RURAL INDUSTRIES RESEARCH
& DEVELOPMENT CORPORATION

Guidelines for evaluation of safety programs
for the agricultural industry

A report for the Rural Industries Research and Development Corporation

by Dr Jenny Sherrard and
Dr Lesley Day

Monash University Accident Research Centre, Victoria, Australia.

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Researcher Contact Details
Dr Lesley Day
Monash University Accident Research Centre
PO Box 70A,
Monash University
Victoria 3800

Phone: 03 9905 1811
Fax: 03 9905 1809
Email: lesley.day@general.monash.edu.au

Dr Jenny Sherrard
Monash University Accident Research Centre
PO Box 70A,
Monash University
Victoria 3800

Phone: 03 9905 1814
Fax: 03 9905 1809
Email: jenny.sherrard@general.monash.edu.au

RIRDC Contact Details
Rural Industries Research and Development Corporation
Level 1, AMA House
42 Macquarie Street
BARTON ACT 2600
PO Box 4776
KINGSTON ACT 2604

Phone: 02 6272 4539
Fax: 02 6272 5877
Email: rirdc@rirdc.gov.au.
Website: http://www.rirdc.gov.au

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Foreword

Safety and health are key issues for the rural sector. The patterns of farm injury resulting from research studies and surveillance systems underpin the growing areas of development and implementation of farm safety initiatives. With the growth in program implementation, there is increased recognition of the need to evaluate these programs and a consequent requirement for clear information and skills development in those responsible for conducting useful evaluations.

The Rural Industries Research and Development Corporation funded Monash University Accident Research Centre to develop Guidelines for evaluation of safety programs for the agricultural industry. This publication considers some of the most important elements necessary for designing and conducting an evaluation in conjunction with the design and implementation of a safety program. It includes several examples of evaluations of rural safety programs in Australia to illustrate the general principles of evaluation discussed in earlier sections. References to supporting materials for the design, implementation end evaluation of safety programs are also included.

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This report, a new addition to RIRDC's diverse range of over 700 research publications, forms part of our Human Capital, Communications and Information Systems R&D program, which aims to enhance human capital and facilitate innovation in rural industries and communities.

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Peter Core
Managing Director
Rural Industries Research and Development Corporation

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Dr Peter Anderson, Lecturer in Health Promotion, School of Public Health, Queensland University of Technology

Mr Tony Audley, Executive Director, Rural Training Council of Australia

Ms Pam Brown, Executive Officer, Giddy Goanna Ltd

Dr Lyn Fragar, Director, Australian Centre for Agricultural Health and Safety, University of Sydney

Mr James Houlahan, Deputy Director, Australian Centre for Agricultural Health and Safety, University of Sydney

Dr Tony Lower, Coordinator Distance Education, Department of Health Promotion, Curtin University

Ms Jane Mackerath, South Australian Divisions of General Practice

Mr David Rich, Farm Safety Project Officer, Victorian Farmers Federation

Mr Andrew Sullivan, Manager, Victorian State Farm Safety Training Centre

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PART B THE FARM INJURY CONTEXT

Background and Purpose

Farm health and safety initiatives in Australia have largely been guided by the philosophy agreed to and adopted by the member organisations of Farmsafe Australia. The underpinning principle of this philosophy is that the key responsibility for farm health and safety ultimately rests with farmers, their families and workers. Successful implementation of farm health and safety programs requires increased awareness, competency development, promotion of leadership, and partnerships at the local and industry levels to build the capacity within the industry to improve productivity, sustainability, health, wellbeing and safety. This process will be enhanced by the development and maintenance of a culture of safety within agricultural industries and rural communities.

Building of capacity is commonly directed at outcomes projected at some considerable time into the future. Therefore, it is useful to distinguish three levels of outcome for farm health and safety initiatives in terms of their respective time-frame of achievement. The first concerns measurable health gains achievable in relatively short time frames; the second, improved health care or health promotion delivery with an intermediate time frame and the third level of outcome involves the long term goals of enhanced institutional, professional and community capacity for better decision-making and more effective action. These concepts are inherent in the Ottawa Charter for Health Promotion which focuses on health as a positive concept emphasising social and personal resources and on health promotion as creating conditions to achieve not only healthy lifestyles but also general well-being.

These guidelines have been written to support the ongoing development of, and capacity building within, the safety field in Australia. Potential users of these guidelines include: program managers, health promotion officers, community health workers, community groups, Farm Safety Action Groups, agricultural extension officers, Divisions of General Practice, commodity and industry based groups, funding bodies, and others involved in health and safety in the rural sector. The guidelines show that by merging evaluation and program activities, evaluation may not take as much time and effort as is commonly believed.

An ongoing commitment to an evidence and business based approach clearly challenges program managers, researchers and evaluators to continue to provide high quality data, including that required for cost-benefit analyses, to inform prevention policies. Evaluation is an integral component to the evidence base for prevention programs, providing guidance on the selection of effective strategies, demonstrating the value of programs, and increasing commitment from funding agencies.

It is important to note that these guidelines focus on evaluation principles and methods, and are not intended to be a comprehensive source of information about improving health and safety, or preventing injury and disease. For simplicity and consistency, we use the principles of injury occurrence and its prevention to illustrate how a safety program is planned and how evaluation is woven into the planning and fabric of the program. These principles can be applied to any preventive health program and its evaluation.

PART A GENERAL PRINCIPLES

1. Introduction

Australia has a significant commitment to improving health and safety in agriculture, which entails a strategic approach to the identification of priority issues, and subsequent preventive action in this arena. Consideration of the appropriateness, adequacy, effectiveness and efficiency of health and safety initiatives is essential for fulfilment of this commitment.

In order to judge the worth of any safety program, it is necessary to determine whether the program has worked. Evaluation can tell us whether or not the program was delivered and received in the planned and expected manner. It can tell us whether or not there were any effects on the knowledge attitudes and skills of the target population, and also can assess any changes in injury hazards, unsafe environments, or relevant policies. Finally, and importantly, evaluation can tell us whether there was a reduction in injury.

Evaluation of a safety program has many uses and is designed to:

- contribute to the development and refinement of the program
- determine its effectiveness
- gain and develop community and technical support
- identify any unanticipated benefits and dis-benefits of the program
- establish accountability to a funding body
- establish accountability to employer and performance management systems
- support submissions for continuing resources and legislation
- justify the application of the safety program to another setting.

There are essentially two ways a safety program for reducing injury may be judged as successful. If evaluation shows a reduction in injury associated with the program, then clearly, the safety program is successful. However, evaluation is also seen as successful if it demonstrates that an apparently promising program does not reduce injury. Such a demonstration saves other groups from wasting their time and valuable resources in implementing a non-effective program. Clearly, if a program does not have injury reduction as a measurable goal or outcome, but meets its targets for reduction in risk factors for injury, it would also be judged as successful.

It is highly desirable for evaluation to be incorporated into the planning, implementation, and management of a program. Therefore, budgets for safety programs should allocate approximately 10-15% of total costs for evaluation purposes (Thompson 1998). All levels of government, communities and organisations which fund safety programs expect value for money. Evaluation offers the means of assessing any program effects in a systematic manner and provides stakeholders with confidence in program managers and administrators. This confidence fosters a climate conducive to other cooperative ventures for safety programs.

There is no correct way to evaluate a safety program. Program staff, funding agencies and other stakeholders all have somewhat differing views as to which type of information is important for them, although demonstrating a planned improvement in competency (knowledge, attitudes and

skills) is generally attractive to funding groups. Further, cost benefit analyses may be a greater part of evaluation briefs in the future.

Consultation with and collaboration between key interdisciplinary professionals and stakeholders is essential at all stages of a program to gain a useful and informative evaluation result. A willingness to negotiate for a satisfactory evaluation framework and budget is essential if the evaluation is to be useful and utilised. In particular, sufficient time and funding must be allowed for the effects of a program to be measurable. A range of evaluation approaches and associated costs provide different levels of evaluation results. Since funding bodies may limit money for evaluation purposes, an application for funding which describes the safety program integrated with its evaluation is more likely to attract adequate funds for a satisfactory evaluation.

The following sections briefly describe the principles of identifying a safety problem using needs assessment, planning a safety program, and designing the program evaluation. These sections provide a framework for understanding how evaluation is integrated within a program plan and its implementation. The principles in each section are illustrated by the example of tractor rollover injury as a health problem and how the evaluation of a program to prevent these injuries is integrated within the program structure. Other examples to illustrate prevention programs/interventions and possible approaches for evaluation can be found in Part B, Section 8.

2. Needs Assessment

A needs assessment can establish a clear picture of an injury problem in a community which may be a large population such as a state or a small local population in a region or area. The needs assessment can focus ideas about a possible safety program. It is important to establish that an injury problem actually exists before an attempt is made to reduce or remove it!

We have chosen the example of a statewide community which is known to have a higher rate of tractor rollover deaths than the nation as a whole to illustrate the principles of program planning and evaluation. The tasks of a needs assessment could be to:

- systematically review and interpret the nature and pattern of the state injury mortality using available injury data and existing literature
- determine the relative priority of the injury problem to the state
- assess whether there are recognised prevention strategies available eg. Roll-Over Protective Structures (ROPS) for tractors
- investigate other programs of a similar type for useful approaches to planning
- consult with state and local community groups (eg. Farmsafe Committee, Farm Safety Action Groups, Regional Project Officers) to assess the feasibility of reaching potential target groups for safety programs
- assess factors that may influence the acceptability of a safety program in the state.

In the case of a small community with a relatively small population (say 4,500), the focus of a needs analysis may be on local problems which may be greater than anticipated from an overview of state figures. For example, a Farm Action Safety Group in NSW established a planning group which initially collected local childhood injury data from hospitals, schools, and farms to accurately determine the nature and pattern of injuries and the types of hazards present on properties in the area (Wolfenden K, Clarke L, Lower T, Murray-Jones S, 1991). The needs analysis included a literature review on injury prevention, and interviews with parents to assess potential methods for intervention. An unexpectedly high level (30%) of injuries involving horses, compared with that for NSW as a whole, led to the design and implementation of a program to further investigate horse-related injuries and to reduce their incidence and severity in the area (Lower T, 1993). Other priorities established by the needs analysis included the need for prevention effort directed toward childhood drowning, helmet wearing (bikes and horses) and hearing protection.

