

THE NATIONAL OCCUPATIONAL HAZARD SURVEY
(NOHS II)--PROGRESS REPORT

David S. Sundin
Hazard Section, Surveillance Branch, DSHEFS
NIOSH - Cincinnati, Ohio

In order to make intelligent decisions concerning priorities for action, NIOSH requires a current and continuing supply of information on nationwide patterns of occupational exposure to health hazards. The National Occupational Hazard Survey of 1972-1974 (NOHS I) which developed such information among a probability sample of nearly 5,000 plants, has had important applications in a wide range of NIOSH research activities. It will become increasingly necessary to update the results of that survey in order to reflect current conditions.

The foundation of experience which was developed during NOHS I will be used to support and guide the planning and implementation of a second national survey. Although methodologies used in the new survey will closely resemble those of NOHS I, the previous survey forms, data processing systems, programs, and procedures will be critically examined to identify areas where improvements can be made.

A sample of approximately 5,000 facilities will be selected to cover a wide range of industry types, facility sizes and geographical locations, and will be constructed so as to permit the development of national exposure estimates. This sample will be selected in the fourth quarter of fiscal year 1980. Twenty-one industrial hygienists will be recruited and trained intensively in observational survey techniques during the fourth quarter. The surveyors will then be subdivided into teams and deployed into the selected facilities beginning in fiscal year 1981 in order to gather data on the nature and extent of potential occupational exposures to chemical and physical agents, including trade name products. The field phase of the survey will last approximately two years, and preliminary data should be available during the year immediately following the survey.

JUSTIFICATION AND BACKGROUND

An intelligent and informed sense of priorities for action requires a current and continuing supply of information on nationwide patterns of occupational exposures to health hazards. It is important to know what hazards are associated with certain industries and occupations, and to have some idea of the relative importance of those hazards, both in terms of total number of workers at risk, and the toxic properties of the substances. An effective program of hazard surveillance requires a diverse array of data collection activities. It must identify and seek out networks which supply intelligence on occupational hazards, and must be sensitive enough to detect early indications of potentially hazardous situations in time for effective intervention on behalf of those affected. Hazard surveillance aims to provide the information necessary to prevent occupational disease, so that the in vivo experiment need not be carried to its obvious conclusion. It is a goal which challenges us for a number of reasons. Chief among these is the fact that new chemicals are introduced into the workplace in numbers which largely overwhelm the capacity of toxicological testing facilities. A second factor involves the difficulty in extrapolating animal data to humans. Another confounding factor is the extensive practice of masking chemicals with trade name designations, thus frustrating attempts to even identify the chemicals to which workers are exposed.

Recognizing these factors, NIOSH has constituted a program of hazard surveillance which (1) attempts to monitor a broad range of current information on chemical toxicology, (2) conducts periodic special surveys to develop intelligence on the distribution patterns of health hazards at the workplace, and (3) persistently seeks to gather information on the chemical ingredients of industrial trade name products.

NIOSH's first nationwide special survey of occupational hazards was conducted from 1972-1974 in a probability sample of nearly 5,000 facilities. A team of twenty surveyors conducted wall-to-wall observational surveys in a broad sample of workplaces, inventorying chemical and physical agents, including trade name products. A total of more than 9,000 different potential hazards were discovered, and more than 85,000 trade name products were listed. After an extensive and time-consuming period during which over 10,500 manufacturers were contacted and asked to supply ingredient information on their products, the data base was available for producing estimates of the number of people exposed to selected hazards.

The foundation of experience which was developed during the original National Occupational Hazard Survey is being used to support and guide the planning and implementation of a second national survey.

OBJECTIVES

The broad objectives of NOHS II can be simply stated:

- (a) To develop a data base capable of producing reliable estimates of the total number of workers in the target population exposed to the health hazards which are observed during the survey.
- (b) To develop data which is capable of reliably describing each industry type comprising the target population in terms of the nature and extent of exposures to health hazards, and the degree to which facilities have implemented programs to reduce occupational health problems.
- (c) To compile the data in such a way that analyses of industrial hazard exposure trends can be made by comparison with NOHS I information.

There are a number of important parallel activities which must be conducted to initiating the field phase of the survey. The ultimate utility of the data and the speed with which it can be made available for dissemination and use depend on the successful timing and execution of these tasks.

FORMS DESIGN

One task which is a necessary prerequisite to many others is the drafting of forms for data collection and guidelines to enable the surveyors to use the forms. MOHS I used a 3-part form, and the same basic structure will be employed in the second survey. Part I of the form is filled out during an initial interview with plant management. It consists of a series of approximately 50 questions which elicit information about the health and safety program at the facility, and the degree to which the program has been effective in reducing illnesses and injuries. We have encouraged widespread input of candidate questions for inclusion in Part I. Part 2 of the form is filled out during the walk-through survey, and captures data on the types of workers (sex and occupational title) observed, and their exposures. Additional data on the duration of the exposures, the physical form of the substance, and the control measures being used are also collected at this time. Part 3 contains information on the amount of surveyor time spent travelling to a plant, walking through the facility, and writing up the results.

