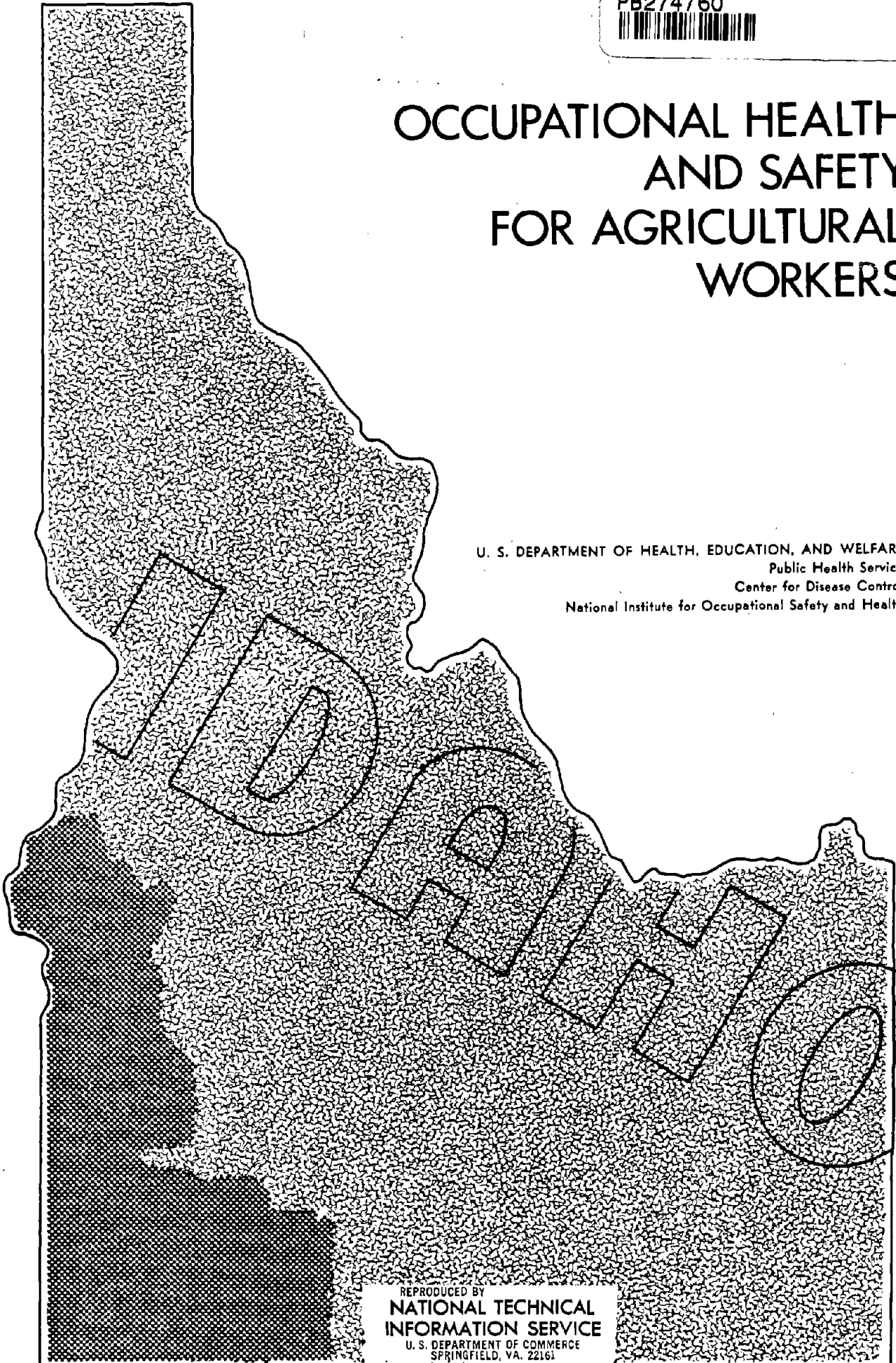


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OCCUPATIONAL HEALTH AND SAFETY FOR AGRICULTURAL WORKERS

U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service
Center for Disease Control
National Institute for Occupational Safety and Health



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OCCUPATIONAL HEALTH AND SAFETY FOR
AGRICULTURAL WORKERS

Agricultural Health and Safety Considerations
for a Rural Primary Health Care System

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December 1976

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ABSTRACT

This report describes activities undertaken at a rural primary health care facility located in the agricultural center of Southwestern Idaho. The goal of the activities was to evaluate an occupational safety and health program for agricultural workers which was integrated into the facility's everyday operations.