3. Program plan

There is a systematic approach to safety programs in the fields of public health, occupational health and safety, and risk management. The prevention approach is based on reduction of risk factors for injury. The 'Hierarchy of Controls' model is used by occupational health and safety professionals and is a basis for industry legislation and regulation. The model, which has been adopted by the agricultural industry in Australia, operates at three levels for injury prevention and control (Injury Prevention: Meeting the Challenge; Standards Australia AS 6001-1999). The first level uses elimination of the hazard (eg., discontinue the activity). The second level of control attempts to minimise the risk by engineering controls including replacement or modification of systems or plant, isolation of the hazard within a restricted area, and physical controls such as guarding. The third and least effective level includes administrative controls (eg. work rotation, instruction), and personal protective equipment (eg. respirators, protective eyewear, requiring enforcement). The cost, benefit and practicability associated with action at each of these levels often influences their selection for safety interventions in the workplace.

The 'Three E' method (engineering, education and enforcement) of approaching hazard reduction and injury prevention developed from industrial processes early last century when working conditions were deplorable (Murphy D. Safety and Health for Production Agriculture). Because education and enforcement rely on human behaviour, they are limiting factors in this model as they are for the Hierarch of Controls model. Nevertheless, there is a need to influence and change unsafe behaviour despite this approach posing a substantial challenge to providers of injury prevention and safety programs.

Haddon (Injury Prevention: Meeting the Challenge) developed a list of ten general injury prevention strategies designed to interfere with the energy/transfer process in injury occurrence. These are:

1. Prevent the creation of the hazard
2. Reduce the amount of the hazard
3. Prevent the release of a hazard that already exists
4. Modify the rate or spatial distribution of the hazard
5. Separate, in time or space, the hazard from that which is to be protected
6. Separate the hazard from that which is to be protected by a material barrier
7. Modify the relevant basic qualities of the hazard
8. Make what is to be protected more resistant to damage from the hazard
9. Begin to counter the damage already done by the hazard
10. (10) Stabilise, repair, and rehabilitate the object of the damage

The strategies were not intended as a formula for choosing countermeasures, but rather as an aid to analysing injury problems logically and systematically. They essentially address an engineering and environmental approach.

A plan for a safety program is based on and developed from the needs assessment. It requires the development of the *goal*, *objectives* and *strategies* for the program. In practice, goals and objectives should be consistent with the acronym SMART which stands for Specific, Measurable, Achievable, Realistic and Time specific.

3.1 Goal

The *goal* of a safety program is the desired measurable long-term outcome of an intervention or program. It defines a change in the health problem in terms of a group of people (farmers, children) over a prescribed time (months, years) and in a particular setting (national, state, region). For example, a safety program goal could be a 30% reduction (specific and measurable) in tractor rollover injury to farmers in the state within 5 years (time specific, achievable and realistic).

It is important to note that not all safety programs can have injury reduction as a measurable goal. If the target population is small, then a long time is required to collect sufficient injury data to show any effect and may be unachievable. However, if a reasonably large number of small groups across a state have the same safety program, there may be a collective measurable goal. Also, the goal of a small local program may simply be to increase knowledge regarding tractor injuries in the local community. This is a measurable goal in itself and the program, and accompanying evaluation, can be designed to suit.

3.2 Objectives

The Objectives of a safety program are the desired measurable improvements in factors which contribute to the health problem. For example, injury occurrence can be attributed to a number of risk factors. These risk factors for injury fall into three broad categories; physical hazards, unsafe environments, and human factors. The first category consists of physical hazards including fire, smoke, water, electricity, chemicals, and mechanical energy. These hazards cause injury by burning, suffocating, drowning, electrocution, poisoning and trauma. The second category of risk factors for injury consists of unsafe environments such as poor roads, unfenced home property or pools, unguarded machinery, inadequate storage conditions for pesticides and herbicides, and inadequate protection from noise, the sun, and animals. These unsafe environments allow the hazards to come into contact with people. The third category of risk factors consists of host or human factors such as a lack of knowledge, or a poor skills base for using and managing machinery, chemicals, or noise, sun and animals in a safe manner. All three types of risk factors interact to result in injury occurrence and its consequences and are potentially preventable.

To illustrate, the lack of ROPS on tractors is a known risk factor for tractor injury. Therefore, a major objective for a safety program could be the fitting of ROPS to 90% of tractors in the state thereby reducing the known risk factor for injury. Achieving this objective, for example by employing educational measures and subsidies, is a necessary precursor to achieving the stated program goal of a 30% reduction in tractor rollover injury. Objectives should satisfy the SMART acronym in being Specific, Measurable, Achievable, Realistic and Time-specific.

3.3 Strategies

Strategies are activities aimed at promoting factors that enhance, or remove factors that impede, the achievement of objectives. Main strategies employed for intervention programs include education, structural and environmental change, and legislation and regulation.

For example, factors that impede farmers from fitting ROPS may include a lack of understanding about the protective nature of ROPS, lack of available ROPS for older tractors, competing priorities, or the cost of purchase and fitting. Strategies to increase ROPS fitment could include: (1) a publicity campaign to inform farmers of the risk of unprotected tractors (2) the gaining of a subsidy for farmers to purchase and fit ROPS (3) ensuring availability of ROPS and (4) legislative changes. Implementing these strategies is a necessary step to achieving the objective of ROPS being fitted to 90% tractors in the state and thence to achieving the program goal of injury reduction.

It is important to access and utilise any evidence base provided by randomised controlled trials and other high level research for selection of risk factors and strategies in an injury prevention program. Using untested new approaches requires substantially more resources for effective evaluation.

3.4 Sources of information and expertise for programs

Sources of information to plan and develop safety programs include published books, literature, program and evaluation reports of other similar initiatives, and consultation with experienced program managers and evaluators (Hawe 1990, Thompson 1998). Key references for program planning can be found at the beginning of the bibliography. A list of data sources, and data management and evaluation advice can be found in the Appendices and Bibliography.

4. Evaluation

Evaluation of a safety program consists of four distinct stages integrated with the program at the planning phase and continuing until after completion of the program. Each of the elements of the development and implementation of the program plan has a corresponding level of evaluation. Defining the goals, objectives and strategies of a program determines what is described and/or measured at each level of evaluation.

4.1 Formative evaluation

Formative evaluation is a way of making sure that procedures, activities, and materials will work as planned. It offers the opportunity to solve any unexpected problems early in the safety program. It requires documentation of the program including its plan, goal, objectives, target groups, control or comparison groups, program strategies and organisation, management and program implementation (Table 1). It involves pilot testing of procedures, activities, and materials for feasibility, acceptability and high and consistent quality. This type of evaluation is also very important when an existing safety program is being modified or adapted for use with a different target population in a new location because there is no guarantee that a successful program under one set of circumstances will be successful in other circumstances. Once a safety program is implemented, continuing formative and/or process evaluation provides feedback to program managers regarding the consistency, integrity and quality of the program throughout its life.

4.2 Process evaluation

Process evaluation determines whether the program has been implemented or delivered as planned by measuring program reach to the target group, participant satisfaction, implementation of activities, performance of materials and other components, and ongoing quality assurance (Table 1). These measures relate to assessing satisfactory progress in the implementation of the program *strategies*. It is not uncommon to find that the program delivery changes over time so that materials and activities are no longer the same as at the beginning of a program. Staff and settings may change, materials may no longer be available or have become modified. Thus process evaluation monitors the initial implementation and continuation of the program for integrity and consistency of format.

Table 1. Relationships between stages of evaluation for a safety program for ROPS

Program Plan for ROPS	Evaluation
Needs Analysis Establish the incidence, pattern and nature of tractor roll-over injuries in the target area. Investigate feasibility of various intervention approaches.	**Formative evaluation documents the program plan and its implementation.** Detailed description of a ROPS program including its goal, objectives, strategies, target and control groups. Documentation of any pilot testing of activities and materials and the implementation activities and sequence of the program.
Strategies Publicity campaign for ROPS Subsidy for ROPS Ensuring availability of ROPS Seek legislative change	**Process evaluation assesses the delivery of a program and measures achievement of program *strategies*.** Measurement of ROPS publicity reach and target group participation. Measurement of information received by farmers. Measurement of uptake of ROPS subsidy (Section 4.2)
Objectives Fit ROPS to 90% tractors	**Impact evaluation assesses change in risk factors and measures achievement of *program objectives*** Measure change in knowledge related to publicity campaign Measure level of ROPS fitment Assess any legislative change (Section 4.3)
Goal Reduce tractor roll-over injury by 30% within 5 years.	**Outcome evaluation measures change in injury levels and achievement of *program goals*** Measure change in tractor related injury rate (Section 4.4) Evaluation report.

For example, process evaluation of a tractor safety program could include monitoring of the quality and extent of the delivery of the publicity campaign (Table 2), measures of information received by farmers, and the rate of uptake of ROPS subsidies by farmers. If these measures show low response to program activity, then additional formative evaluation may identify the problem and help provide a solution before evaluating the impact of the program.

Table 2. Examples of measures for process evaluation (Thompson 1998, Rodriguez 1997)

Measures for public media campaigns or advertising	
Count	Number of advertisements/notices displayed in newspapers, on TV Number of different types of media used Daily circulation of newspaper
Observations	Observe television watchers in hotels, restaurants Observe what people are reading in newspapers or on billboards
Measures for information received	
	Whether people saw the advertisements on TV or in the newspaper Recall of content of the advertisement/notices Relevance of the advertisements/notices to respondents

4.3 Impact evaluation

Impact evaluation involves the assessment of immediate program effects on risk factors for the health problem. In the case of a safety program, impact evaluation measures the effect of the program on known and measurable risk factors for injury. Therefore any change in knowledge attitudes and skills of the target group, level of injury hazards, the environment, and relevant policy indicate the immediate effect of the program (Table 1). These measurements relate to progress toward achievement of program *objectives*. If these effects are not in the desired direction, then the program is unlikely to be progressing as planned and should be reviewed/modified with further process evaluation of the modifications.

