forestry companies, accounting for a majority of the logging workforce. Highly accurate capture of injury rates through the collection of exposure (hours of work) data from the same group of companies.	

The following conclusions can be drawn about the completeness of occupational injury coverage across these systems:

- The comprehensive coverage of the ACC scheme for work-related injuries ensures all non-fatal major injuries and most minor injuries at work are captured and, with the exception of motor vehicle accidents, are positively identified as being work-related.
- Work-related fatalities are more difficult to identify, but are improving with the addition in 2000 of the work-related flag in the Mortality Collection.
- The other databases are worthwhile from the perspective that they may capture additional cases that are not recorded by ACC (as well as providing additional depth to the information captured on the ACC claims database).

#### 4.13.2 STANDARDISATION, ACCURACY AND INTEGRITY, AND WORK-RELATED FIELDS

The following table summarises key data elements of interest for each system. The table indicates what data elements are captured within each system, how they are captured, and, where possible, how well they are captured for the purposes of occupational injury surveillance. This table has been adapted from the *New Zealand Injury Data Review April 2000 – December 2001* to include the systems and data elements covered by the current review.

<b>TABLE 4.2</b>		<b>Standardisation of data elements</b>											
<b>DATA ELEMENT</b>	<b>IIM: INJURY DATABASE</b>	<b>CORONERS' REPORTS</b>	<b>MORTALITY COLLECTION</b>	<b>NMDS</b>	<b>HASARD</b>	<b>ACC</b>	<b>NAT. POISONS CENTRE</b>	<b>ERMA</b>	<b>CAA</b>	<b>MINZ</b>	<b>LISA</b>	<b>COHFE</b>	
Unique identifiers	H	-	H	H	-	H	-	-	L	L	-	M	
Name, DOB, sex, etc	H	L	H	H	M	H	L	M	M	M	M	H	
Ethnicity	L-M	L	L-M	L-M	L-M	L-M	-	L-M	-	L-M	-	-	
Occupation	M-H	L	L	L	L-M	M-H	-	-	H	H	-	H	
Industry	M-H	L	-	-	L	M-H	-	-	H	H	-	H	
Work-relatedness	M-H	L	M	L	H	M-H	-	-	H	H	-	H	
Injury type	H	L	H	H	M	H	-	-	L	M	L	M	
Death	H	H	H	H	M-H	L	-	-	H	H	H	H	
Severity	M	L	-	H	-	-	-	-	M	M	M	M	
Site	M	L	-	H	H	M	-	-	-	H	-	H	
Activity	H	L	M	H	-	H	-	-	L	L	H	H	
Agent	L-M	L	M	M	M	L-M	H	L-M	-	L	H	M	
Mechanism	L-M	L	M	-	M	L-M	-	-	-	L	H	M	
Exposure denominators	-	-	-	-	-	-	-	-	H			H	
Cost	M	-	-	H	-	H	-	-	-	-	-	M	

*Adapted from: Department of Labour and Statistics New Zealand. New Zealand Injury Data Review April 2000 – December 2001. Wellington, 2002. Figure 6, p28.*

**Key:**

*H* Collected to a high standard of specificity, completeness, and accuracy and in a format suitable for data linkage and surveillance  
*M* Collected to a moderate standard or in a format with moderate utility for surveillance (e.g. non-specific coding; partially recorded)  
*L* Collected to a low standard or in a format with low utility for surveillance (e.g. not coded; not recorded electronically)  
 - Not collected  
 NA Not applicable or irrelevant

The following conclusions can be drawn about the level of standardisation and the accuracy and integrity of data coding and recording across these systems:

- The unique identifiers that hold the greatest potential to facilitate record linkage across data sets are the NHI number and ACC45 claim number. The NHI number is recorded within the Mortality Collection, National Minimum Data Set, and ACC. The ACC45 number is recorded by ACC and, where available, on the NMDS. Both unique identifiers were successfully used by the Injury Information Manager to link ACC and NMDS records.
- Occupation is, in general, poorly coded. The NZHIS systems use a free-text field, in which occupation is incomplete and ambiguous. HASARD uses a non-standard coding system (based on a standard system).

