Evaluation Challenges in Agricultural Health and Safety Centers

M. C. McDonald, J. A. McDivitt

Abstract

Evaluation challenges in NIOSH-funded agricultural health and safety centers 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 centers, 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 centers, the tasks of which include interdisciplinary research, education, and intervention, is another source of difficulties. Challenges related to evaluation itself include lack of evaluation resources, both human and financial. This article makes three suggestions for advancing evaluation in agricultural health and safety centers: the adaptation of evaluation to the agricultural health and safety arena; evaluation capacity-building in the centers; and the development of national evaluation standards.

Keywords. Evaluation, Agriculture, Injury, Centers, Multi-site.

When the U.S. Congress mandated the development of agricultural health and safety initiatives under the aegis of the National Institute for Occupational Safety and Health (NIOSH) in 1990, it did so based on the assessment that agriculture continues to be one of the nation's most hazardous industries (Merchant et al., 1989). Beginning with a few centers, the initiative established centers for research, education, and prevention in agricultural health and safety (NIOSH, 1992).

Over the past seven years, the Centers have conducted extensive research, including surveillance, case-controlled studies, basic biomedical investigations, behavioral science research, and intervention studies (NIOSH, 1992, 1997a,b). They have carried out a wide range of educational and other interventions. Today eight centers across the country conduct work in a variety of research, education, and prevention activities.

How can we know if these initiatives are making a difference? If these agricultural initiatives are to maintain their governmental financial support in the years ahead, and if they are to improve the quality, effectiveness, and reach of their work, multifaceted evaluation is essential.

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This was one of many conclusions reached by the Kennedy report, drafted by an external panel convened by NIOSH in 1994 (Kennedy, 1995). The first of its conclusions is as follows: "NIOSH and the Centers need to work together to develop an evaluation scheme for the various component programs and projects initiated by the Centers and for evaluating the Centers overall." (Kennedy, 1995, p. 12).

The Kennedy report echoes the thinking that has given rise to a trend toward more efficient and accountable government practices, manifest in legislation entitled the Government Performance Results Act, or GPRA. (U.S. Congress, Senate, Committee on Governmental Affairs, 1993). The GPRA, enacted in 1993, makes strategic planning, the development of measurable objectives, and performance reporting mandatory throughout the country's complex federal government by the year 2000 (Wholey, 1997).

Effective—and convincing—evaluation is essential for both the current and long-term well-being of the agricultural health and safety arena. "Good" evaluation can provide some of the necessary artillery to assure the continued funding of this work, and can also help planners and decision-makers develop useful programs (Chelimsky, 1997).

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However, a number of factors make evaluation in the agricultural health and safety arena particularly challenging, including the current state of agricultural health and safety work, the difficulties inherent in the multi-site character of the diverse agricultural centers, and challenges having to do with characteristics of evaluation itself.

The Current State of Agricultural Health and Safety

One challenge is that agricultural health and safety is a relatively new arena of research and intervention. Occupational health and safety has been a national governmental research priority for less than three decades, and occupational health and safety surveillance is a relatively underdeveloped field, with great unevenness across the states (Baker and Matte, 1992). Within this general framework, agricultural health and safety research is quite young (Aherin et al., 1992).

As a result, a limited base of knowledge exists against which to measure success. Specifically, there are limited surveillance data, a lack of established baseline measures, and a dearth of tested research and intervention models (Purschwitz, 1992). For example, we cannot state at this time the annual incidence of injuries from animal handling, or whether child agricultural injuries have increased or decreased in any specific five-year period (Rivera, 1985; Nordstrom, 1992; Lee and Gunderson, 1992). Similarly, the theoretical basis of much of the current work is limited. While it typically draws on general principles of epidemiology, occupational medicine, and behavioral science, the application and adaptation of these theories to agriculture is still in the beginning stages. A few notable exceptions are Murphy's use of Haddon's injury theory and behavioral theories (Murphy, 1992).