SAMPLE FRAME

A second major task which must be completed prior to initiating the field phase of the survey is the construction of a sample frame or comprehensive listing of facilities from which a probability sample can be drawn. Since there are more than 4,000,000 facilities in the United States, a certain portion of which enter or leave the scene each year, the assembly of a current and accurate frame requires some effort. A MOHS II sample frame will be built from existing data sources, and modified where necessary. The construction industry, which includes general contractors and special trade contractors, will create special problems due to the fact that the majority of exposures probably occur at the job site rather than at the location of the business headquarters. Separate listings of construction projects in progress will likely be required to adequately describe this important activity.

The target population for NOHS II will be slightly different than that chosen for NOHS I. Extremely small facilities (7 employees or less) will still be excluded from the frame, but an attempt will be made to achieve a larger, more complete sampling of the manufacturing industries. This will mean that fewer facilities in industries like wholesale and retail trade, financial institutions, and educational services will be surveyed.

After the target population has been described, a sample strategy will be developed which maximizes the use of the surveyor resources and meets the objectives of the survey. It is anticipated that some form of stratification by Standard Industrial Classification (SIC) and size of facility will be used, and that geographical clustering will be required. Part of the sampling strategy will involve developing exigency procedures to deal with situations where a facility is unsurveyable. While NIOSH has been granted statutory authority to enter workplaces during the conduct of its research activities, there may be occasions where this authority will be challenged. In such cases a decision will be made on whether to undertake the legal action required to effect entry, or to draw another facility as a replacement.

The final stage in design of a sampling strategy is to produce a list of facilities which constitutes the sample. It will probably be necessary to validate the list of facilities by verifying the critical data through phone contact with management personnel at each candidate facility.

A specific task which is closely related to the development of a sampling strategy is the design of analytical methods which will accept the survey data as input and produce national estimates of numbers of workers exposed to selected hazards. This projection algorithm must be computationally efficient and capable of identifying those estimates for which measures of variance can be computed.

RECRUITING AND TRAINING SURVEYORS

It will be extremely important to select and train the surveyors properly. All surveyors will be required to have a bachelor's degree in a scientific discipline such as chemistry, chemical engineering, or health sciences. A minimum level of training in organic chemistry will be necessary. Six to eight weeks of classroom training in general principles of industrial hygiene with special emphasis on recognition of hazards is planned. A two week module tailored to the specific goals and methods of the survey will follow, after which a period of two to three weeks will be spent in in-plant instruction in the use of the forms.

CLARIFYING TRADE NAME INGREDIENTS

The entire process of acquiring ingredient information on trade name products will be critically examined to identify areas where improvements can be made. It will be important to check the product names from NOHS II against those identified in NOHS I to avoid requesting the same information from a manufacturer a second time. It may also be possible to access other sources of ingredient information which provides a satisfactory level of detail. The strategy of offering the option of comprehensive reporting on an entire product line to manufacturers is being considered as one means of minimizing the need for repeated contact. Current procedures for safeguarding confidential data will be evaluated for possible improvements.

DATA PROCESSING

It is hoped that the extensive collection of systems and software developed during and following NOHS I can be used as the basis for the development of the data automating system which will be required for NOHS II. If the survey data is automated and edited as soon as it is collected, it will be possible to spot errors in time to communicate this information to the surveyors for correction while they are still in the field, and before it becomes a widespread problem.

FIELD PHASE

The operational aspects of the field phase of the survey will be modified somewhat to improve the quality and quantity of data collected. The survey force will be divided into several smaller teams, and a team leader for each group will be identified. It will be the responsibility of this individual to coordinate the activities of the group, schedule and assign facility surveys within a region, desk check and organize the data forms for submission to headquarters, and serve as a conduit for information between the surveyors and headquarters staff. The surveyors will spend more time disseminating general information at the plant site, including information about NIOSH services such as the Health Hazard Evaluation program. They will also be on the alert for any special problems that arise, including previously undiscovered health problems associated with new chemicals or new uses of common chemicals. They will thus function as a continuing source of current intelligence on emerging problems. All such information will be relayed to headquarters for appropriate action.

DISSEMINATION PLANS

The ultimate worth of such a large-scale survey effort is judged on the basis of how the data is disseminated and used. Many of the changes in survey design from NOHS I to NOHS II are designed to reduce the interval between termination of the field phase of the survey and availability of survey data. Rather than publishing a single volume of summary statistics, a series of interim, special topic reports is contemplated. These special topic reports could take the form of profiles of selected industries or occupations, or could be designed to deal with classes of chemicals. Efforts will be devoted to loading the data under a data base management system to facilitate specialized retrievals soon after automation is completed.

In a survey of this magnitude and complexity there will always be unanticipated developments which necessitate modifications to the original plan. Realization of this fact increases the ability of the survey managers to accommodate the unexpected. NOHS I provided many essential lessons which will not be lost on the architects of NOHS II. It is with considerable enthusiastic anticipation that we look forward to this challenge.