Basic objectives of the project were:

1. To assess how an agricultural occupational safety and health program can be delivered to a farming community;
2. To evaluate how medical persons (physicians, nurse practitioners, etc.) can assess the physical well-being of farm-related persons (what to look for, what questions to ask the patient. . .);
3. To pinpoint "perceived" and "real" agriculture-related illnesses and disabilities in both farmer and farmworker populations;
4. To carefully examine migrant farmworker problems and the workers' responses to a safety and health program;
5. To find methods to increase clinician interest in occupationally-related accidents and illnesses; and
6. To integrate preventive health measures, such as "health education," into an agricultural population--at the time of a medical encounter and on the farm or ranch.

Baseline data on problems related to the safety and health of farmers, ranchers, and farmworkers of this geographic area were not available when the project was undertaken. Therefore, the project spent much of its efforts in the collection of baseline information. This information was obtained by offering complete physical examinations to farmers, ranchers, farmworkers, and their families. The examinations included patient education concerning agricultural health and safety and occupational histories, in addition to the standard examination and necessary laboratory work. Aside from providing subjective and objective baseline data, the examination facilitated clinician education and training in agricultural-related health problems. A total of 640 examinations were completed, reviewed, and statistically analyzed. In addition to in-clinic activities, activities outside of the clinic setting included 141 informal

interviews with farmers/farmworkers; surveys of farm-related agencies, organizations, and businesses; various educational activities; and 25 professional walk-through evaluations of farms and ranches.

Although very few objective agriculture-related health problems were uncovered, clinical formats for examining and recording such problems were designed and tested. Subjective data from the interviews revealed numerous health and safety problems which are addressed in the report.

This report was submitted in fulfillment of Contract CDC-99-74-27 by Community Health Clinics, Inc. under the sponsorship of the National Institute for Occupational Safety and Health.

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INTRODUCTION

FOCUS OF CONCERN: OCCUPATIONAL HEALTH AND SAFETY IN AGRICULTURE

In the last fifty years America has witnessed extensive migration from rural to urban areas. However, rural health and safety problems have not left with this migration but remain behind. People involved in agriculture in the rural areas have become a growing concern in terms of their health, safety, and habits.

There are approximately 9.4 million farm residents in the United States. In 1971 there were 2,300 accidental, agricultural work deaths. The death rate in 1971 was 66 per 100,000 workers. This is an increase of 10 percent over the 1961 death rate; whereas various other occupational groups, such as manufacturing, trade, service, etc., had a decrease in the death rate for the same period of time.

America's farm population is subject to many types of accidents and diseases which are not so apparent in the urban setting. Many of these problems are associated with environmental factors such as noise, dust, heat, and zoonotic diseases. Farming is a hazardous occupation and one which is located remote to health services or where health services are essentially unavailable. Medical services, as well as occupational health and safety services, are in short supply to a group which by definition is in need of such services.

FEDERAL RESPONSE

Various federal, state, local, and private agencies have attempted to address the problems associated with rural agricultural workers, including farmers and farmworkers. One of the federal agencies, the National Institute for Occupational Safety and Health issued a request for proposal to "Develop a Model Occupational Health and Safety Program for Agricultural Workers." Community Health Clinics, Inc. responded with a proposal to develop a program for people involved in agriculture.

PURPOSE OF THE STUDY

The purpose of the study was to develop, test, and evaluate a model program aimed at identifying health and safety problems in agriculture. Helping the farmer and farmworker become more aware of the health problems associated with their work, providing a health facility to offer occupational health services, and providing instructions on what can be done to prevent these adverse conditions were areas of major emphasis for the study.

Specifically, the contract required:

(1) Survey - Develop and conduct a survey of on-going occupational health programs for agricultural workers in a state or region or recognized area such as a large county or combination of counties and determine who provides the services, what they are, what the approach to health problems is, and what the results of the efforts are in terms of a decrease in the incidence of occupational illnesses and accidents.