Limited Resources for Evaluation

A second challenge is that limited human and financial resources are available to the field of agricultural health and safety. In a time of federal cutbacks in research,

there is greater competition for limited public health related funds. Within the limited research funding infrastructure, there are few mechanisms pathways to attract researchers to agricultural health (Merchant, 1989). To the authors' knowledge, federal fellowships designed to recruit and produce the next generation of agricultural health and safety scholars are not available. Competing arenas with greater funds attract young scholars, especially those from the special populations agricultural scholarship needs to address, such as Mexican-Americans, African-Americans, and women (NIOSH, 1996).

On the other hand, often the people in the best position to conduct agricultural health and safety research have a limited research background. These individuals, including migrant farmworker advocates, agricultural extension personnel and community based organizations staff, have the commitment to the community, and the ability to reach the population, but lack research expertise.

Challenges of Evaluating Diverse Multi-site Centers

When examining U.S. agriculture, diversity dominates. Just as there is not a single crop or geography that defines agriculture, there is not a single injury or illness that can be said to dominate agricultural health and safety concerns. From machinery scalpings to pesticide poisonings, the range of injury and illness is great (Nordstrom, 1992). Those who suffer from agricultural illness or injury are also a strikingly diverse group.

The agricultural health and safety centers reflect these differences: in populations served, geographies, crops, climates, and economies. There are also differences between the centers, in levels of funding, stages of development, organizational structures, kinds of databases, levels of staffing (including the percent time of the director), as well as varying roles of and kinds of evaluators.

Additionally, the centers' work is multi-disciplinary in character. A wide array of disciplines are involved in agricultural health and safety, including epidemiology, occupational medicine, nursing, health education, engineering, family medicine, industrial hygiene, sociology, toxicology, and psychology. Finally, some of the problems confronted in agricultural health and safety may well require new epistemologies and new strategies for implementation. For example, the traditional population based quantitative studies may not be workable or appropriate for migrant farmworker populations, whose disenfranchised and migrant status require innovative means of securing trust as well as collecting data over time (Slesinger, 1994; Rust, 1990).

The many differences among the centers and their programs pose special problems for evaluation. Evaluating an individual program can be complicated because of the changes that occur during the course of program development, implementation or the evaluation itself and because programs have multiple stakeholders, each with different interests (Rossi and Freeman, 1993; Patton, 1996; Knapp, 1996.) When one is conducting evaluations across several sites, the process becomes even more complicated at every stage of the evaluation (Sinacore and Turpin, 1991). The evaluators can choose to use the same design and instruments in all the sites (e.g., Hedrick et al., 1991) or attempt to tailor each evaluation to the specific site but still maintain some commonalty between sites (e.g., Reiss and Boruch, 1991). For multi-site evaluation to be effective, there must be agreement and standardization of concepts, measures, data collection and analysis methods and substantial communication between the different sites (Sinacore and Turpin, 1991; Hedrick et al., 1991; Reiss and Boruch, 1991; Buchan, 1997).

Challenges within Evaluation Itself

The last, but not the least, of evaluation challenges in agricultural health and safety centers are those that arise from the discipline of evaluation itself. In the authors' experience, the chief misunderstanding about evaluation is the belief that evaluation is a process that yields a good-or-bad answer. That is, evaluation will show that one has either succeeded or failed, a dichotomous result with no middle ground. It is also seen as making a definitive, singular assessment of a project, giving it a sort of grade—"the report card syndrome".

While evaluation does help one arrive at an overall assessment of how well a project has reached its goals, the report card syndrome is a rigid oversimplification of evaluation work which negates the role evaluation plays in the process of review, adjustment, implementation, and improvement of a project. Evaluation is a multifaceted endeavor which can take a number of different forms and change over time within a project. Evaluation must be carefully fashioned to meet the needs of the program being evaluated, and needs to draw on a wide range of methodologies to be successful (Israel et al., 1995; Patton, 1996; Scriven, 1991; Green and Lewis, 1986; Rossi and Freeman, 1993).

Among the greatest challenges to evaluation of all types are establishing evaluation's priority and funding. Evaluation is often added to a project almost as an afterthought, and is often not funded adequately. As a result, limited resources must be stretched to come up with plans with the semblance of evaluation in order to meet funders' requirements (Fetterman, 1996). Evaluators are always trying to compromise as a result—that is, to provide the most useful evidence with the resources available (Cronbach, 1982; Rossi and Freeman, 1993).