Impact evaluation in tractor safety could include measures of change in the knowledge, attitude and skills gained from the rollover publicity campaign and the proportion of tractors fitted with ROPS (hazard reduction) before and after the campaign. Simple questionnaire surveys of farmers knowledge and attitudes to ROPS could be undertaken at local field days before the campaign, recording names and addresses. The same questionnaire could then be mailed to the same farmers after the campaign for completion and return by postage paid mail. Results could be compared for any changes. The survey could also include questions regarding the fitting of ROPS to tractors. The proportion of fitment before and after the campaign could then be compared to evaluate the campaign effect on action taken for hazard reduction.

Legislative change could create a regulatory environment in which tractors are required to have ROPS. Also, if participants transfer their new knowledge into modification of other risk factors for injury (eg. repeated machinery maintenance) then this demonstrates attitudinal change and the on going safety effect of an intervention to prevent injury in the future. Questions relating to other safety measures could be included in the survey.

There are a variety of methods for measuring change ranging from simple local surveys to full scale investigations involving field visits and national wide sampling for telephone interviews.

4.4 Outcome evaluation

Outcome evaluation involves the assessment of longer term effects of a program on the program *goal.* The program goal may be defined as reduction of injury mortality and morbidity as shown

Table 1. This can be measured in terms of case numbers. However, a more accurate measure, known as rate, is case numbers per head of population per year. For example, tractor deaths per 100,000 agricultural workers per year. Ideally, the rate should include measures of exposure to the hazard (eg deaths per 100,000 hours of tractor work per year), but this is infrequently done. Often, smaller programs may have a different goal (achievable at the local level) of, for example, increasing a specific competency in an industry area. In this case the outcome evaluation assesses the competency gained and not a reduction in injury, but a series of these programs could contribute to a national goal for safety. Clearly the structure of an evaluation is dependent on the design of the program and its defined goals and objectives.

Using the ROPS example for outcome evaluation, the differences in injury rates before during and after the completion of the program indicate the level of reduction of injury associated with fitting of ROPS to tractors. However, showing a change in rates of morbidity and death due to injury may take a long time and requires a large number of program participants. Further, outcome evaluation may continue for years after the completion of a safety program to assess whether program effects are sustained over time. Limited funding for long term followup of outcome may mean that only impact evaluation can be realistically achieved, unless monitoring of trends in farm injury mortality and morbidity is continued by local, state or national authorities.

The final stage of evaluation is to compile a report documenting the evaluation results for each stage of the safety program evaluation. This document may range from a short memo to a large report depending on the brief of the evaluation and the stakeholders and funding agency requirements.

Costs associated with injury and its prevention can be assessed in cost benefit analyses as an extension of outcome evaluation. Miller and Levy (1997) have recently published a useful introductory paper on the principles of such analyses that would require expertise to implement. Nevertheless, a simple collection of data associated with costs of part of a program can be useful for evaluation purposes. For example, costs of production of leaflets and associated media costs announcing a workshop, costs of a field day for a tractor safety workshop, and costs of mailing questionnaires can provide useful information for evaluation and for others wanting to implement a similar program.

4.5 Full or partial evaluation?

It is important to recognise that not all safety programs require a full formative, process, impact and outcome evaluation. If an intervention, such as a ROPS fitment program, is known to be effective in reducing injury, then the use of this intervention in a new community or group of people only requires formative, process and possibly some impact evaluation. An outcome of injury reduction can be generally be assumed if the safety program is evaluated for satisfactory implementation and penetration to the target population.

On the other hand if a safety program has been newly devised and there is no history of any satisfactory program effects elsewhere, then a full evaluation is essential to demonstrate its worth. Because of limitations in funding it is not always possible to evaluate every aspect of a program. Therefore it is more practical for program evaluators to focus on measures to demonstrate whether or not a program has worked rather than attempting to evaluate why a program worked which tends to be in the realm of more extensive research.

4.6 Internal or external evaluation

Frequently it is preferable for program staff to act as evaluators to conduct formative and process evaluation, as they are the most familiar with the planning and implementation of the program. They

can collect and document activities during implementation which can assist in refining program delivery.

External evaluators may be consulted/contracted early in program planning to assist with design and conduct impact and outcome evaluation. If the program is relatively small, program staff may manage all stages of evaluation.

5. Design of programs and their evaluation

There are several approaches to designing a program so that evaluation can demonstrate program effects in a logical and unambiguous manner. Without suitable design, the program effects can only be presumed to be associated with the program and cannot be claimed as entirely due to the program. Therefore, some form of control or comparison group (individuals, communities, schools, farms, commodity groups) is required to compare with the program group to assess the additional effect of a program over and above any background effects due to other outside influences.

Comparison group and control group both refer to a group of people who don't receive the program, but whose knowledge and conditions are monitored in order to compare with those in the program. If the people in the program improve more than those in the comparison or control group, then there is some evidence that the program is causing the observed effects. A comparison or control group is one which is as similar as possible to the program group. Comparison and control groups differ by their method of selection. A control group is rigorously selected by randomisation of subjects (communities, schools, farms, commodity groups) into the control group or the program (intervention) group. A comparison group is selected without randomisation but to match the program group as closely as possible on key characteristics such as major commodities produced and age and gender composition.

Program designs fall into two broad groups, experimental and quasi-experimental.

5.1 Experimental designs

Experimental designs are the ideal designs for impact and outcome evaluation of safety programs, but are practically demanding. They produce the strongest evidence that a program has worked and are particularly useful for detecting not only strong effects but also small but important effects of a previously untested program or strategy. The key to an experimental design is randomisation where consenting program participants are randomly assigned to an intervention group which takes part in the safety program or to one or more control groups which receive no safety program. The effects of the program are measured by comparing the two groups. Randomisation ensures that the groups are as similar as possible and eliminates factors outside the program as being the cause of change, such as the different attitudes and beliefs of a volunteer group. Experimental studies can be challenging to conduct and require sophisticated research skills. Appropriate interpretation of the results provides the evidence base for selection of interventions for local level programs.

However, inherent difficulties arise in randomised interventions involving people. Often logistical, budgetary, ethical and political issues make it difficult to use this design. If those who consent to participate in a randomised-controlled trial are not representative of the community from which they come, the findings of the program evaluation will not be generalisable to the whole community. Further, if they are randomly allocated to the control group they may be unhappy at not receiving potential benefits. Frequently ethics approval for these designs may involve the program being delivered to the control group after the test group has completed the program thereby incurring increased costs.

Producing an evidence-base that an intervention works needs rigorous design and may require a large and complex research program often at the regional, state or national level. It is important to note that good evidence for an intervention is not necessarily only obtained from randomised controlled trials, but can be based on knowledge and application from engineering and design (eg, ROPS) and related research (evidence for helmets saving lives on the road applied to helmet use on farms). However,

these assumptions and applications may mean missing negative outcomes. If the evidence is recognised that an intervention works (eg ROPS) then evaluation may be simplified to completeness and reach of program implementation.

Program managers must investigate the evidence-base for interventions as part of formative evaluation, (section 4.1) before deciding whether an experimental design in warranted.

5.2 Quasi-experimental designs

Because of the inherent and practical difficulties with experimental designs, quasi-experimental designs are more commonly used. No randomisation of participants is required and generally the whole group, community, or region receives the intervention. Another group, community, or region (as similar as possible to the intervention group) is chosen as a comparison group. For example, a program may involve a comparison between two communities where one test community is exposed to a safety program. The other comparison community is located far enough away to minimise the spread of the intervention program to the residents. However, it is not possible to ensure that the comparison group is not inadvertently exposed to intervention material. Further, it is difficult to control for extraneous injury information from other external sources altogether eg. a quite independent media campaign or news of a similar safety program in another country or state. This extraneous information may affect both communities differently and cause spurious or inaccurate results in the evaluation. It is also not possible to match the intervention and comparison groups on significant factors likely to influence the outcome (Section 5). Therefore, although strong effects of a program can sometimes be detected, smaller useful program effects may be missed against the background of extraneous influence.

If a comparison group is not available, then practical evaluation may depend on comparing measurements before and after the safety program with no ability to assess the influence of outside events and effects. Consequently, evaluation results using this latter design are not as reliable as for designs using comparison groups.

5.3 Selection of target, control and comparison groups

The issues involved in selecting groups of appropriate size for statistical analyses and designing safety programs and evaluation can be complex and collaboration with evaluators and other research personnel and experts is recommended (Hawe 1990, Thompson 1998).

Samples for programs and their evaluation (Green, 1986)

- Random sample

In a random sample each individual had an equal chance or probability of being selected and hence the sample is representative of the population from which it is selected. Therefore results of an evaluation can be generalised to the larger population from which the sample was drawn. Wherever possible program participants should be randomised to target and control groups, as this process will provide the best evidence for an effect being due to the program.

- Stratified random sample

Here the population is split into groups or strata on the basis of some variable (eg. gender, age groups, farm commodity groups, property size, owners and workers) Random samples are then selected from each strata.

- Systematic sample

A systematic sample is one selected according to some system (eg. A sample of 60 subjects from a total population of 1,200 in a town would be every twentieth person in the population). This method of selection can lead to biases due to trends in the listing of the population. If the population is listed alphabetically, as on an electoral role, then the sample may end up with an over-representation of certain ethnic groups according to their surnames. Therefore this method of selection of target and comparison groups provides less rigorous evidence for program effects than randomised groups.