ACC uses the Statistics New Zealand coding system and probably has the best recording of occupation among these databases for work-related claims. The industry-specific systems cover a narrow range of occupations and these are usually well identified.

- NZHIS and ACC both use ICD-10 to code injury type (and other information captured by the classification where relevant, such as cause of death, site, agent, procedures, etc). This is a strength because the classification system is both specific and compatible across the systems. The E codes within this system also provide some clues regarding work-relatedness, activity, and agent.

#### 4.13.3 TIMELINESS AND ACCESSIBILITY

The following table summarises the timeliness and accessibility of data from each system.

DATA COLLECTION	TIMELINESS	ACCESSIBILITY
Injury Information Manager: NZ Injury Database	Data set from feasibility study is based on 2002 data. The data set will ultimately be updated quarterly.	Statistics New Zealand will publish regular summaries of this data and will make micro-data and customised summaries available on request.
Death certificates, coroners' reports	Data/records accurate within a few months of death, for most deaths. Some coroners' investigations can take longer to complete.	Publicly available summaries are via the Mortality Collection.
Mortality Collection	Data set accurate within a few months of death, for most deaths. Some coroners' investigations can take longer to complete. Latest report uses 2000 data.	Regular public reporting of summary data. Customised data available on request, subject to privacy and ethical considerations, and may incur a charge.
National Minimum Data Set	Data set accurate within 6 months of discharge. Latest report uses 2000/01 data.	Regular public reporting of summary data. Customised data available on request, subject to privacy and ethical considerations, which may incur a charge.
Health and Safety Accident Recording Database (HASARD)	Data set fairly complete within a short time of notification.	No published summaries of HASARD data. Data extracts available on request, subject to privacy and ethical considerations.
ACC claims database	Data set complete as soon as claims are registered. Some delays for claims management data from third parties, and cost data imported from NMDS. Latest injury statistics report uses data as at August 2004.	Regular public reporting of summary data. Customised data available on request, subject to privacy and ethical considerations, and may incur a charge.
National Poisons Centre	Data set complete as soon as calls are registered.	Annual reporting of summary data. Customised data may be available on request.
Environmental Risk Management Authority	Analysis currently done once a year. The 2003 Annual Report noted that the most recent completed analysis used 2001/02 data.	ERMA monitors the effectiveness of the HSNO Act and provides reports on this to the Minister. The reports are publicly available on request. The raw data would be available subject to agreement of the contributing agencies.

DATA COLLECTION	TIMELINESS	ACCESSIBILITY
Civil Aviation Authority (CAA)	Accidents and incidents reported within a few days of occurring. Investigation details fairly complete within a few months for incidents and sometimes longer for accidents. Latest quarterly Aviation Safety Summary Report uses Q2, 2004 data.	Annual and quarterly reporting of summary data.
Maritime New Zealand (MNZ)	Accidents and incidents reported within a few days of occurring. Investigation details fairly complete within a few months for incidents and sometimes longer for accidents. Latest <i>Maritime Accidents</i> report uses 2001–02 data.	Annual and monthly reporting of summary data.
Land Transport Safety Authority (LTSA)	Data set fairly complete within a few weeks. Latest annual statistics report uses 2002 data.	Annual reporting of summary data. Weekly reporting of road deaths.
Forest Research Centre for Human Factors and Ergonomics (COHFE)	Data set fairly complete within a few months. Latest <i>Annual Summary Report</i> uses 2002 data and <i>Logging Quarterly Report</i> uses Q4, 2003 data.	Annual reporting of summary data. Customised data available on request, which may incur a charge.

As can be seen, most data is collected within a fairly short timeframe and, with few exceptions, data over six months' old is unlikely to require further updating. In general, customised data is provided on request, subject to privacy and ethical considerations.