While this is changing, especially in light of developments like GPRA, the evaluator is still often seen as dispensable or, as one evaluator put it, "always a bridesmaid, never a bride" (Victoria Buchan, personal communication, May 1997). Yet enlightened program planners will understand the need to establish evaluation plans up front, with funds set aside for that purpose. Evaluation plans that are incorporated into the project design and established from the beginning will be most useful.

Meeting the Challenges in Evaluation of Agricultural Health and Safety Centers

The challenges of conducting evaluation in agricultural health and safety centers are formidable. Yet these challenges can be addressed by the accomplishment of three general tasks: (1) the development of evaluation tools specific to agricultural health and safety; (2) building evaluation capacity within the centers; and (3) establishing national evaluation standards for agricultural health and safety centers.

Developing Evaluation Tools Specific to Agricultural Health and Safety

One of the first steps to making evaluation useful to agricultural health and safety is the development of evaluation tools specific to agricultural work, as has been attempted by the Southwest Center for Agricultural Health and Injury Prevention, which provides the examples in this section. Agricultural health and safety evaluators need to translate evaluation vocabulary into concepts and terms that make sense to our field, and be willing to modify evaluation methods as needed.

It is also important to understand the kinds of questions different types of evaluation pose, and how these may be relevant to different areas of work. In the initial stages of a center's development it can be expected that research is designed to gather baseline data, what many would call a needs assessment. Demonstrating the

Table 1. Evaluation types and corresponding questions and applications to agricultural programs

Type of Evaluation	Question Posed	Agricultural Center Example	Time Period	Main Elements
Context evaluation (needs assessment)	What needs to be done?	What are the health issues of farmworkers? What injuries are associated with cattle handling?	Initial	Establish baselines Determine needs/assets Farm-worker study/ies Others studies: e.g., of farm owners, health care providers, part-time farmers, women, children
Process evaluation	Are you doing what you said you would do?	Have you collaborated with relevant agricultural organizations? Is the newsletter being distributed as planned?	Ongoing	Examine whether plans are carried out Key elements: advisory board, administration, project work areas
Impact evaluation	Have you made changes in people's knowledge, attitudes, and/or behavior? Have you changed public policy? Can you attribute these changes to your program?	Do farm owners now shield PTOS? Do farmworkers have access to health care? Do children now stay away from farm animals? Are agricultural health and safety materials available in Spanish?	Initial and later period	Pre-and post-test surveys of knowledge, attitudes, and behavior in targeted populations: e.g., farmworkers, women, health care providers Example: pre- and post-use of PPE
Outcome evaluation	Have you decreased morbidity or mortality associated with the problem in the relevant populations and contexts?	Are there fewer deaths on farms? Are fewer children injured on farms? Are cases of heat stroke reduced? Are there fewer respiratory diseases?	Initial and end of project	Determine outcome measure changes over time span Examples of possible outcome measures: farm-related deaths, farm-related MVAs, machinery injury rates, RSI injury rates, farm injuries among children, pesticide poisoning

different possible types of evaluation in different stages of a project is yet another way that evaluation can be adapted to agricultural health safety (see table 1). Just as it is important to know the general types of change the centers aspire to, it has also been helpful to map out the kinds of change that can be sought in relationship to a particular issue. For example, working on the issue of rollover protection structures (ROPS) and tractor safety involves different kinds of outcomes which can be anticipated as a result of the centers' work, as noted in table 2. Change may also take place in stages, over time. As the stages change (due, one assumes, to the effectiveness of the center's work), the outcomes to be examined change, and measurement tools also change, as noted in table 3.

Table 2. Categories of possible change in agricultural health and safety work, using rollover protection structure (ROPS) as an illustration

Type of Change	Illustration
Change in basic knowledge	Engineering research adds to basic knowledge about ROPS' effectiveness
Change in circumstances	All new tractors built with ROPS
Change in status	ROPS become part of farm culture
Change in capacity	Financial support to assist in ROPS retrofit on older tractors
Change in policy	ROPS required on new tractors
Change in awareness	Farmers and farmworkers see connection between ROPS use and avoidance of injury
Change in attitudes	Farmers and farmworkers view ROPS as valuable
Change in behavior	Farmers retrofit old tractors. Tractor drivers use seat belts
Maintenance	Tractor drivers maintain ROPS and seat belt use
Prevention	Reduction in tractor injuries and fatalities

Adapted from Patton (1996).