- Cluster sample

The total population is divided into clusters based on natural or geographic groupings (eg. farms, schools, and shires) and then a predetermined number of clusters are randomly selected. Subjects are then randomly selected from each selected cluster.

6. Methods of evaluation

Many evaluations use both qualitative and quantitative approaches (Hawe 1990, Thompson1998). This mix of methods provides a balanced option for examining the scope and detail of program effects.

6.1 Qualitative methods

Qualitative methods are a means for collecting information on the feelings, beliefs, and impressions of participants about a safety program and its activities. Qualitative methods are open-ended and especially useful in the formative evaluation of a safety program when pilot testing of procedures, activities and materials are being conducted.

For example, it could be informative to evaluate whether participants in a safety program feel they have benefited from the program or pilot study and whether there are areas the program or pilot study has missed. Qualitative methods such as interviews, focus groups and participant-observation can collect this information which can then be used to refine program delivery as part of formative evaluation. These methods are also useful to help solve problems arising after the program is implemented such as why people are not coming to workshops. For example, a training program may be scheduled at a difficult time, or be too long, or there may be problems with the presenter.

- Personal interviews. In-depth personal interviews with broad open-ended questions can help the understanding of the strengths and shortcomings of a new or modified program before implementation and identify any problems after implementation. This type of interview is particularly useful when the target group population differs in age, ethnicity, culture, training or social background from program staff and evaluators. Questions that encourage discussion and sharing of ideas rather than a one-word answer will collect more useful information. Personal interviews are most appropriate when it is difficult to bring a group of people together (eg. in rural areas) or people are shy or the topic is sensitive. Personal interviews should be audiotaped and transcribed verbatim. Common themes and useful comment can be included in the evaluation report.

- Focus groups are similar to personal interviews but involve ideally 6-8 people who are comfortable enough with each other to express their opinions easily, even when opinions may differ widely. The advantage of a focus group lies in the encouragement and stimulation the members of the group draw from each other. Questions are similar to personal interviews. Several different focus groups will provide a broad set of views. The focus groups should also be audiotaped and transcribed verbatim. Common themes and useful comments form the basis of a report.

- Participant-observation. Although time consuming, participating as an observer in a program activity or event can assess the strength and weaknesses of the program from the perspective of a participant (Thompson 1998, Hawe 1990). For instance, are the participants in a training program looking interested, is the presentation delivered in a logical manner, can everyone see?

It is important to note that qualitative methods require people trained and experienced in a particular method (interview, focus group, and participant-observation). Consultants could be uses to advise program staff wishing to use the methods for the first time.

A summary of qualitative methods for evaluation is shown in Table 3.

Table 3. Qualitative methods in evaluation.

Method	Purpose	Number of people to interview or events to observe	Resources required	Advantages	Disadvantages
Personal interviews	To have individual, open-ended discussion on a range of issues To obtain in-depth information on an individual basis about perceptions and concerns	The larger and more diverse the target population, the more people must be interviewed	Trained interviewers Written guidelines for interviewer Recording equipment A transcriber A private room	Can be used to discuss sensitive subjects that interviewee may be reluctant to discuss in a group Can probe individual experiences in depth Can be done by telephone	Time consuming and expensive to conduct interviews and transcribe and analyse data Participants are one-on-one with interviewer, which can lead to bias toward 'socially acceptable' or 'politically correct' responses
Focus groups	To have an open-ended group discussion on a range of issues To obtain in-depth information about perceptions and concerns from a group	6 to 8 interviewees per group	Trained moderator Appropriate meeting room Audio and visual recording equipment	Can interview many people at once Response from one group member can stimulate ideas of another	Individual responses influenced by group Transcription and analysis can be expensive Participants choose to attend and may not be representative of target population Because of group pressure, participants may give 'politically correct' responses Harder to coordinate than individual interviews
Participant-observation	To see first-hand how an activity operates	The number of events to observe depends on the purpose. To evaluate people's behaviour during a meeting may require observation of only one event (meeting). But to see if products are installed correctly may require observation of many events (installations in homes)	Trained observers	Provides first-hand knowledge of a situation Can discover problems which the parties involved in are unaware of (eg. that their own actions in particular situations cause other to react negatively) Can determine whether products are being used properly (eg. helmets worn by bike riders) Can produce information from people who have difficulty verbalising their points of view	Presence of observer can affect activity being observed Can be time consuming Can be labour intensive

Source: Thompson 98.

6.2 Quantitative methods

Stakeholders may want to know for example whether the proportion of motor bike owners conducting regular maintenance has increased as the result of a safety program. This requires a quantitative approach and is assessed by comparing data on maintenance frequency before and after implementation of the program (ideally a randomised controlled trial). Additionally, some funding bodies may only be interested in the quantitative approach to justify their funding of a particular safety program.

Quantitative methods are used to collect objective data expressed in numbers (the number of participants attending a program (process evaluation), change in knowledge or practice after the program (impact evaluation), or a change in injury rates after the program (outcome evaluation). These methods are used during evaluation to quantify the effects of the program.

Surveys are a systematic method for collecting data. They may be conducted by personal or telephone interview, or by completing in private a posted or delivered questionnaire. The choice of method can depend on issues of accessibility to the telephone, and understanding spoken and written English.

During the development of a program, surveys can:

- identify areas of difficulty before implementation and allow modification to increase efficiency (pilot survey)
- gather baseline data on knowledge attitudes and behaviour, presence or absence of hazards (eg. proportion of tractors with ROPS) injury rates
- Once a program is implemented, surveys can:
- measure participant satisfaction and information received
- measure change in competency compared with baseline levels
- measure changes in hazard levels or levels of protective factors
- identify a problem with the program because of no measurable effect.

Survey populations

In small community safety programs, it is often possible to survey the entire program target group. However, if the target group is large, surveys are frequently done on samples rather than the entire group. Selection of a survey group from the sampling frame (entire group) may be by random sampling, systematic sampling (eg. every second person on a list), or stratified sampling (eg. age, gender farm commodity groups). Expert assistance should be sought to determine sample size and select representative samples for evaluation. A full discussion of sampling techniques can be found in Green (1986) with other discussion in Hawe (1990).

Survey instruments

Survey instruments are the tools used to collect information. These include questionnaires and checklists.

The methods for administering survey instruments are: personal interview, telephone interview or mailed self-administered questionnaires. The advantages and disadvantages of each method are shown in Table 4.

Table 4. Advantages and disadvantages of methods of administering survey instruments.

Method	Advantages	Disadvantages
Personal interviews	Least selection bias: can interview people who have no telephones Greatest response rate Visual materials may be used	Most costly: requires trained interviewers and travel time and costs Least anonymity: therefore most likely that respondents will modify responses toward the socially acceptable
Telephone interviews	Most rapid method Most potential to control the quality of the interview: interviewers remain in one place so easily supervised Easy to select telephone numbers at random Less expensive than personal interviews Better response rate than mailed surveys	Most selection bias: omits those without telephones Less anonymity for respondents than for those completing instruments in private Requires a trained interviewer
Mailed or delivered instruments completed by respondent (self administered)	Most anonymity, therefore least bias toward socially acceptable responses Can collect large quantities of data Cost per respondent varies with response rate: the higher the rate, the lower the cost per respondent Less selection bias than with telephone interviews	Least control over quality of data Dependent on respondent's reading level Mailed instruments have lowest response rate Surveys using mailed instruments take the most time to complete because they take time in the mail and time for respondents to complete

Source: Thompson 98.

Design of Survey instruments

There are standard established surveys and questionnaires (see below) which should be explored for use in programs before attempting to design a new instrument which requires expert advice. However, it is important to first clearly identify the aims of a survey and then select the questions accordingly, rather than simply adopting existing surveys. All instruments should be pilot tested on any new population to assess whether they provide the desired information in the desired format to answer questions related to the program and its evaluation. If existing questionnaires are to be employed, then their validity and reliability should be established first.

The validity and reliability of questionnaires are important issues which determine the confidence placed on any information derived from them. The reliability of a questionnaire refers to the consistency of information collected from the same person when repeated. The validity of a questionnaire refers to whether it collects the information it is meant to collect (Green and Lewis, 1986).

A survey instrument should encourage people to respond. Its design should:

- use language at the reading level of the least educated people in the target group
- avoid abbreviations and terms not easily understood
- limit the number of items or questions needed to fulfil the requirement of the survey
- be attractive (if printed) and easy to read with typing of adequate size

A number of steps are important in the design of a survey instrument (Green 1986, Thompson 1998, and Hawe 1990)

- Define the survey population
- Identify the survey aims
- Choose a method of administration (mail, personal interview, focus group)
- Use closed questions wherever possible as they are easier to answer (eg. responses requiring a yes/no answer or multiple choice answers, rather than 'Tell me what happened'). However, some room for comment can be useful.
- Order questions so that the least sensitive items are first. Sensitive items such as income and education should come late in the instrument. General questions should come before specific questions and questions relating to a particular topic eg. ROPS should be grouped together
- The instrument should have a title which encourages response eg. 'Survey of the safety needs of our region'.
- Assess the reliability and validity of the instrument. Expert advice may need to be sought (Green and Lewis 1986).
- Pilot test the instrument on a group of people similar to the target population to assess whether it is relevant to program requirements.
- Modify the instrument based on information from the pilot test.

This process of development of questionnaires is designed to collect objective information. Developing questionnaires without this process can compromise the reliability of the questionnaire and its results and would be a major criticism of the veracity of an evaluation report. It is important to use existing validated questionnaires where these are appropriate for the survey aims, or seek expert assistance wherever necessary. Some organisations with specialist expertise in population surveys are listed in Appendix 1

PART B THE FARM INJURY CONTEXT

1. Introduction

Farm health and safety initiatives in Australia are a mix of strategic national initiatives, state wide programs, and robust local level activities, a large number of which are developed within, or in association with, the strategic framework for education, resources and legislation developed by Farmsafe Australia. A summary of the health and safety strategies developed and adopted by Farmsafe Australia and its member organisations is provided in Table 5 (Fragar and Franklin, 1999). Specific goals and targets to be addressed include reductions in injury related deaths on farms, in compensable injury, in on-farm injury hospital admissions, and in noise induced hearing loss among young people. Other targeted issues include zoonotic disease, cardiovascular disease, mental health and suicide, cancer and road traffic deaths.

