

Agriculture, Forestry, and Fishing Research at NIOSH

An assessment of the National Institute for Occupational Health and Safety (NIOSH) Agriculture, Forestry, and Fishing Research Program (AFF Program) reveals that from 1990-2006, the program has made meaningful contributions to improving worker safety and health in agriculture, forestry, and fishing. To enhance the relevance and impact of its work and fulfill its mission, this program should provide national leadership and coordination of research and transfer activities, establish strategic goals, and implement a comprehensive surveillance system in order to better identify and track worker populations at risk.

The agriculture, forestry, and fishing sectors are the cornerstone of industries that produce food, fiber, and biofuel. Collectively, the three sectors make up a huge component of the U.S. economy, generating more than \$1 trillion in sales including exports valued at more than \$68 billion. Agriculture, forestry, and fishing consistently rank among the six most hazardous occupations nationally. In fact, fishermen and loggers have the highest fatality rates, and collectively, the three sectors consistently have the highest injury and fatality rates of any U.S. industry.

In conjunction with planned reviews of up to 15 NIOSH research programs, the National Research Council convened a committee of experts to review the NIOSH AFF Program to evaluate the 1) relevance of its work to improvements in occupational safety and health and 2) the impact of NIOSH research in reducing workplace illnesses and injuries. The report also assesses the program's identification and targeting of new research areas, identifies emerging research issues, and provides advice on ways the program might be strengthened.

Mission of the NIOSH Agriculture, Forestry, and Fishing Program

The AFF Program's mission is to provide national leadership to reduce agriculture, forestry, and fishing workplace hazards through a focused program of research and prevention. In contrast with other NIOSH programs that focus research on narrow sectors and well-defined problems such as mining, the AFF Program has the task of addressing issues that affect the occupational safety and health of nearly all natural resource workers on land and sea. An estimated 5.5 million workers are employed in the agriculture, fishing, and farming industries as compared with approximately 331,000 workers employed in mining. The program conducts research on why diseases and injuries occur in these industries, the consequences, and intervention strategies to prevent future incidents.



Physical strain is a factor contributing to the fact that agriculture is one of the six most hazardous occupations.

A number of projects in the AFF Program have been successful in achieving its mission. The Alaska Field Station has conducted exemplary work through its focused research topics, clear goals, strong partnerships with those associated with the industries, and adequate resources to carry out research to reduce injury and fatality rates among commercial fishermen. Since the inception of the station, there has been a 51% decline in the annual death rate in Alaskan commercial fishermen, active interagency cooperation is occurring, and, perhaps most importantly, NIOSH has achieved buy-in and respect from the commercial fishermen themselves.

The program also has consistently carried out sound research practices to positively affect children in the workplace. For example, the Childhood Agricultural Injury Prevention Initiative is an extremely relevant program, and some evaluations of the North American Guidelines for Children's Agricultural Tasks have shown reduced injuries when the guidelines were applied.

Nearly one-third of the research conducted by the AFF Program is conducted through the NIOSH Centers for Agricultural Disease and Injury Research, Education, and Prevention (Ag Centers). These university-based centers serve as an invaluable national resource for addressing agricultural safety and health problems through research, education, prevention, and intervention. The regional nature of the centers allows research to be focused, targeted, and relevant to U.S. worker populations.

Assessment of Research Relevance and Impact

The report makes its assessment of the program's relevance and impact using a five-point scoring scale (where 5 is highest) developed by the National Research Council to introduce consistency in the reviews of different NIOSH programs (See Box 1). The report gave the AFF Program a score of 4 for relevance because research has been conducted in high-priority areas, and because research has resulted in some successful activities to transfer research findings, technologies, and information into practice. Research carried out in some subprograms has been more relevant than in others. In addition, the program has been somewhat engaged in transfer activities, but not always the most appropriate.

With regard to program impact, the report gave the AFF Program a score of 3 for impact because research program activities are ongoing and outputs are being produced that are likely to produce improvements in

worker safety and health. The program's research has informed public policy and regulatory initiatives at the federal level and in several states, as seen in the success of projects that affected children, commercial fishermen, and tractor operators. In other cases, however, it is clear that the contributions of the program have not been accepted by workers and other partners nor has the research program engaged sufficiently in transfer activities.

Recommendations for Program Improvement and Future Work

Although on the whole the AFF Program demonstrated success in addressing some relevant issues and showed that it had impacted some populations, the report identified limitations that affected the program's progress and effectiveness. The report observed several issues that affected both the AFF Program's ability to conduct research on issues relevant to AFF workers and its ability to conduct research that would have an impact on worker safety and health.

Leadership and Strategic Planning

Training and retention of key staff members are vital for the successful execution of research from project initiation to completion and for researchers to recognize such issues as changes in workplace practices. Long-term funding also enables researchers to carry out adequate surveillance, research, and outreach and to identify relevant issues on the horizon.

The overarching concern about the AFF Program is the lack of a single cohesive vision to drive the research agenda. The lack of consistent leadership, long-term strategic planning, and periodic review of that course has led to a piecemeal approach to the research program, and the program appears disjointed more often than not. However, the patchwork approach has produced some successful efforts because of the efforts of talented and dedicated researchers. For example, key factors in the success of the fishing projects in Alaska and the farm-resident child injury initiatives noted earlier have been the continuity of funding and staff.

Surveillance

The AFF Program appears to have had considerable difficulty engaging in surveillance of worker populations, although that difficulty may be due to external factors and funding limitations. Conducting basic demographic and health effects surveillance of each worker population at risk of worksite exposure is essential; without it no effective targeting of other

programmatic elements can occur, nor can one know when an intervention has been effective and move on to address other priorities. Surveillance must be broad-based in its population targets because the sector's settings and employment practices can be risky and dangerous, especially to vulnerable populations such as children and the elderly.