Discussion

Dr. Green (NIOSH): I have two questions. You mentioned that when you get some trade name information, you will go back and check and see if it overlaps with requests to manufacturers from NOHS I, and there was a point brought up that the ingredients may have changed in the interim, so perhaps you might consider that, and a second contact might be worthwhile.

Mr. Sundin (NIOSH): Yes. I should clarify my statements here. We are undertaking at the current moment a research effort which analyzes our existing trade name file. One component of that research effort is to gain some sense of the rate of change in production formula.

A similar study was conducted on CPSC's file of trade name ingredients, and we are looking with some interest at the results of that study.

In any case, I think it will be important not to simply go out and re-request information on a product for which we have even antiquated data. Rather, an intelligent strategy would seem to be to at least give the manufacturer the opportunity to indicate whether the product formula as we have it has changed or is the same. I think that the people that are looking at respondent burden would want us to operate in such a fashion. We are sensitive to the fact that we cannot just use old information that we have on file, but we will at least establish whether or not we have any information on that particular product and then attempt to validate with the manufacturer whether it is current information.

Dr. Green (NIOSH): The other thing I wanted to bring up, in the first survey there was a certain percentage of the exposed population whose estimate was based on what was called the generic exposure. Can you discuss what that means and what are the criteria for selecting people as falling into that group?

Mr. Sundin (NIOSH): A "generic procedure" was used to derive data on exposures for those people that were exposed to trade name products for which we did not have ingredient information from the manufacturers.

The whole process of clarifying trade name products has been an extremely difficult one for a number of different reasons, which is why we are directing a lot of our attention during the current planning stages to improve that effort.

Any kind of response you could possibly imagine occurring, did in fact occur at some time during the course of contacting these 10,000 manufacturers. Our file of ingredient information grew rather slowly, and the pressures to examine survey data began almost immediately after the field phase was completed, as you might expect.

Everytime a trade name product was noted in the field, an accompanying record was input by the surveyor concerning what that product was doing, what type of product it was. Was it a surfactant, a cleaning compound, and so forth? Under contract, we then researched the contemporary chemical literature and assembled a list of probable ingredients for product formulas that we have not yet received from manufacturers. At such time as we receive actual ingredient information from manufacturers, we then replace the generic resolution with the actual data.

With a view toward NOHS II and some of the problems that we have noticed with using generic resolution, we are attempting to compare the set of ingredient information which we actually got in specific product classes from manufacturers with that generic list and see how good the generic list actually was and modify it based on actual data received. We realize we will still be faced with that kind of a situation, since to get trade name ingredient information requires some time, but we hope our generic resolution process will be a little more accurate the second time.

Dr. Weisburger (NCI): There have been some comments made that some times the NOHS overestimates the number of workers that are exposed to a particular chemical. Could you comment on that, please.

Mr. Sundin (NIOSH): In this business, nobody is ever satisfied with your estimates. Either they are too high or they are too low. But in most instances where we have researched what seemed to us to be a serious challenge to the estimates, what we find is that there are so many non-standard, secondary, widely dispersed uses of certain products which the manufacturers or the processors or the distributors of the chemical are totally unaware of, that we indeed find that the NOHS estimates derived, as they are, from a plant level sort of survey procedure, tend to represent potential exposures fairly well.

Realizing that we are not talking about exposures that were defined by taking environmental measurements, but rather about a compound that is in the workplace of a worker, being used at something more than 30 minutes per week, the other process that we sometimes use to answer these sorts of questions is to look at only full time; i.e., more than 4 hours a day, or part time, and an amazing number of exposures occur in very short bursts. The numbers drop drastically when you talk about only full time exposures, and that tends to be closer to the classic definition of exposure in many people's minds. We realize however that even part time exposures for certain chemicals are important to consider.

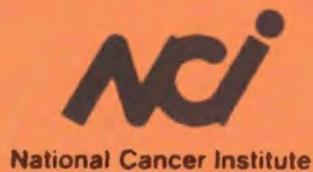
So in most cases when we examine apparent discrepancies, it turns out that there is some validity to our estimates.

Dr. Bellin (EPA): Down to what level do manufacturers identify their products, and is there any attempt to gain information on hazardous contaminants that we have some idea might exist?

Mr. Sundin (NIOSH): That is something we will probably be examining closely, with an eye to potentially modifying during the second survey. We asked the manufacturers to report anything that was there at greater than one percent by weight or volume, except in the cases of carcinogens which should be reported regardless of the percentage -- but the definition of carcinogen was not presented to manufacturers, and I am sure they interpreted it fairly liberally.

We have seen cases where a pesticide, for example, will come back as 100 percent petroleum distillate; the active ingredient being in the product at less than one percent, and therefore the manufacturer is choosing to ignore it. We are therefore contemplating a change in the wording of our request form to include a request for total reporting of any active ingredients and impurities where the manufacturers have such knowledge.

We permitted also a plus or minus 5 percent margin on the percentage of composition reporting. That does not affect the way in which we use the data back in NOHS. I think it is probably an adequate level of reporting and gives us fewer problems with certain manufacturers if they are permitted to use a plus or minus 5 percent tolerance on individual percentages of the components.



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