Table 5: Farmsafe Australia Health and Safety Strategies.

Strategy	Examples of programs
1. Develop and maintain a "culture of safety" in the farming community, and effective communication mechanisms for OHS extension and promotion	Farmsafe Australia and member agencies acting through: ▪ State and local level Farm Action Safety Group promotion and extension activities, and activities in schools and colleges ▪ Industry specific development of OHS plans, programs and resources ▪ Farmer peak body level engagement of the National Farmers Federation and industry Reference Groups in all key strategy developments ▪ Worker level input from the Australian Workers' Union, rural women level input from the Country Womens' Association and other womens' networks ▪ Media involvement
2. Integrate farm health and safety into human resources management and the risk management of farm business	▪ Managing Farm Safety resources and training ▪ Tractor Operation and Maintenance course
3. Develop relevant OHS competencies for education and training of all farm workers and make education and training accessible to all practising farmers, farm workers and their families	▪ Vocational competency standards and Managing Farm Safety training ▪ Training opportunities in farm health and safety for rural health workers ▪ Farm safety education in schools
4. Ensure farming community contributes to the legislative development of national uniform standards for agriculture	▪ Legislation relating to OHS management in agriculture
5. Develop improved data systems to establish baseline data for problem identification, assessment of causal factors, risk assessment, and for monitoring and evaluating effectiveness of programs.	▪ National Farm Injury Data collection ▪ Other data collections
6. Implement research to improve health and safety on farms including specific hazard definition and control of associated risk, and improved methods of education and extension	▪ Rural Industries Research and Development Corporation and the Farm Health and Safety Joint Research Venture ▪ Other programs
7. Address specific targeted issues essential to achieving health and safety goals.	▪ Tractor safety. Tractor Operation and Maintenance Course ▪ Farm machinery safety ▪ Child injury prevention on farms. RIPPER, Giddy Goanna ▪ Safe animal handling ▪ Hearing conservation on farms ▪ Safe use of farm chemicals. Chemcert course ▪ Farm motorcycle safety ▪ Horse safety ▪ Health and safety in each of the sheep, dairy, grains, beef, horticultural and piggery industries
8. Establish effective links for injured persons on farms with providers of services to minimise the impact of farm injury on illness.	▪ Health Reference Group ▪ AgrAbility Australia and improved rehabilitation services for agriculture

2. Evaluation of safety programs for small groups

It is not usually possible to expect a measurable outcome for injury reduction for a program with a small target group. For example, a program may consist of a training course for 20 people to inform and increase competence for vehicle maintenance. The expected reduction in injury for the target group would be too small to adequately measure in any reasonable time. Therefore, the most useful approach is to evaluate the impact of the training course on competencies gained by participants. This could be achieved by a questionnaire used before and after the course and designed to measure any increase in knowledge, attitude and skills. Development of maintenance skills could be measured by having the participants conduct a vehicle maintenance task under supervision. The value of a small group program is the supervised participation of the group in practical measurable activities that tend to offset the disadvantage of a lack of measurable injury outcome.

It is useful for program managers and evaluators of small group programs to consider linking in with larger programs. For example regional commodity based programs could link with state and national commodity groups. The implications of this approach raises various issues including collecting compatible data to be consistent across all groups. Therefore managers should be aware how their program fits with state and national goals and targets and consult the bigger picture before designing any new data collection instruments.

Example

Safe Tractor Access Platforms are designed to prevent tractor injury associated with mounting and dismounting. Farm safety action groups in Victoria are currently conducting workshops for farmers to install platforms. The aims of an evaluation could be to

1) document the processes of uptake of platform installation by farm safety action groups

2) document the group workshop method of installation

3) explore the benefits and disadvantages of the platforms identified by tractor users and

4) assess the design benefits and disadvantages of the installed platforms. Evaluation of this program could include interviews with safety group leaders and farmers, documentation of costs to farmers, and engineering inspection of the platform.

3. Evaluation of safety training programs

Training programs are commonly evaluated using process evaluation (participant attendance, feedback on program content and delivery), and sometimes impact evaluation (formal assessment to determine change in knowledge and skills). It is important to monitor the quality, consistency and delivery of training programs before attempting to accurately assess the effects of the program on the participants.

Impact evaluation of program effects on risk factors other than competency (eg. hazard reduction and environmental change) and evaluation of outcome on injury occurrence are not often documented for safety training programs, but should be considered where no such information exists. Nevertheless, assessment of (1) competency on the job following competency based training and (2) an intention to act more broadly by transfer of other safety knowledge and skills gained by training, are useful program evaluation measures. Occupational Health and Safety issues are often incorporated into programs (eg. Chemcert course) in the expectation of a translation into the workplace.

Where programs are delivered nationally or across a state it may be possible to assess these effects by combining data from all programs, provided the data are collected in a consistent manner with the same instruments. Consultation with other programs is essential to achieve such consistency which can lead to improved efficiency in delivering programs.

Measures suitable for evaluation of training programs

- Questions to ask participants
  What was the most important thing you learned at the training program?
  Was the program useful and relevant to you?
  What will you do with the information you received?

- Observations to make
  Participant-observer to assess information presented, organisation and delivery of information by presenter and length of sessions
  Observe other participants for levels of interest and involvement

- Counts to conduct
  Count of number of participants attending
  Level of knowledge attitude
  Level of skills or competencies

Examples

The National Farm Chemical User Training Program developed by Farmcare Australia is designed to teach the safest and most cost-efficient use of agricultural chemicals for crop protection and animal health. Delivery of the program is through face-to-face workshops. Participants are eligible for national accreditation after formal assessment. Evaluation measures include details of program delivery and management, audits of trainers and resources, and a random selection of participant assessment papers.

The Queensland Rural Women's Pesticide Awareness Program was recently developed by the University of Queensland in association with Farmsafe Queensland and supported by industry and government. It is an interactive education program for rural women providing information on the safe use and regulation of pesticides. Evaluation has been in the form of written and verbal feedback from participants to assess awareness raising and to modify and focus on areas of particular interest to participants.

Farmsafe Australia has developed the 'Managing Farm Safety' training program. It is a two-day nationally accredited course targeted at farm owners and managers and aims to assist farmers in achieving the necessary underpinning knowledge and skills to develop and implement a risk management approach to health and safety on farms. An approach similar to the way other farm business risk should be managed. A resource package is provided in association with the training course as an important additional management tool for on-farm use and includes hazard checklists, chemical and worker training registers and specific guidance material relating to high-risk hazards. An evaluation of the original one-day version of the program found that farmers were generally receptive to farm safety management training and that there was a transfer of knowledge and skills to improved safety management on farms for those who attended the course.

The existing two-day "Managing Farm Safety" training course has been implemented nationally and is based on current best-practice farm health and safety management. A major review of the course was planned to commence late 2000. Charles Sturt University has expressed a keen interest in undertaking a process evaluation study, with the results feeding into the course review and guiding any revisions. Formative evaluation for the program could include piloting of course/revisions for all commodity specific courses, process evaluation could track the uptake, impact evaluation could assess the competencies achieved, and outcome measures could focus on implementation in business plans on farms.

4. Evaluation of community based safety programs

Community based programs aim to benefit all community members and use local organisations and networks for implementation. The community may be defined as a shire, town, region, or as a school, industry or commodity group. These programs commonly draw on the resources of the community, its organisations and services and may implement a program and its evaluation through these existing systems. A comparison community is important for evaluation purposes.

Example

The East Gippsland Children's Farm Safety Project aimed to reduce child injury mortality and morbidity on farms in East Gippsland. The objectives were to 1) raise awareness about child farm safety issues in the community, particularly among children aged 9-11 years, their parents and teachers, 2) increase ability to identify farm hazards, change attitudes and behaviour, and adopt safer farm practices 3) inform, extend and strengthen links between health sector, local government, schools, and other rural services and community groups and residents and 4) increase awareness within schools of the importance and legitimacy of including farm safety within the school curricula on an ongoing basis. Strategies included: 1) seven school safety field days with workshop sessions focussing on the main issues for children's safety on farms 2) promotion and dissemination the Rural Injury Prevention Primary Education Resource (RIPPER) kit to schools (kit developed by the Victorian Farmers Federation and used by teachers as pre and post field day assessment material) 3) development and dissemination of additional farm safety resources for children in a 'show bag' to be taken home to parents and 4) regular safety issues in the local media. Process evaluation measures were participation rates for schools at the farm safety field days (86%) and attendance by 78% (1320) children aged 9-11 years and 67 teachers. State and local newspapers, weeklies, school newsletters, and national and local radio publicised and reported on the program. Measures used for evaluation of the impact of the safety program included collecting questionnaire data about knowledge, attitudes and behaviour toward farm safety before and after the program from parents, children and teachers. Results showed substantial improvement in knowledge, attitude and behaviour by teachers, parents and children toward farm safety. Effects on injury morbidity and mortality were not measured. This type of program design which lacks a comparison community illustrates the difficulty of attributing any observed changes directly to program rather than to some outside influence.

5. Evaluation of school based safety programs

There are a number of challenges specific to the evaluation of school based safety programs. These programs often include components that require teacher and parent participation to achieve program delivery. Establishing that all components of a school program are completed and delivered in the planned manner are therefore important measures. Delivery may be accepted more easily if teachers are involved in program design, delivery, and the evaluation plan as they are aware of children's capabilities. Teacher training in the required methods may be necessary. Reading ability can limit many evaluation approaches for children. For example young children, and some upper primary school children, cannot read sufficiently well to reliably answer a questionnaire. Alternate methods such as questionnaires for parents and teachers and child interviews using pictures or videotaping may be required to evaluate a program.