(2) Model Design - Design a model occupational health program for agricultural workers that may be carried out by some already existing local or state agency, for example, county health department, county hospital, extension service, private practice clinic, state health department, or other organizations. Describe how the present personnel of these establishments may be utilized in an agricultural occupational health program for farmworkers in their area of jurisdiction, how the program may be evaluated in meaningful terms, and what additional personnel may be needed, including their professional category or technical specialty, and salary range. Develop a budget for such a program considering all the costs which can be identified.

(3) Testing - Test the program in an organization such as a county hospital, a local health department, a private practice clinic, or another agency. Set the program up, offer medical, nursing, industrial hygiene, and safety services to the agricultural population in a defined area (probably a county), stimulate interest in utilizing the services, and keep accurate records on services performed.

(4) Evaluation - Evaluate this technique or system for provision of occupational health care and develop testing to measure the success or failure of this method of providing such services.

MODEL DESIGN

MAJOR CONSIDERATIONS

When designing the model occupational health program for agricultural workers many variables had to be examined. Community Health Clinics, Inc. incorporated a model design in the following manner: (1) identifying occupational health and safety problems associated with agriculture in the defined geographic area, (2) defining the extent of the problems, (3) assessing groups affected by the problems, (4) determining factors of the economic and political environment causing the extenuating circumstances and conditions, (5) evaluating the level of interest of the farmers, ranchers, and farmworkers regarding knowledge, attitude, and behavior change, and (6) seeking remedies for the problems, specifically how a rural primary health care system can develop and implement such remedies on the basis of 1 through 5 above.

Using the above considerations the issue of pesticides was examined as the central problem focus of this design. The following summarizes the methodology for discussion of the problem:

(1) What are the occupational health and safety problems associated with agriculture in this geographic area? One problem is believed to be that of exposure to pesticides. There is concern about the long-term effects from using pesticides. Does this create a specific health problem? Are there deleterious effects from using pesticides over a long period of time? Can health providers identify such effects? Are the farm workers aware of such effects? Reviewing various states' morbidity and mortality rates one could be led to believe that pesticides have had few ill health effects. In most states, reporting of pesticide poisonings seems to have been lax, and as a result, the reports do not reflect a problem. In addition, if there is a problem, is its nature more agricultural or rural, or is its nature more occupational or environmental?

(2) Can the extent of the problem be defined? Definition of the extent of pesticides as a health-related problem may be made through a literature search. National statistics, individual state statistics, industrial chemical handbooks, journal articles, audiovisuals, and books make reference to pesticide problems.

(3) What group or groups of people are affected by the problem? Morbidity and mortality data must be broken down by sex, age,

ethnicity, extent of agricultural involvement, and wherever possible, the types of agricultural involvement and exposure. One must also be aware of possible secondary medical complications from pesticide exposure.

(4) What extenuating circumstances and conditions influence the specific problem? If it is validated that pesticides are indeed a problem, extenuating circumstances and conditions must be examined. Should the pesticide or pesticides be banned? Should they be more closely regulated? Should re-entry time be altered? Should persons without proper clothing and/or equipment not be allowed into the fields? One must also examine such things as the geographic area's economic system, political climate, and existing enforcement procedures of regulations. For example, if one looks at the average migrant worker, may a chance pesticide exposure and its accompanying discomfort not be more tolerable for the worker than not having food on the table for his/her children? For the self-employed farmer with eighty acres who is barely making financial ends meet, may not taking chances on applying a pesticide in a 15-MPH wind outweigh financial destruction?

The array of authorities who have pesticide information, control, and enforcement responsibilities is also confusing. Involved may be the County Agricultural Extension Service, the Agricultural Commissioner, the State Health Department, the Bureau of Land Management, the State Department of Agriculture, the United States Department of Agriculture, the Food and Drug Administration, the Environmental Protection Agency, the Occupational Safety and Health Administration, local and state poison control centers, hospital emergency rooms, health clinics, individual physicians, the Department of Labor, the State Industrial Commission, state and federal national laboratories, chemical companies, the Fish and Game Commission, the Consumer Product Safety Commission, and private and state insurance programs.

