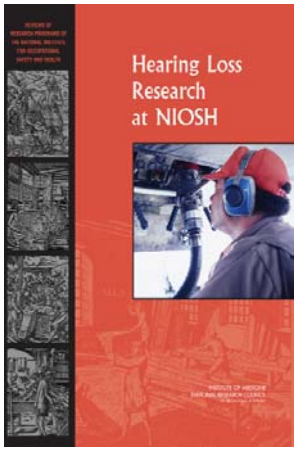
REPORT BRIEF • AUGUST 2006

HEARING LOSS RESEARCH AT NIOSH



Each day, several thousand U.S. workers sustain disabling injuries on the job, more than a dozen workers die from injuries suffered at work, and at least a hundred workers die from work-related illnesses. The National Institute for Occupational Safety and Health (NIOSH) addresses this toll through research to prevent work-related illnesses and injuries and efforts to promote safe and healthy workplaces.

In 2004, NIOSH asked the National Academies to convene committees for reviews of up to 15 of its research programs. The National Research Council and the Institute of Medicine committees that are to conduct these reviews are to assess the relevance and impact of the NIOSH research programs in improving occupational safety and health. The committees' reports are also to discuss emerging issues relevant to research needed for future improvements in worker protection. The report on the NIOSH Hearing Loss Research Program is the result of one of the first two reviews for NIOSH.

MISSION AND GOALS OF THE NIOSH HEARING LOSS RESEARCH PROGRAM

The problem of occupational hearing loss has been part of the NIOSH research agenda since the agency was established in 1970. Using data from the 1980s and 1990s, NIOSH estimated that at least 4 million workers in the United States were exposed to workplace noise levels that put them at risk of hearing loss. Occupational hearing loss may impede communication, contribute to safety hazards in the workplace, and adversely affect other aspects of workers' lives.

The mission of the NIOSH Hearing Loss Research Program is to provide national and world leadership to reduce the prevalence of occupational hearing loss through a focused program of research and prevention.

The program has established four research goals:

1. Contribute to the development, implementation, and evaluation of effective hearing loss prevention programs.
2. Reduce hearing loss through interventions targeting personal protective equipment.
3. Develop engineering controls to reduce noise exposures.
4. Improve understanding of occupational hearing loss through surveillance and investigation of risk factors.

THE REVIEW PROCESS

The Institute of Medicine convened a committee of experts to review the relevance and impact of the work of the NIOSH Hearing Loss Research Program. The review focused primarily on the program's work from 1996 through 2005.

The committee was asked to use a five-point scale (with 5 being the highest score) to summarize its evaluation of the relevance and impact of the program's

work. Relevance was scored by assessing the priority of the work carried out and its connection to improvements in workplace protection. Impact was evaluated in terms of the research program's contributions to worker health and safety.

In evaluating the program, the committee took into account several important factors beyond the program's control. The Hearing Loss Research Program must rely on others to establish or enforce regulations on noise hazards and the prevention of occupational hearing loss. The program also operates in a matrix environment, not as an identifiable organizational entity in NIOSH. It comprises a collection of activities taking place within five organizationally separate and geographically distributed NIOSH units, which poses a challenge for developing and implementing a program plan and allocating resources in accordance with program priorities.

Furthermore, the program's budget is small. In fiscal year 2005, the program had $5.2 million in intramural funding and $2.3 million in extramural funding, out of a total NIOSH budget of $286 million. Congressional targeting of funding to mining safety and health research significantly shaped the portfolio, staffing, and distribution of funds within the Hearing Loss Research Program during the period under review.

ASSESSMENT OF RELEVANCE

Overall, the committee found the activities of the Hearing Loss Research Program to include strong, high-priority work as well as projects viewed to be of lesser priority. The committee found the program mission and four main research goals highly relevant to the overall aim of reducing occupational hearing loss. In the work carried out to pursue these goals, however, the committee found considerable variation in relevance across the program.