It is not often appreciated that adults can over-estimate a child's capacity to act safely. There can be a considerable lag between when a child can comprehend the importance of a safety hazard and when they subsequently develop the ability to cope with the hazard. In this setting, measuring acquisition of competency to handle unsafe situations and determining whether the child conveys the safety message to parents are useful measures.

Most schools require parental consent for children of any age to take part in programs or to be evaluated. Gaining consent from parents can be a slow process and lead to poor response rates. Further, approval from Education Departments and principals is generally required before the program can be implemented and can delay commencement. Many evaluation methods appropriate for adults can be employed for students in secondary schools, TAFE and apprenticeship programs.

Several strategies which could maximise parent response rates include:

- Informing parents that their child will receive a reward for returning the parent-completed survey/questionnaire. Rewards could include stickers, badges, vouchers, raffle tickets, activity posters/books. If parents do not wish to participate, the child would still receive the reward providing they bring back the questionnaire.
- Public praise for children who return questionnaires encourages other children to do the same.
- Provide teachers with a class list to record which students return questionnaire
- Provide a sealable envelope for returning the questionnaire.
- Reminders to teachers, principles and parents at weekly intervals to encourage compliance. Provide additional questionnaires to parents who are late with their returns.

6. Evaluation of broad-based safety programs at the regional, state or national level

Programs in this category are often aimed at large target groups running into many thousands or millions of people. Issues here include reduced opportunities for formative and process evaluation of a program. This can be offset to some extent by pilot testing program components on small samples of the larger target group. The advantage of a large population is that the outcome for any reduction in injury rate can generally be assessed. This sometimes occurs in the absence of a comparison group, particularly for state and national programs. The preventive strategies used for such programs sometimes differ from those for small populations and may largely involve awareness raising through a mass media approach (television, internet, radio, press, association newsletters, mail) and agricultural field days and shows. An example would be television advertisements regarding acute back injury. These convey the message, recommended by doctors, that to keep moving (ie. walking but not doing manual work) is more beneficial for healing rather being confined to bed and rest. The ability to increase practical skills in this type of awareness raising program is likely to be minimal. Population based telephone surveys are a useful way of tracking changes in awareness and attitudes. Many State Health Departments routinely conduct such surveys providing the opportunity to request inclusion of questions specific to current safety programs. Over-sampling in regional areas within these surveys can address sample size issues.

Such diffuse broad programs may be a useful approach early on in a safety campaign where awareness raising is the first priority. This approach can then be complemented with strategies such as focused intensive programs for smaller target groups with an emphasis on competency development and work place system change. The more focused programs can have evaluation incorporated according to basic principles.

Example

The Giddy Goanna program is a nationally recognised non-profit rural health and safety educational program aimed at encouraging long term safe and healthy choices for children aged 2-12 years and their families. The program consists of eight educational components: puzzle books, kid's club, costume, demonstration days, songs, web page, update newsletter and promotional material and merchandise. Local health and safety demonstration days are held at farms and showgrounds involving the local community and having a local theme.

The program aims to teach children how to behave safely and includes information about safe adult practices. It encourages children to become strategic agents for co-operative behaviour change in parents and family. The program revolves around several key cartoon characters, Giddy Goanna, Careless Cousins, Farmer Goanna and Spiney. The program is designed to engage children in a positive interactive process to encourage thinking about safety issues and making decisions about safe behaviour.

Queensland University of Technology was asked to evaluate the program after the program had been implemented (Anderson, Oldenburg and Tanner, 1998). As no base line measures of injury incidence had been taken prior to implementation, it was not possible to measure achievement of the major program goal of a reduction in injury. Methods used for evaluation included

(1) a comparison of questionnaires regarding knowledge, attitudes and behaviour in children who received and did not receive the Giddy Goanna booklet (baseline measures could not be taken as the booklet had been in circulation for several year prior to the commencement of the evaluation)

(2) focus group interviews with children who had read the booklet together with their parents to gain qualitative information relating to the booklet, the characters, and other general project issues and

(3) personal interviews with children before and after they attended the demonstration days compared with children who did not attend demonstration days (these interviews reduced problems associated with reading ability required to answer questionnaires).

There was a significant improvement in health and safety knowledge in children who had read the Giddy Goanna booklet compared with those who had not, although the subjects were not a random sample so the results may not be generalisable. Also there were difficulties in expecting the activities and characters to appeal uniformly across the broad age range (4-10 years) Parents and general practitioners involved in the distribution of the booklet provided very positive feedback and interest in farm safety. This evaluation illustrates the difficulties encountered when evaluation design is not integrated with program design. The important elements of randomisation, control groups and pre-intervention measures are essential if the program and evaluation results are to be used elsewhere. Feedback from parents has encouraged a planned expansion of the program to include materials for other health and safety issues on a broader community basis. These new initiatives will require an evaluation framework integrated with the new program design, preferably including a comparison or control group.

7. Evaluating programs for minority groups

Evaluating safety programs for some members of minority groups such as Non-English speaking groups, itinerant workers, low education and literacy groups, and Aboriginal and Torres Strait Island workers poses several difficulties. Existing safety programs may require substantial modification for these groups. This modification would require evaluation. However, as the programs are likely to be designed for small groups and not have co-ordinating national or state bodies as yet, formative and process evaluation may be the only achievable types of evaluation. Essentially such evaluation would require documentation of the program and assessing participant attendance and participation. Attempting to conduct impact evaluation may encounter major problems in measurement, and outcome evaluation for injury reduction would be limited by small sample sizes.

8. Relationships between stages of evaluation and programs

The following tables provide examples of different safety programs to illustrate the range and variation in approaches for evaluation. The safety program examples relate to prevention of hearing loss, head injury on farm bikes, skin cancer, and leptospirosis in a variety of settings. The specific strategies shown are illustrative in nature, as strategy development is usually an iterative process involving a range of stakeholders

8.1 Evaluation of a farm hearing safety program to increase the wearing of hearing protection by farmers in a local area.

Table 6. Relationships between stages of evaluation for a hearing safety program.

Program Plan	
Needs Analysis Collect information regarding the incidence, pattern and nature of hearing loss in farmers from research literature, farm safety organisations and other relevant sources. Establish that hearing protection reduces noise induced hearing loss. Establish the type, cost and availability of hearing protection. Conduct hearing loss tests at field days and other local events. Consultation with community stakeholders such as GPs, health workers, farmers and retailers.	**Formative evaluation documents the program plan and its implementation.** Detailed description of the hearing safety program including its goal, objectives, strategies, target and comparison group and implementation (comparison group could be another area similar in size and other demographics). Documentation of any pilot testing of hearing safety promotion materials and questionnaires.
Strategies Design and implement a publicity campaign incorporating hearing profile from field days to promote message to (1) raise awareness of hearing loss among farmers and their families and (2) provide printed information about hearing protection, where to purchase hearing protection and when to wear it (3) display information at farm suppliers, general practices, community health, the council and other relevant organisations.	**Process evaluation assesses the delivery of a program and measures achievement of program *strategies*.** Reach of publicity campaign measured by the amount of printed material distributed to the population. Interview customers on exit from display points.
Objectives To (1) increase farmers knowledge about hearing loss and (2) increase purchase of hearing protection	**Impact evaluation assesses change in risk factors and measures achievement of *program objectives*** Conduct baseline and post program surveys of convenience samples at field days and other local events to (1) assess any change in knowledge related to publicity campaign and compare with knowledge change in comparison group (2) Assess any change in purchases of hearing protection related to the campaign for both target and comparison groups Measure pre and post program hearing protection sales at retailers.

Program Plan

Goal

For farmers in the shire to increase wearing of hearing protection while in noisy farm environments by 30% in one year

Outcome evaluation measures change in injury levels and achievement of *program goals*

Measure change in rate of wearing of hearing protection related to the campaign for program participants and comparison group using questions in the pre and post program survey. Produce evaluation report.

Note: While the longer term goal is to reduce noise induced hearing loss, it would be unrealistic to expect to measure this in a one year time period. Consequently, the goal focuses on what is achievable and measurable in this time period. Therefore impact measures may become defined as the goal in a small program.

8.2 Evaluation of a high school based program to promote the wearing of helmets for prevention of head injuries associated with horse riding.

Table 7. Relationships between stages of evaluation for a helmet wearing promotion program.

Program Plan for	Evaluation
Needs Analysis Investigate and collect information about head injuries associated with horse riding from relevant sources nationally and in states where available. Establish evidence that helmets reduce head injury. Focus groups with local teenagers regarding compliance with helmet wearing. Consultation with local high schools and riding groups to develop strategies to improve compliance	**Formative evaluation documents the program plan and its implementation.** Detailed description of the program including its goal, objectives, strategies, target and comparison group. Documentation of any pilot testing of activities and materials, and the implementation activities and sequence of the program.
Strategies Publicity campaign directed at parents about children wearing helmets when riding horses to include information regarding type, cost and availability of suitable helmets and the anticipated reduction in risk of injury by wearing helmets. Delivered through school newsletter. Specific strategies directed at teenagers developed from focus groups. Supporting publicity implemented at key locations in local community.	**Process evaluation assesses the delivery of a program and measures achievement of program *strategies*.** Measurement of publicity reach. Measurement of information received by parents using mail or telephone survey. Comparison measures from comparison community.
Objectives Increase knowledge of helmet safety. Increase helmet purchase by 30% in 12 months.	**Impact evaluation assesses change in risk factors and measures achievement of *program objectives*** Measure change in knowledge related to publicity campaign and compare with comparison community using mail or telephone survey. Measure comparative levels of helmet purchase from local retailers pre and post program.
Goal Increase wearing of helmets on agricultural bikes by 40% within 1 year in the region.	**Outcome evaluation measures change in injury levels and achievement of *program goals*** Measure change in helmet wearing rate for target and comparison groups using the survey. Monitor injury outcome over an extended period. Can monitor head injury as a percentage of all horse riding injury pre and post program to assess any change. Evaluation report.