If a state or area does not enforce pesticide regulations, more farmers may take risks. If a state emphasizes pesticide education, there may be less abuse. If a state has adequately trained medical personnel in pesticide poisoning management and reporting, pesticide surveillance may be facilitated. Basic to the whole enforcement issue is whether state and federal laws should be enacted or whether individual agricultural workers should be responsible for their own health.

Is the problem perceived important enough by authorities to encourage learning and behavioral change? Are there alternatives in the existing economic and the political system?

(5) How are some of the problems being solved? To ensure the safe use of pesticides, such actions as proper labeling procedures, pesticide poisoning reporting requirements, spraying and mixing licensure, re-entry time regulations, education, pesticide registration, pesticide enforcement, and pesticide research projects are being developed by various governmental and private agencies.

(6) How can the problems be resolved by a rural primary health care system? The model design developed by Community Health Clinics, Inc. was to assess and rectify the pesticide problem which was recognized as only one component of the many problems presented by agriculture. The design focused on using medical examinations, farmer-farmworker interviews, and community surveys as the major tools in assessing and delivering occupational education to agricultural workers. Methodology for defining agricultural-related problems and learning to identify and assess them during the course of a medical examination was refined throughout the project. The immense scope of the project and the uniqueness of the agency responsible for the pilot design must be kept in mind. If a similar agency wishes to incorporate agricultural health and safety, both in the preventive and diagnostic areas, into their health program it is recommended that rather than following the research model design which was implemented for this project, the guidelines and tools in Appendices B and E be incorporated.

MODEL DESIGN AND COMPONENTS

The model design which was implemented can be viewed as having three components: (1) medical services, (2) health education and promotion services, and (3) occupational health services.

To understand the base within which the project was developed and implemented, it is first necessary to describe Community Health Clinics, Inc. After that description, each component of the model design will be discussed.

Background

Community Health Clinics, Inc. (CHC) is a non-profit health corporation with clinics in Nampa, Parma, and Homedale, Idaho. The organization began as a neighborhood health clinic on May 1, 1971. Since then it has developed into a comprehensive primary health care system providing services to farmworkers, low-income people, and rural residents in Southwest Idaho and Eastern Oregon.

Organizational Structure

According to the Articles of Incorporation, the Board of Directors is the sole legal body of the corporation. All funds are received for the services of the corporation by the Board of Directors. The Board of Directors is responsible for hiring the Administrator, who in turn employs the necessary personnel for clinic operation.

Services

Community Health Clinics, Inc. is presently able to provide a wide variety of services. These services include primary, therapeutic, and preventive care. Laboratory, transportation, X-ray, and pharmaceutical services are also provided. Limited dental care, outreach, and health education services, migrant hospitalization, and referrals to specialists are available.

During the CHC fiscal year, April 1, 1975, to March 31, 1976, there were 25,804 encounters of which 20,553 were in-clinic patient visits. The remainder were outreach, hospital visits, and other out-of-clinic encounters.

All services are provided on a financial basis determined by a person's ability to pay.

Personnel

The staff includes: 1 3/4 physicians, 5 nurse practitioners, 1 MEDEX, 4 LPN's, 1 pharmacist, 1 health educator, 4 family health workers, 4 receptionists, 6 aides, 1 secretary, 1 bookkeeper, 1 medical secretary, 1 accountant, 1 accounts receivable clerk, and 1 administrator.

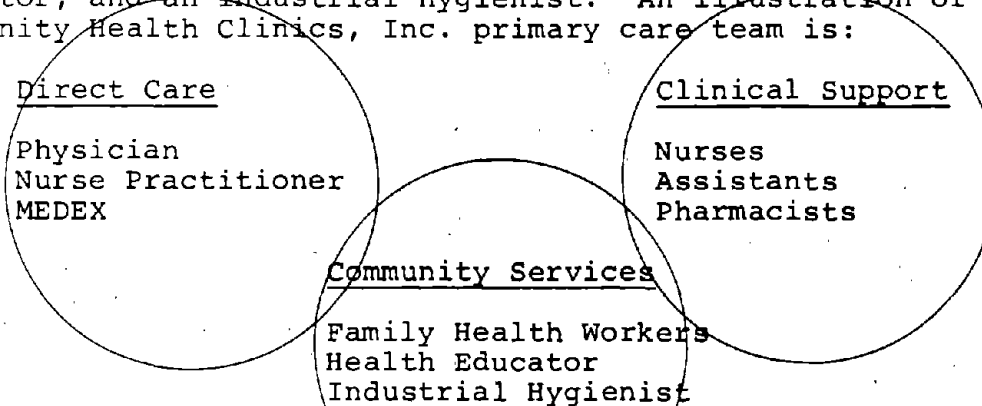
Resources

During the past fiscal year a total of \$557,626 was expended in the operation of the corporation according to the audited statement. Resources and the amounts received include:

HURA/PHS Grant	\$215,690
319 Migrant PHS Grant	215,850
W.K. Kellogg Grant	14,941
NIOSH Grant	63,095
M.S.R.M.P. Grant	5,739
Donated Services	24,715
Other Income	14,304
Patient Services	52,616
Total	\$606,950

Primary Care Delivery System

Optimal health care requires the use of medical, social, and environmental services organized into a primary care delivery team. Community Health Clinics, Inc. has attempted to deliver primary care to patients through physicians, nurse practitioners, MEDEX, nurses, and health workers, as well as a pharmacist, a health educator, and an industrial hygienist. An illustration of the Community Health Clinics, Inc. primary care team is:



All functions necessarily overlap.

Figure 1. Primary Health Team: Community Health Clinics, Inc.

PRESENTATION OF MODEL DESIGN COMPONENTS

Medical

In an effort to assess the present health status of farmworkers, it was determined to be in the best interest of the project and the worker to design a research model utilizing a physical examination. The results of such a study would have significant implications in the development of environmental activities and educational programs. The major purpose of this component was to assist in identification of agricultural health problems in specific sub-groups of the population. In addition, the examination was designed to serve as a health education tool.

All persons involved in any agricultural work and their families were eligible to participate in the program. No payments were required of the persons for medical assessment. The persons were requested to make appointments, but appointments were not mandatory. The clinician completed all the medical assessment feasible during the examination. The complete examination, however, often had to be extended over two or three visits. This extension was due to limited patient cooperation (especially with blood work) and time of the week (cholinesterase drawing could only be done if the blood could be transported to Boise in 48 hours). Followup by the outreach worker was made whenever needed and possible history was completed by the patient (or parent). Laboratory work was generally done by the clinic's licensed practical nurse and the examination and history were completed by a nurse practitioner or medical doctor. X-rays were usually referred to a hospital or the Community Health Clinic facility in Parma. Specific forms were designed for use during the medical assessment. A problem-oriented medical records system was used to record all medical information. The forms designed for recording occupational health and safety information are shown in Appendix B. Charts designed to assist the clinician in diagnosis and treatment appear in Appendix E.

The following general procedure was designed and implemented for the provision of medical assessment:

MALES (16 years and over)

1. Complete physical examination and history
2. Diagnostic laboratory work:
Complete urinalysis, urine culture if indicated

Hematocrit
Stool Guaiac
Screening audiogram, full audiogram if indicated
SMA-18 with random blood sugar, triglycerides
PPD if not done in past two years or if indicated
Chest X-ray if not done in past two years or if indicated
EKG if age 40 or over or if indicated
Cholinesterase baseline level if exposed to organophosphates
Pulmonary function studies, if indicated
Other laboratory tests depending on pathology found

3. Detailed work history including the following:
Pesticide exposures, past and potential
Agricultural accidents, past and potential
Hazardous exposures, past and potential especially to dust, noise, solvents, and eye irritants
Safety practices
4. Health education session on individual, family, or small group basis tailored to specific needs. To include audiovisual program and discussion if feasible, probably 10-15 minute duration.

FEMALES (16 years and over)

Same as above outline for men with addition of pap smear, G.C. culture, and pelvic examination.
Health education session included increased emphasis on accidental poisonings and other farm-related hazards to children.

CHILDREN (Under 16 years)

Note: Since the farmworker frequently came to the clinic with his family, the children were also examined for evidence of unidentified health problems that might have a causal relationship to harmful exposure on the farm.