#### 4.13.4 CAPACITY FOR LEARNING: CHARACTERISTICS OF THE SYSTEM THAT CAN IDENTIFY RISK FACTORS, CONTRIBUTING FACTORS, AND PREVENTATIVE FACTORS

ACC data on injuries by industry classification is sufficiently rich to enable ACC to calculate levies for personal injury cover for over 500 individual industry classifications<sup>66</sup>. ACC also captures sufficient occupation, activity, and mechanism data to enable some analysis of associations of these variables with injury type and severity.

NZHIS data has a lower capacity to identify risk factors and contributing factors, including some potential to conduct analysis by activity, agent, and mechanism, but not by occupation. The Injury Information Manager, by linking ACC and NZHIS records, may enhance the aggregate learning capacity from the two data sets.

Industry-specific accident investigation systems have a high capacity to identify risk factors, contributing factors, and preventative factors. COHFE identifies risk factors through the detailed analysis of logging industry injury data by activity, type of machinery, type of terrain, and a range of other factors. COHFE and CAA also collect exposure denominator data in the form of hours of work each month. However, CAA and MNZ principally consider such investigation findings on a case-by-case basis, rather than identifying risk factors through analysis of aggregated data, and learnings are recorded more thoroughly in individual accident reports than in the database. The same observation can be made of coroners' reports.

Fields within the HASARD system should enable the exploration of associations of injury with industry, agent, and mechanism. However, there are difficulties extracting individual-level and employer-level data, and numerator data is unreliable due to under-reporting.

#### 4.13.5 INCENTIVES/DISINCENTIVES

Reporting of deaths to the Mortality Collection (via Births, Deaths and Marriages), and public hospital discharges to the National Minimum Data Set, is compulsory and has high levels of compliance.

There are strong financial incentives to submit a claim to ACC for any occupational disease involving treatment costs or time off work.

Reporting of logging injuries to COHFE is voluntary. All of the largest 16 forestry companies participate, and report all or the vast majority of their injuries. Incentives include recognition of the value of the data to individual companies for protecting the health and safety of their workers and the regular feedback of statistics and analysis by COHFE to support this objective. Good networks and established trust between COHFE and the participating companies is another important factor that facilitates complete and accurate reporting.

It is mandatory to report occurrences of serious harm under the HSE Act to OSH, CAA, or MNZ. However, compliance levels are low. Disincentives include possible fear of prosecution or investigation, a lack of awareness of reporting requirements, and a lack of feedback in the form of summary data from HASARD.

#### 4.13.6 CONCLUSION: STRENGTHS, WEAKNESSES, AND GAPS

The key strengths across the systems are:

- the positive progress being made by the Injury Information Manager toward making the best use of the available data and producing a comprehensive database of injuries in New Zealand
- the high level of capture of occupational injuries within the ACC claims database (due to comprehensive personal injury cover and strong financial incentives to claim), of which all except motor vehicle accidents are positively identified as being work-related
- the existence of two unique identifiers (NHI number and ACC45 claim number) which the Injury Information Manager has shown to effectively facilitate the linkage of the ACC and NMDS data sets, and should work with a similar degree of success for the Mortality Collection
- the use of ICD-10 as a common coding standard across all three of the most promising data sets
- sufficient coding of industry, occupation, activity, and mechanism data within the ACC database, to facilitate some analysis of risk factors and contributing factors and to help identify priority areas for further research
- ready access to timely data and advice on its interpretation.

Key weaknesses include:

- poor coding of occupation, industry, work-relatedness, and ethnicity in most databases
- a lack of capture of occupational history and inability to determine the victim's current occupation at the time of the injury or death. This is important for the calculation of accurate occupation-specific rates. The 1998 Australian Work-Related Fatalities Study<sup>90</sup> estimated that about 12% of deaths involved people whose documented usual occupation was different from their occupation at the time of the fatal incident.
- very little information on the costs of occupational injury in New Zealand (other than ACC data)
- the low potential of the HASARD system to contribute significantly to occupational injury surveillance, due to under-reporting and shortcomings in system design.