8.3 Evaluation of a sun protection program for farm workers in a local government area to reduce the risk for skin cancer

Table 8. Relationships between stages of evaluation for a sun protection program

Program Plan for	Evaluation
Needs Analysis Investigate the incidence and pattern of skin cancer in farm workers nationally and regionally. Determine evidence for intervention methods. Investigate feasibility and cost of various intervention approaches eg, hat wearing campaign, skin protection by clothing (eg always wearing a shirt), sunscreen creams, and changing certain work practices to minimise exposure to the sun between 11am and 3pm where practicable.	**Formative evaluation documents the program plan and its implementation.** Detailed description of program including its goal, objectives, strategies, target and comparison groups. Documentation of any pilot testing of activities and materials and the implementation activities and sequence of the program.
Strategies Publicity campaign for sun protection on local radio, television, in local newspapers, posters in shops, schools, pharmacies and other community points, including gathering places for itinerant workers. Negotiate sponsors for broad brimmed hats, sun-screen. Work with local farmers to implement 'no hat no work' policy for employees. Work with local farmers to implement work practice changes. Demonstration and promotion of suitable protection using hats, clothing, sunscreens at local field days and other events for farm workers, Raffles, give-aways for products supplied by sponsors.	**Process evaluation assesses the delivery of a program and measures achievement of program *strategies*.** Measurement of publicity reach by interview at shopping centres. Measurement of information received by farmers by interview at field days, questionnaire survey at farmers meetings. Measurement of visits to field days and other venues where promotion occurred. Documentation of policy change.
Objectives To increase knowledge of risk and protection from the sun using various protective strategies. To increase purchase of hats and sunscreens by 30%.	**Impact evaluation assesses change in risk factors and measures achievement of *program objectives*** Measure change in knowledge related to publicity campaign and compare with comparison area. Measure comparative level purchase of hats and sunscreens, level of inquiry at pharmacies
Goal To reduce risk for skin cancer by significantly increasing protective measures of wearing of hats shirts and creams. Reduce time of exposure to the sun during time of highest UV levels. To contribute to prevention measures as a national goal of reducing skin cancer rates.	**Outcome evaluation measures change in injury levels and achievement of *program goals*** Measure change in hat wearing, shirt wearing and sunscreen use between target and comparison areas. Could work with local ariel sprayers and other aviators to do observational study before and after for hat wearing and the numbers of people out in the sun between 11am and 3pm Evaluation report.

Note: Due to the seasonal nature of this program may need to collect baseline data in the summer preceding program delivery.

8.4 Evaluation of a statewide dairy farm leptospirosis prevention program as part of a national program

Table 9. Relationships between stages of evaluation for a leptospirosis prevention program

Program Plan for	Evaluation
Needs Analysis Establish the incidence and distribution of leptospirosis in dairy farmers nationally and statewide from national program personnel. Establish evidence for intervention methods. Investigate feasibility and cost of vaccination of dairy herds and utilise strategies consistent with the national leptospirosis prevention program.	**Formative evaluation documents the program plan and its implementation.** Detailed description of a vaccination promotion program including its goal, objectives, strategies, and target group. Documentation of any pilot testing of materials and the implementation activities and sequence of the program.
Strategies Publicity campaign for leptospirosis vaccination through media, general practices, pamphlets to dairy farmers in the state. Government subsidy for vaccination. Information re reservoir of leptospires in rats with secondary sources in pigs, cattle, and dogs. Transmission via urine with infection through the skin and mucous membranes. Range of human illness from mild to severe with jaundice, haemorrhage, meningitis. Preventable with vaccination of dairy herds. Occupational hazard for farmers, vets, abattoir workers, and cane cutters.	**Process evaluation assesses the delivery of a program and measures achievement of program *strategies*.** Measure reach of promotion program by survey of farmers of recall of media campaign, general practice, and use of pamphlets. Monitor subsidy uptake.
Objectives Increase awareness of leptospirosis in dairy farmers by 30% Increase vaccination levels to 85% of dairy herds over 2 years.	**Impact evaluation assesses change in risk factors and measures achievement of *program objectives*** Measure change in knowledge related to publicity campaign Measure levels of herd vaccination before and after campaign.
Goal Contribute to national leptospirosis prevention program.	**Outcome evaluation measures change in injury levels and achievement of *program goals*** Measure rate of human leptospirosis reported to public health laboratories before and after campaign. Evaluation report forwarded to national program for leptospirosis prevention.

9. Glossary

Comparison group	A group of people with similar key characteristics to program participants (eg. commodity produced, age, gender) but who do not receive the intervention program
Competency	A term to encompass the knowledge, attitude and skills of an individual, relating to a particular field
Control group	A type of comparison group for which people are **randomly** selected
Evaluation	A process by which we judge the worth or value of something and involves measurement, observation and comparison with some standard
Formative evaluation	Evaluation to improve the program as it is being implemented
Goal	Desired long term outcome of a program; may be a health outcome (eg. injury) or an intermediate outcome (behaviour)
Impact evaluation	Measures the immediate effects of a completed program, and usually relates to changes in the targeted risk factors
Intervention group	Target group of an intervention program; maybe a volunteer group, or may be randomly selected
Morbidity	Injury, ill health
Mortality	Death
Needs assessment	Initial step in planning any program to identify and analyse the health priorities and target group for an intervention
Objective	Desired immediate impact of a program showing improvement in risk factors for the health problem
Outcome evaluation	Final phase of evaluation and tests the achievement of program goals
Process evaluation	Evaluation phase which measures the activity of a program and its reach
Randomised controlled trial	A research project in which people are randomly allocated to receive, or not receive, an intervention program
Reliability	Shows the degree to which the same result is produced on repeated use of a particular instrument, in the absence of any true change. Repeated use refers to the same instrument used by the same person at different times (test-retest reliability) or by different people (inter observer reliability).
Response rate	The number of eligible people completing a survey compared with those who were asked to participate
Risk factor	Any characteristic of people, the environment, or things which is considered to be a cause of a health problem eg. Lack of ROPS fitment can cause tractor deaths, lack of protection from the sun can cause skin cancer.
Survey	An investigation to systematically collect information from a population or a sample of a population
Target group	Those who receive the health program, also referred to as the intervention group or the experimental group
Validity	The degree to which an instrument measures what it claims to measure eg. to what extent is a questionnaire a valid measure of safety practice.

10. Appendix 1

A useful internet site for general public health resources is provided by Queensland University of Technology at: www.hlth.qut.edu.au/ph/phlinks/austdir.htm

Agencies maintaining useful data sources, and having data management and analysis expertise

Agency	Contact Telephone	Web site or email address
National		
National Farm Injury Data Centre, Australian Centre for Agricultural Health and Safety, Universityof Sydney, Moree, NSW	02 67 528 215	
National Injury Surveillance Unit, Centre for Injury Research Studies, Flinders University, SA	08 8374 0970	www.nisu.flinders.edu.au
National Occupational Health and Safety Commission	02 9577 9555 Toll free: 1800 252 226	www.nohsc.gov.au
Monash University National Centre for Coronial Information, Victorian Institute of Forensic Medicine, VIC	03 9686 2450	www.vifp.monash.edu.au
National workers compensation	02 9577 9555	www.nohsc.gov.au/work/statistics/index.htm
State		
Queensland Injury Surveillance Unit	07 3840 8569	www.qisu.qld.gov.au
Victorian Injury Surveillance System	03 9905 1805	www.general.monash.edu.au/muarc
NSW Injury Research Centre	02 9391 9679	palba@doh.health.nsw.gov.au
Western Australia Injury Control Program	08 9222 2087	sylvie.price@health.wa.gov.au
Tasmanian Department of Health and Human Services	03 6233 3774	stan.bordeaux@dchs.tas.gov.au
Victorian Department of Human Services	03 9616 7777	www.dhs.vic.gov.au/
New South Wales Health Services	02 9743 7200	www.search.nsw.gov.au/health.asp
Health Department of Western Australia, Public Health Division	08 9222 4046	www.public.health.wa.gov.au/
Queensland Health Department	07 3234 0111	www.health.qld.gov.au/
South Australia Department of Health	08 8226 8800	www.health.sa.gov.au/
Northern Territory Department of Health	08 8999 2400	www.nt.gov.au
Local		
Divisions of General Practice	Contact local branch	www.gp.org.au/
Ambulance services	Contact local branch	

Agencies with expertise in health program evaluation

Agency	Contact Telephone	Web site address
Australian Centre for Health Promotion Department of Public Health and Community Medicine, University of Sydney	02 9351 5129	www.health.usyd.edu.au/achp
Centre for Health Program Evaluation, Department of General Practice and Public Health, University of Melbourne	03 9496 4433	www.gpph.unimelb.edu.au/phsection/ph_index.htm
Centre for Health Promotion Research Curtin University of Technology	08 9266 7944	www.curtin.edu.au/curtin/dept/health/hp/chpr/

Agencies with expertise in injury program evaluation

Agency	Contact Telephone	Web site address
Monash University Accident Research Centre	03 9905 1808	www.general.monash.edu.au/muarc
National Centre for Injury Research Studies, Flinders University	08 8374 0970	www.nisu.flinders.edu.au
Australian Centre for Agricultural Health and Safety, University of Sydney, Moree, NSW	02 67 528 215	Not available
Queensland University of Technology	07 3864 5979	www.hlth.qut.edu.au/ph/

Registers of health promotion programs and rural health research

Register	Organisation and Contact Telephone	Web site address
HEAPS – Health Education and Promotion System	Promethus Information Ph 06 257 735	www.hcn.net.au/acha/heaps.htm
Rural Health Research Register	Monash University Centre for Rural Health	www.med.monash.edu.au/crh/resource/
Research in progress	Rural Industries Research and Development Corporation	www.rirdc.gov.au/99comp/hcc1.htm

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Browning, S. Truszcynska, H. Reed, D. McKnight, R. Agricultural injuries among older Kentucky farmers: The Farm Family Health and Hazard Surveillance Study. American Journal of Industrial Medicine 1998, 33: 341-353.