1. Complete physical examination with history, along with a specific modified history related to agricultural hazards
2. Diagnostic laboratory work:
Complete urinalysis, urine culture if indicated
Hematocrit
Screening audiogram, full audiogram if indicated
PPD if not done in the past two years or if indicated
Other laboratory tests depending on the pathology found
3. Immunizations as needed

Health Education

The health education program was to fulfill the following:

- (a) Increase awareness of possible health hazards associated with agricultural work
- (b) Motivate health professionals, farm-related agency personnel, agribusiness persons, and farmers and farmworkers to take action to minimize health hazards associated with agricultural work
- (c) Be adaptable for inclusion into the medical assessment component of the design

The areas of program emphasis included:

- (a) "Project interest" - interest farmers and farmworkers to come to the clinic for a physical examination. The target was the farmworker, first, the second was the farmer, and the third was any person involved in agribusiness.
- (b) Patient education - provide health education relating to occupational safety and health at the time of physical assessment and interview

- (c) Community education regarding health and safety on the farm and ranch
- (d) Stimulating agribusiness activity in developing and implementing safety and health measures
- (e) Supporting development of agricultural health and safety activities by local governmental health agencies and farm-related organizations.
- (f) Education by the industrial hygienist, clinician, health educator, and/or outreach worker at the time of routine or emergency on-site visits to agricultural operations
- (g) In-service training of clinic personnel regarding diagnosis and treatment of agriculture-related problems

In implementing the education program, it was decided to use the family health workers on the clinic staff to provide as much individual patient contact as possible. The health workers were responsible for (a) conducting informational discussions with groups outside the clinic, (b) promoting the project, and (c) conducting occupational interviews. The clinician provided individual instruction to patients at the time of physical evaluation. The professional health educator coordinated in-staff, community, and individual education. The professional industrial hygienist and consultants provided specific technical assistance, especially as it concerned in-staff agricultural safety and health education.

The occupational health areas of primary concern in the educational program included:

- 1. Chemical exposure, e.g., pesticides
 - a. Accidental field exposures
 - b. Accidental poisonings, especially in children, from contact or ingestion. Examples include non-disposal of containers, failure to wash clothing, inadequate posting of fields, and lack of use or improper use of protective clothing.

c. Early recognition and reporting of poisonings

2. Physical exposure, e.g., excess noise
3. Biological exposure, e.g., salmonella, brucellosis
4. Physical exposure, e.g., thermal stress
5. Trauma, e.g., accidents involving agricultural equipment
6. Equipment, e.g., lifting of heavy objects

Other areas of concern in the health education program were:

1. Inadequate sanitation
2. Home accidents
3. Child care (both when child is healthy and sick)
4. Prenatal care
5. Other personal environmental health risks, e.g., smoking

A publicity program was necessary, since research relied upon voluntary participation by a wide variety of persons within a relatively large geographical area. Information sources included local newspapers, radio announcements, personal letters, pamphlets, posters, and personal contacts at farms and labor camps. The presence of Spanish speaking people required the reproduction of all materials in both Spanish and English. Educational tools used to facilitate teaching included slide shows, literature hand-outs, films, and medical guidelines.

Occupational Health Activities

For the first half of the project, a professional industrial hygienist was on the staff to provide environmental assessment and services. A consultant assumed the responsibilities during the latter half of the program.

The hygienist and consultant concentrated on:

1. Technical findings of the study which required professional services of the hygienist. These included some of the services described in the educational activities above.
2. Coordination of proceedings of the study with local agriculture-related agencies in the area.

3. Professional services offered to local farm operations.
4. Assessment of area agriculture.

SUMMARY

The model design was to include a wide variety of medical, educational, and industrial hygiene services provided through a primary health care team.

The setting was within the three clinics of Community Health Clinics, Inc. on the farms and at the labor camps. The combined services of CHC, Inc. were available with a coordinated effort of various agencies of the area which are involved in agriculture. The intent of the model design was to develop a role for a rural primary health care team in identifying farm-related health and safety problems and to educate and motivate patients to practice sound health and safety practices in the agricultural workplace.

Addressing farm-related health and safety problems is complex and requires extensive community and agency involvement. Educational programs must take these considerations into account. The contracting agency recognized the importance of these considerations; however, when incorporating a manageable model design, it was necessary to focus primarily on the role a primary health care system could feasibly take.