Community Involvement and Feedback

The program has met the most success when it asks for direct feedback from farm workers, loggers, and fishermen. It also has garnered the most credibility when researchers have demonstrated that they are sensitive to the needs of those directly associated with the industry, which vary greatly among the three sectors. Without a strong buy-in from its targeted

populations, the program may appear to be out of touch with workers and unresponsive to the realities of the workplace environment. Its work therefore may not be credible among farm workers, loggers, and fishermen.

Populations at Risk

The AFF Program targeted specific populations that it deemed at higher risk than others but omitted certain other populations and fell short in defining the entire population of AFF workers at risk of injury and illness. There has yet to be a program-wide endeavor to characterize the numbers and types of workers involved in agriculture, forestry, and fishing. Some populations, such as hired farm workers, also have been poorly defined or miscategorized, and others, such as ranchers, have been largely unaddressed.

BOX 1

Scale for Rating Program Relevance and Impact as Developed by the National Academies Committee for the Review of NIOSH Research Programs.

This scale was developed based on the identification of possible factors to consider in the assessment of all NIOSH programs.

Rating of Relevance

- 5 = Research is in highest-priority subject areas and highly relevant to improvements in workplace protection; research results in, and NIOSH is engaged in, transfer activities at a significant level (highest rating).
- 4 = Research is in high-priority subject area and adequately connected to improvements in workplace protection; research results in, and NIOSH is engaged in, transfer activities.
- 3 = Research focuses on lesser priorities and is loosely or only indirectly connected to workplace protection; NIOSH is not significantly involved in transfer activities.
- 2 = Research program is not well integrated or well focused on priorities and is not clearly connected to workplace protection and inadequately connected to transfer activities.
- 1 = Research in the research program is an ad hoc collection of projects, is not integrated into a program, and is not likely to improve workplace safety or health.

Rating of Impact

- 5 = Research program has made a major contribution to worker health and safety on the basis of end outcomes or well-accepted intermediate outcomes.
- 4 = Research program has made a moderate contribution on the basis of end outcomes or well-accepted intermediate outcomes; research program generated important new knowledge and is engaged in transfer activities, but well-accepted intermediate outcomes or end outcomes have not been documented.
- 3 = Research program activities or outputs are going on and are likely to produce improvements in worker health and safety (with explanation of why not rated higher).
- 2 = Research program activities or outputs are going on and may result in new knowledge or technology, but only limited application is expected.
- 1 = Research activities and outputs are NOT likely to have any application.

NA = Impact cannot be assessed; program not mature enough.

Emerging Issues and Future Research Opportunities

Given trends in agriculture that will affect forestry and fishing, the AFF worksite of tomorrow clearly will be different from the worksite of today. The changes, both predicted and unpredicted, will fuel the need for surveillance of such human factors as worksite organization and management; climate, technology, and policy change; and of economics. The success of a public health research program is marked by its ability to recognize and address the emerging needs of a targeted population. The AFF Program should be at the forefront of efforts to review and define needs in agriculture, forestry, and fishing and should promote opportunities to pursue innovative ways of responding to these needs. Some research issues that have not been investigated are of great relevance to improvement of AFF worker safety and health, and could substantially affect safety and health with help from NIOSH. The report identifies future and continuing research areas in order of priority.

High-Priority Research

The report recommends that the AFF Program consider certain crucial issues in the immediate future

as it moves its research agenda forward. These high-priority topics include: changes in the demographic characteristics of the workforce; changes in the fishing industry, emerging forestry issues, blurring boundaries for food harvesting and food processing, food safety and food security, and the transformation and industrialization of agriculture.

Medium-Priority Research

Medium-priority issues and research subjects that would potentially be critical in the near future include: the development of biofuels and their impact on workers and the environment, conditions of farm labor housing and its impact on public health, the rising demand for specialty agriculture, the integration of human and animal health, and the need to review equipment safety issues.

Low-Priority Research

The report identifies the following wide-reaching issues and research subjects that are candidates for long-term study: the impact of nutrient enrichment of food and genetically modified organisms on worker safety and health, transportation injuries, and the impact of global warming on growing and harvesting practices and worker conditions.

Committee to Review the NIOSH Agriculture, Forestry, and Fishing Research Program: Paul D. Gunderson (Chair), National Farm Medicine Center (Emeritus), Marshfield, WI; Maria T. Correa, North Carolina State University, Raleigh; R. Alan Davis, American Seafoods Company, Seattle, WA; James A. Dosman, University of Saskatchewan, Saskatoon, Canada; William A. Groves, Pennsylvania State University, University Park; Ronald L. McAllister, CNH America LLC, New Holland, PA; James D. McGlothlin, Purdue University, West Lafayette, IN; Susan H. Pollack, University of Kentucky, Lexington; Lorann Stallones, Colorado State University, Fort Collins; Don Villarejo, California Institute for Rural Studies (Emeritus), Davis; Susanna G. Von Essen, University of Nebraska Medical Center, Omaha; James J. Zuches, North Carolina State University, Raleigh; Peggy Tsai, Study Director, National Research Council

This report brief was prepared by the National Research Council based on the committee's report.

For more information, contact the Board on Agriculture and Natural Resources at (202) 334-3062 or visit <http://dels.nas.edu/banr>. Copies of Agriculture, Forestry, and Fishing Research at NIOSH are available from the National Academies Press, 500 Fifth Street, N.W., Washington, DC 20001; (800) 624-6242; www.nap.edu.



This study was supported by funds from the National Institute for Occupational Safety and Health of the Centers for Disease Control and Prevention.

Permission to reproduce this brief in its entirety with no additions or alterations.