Farmsafe Australia. Managing Farm Safety 1998, Moree. A 2 day accredited training program with an associated resource package for on-farm use.

Fragar L. Agricultural health and safety in Australia. Australian Journal of Rural Health 1996, 4: 200-206.

Fragar and Franklin 1999. Farmsafe Australia Goals, Targets and Strategy 1996-2001: Mid-term Review, May 1999. Australian Centre for Agricultural Health and Safety.

Freeman S. Whitman S. Tormoehlen R. Baseline childhood farm safety data for Indiana. J Agricultural Safety and Health 1998, 4(1): 119-130.

> Abstract: A survey of Indiana farm home was conducted in the winter of 1994-1995 to establish realistic baselines concerning child safety practices for populations in rural Indiana for the purpose of 1) adjusting interventions to target specific issues where prevention efforts are most needed and 2) evaluating the effectiveness of safety efforts targeting rural Indiana families. A questionnaire was designed to obtain baseline information for child safety practices on Indiana farms and a stratified random sample of 1,500 Indiana farms (arrayed by county) was selected from a population consisting of all 60,000 Indiana farms. Survey procedures involved two mailings, and phone interviews with non-respondents, which yielded 597 useable questionnaires. Survey responses indicate that on Indiana farms where children reside or frequently visit, 63% of owners or operators allow children to ride as passengers on tractors or combines, and 36% allow children to operate tractors. Survey responses suggest that grandparents are more likely than parents to prohibit potentially dangerous farm activities (eg. riding on tractors, combines, and grain transport vehicles, and operating tractors and ATV's), while parents are more likely to implement strategic safety practices (eg. having a fire escape plan, and obtaining CPR and first aid training). Survey results also show that Indiana farm families do not meet national goals for the use of bicycle helmets, child seats, seatbelts, or smoke detectors.

Glasscock D, Hansen O, Rasmussen K, Carstensen O, Lauritsen J. The West Jutland Study of Farm Accidents: a model for prevention. Safety Science 1997, 25: 105-112.

> Abstract: This article summarises the main elements of the West Jutland Study on the Prevention of Farm Accidents, that was presented in four separate papers at the 1996 Occupational Injury Symposium in Sydney, Australia. The objective of the study is to develop and conduct an intervention on the basis of an initial investigation of risk factors, aimed at reducing the number of occupational accidents in a randomly selected, representative sample of Danish farms. The article focuses on the underlying model used in the study, the methods and design employed, and the form and content of the intervention that is currently underway. Results will be presented at a later date.

Lower T. Farmsafe Australia Yearbook 1993. Farmsafe Australia Agricultural Health Unit, Moree NSW.

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Murphy D, Kiernan N, Hard D, Landsittel D. The Pennsylvania Central Region Farm Safety Pilot Project: Part 1 – Rationale and baseline results. J Agricultural Safety and Health 1998, 4(1): 25-41.

Abstract: The Pennsylvania Central Region Farm Safety Pilot Project is an agricultural safety and health project designed to test three interventions to reduce hazards and risks of farm work. The interventions represent distinct operational approaches to farm safety and health education and farm risk reduction. This article a) introduces details on the project's overall rationale and objectives and b) presents preliminary findings from baseline data collected prior to the start of the intervention.

National Committee for Injury Prevention and Control. Injury Prevention: Meeting the Challenge. Oxford University Press NY 1989.

Scharf, T. Kidd, P. Cole, H. Bean, T. Chapman L. Donham K. Baker, D. Intervention tools for farmers – safe and productive work practices in a safer work environment. J Agricultural Safety and Health 1998. Special issue No 1: 193-204.

Abstract: Recent interventions in agricultural safety and health have developed a more comprehensive and contextual approach to farm safety behaviours. These are broad, general approaches to safe work practices that complement the task-focused safety training and engineering interventions of many farm safety programs. Some common features of these more recent intervention are 1) the interventions require the active participation of the farmers and farm workers, for whom the intervention are intended 2) farm economics and productivity are recognised as powerful determinants in shaping the structure and organisation of the enterprise 3) safe work practices and safety-related improvements in the work environment are shown to promote the productivity and economic viability of the farm and 4) participation from community members, including extension agents, 4-H, FFA, educators, equipment dealers, insurance agents, bakers, local media, and others can be the key to making such interventions successful –both in the early phases, and over the long term. This articles describes a breakout session that was held at the Agricultural Health and Safety Conference sponsored by the National Institute for Occupational Safety and Health in 1997, West Virginia. The panel was convened to address the approaches to interventions outlined above. These approaches, brief highlights of six presentations illustrating these approaches to interventions, comments from three discussants, and feedback from the audience are summarised in this article.

The Pennsylvania Central Region Farm Safety Pilot Project: Part 2 – Baseline data associations between Approach-to-safety and Hazard conditions. J Agricultural Safety and Health 1998. Special issue No. 1: 21-28.

Abstract: This article analyses baseline data associations between farmers' approach-to-safety and hazard conditions on their farms. Identifying which aspects of approach-to-safety are significantly associated with actual hazard conditions will help researchers design and implement more effective educational interventions. Baseline data on 216 different farms in the Pennsylvania Central Region Farm Safety Project were collected through the use of a self-administered survey questionnaire of the farmers' approach-to-safety and a hazard audit (by a trained auditor) of participating farms. Factor analysis was used to determine construct validity of the questionnaire. To measure the reliability of the survey, Cronbach's alpha was calculated for each component in the questionnaire. After adjusting for significant demographics (farm size, income and hired labour) in a linear regression, greater concern by farm operators for absence of safety features was significantly associate with less hazardous conditions. These results provide useful guidelines for designing and implementing agricultural safety interventions by identifying which factors are significantly related to hazard conditions.

Wadud, S. Kreuter, M. Clarkson, S. Risk perception, beliefs about prevention, and preventive behaviours of farmers. J Agricultural Safety and Health 1998, 4(1): 15-24.

Abstract: Because the concept of health in agrarian philosophy is nearly synonymous with 'ability to work', it seems likely that diseased having little immediate impact on a farmer's ability to work may be ignored until they have progressed to a disabling state. In order to develop effective health and safety programs to reduce the burden of illness and injury among farmers, it is important to

understand the relationship between their beliefs about prevention and their actual safety practices. In this study, 300 farmers in central Missouri were surveyed to identify beliefs and practices regarding the prevention of respiratory disease, noise induced hearing loss, and skin cancer. For each problem, farmers who expressed concern about the problem and who also believed it was preventable were more likely to report taking preventive measures than were those who did not believe the disease was preventable, those who were not concerned about it, or both. Understanding the beliefs, values and concerns of a population is one of the most important steps in assessing its health needs and a fundamental precursor to planning health and safety programs. Based on findings from this study, three recommendations are made for the development of health promotion programs to reduce agricultural health and injury problems.

Wolfenden, K. Clarke, L. Lower, T. Murray-Jones, S. Rural injury prevention: a community-based approach. Health Promotion Journal of Australia 1991;1 (2): 23-27.

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Abstract: The Iowa Farm Family Health and Hazard Surveillance Project was a cross-sectional study that assessed the health and safety status of Iowa farm families and others who lived and worked on those farms. Data were collected using a comprehensive mail-out questionnaire that was sent to 989 representative Iowa farm operators, their families, and hired help. Three hundred and ninety (39%) farm operators returned the questionnaire. Here, we present an overview of the methods of this survey and some illustrative results. We expected that this rural sample would be similar to urban dwellers surveyed during a national health interview in terms of accessing medical care. Instead, this study's farm participants had much less difficulty getting medical care than US farmers questioned in 1987 (3.4% compared with 7.3% respectively). We found that the average age of all tractors being used by this cohort of Iowa farmers was almost 254 years. Not even 40% of these tractors had Roll Over Protective Structures.

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Coleman, R. Challinor, K. An evaluation of the NSW Rural Hearing Conservation Program: Farmers attitudes, perceptions and suggested improvements. Australian Agricultural Health Unit 1996.

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McDonald M, McDivitt J. Evaluation challenges in agricultural health and safety. J Agricultural Health and Safety 1998. Special issue No. 1: 139-148.

> Abstract: Evaluation challenges in the American National Institute for Occupational Safety and Health funded agricultural health and safety centres include those related to the current state of development of agricultural health and safety as a public health arena, those inherent in multi-site evaluation of diverse centres, and those related to evaluation itself. Challenges posed by the current state of development of the agricultural health and safety field include lack of established markers and measures for health and safety problems. The multi-site nature of centres, the tasks of which include interdisciplinary research, education and interventions another source of difficulties. Challenges related to evaluation itself include lack f evaluation resources, both human and financial. This article makes three suggestions fro advancing evaluation in agricultural health and safety centres: the adaptation of evaluation to the agricultural health and safety arena: evaluation capacity-building in the centres: and the development of national evaluation standards.

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> Abstract. The 1992 public information campaign, Safe Farm, made farm safety messages available to a diverse and independent target audience of 104,000 full-time and part-time Iowa farm operators and their families. The print portion of the campaign reached 5.02 million Iowa newspaper subscribers. A series of public service announcements received at least 180 hours of air time on more than 100 Iowa radio stations and nearly 80,000 farm safety publications were distributed by Iowa State University Extension during the campaign. The impact of this public information campaign was measured by baseline and follow-up telephone survey of 460 Iowa farm operators. The baseline survey showed that farm operators relied heavily on local media for farm safety information, as well as the cooperative Extension service. When asked where they obtained safety information, 95% of the respondents said newspapers and magazines, 82% radio, 77% television, 59% relied on publication from Iowa State University Extension, and 33% on the University Extension staff. The follow-up survey measured significant improvements in Iowa farm operators' awareness, concern, and behaviour based on three indices composed of scales common to both surveys. A multiple regression analysis was conducted based on a causal model. The multivariate test indicated that these changes could not be statistically attributed to the Safe Farm campaign.

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