DESCRIPTION OF THE AREA

OVERVIEW OF THE TREASURE VALLEY

The Treasure Valley is located in Southwest Idaho and Eastern Oregon (see map on page 13). The Valley encompasses 11 counties of which 10 are in Idaho and one is located in Oregon. There are 41,348 square miles in the area, 31,547 are located in Idaho; and 9,801, in Oregon. According to the 1974 provisional census, there are 300,000 people residing in the Valley; 92% reside in Idaho; and 8% in Malheur County, Oregon. A migrant farmworker influx of approximately 20,000 people comes into the Valley for a period of 2 to 7 months yearly. Table 1 provides the population of the Valley by each county.

The Valley is bordered to the north and south with mountain ranges and to the east and west with semi-arid plateaus. A major interstate highway and a system of secondary federal and state roads connect several counties. Many small outlying communities are scattered throughout the Valley with a dependence on the larger commercial areas of Boise and Nampa-Caldwell in Idaho and Ontario, Oregon, for principal trading activities and amusement.

The weather varies throughout the area depending on elevation and location relative to the mountain ranges. The northern part of the Treasure Valley has considerable inclement weather in the winter; however, the remainder of the Valley is mild for the mountain states. Average precipitation for the Valley is 10.65 inches per year.

The economy is primarily dependent upon the industries of agriculture and related commercial activities. Agriculture had played a predominant role in the Valley in terms of work force, land usage, income, and tax base.

Table 1. Population of the Treasure Valley. Source:
Bureau of Vital Statistics, February 3, 1975.

County	July 1, 1974 (Provisional)
(IDAHO STATE TOTAL	799,000)
Ada	131,700
Adams	3,200
Boise	2,400
Canyon	72,900
Elmore	20,300
Gem	10,900
Owyhee	7,500
Payette	13,900
Valley	4,400
Washington	8,300
Total Idaho Counties	275,500
Malheur County, Oregon	24,100
Total Treasure Valley	299,600

[illegible]

IMPACT AREA - CANYON AND OWYHEE COUNTIES

Population

The principal impact area of this study includes the Idaho counties of Canyon and Owyhee. A total of 80,400 people reside year round in the two counties according to the provisional census of 1974. Approximately 12,000 migrant farmworkers come into the area for a period of 2 to 7 months. The two-county area contains 8,219 square miles with a population density of 105.7 persons per square mile for Canyon County and 0.8 persons per square mile for Owyhee County (United States Department of Commerce, 1970 Census). This figure compares to the Treasure Valley average of 8.1 persons per square mile.

Tables 2, 3, and 4 list the population characteristics of the impact area.

Table 2. County population characteristics. Source: Bureau of Vital Statistics, February, 1975.

County	1974 (Est.)	1970 Census	%Change	%Urban	%Rural
Canyon	72,900	61,288	18.9	57.1	42.9
Owyhee	7,500	6,422	17.2	0.0	100.0

Table 3. Population of principal cities in Canyon and Owyhee Counties. Source: Bureau of Vital Statistics, February, 1975.

County-City	1973 (Est.)	1970 Census	% Change
Canyon			
Caldwell	15,643	14,219	10.0
Melba	221	197	12.2
Middleton	835	739	13.0
Nampa	23,584	20,768	13.6
Notus	341	304	12.2
Parma	1,830	1,228	49.0
Wilder	636	564	12.8
Owyhee			
Grandview	291	260	11.9
Homedale	1,601	1,411	13.5
Marsing	679	610	11.3

Table 4. Migrant workers (estimates, 1974).

County	Population
Canyon	10,000
Owyhee	2,000

Sociological Data

Canyon and Owyhee Counties are considered prosperous counties in terms of agricultural production; however, they have a relatively low median family income - \$7,786 and \$5,615 respectively (U.S., 1970 Census). A considerably high number of families are listed below poverty guidelines according to the 1975 Department of Health and Welfare Report on Poverty in Idaho. In Canyon County, 12.3% of the population is below poverty guidelines whereas Owyhee County lists 22.7%. A large number of minorities permanently reside or migrate into the area for the purpose of employment. According to 1970 Census information, 11.7% of Canyon County and 13.7% of Owyhee County are Mexican-Americans. No other ethnic group is represented in any sizable proportion. The Report lists unemployment rates of 5.6% and 5.3% for Canyon and Owyhee Counties. Unemployment rates among minorities in the two counties are 12.8% and 13.5% respectively.