Table 3. Stages of changes in agricultural health and safety work An example: Family farmers using tractors

	Desired Outcome	Indicator	Method of Measuring Change
	Intervention: educational campaign (basic ROPS information)		
Immediate	Farmers become aware of ROPS as way of reducing tractor injuries and deaths	Percent of farmers: Aware of ROPS, knowledgeable about ROPS, with positive attitudes about ROPS	Focus groups, survey of farmers
	Interventions: educational campaign (focus on obtaining ROPS), technical assistance, work with manufacturers		
Inter-mediate	Farmers drive tractors with ROPS	Number of farmers purchasing ROPS-equipped tractors Number of farmers retrofitting old tractors	Examine tractor sales figures, observe tractor use
	Interventions: education campaign (focus on use and maintenance), technical assistance, work with manufacturers		
Long-term	Reduction in tractor injuries and deaths	Number of injuries and deaths related to tractor use	Review death certificates, pre- and post-survey of farmers, review insurance and health data

Adapted from Patton (1996).

Evaluation Capacity Building in Centers

First, evaluation plans and funding need to be built into all project proposals. The 1996 NIOSH request for agricultural health and safety proposals did precisely this; for the first time an evaluation component was required in all proposals (CDC, 1996). A close working relationship between the center director and the evaluator/s helps facilitate this process.

Training center personnel in evaluation is a critical step in capacity building. This can take different forms, such as presentations by the evaluators to key center meetings and individual project technical assistance and training. The development of evaluation tools for staff use can promote and enhance this training. Tools that can be used by the principal investigators and project staff can promote self-evaluation, and enhance the participation in the evaluation process through empowerment of the staff (Fetterman, 1996).

Capacity building is not limited to centers and their staff; it must be an ongoing activity for evaluators of agricultural health and safety centers as well. This can take place by strengthening ties to the broader evaluation community; encouraging center evaluators to participate in professional evaluation organizations (such as the American Evaluation Association); and sharing and publishing agricultural evaluation efforts, as was done in the NIOSH Agricultural centers evaluators' workshop held in Colorado in May 1997 (Buchan, 1997).

Establishing National Evaluation Standards for Agricultural Centers.

The May 1997 evaluators workshop was the first national effort to bring together the evaluators from all agricultural centers to begin mapping out a plan for national evaluation of the centers. Among the meetings' objectives were setting priorities for evaluation based on utility, feasibility, and generalizability between centers and regions (Buchan, 1997). These priorities were based on the overall purpose of the NIOSH agricultural centers and the objectives laid out for centers, as these constitute the national standards for the work (CDC, 1996).

A number of evaluation priorities were identified through the course of the workshop deliberations. A smaller number of these were selected by the workgroup for further development and discussion. For example, one of the evaluation priorities selected for further examination is the centers' work in "special populations," one of the National Occupational Research Agenda priority areas (NIOSH, 1996; NIOSH, 1997c). A draft tool to document the scope and volume of a center's work in special populations has been developed, and a draft tool to document one aspect of the quality of the center's work with special populations, that is, participation of special populations, is also being developed. The process of developing national evaluation standards and measurement tools will involve extensive discussion and pretesting of instruments.

Conclusion

An exciting period is unfolding for agricultural health and safety evaluation. A number of developments, the national evaluators workgroup key among them, offer great promise for strengthening the evaluation of the agricultural centers. These efforts will help to promote quality in the work of the eight agricultural centers and ultimately will help to advance agricultural health and safety as a whole.

Today a number of public health issue-based federally funded centers exist, or are about to come into being. These include injury control centers, centers for women's

health, and children's environmental health centers. Yet the body of knowledge for evaluating multi-site public health centers remains somewhat limited. The lessons learned in evaluating agricultural health and safety centers can be shared with the public health community through presentations, articles, curriculum development, and the promotion of effective evaluation tools and processes. In this way, evaluation of the agricultural centers can serve not only to improve agricultural health and safety, but can contribute to broader public health practice, demonstrating concretely agricultural health and safety's place in the public health community and on the public health agenda.

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