Gaps have been considered along three dimensions:

- Vertical – gaps in terms of the cases captured/not captured by the systems: Occupational injuries that do not result in an ACC claim will only be captured if they are positively identified as being work-related in the Mortality Collection, reported to OSH and recorded in the HASARD system, or can be identified in the NMDS on the basis of E codes. ACC data provides limited coverage of work-related fatalities and does not reliably record work-relatedness against injuries to commuters, bystanders, or volunteers. Another potential gap is minor injuries that result in no treatment costs and/or less than one week off work. There are also other potential information systems that were outside the scope of the current study, such as emergency department and ambulance service databases, which represent a potential gap if they cannot contribute to surveillance.
- Horizontal – gaps in terms of the information required for each injury record: The principal gap in data collection is the lack of standardised coding of occupation in the Mortality Collection, NMDS, and, to a lesser extent, in HASARD.
- Temporal – gaps in terms of coverage or consistency over time: Data should be relatively consistent across the main data sets since 2000. Key changes in the data include the following:
  - The CAA and MNZ took on responsibilities under the HSE Act from May 2003, but have accident and incident data stretching back many years prior to this.
  - ACC data may be incomplete for work-related claims during 1999/2000 due to under-reporting by third-party insurers to the Regulator.
  - ACC started using Read codes and ICD-10 from 1999/2000.
  - Hospitals have provided data to the NMDS in a consistent electronic format since 1993. However, there have been changes to the NMDS since then, including upgrades of the ICD coding system every few years.
  - The NHI number has been recorded on the Mortality Collection since 1988.
  - HASARD was established in 1994.
  - COHFE has a consistently-recorded data set of logging injuries dating back to 1984.

#### **4.14 OPPORTUNITIES FOR IMPROVEMENT**

The following paragraphs identify opportunities for improving the administration/management, data collection, accuracy, and timeliness of existing occupational injury surveillance systems. These opportunities have been identified purely with regard to their desirability from an occupational injury surveillance perspective, and without consideration of legislative, policy, or budgetary implications.

##### **4.14.1 ADMINISTRATION AND MANAGEMENT**

###### **Continue the work of the Injury Information Manager**

The establishment of a designated Injury Information Manager role, with responsibility for collecting and collating occupational injury surveillance data and producing coherent injury statistics, represents a substantial opportunity to improve the surveillance of injuries occurring in New Zealand, including occupational injuries. The continuation of this work will maintain and enhance New Zealand's ability to make use of the available injury data through the production of a comprehensive database of injuries in New Zealand.

#### 4.14.2 DATA COLLECTION

The following opportunities exist to improve occupational injury surveillance:

##### **Increase reporting of suspected cases to HASARD**

Under-reporting of occupational injuries by employers to the Occupational Safety and Health Service results in poor data coverage of occupational injuries within the HASARD system. The under-reporting may be attributed to a range of factors, including fear of prosecution, lack of awareness of statutory obligations for employers, and few incentives to report. The opportunity exists to conduct further research into barriers and enablers to occupational injury reporting and to develop an education/marketing campaign to address these barriers and enablers.

##### **Improve recording of occupation and industry in NZHIS data**

- Start coding occupation in the Mortality Collection, NZCR, and NMDS, using the standard Statistics New Zealand classification system, and code the backlog of occupation.
- Include occupation in the NHI database, and record occupation histories of each patient by entering a new occupation and associating it with the admission date each time the patient is admitted to hospital during their lifetime.
- Extend and improve the coding of industry in NZHIS and OSH data in order to add depth to the information captured in the occupation field: include industry as a variable in the Mortality Collection, NZCR, and NMDS using the standard Statistics New Zealand classification system; and align the industry classification system in NODS/HASARD with the Statistics New Zealand system.

##### **Collect additional information on work-relatedness and occupation history**

- Develop a common definition of work-relatedness to apply in the recording of occupational injuries by NZHIS and OSH (not applicable to ACC).
- Develop common definitions and fields for recording current occupation (when the injury occurred) and usual occupation (if different from current occupation).