Research efforts on interventions targeting personal protective equipment have been appropriately prioritized, and efforts related to developing effective hearing loss prevention programs have also addressed high-priority needs. However, increased emphasis is needed on evaluation of these prevention programs, as well as on dissemination of materials to facilitate the development of engineering controls for noise in prevention programs. Despite Congressional direction that has emphasized mining over other industrial sectors, the program should take more aggressive steps both to apply and transfer noise control technologies developed for the mining industry to other industry sectors and to develop such technologies for other sectors.

The committee was concerned that the program was not giving sufficient emphasis and priority to surveillance for occupational hearing loss and noise exposure—a fundamental gap in the field—or devoting enough expertise to its efforts in noise control engineering. Some of the work appears to be too narrowly targeted, or directed to activities that are secondary to meeting the needs of protecting workers' hearing. For this reason the committee assigned a score of 3 for relevance, indicating that often the research focuses on lesser priorities and is loosely or only indirectly connected to workplace protection (see Box 1).

BOX 1. Scale for Rating Program Relevance

5 = Research is in highest-priority subject areas and highly relevant to improvments 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.

ASSESSMENT OF IMPACT

Because of a lack of data on changes in the end outcomes of occupational hearing loss and noise exposure, the committee based its assessment of the impact of the program primarily on the evidence that its research

products have been put to use beyond NIOSH in ways that can influence occupational hearing loss in the workplace.

The committee found that the program has made meaningful contributions to improving worker health and safety over the last decade through activities that include publishing intramural and extramural research findings in the peer-reviewed scientific literature, developing noise reduction methods for the mining industry, publishing resources for technical and lay audiences, developing educational programs, and providing technical advice to regulatory agencies.

They also identified areas in need of additional attention from the research program, including evaluation of the effectiveness of its products in reducing the incidence of occupational hearing loss or in achieving important intermediate outcomes, such as sustained improvement in the use of hearing protection devices or the management of hearing loss prevention programs. Evaluation based on changes in knowledge, attitudes, or behavioral intentions is appropriate but not sufficient. The program's work on engineering noise controls appears to have had little impact in industrial sectors beyond mining.

The committee assigned a score of 4 for impact, indicating that the program has made a moderate contribution on the basis of end outcomes (improvements in worker health or safety) or well-accepted intermediate outcomes (use or adoption of work by stakeholders) (see Box 2).

BOX 2. Scale for Rating Program 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 may result in new knowledge or technology, but only limited application is expected.

2 = Research program activities or outputs are going on and many 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 is not mature enough.

RECOMMENDATIONS FOR PROGRAM IMPROVEMENT AND FUTURE WORK

The committee sees a need for much wider outreach for expertise and ideas to guide the direction of the Hearing Loss Research Program's future work. The committee offers the following recommendations for improving the relevance of the work and strengthening its impact on reducing occupational hearing loss.

1. Foster effective leadership. NIOSH should ensure that the program has leaders with the appropriate technical expertise and skills in managing in a complex environment, mobilizing resources, promoting collaboration within the program, and increasing program coherence.
2. Recruit additional expert researchers to the program staff and expand access to outside expertise.
3. Improve program planning by developing a strategic plan, using surveillance data and stakeholder input to develop priorities; using information from evaluation of hearing loss prevention measures to guide program planning; and systematizing collaboration with regulatory partners.
4. Place greater emphasis on evaluation of the effectiveness of hearing loss prevention measures on the basis of outcomes that are closely related to reducing noise exposure and the incidence of occupational hearing loss.
5. Initiate national surveillance for occupational hearing loss and hazardous noise.
6. Integrate a noise control perspective into overall program efforts for all sectors, developing noise control engineering approaches for non-mining sectors, increasing the visibility of noise control engineering in the program, and accrediting laboratories used to conduct studies for the program.
7. Target more of the extramural research funding and increase collaboration and mutual awareness of ongoing work among intramural and extramural researchers.

FOR MORE INFORMATION...

Copies of *Hearing Loss Research at NIOSH* available from the National Academies Press, 500 Fifth Street, N.W., Lockbox 285, Washington, DC 20055; (800) 624-6242 or (202) 334-3313 (in the Washington metropolitan area); Internet, http://www.nap.edu. The full text of this report is available at http://www.nap.edu.

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