#### 4.14.3 ACCURACY

- NZHIS working with hospitals to improve the use of work-related E codes in ICD-10-AM 3rd Edition.
- ACC coding work-relatedness and occupation for all claims.
- OSH reviewing the classification systems and field structures used for recording occupation, industry, agent, and mechanism, with a view to aligning these with standard classification and coding systems, and using hierarchical pick-lists for data entry.
- OSH ensuring case data is updated on HASARD upon completion of each investigation.

#### 4.14.4 TIMELINESS

This review found that most data is already captured within the systems in a timely manner. No opportunities were identified to significantly improve the timeliness of data capture.





SECTION FIVE

BARRIERS TO EFFECTIVE

# SURVEILLANCE



The following barriers to effective surveillance have been identified with regard to the current methods and systems used for measuring and monitoring occupational disease and injury in New Zealand:

#### **EXPERTISE REQUIRED TO MANAGE AND ADMINISTER SURVEILLANCE SYSTEMS**

Maintaining a database of occupational disease and/or injury data requires specialist knowledge and skills in areas such as epidemiology, statistics, and health informatics. It also requires skills in relationship management, as external relationships with providers and users of data, and internal relationships with those who enter and those who use data, can have an important bearing on data quality. The range of skills required suggests that a multi-disciplinary team is needed, in most instances, to manage and administer an occupational disease or occupational injury surveillance system. This requires a level of resourcing that may not always be available.

The lack of expertise available to manage and administer the systems is reflected in the fact that the various systems are disparate, with little coordination between them. Crucially, nobody has been appointed as the responsible person for doing the coordination at OSH. At Statistics New Zealand, the Injury Information Manager has started to address this issue for occupational injury. However, this requires quite different skills, systems, and methods from those required for occupational disease. It is therefore crucial that an appropriately qualified person (e.g. an epidemiologist) is appointed to manage and administer surveillance of occupational disease and injury at OSH, while ensuring that this person collaborates with, and does not duplicate, the work of the Statistics New Zealand Injury Information Manager.

Similarly, at individual organisation level, there are questions about the extent to which somebody has been delegated specific responsibility for ensuring the collection of high-quality data for occupational disease and injury surveillance purposes, and the level of priority and resourcing that accompanies this delegation.

#### **INADEQUATE HAZARD/EXPOSURE ASSESSMENT**

The reviewed databases, on the whole, collect minimal information on exposures to hazards and risk factors, such as environmental, technological, organisational, human, and other factors, that contribute to occupational injury and disease. This limits the current potential for conducting robust analysis of incidence, prevalence, distribution, and trends of occupational disease and injury.

Some workforce information is available from Statistics New Zealand. Other exposure information exists in disparate form across a range of sectors and may benefit from some form of collation, classification, and coordination for surveillance purposes. There is also the potential to augment currently available information through primary data collection, including occupational and exposure information in patient case histories, and macro data through targeted and randomised industry surveys.

## **DATA OWNERSHIP AND ACCESS ISSUES**

The current lack of a central repository for occupational disease data is a major barrier to effective surveillance. If arrangements are made for the collation and coordination of occupational disease data, it will be important to ensure the right governance arrangements are in place with regard to data ownership and access. This would probably include a committee structure, with representation by the stakeholder agencies contributing data, and ensuring that the moral rights of these agencies are respected with regard to the use of the data.

Ethical and privacy issues can present a potential barrier to access to identified microdata for linkage purposes.

There are potential cost issues if data requests are complex or time-consuming for data managers to meet.

Fundamental conflicts in purpose can create a barrier in certain circumstances. For example, from an OSH perspective, it is desirable to have access to ACC data as soon as possible to identify potential serious harm occurrences for investigation and enforcement. However, from an ACC perspective, such an arrangement would be undesirable if it created a disincentive for individuals to claim.

## **KNOWLEDGE GAPS**

Key knowledge gaps include:

- horizontal and vertical gaps in the coverage and accuracy of the existing data sets (as identified in this review)
- the inability to identify new associations between occupational disease/injury and factors such as occupation, industry, and exposures, due to the lack of clarity in numerator data and a shortage of appropriate denominator data
- a lack of knowledge on the part of some GPs, employers, and employees regarding matters such as occupational disease risk factors, the existence of NODS and HASARD, and statutory reporting requirements.

## **REPORTING**

Collecting, analysing, and disseminating data can involve significant costs, and these can present a barrier to effective surveillance. These problems are exacerbated by a lack of electronic data (requiring time-consuming searches of paper-based records), a lack of coding (requiring extra data preparation and cleaning), and holes in the available data (requiring expensive one-off studies, such as surveys, to address data requirements).

Currently, nobody is providing regular, comprehensive reporting on occupational disease incidence, prevalence, trends, and distribution. This is a barrier to demonstrating the importance of occupational disease as a public health issue and making it a policy priority.

Under-reporting of occurrences (e.g. to NODS and HASARD) is also an important barrier to effective surveillance.

#### **PRIMARY PURPOSE OF DATA COLLECTION**

Currently, there are no systems that exist specifically and exclusively to collect occupational disease and occupational injury data. Furthermore, the primary purpose of each agency conflicts to some extent with surveillance objectives. For example:

- NODS and HASARD support occupational health and safety investigation and enforcement. Fear of investigation and/or prosecution is a disincentive for employers to report cases to OSH. Efficient use of investigation resources by OSH involves filtering and prioritising of cases for investigation, which impacts on data collection.
- The ACC claims database primarily supports claims administration and case management. Full registration of all claims is unnecessary for these purposes and is therefore an unnecessary cost that can be avoided by entering limited information for minor claims. Also, the claims database only records cases that fall within ACC eligibility criteria and for which a claim is submitted, which results in incomplete coverage of some circumstances of injury and disease.
- The purpose of the NMDS is to provide comprehensive hospital discharge information on inpatients and day patients. Thus, it offers good capture of acute occupational disease cases but potentially poor capture of chronic occupational disease.

# CONCLUSION



Occupational disease and injury are important public health issues and are associated with a substantial burden on individuals and communities, in terms of mortality, morbidity, and costs. It is important to be able to measure and monitor occupational disease and injury effectively in order to identify risk factors, priority areas for preventive action, and to evaluate preventive actions.

This review has identified significant weaknesses and gaps across the current systems for measuring and monitoring occupational disease and injury in New Zealand. It is important to emphasise that these findings are not new and have been detailed within a range of earlier reports. The 1996 Governmental Inquiry into the Administration of Occupational Safety and Health Policy stated that “the current state of the non-existence of meaningful statistics which has been the case for 20 years cannot be allowed to continue”<sup>7</sup>. It is timely to reiterate that statement here.

This review commends the progress that has been made toward the development of a comprehensive injury statistics database, through the work of the Injury Information Manager, while acknowledging that this work is in its infancy and much remains to be done.

Occupational disease is a larger problem in terms of mortality and morbidity, but is harder to diagnose, measure, and monitor than occupational injury. There are no comprehensive sources of routinely-collected data on occupational disease in New Zealand. Moreover, there is little coordination and no aggregation of existing sources of data, no regular reporting on occupational disease statistics, poor recording of occupation and work-relatedness in data sets that could otherwise make a significant contribution to occupational disease surveillance, and poor access to suitable denominator data.

Existing systems are under-utilised at present. In particular, there are five databases which, if integrated in a suitable manner and backfilled with coded occupation information, have the potential to provide strong coverage of a range of occupational diseases. All of these databases record NHI and/or ACC claim numbers, providing a strong foundation for record linkage, and all five code diagnoses using ICD-10.

Although linking these data sets would provide only partial coverage of occupational disease, it stands to enhance New Zealand’s ability to implement other parts of the solution, by helping to identify gaps, priorities for focused research, and providing a data set that makes the best use of existing data sources and can be augmented through additional, targeted studies and surveillance systems.

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