Tables 5 through 11 summarize information relative to sociological data of the area.

Table 5. Ethnicity. Source: 1970 Census, General Social and Economic Characteristics of Idaho.

County	% Anglo	% Black	% Mexican-American
Canyon	86.6	0.1	11.7
Owyhee	79.8	1.7	13.7

Table 6. Age distribution of the population in Canyon and Owyhee Counties. Source: 1970 Census, Idaho Long Term Care Plan.

Age	Canyon	Percent	Owyhee	Percent
Under 15	17,311	28.2	1,197	21.2
15 - 24	11,208	18.3	1,122	19.9
25 - 34	6,567	10.7	698	12.4
35 - 44	6,120	9.9	647	11.5
45 - 54	6,889	11.2	679	12.0
55 - 64	6,013	9.8	653	12.6
Over 65	<u>7,180</u>	11.7	<u>626</u>	11.1
TOTAL	61,288		5,622	

Median age: 26.3 years.

Table 7. Number of individuals receiving public assistance-1976. Source: 1970 Census, Idaho Long Term Care Plan.

Source	Canyon	Owyhee
Old Age Assistance	225	22
Aid to the Blind	1	0
Aid to the Partially or Totally Disabled	230	23
Aid to Dependent Children - No Foster Care	2,135	212
Aid to Dependent Children - With Foster Care	2,229	220
Food Stamp	4,343	556

Table 8. Education. Source: 1970 Census (Education of all residents over 25 years of age).

County	Grades Completed, %		
	0-8	9-12	12+
Canyon	14	25	11
Owyhee	17	24	08

Table 9. Employment. Source: 1975 Department of Health and Welfare Report, Poverty in Idaho.

County	Total Labor Force	Unemployment, %
Canyon	34,940	5.6
Owyhee	3,501	5.3
IDAHO	348,400	6.0

Table 10. Agricultural employment-1974-1975. Source:
Annual Rural Manpower, Idaho - 1975.

County	1974 Monthly Average	1975 Monthly Average
Canyon	5,392	5,189
Owyhee	1,361	1,431

Table 11. Income. Source: 1975 Department of Health
and Welfare Report, Poverty in Idaho.

County	1970 Family Median	Percent of Families Below Poverty Guidelines
Canyon	\$7,786	12.3
Owyhee	5,615	22.7
IDAHO	8,381	13.2
U.S.	9,867	10.2

Health Resources

The only primary health care facility located in Owyhee County is Community Health Clinics, Inc. There is no physician's office. A branch of the district health department is located in the county, as is a dentist's office.

Canyon County has far more health resources, but most services are only available in the two towns of Nampa and Caldwell. Tables 12 through 15 illustrate health resource distribution in the two counties.

Table 12. Physicians/population ratio by county
Source: Idaho Medical Association, 1976.

County	Physicians	Population	Ratio
Canyon	90	68,700	1:763
Owyhee	1	7,100	1:7,100

Table 13. Dentists/population ratio. Source:
Mountain States Regional Medical Program, 1972.

County	Dentists	Population	Ratio
Canyon	35	68,700	1:1,963
Owyhee	1	7,100	1:7,100

Table 14. Hospital beds. Source: 1970 Census, Long
Term Care Plan.

County	City-Hospital	Beds
Canyon	Caldwell Memorial Hospital Nampa - Mercy Medical Center	154 143
Owyhee	No Facility	-

Table 15. Pharmacists/population ratio. Source:
Mountain States Regional Medical Program,
1972.

County	Pharmacists	Population	Ratio
Canyon	39	65,700	1:1,684
Owyhee	3	6,800	1:2,266

Health Status Indicators

Using the best statistics which could be found in Idaho, Tables 16 through 18 summarize health status indicators.

Table 16. Infant mortality per 1000 live births. Source:
Comprehensive Health Planning Agency, Inc.

Area	1960	1970	1971
Idaho	22.9	16.6	17.0
Treasure Valley	22.5	16.8	17.2
County			
Canyon	31.0	18.3	18.6
Gem	13.4	10.8	43.5
Malheur, Oregon	15.3	21.1	16.8
Owyhee	51.5	42.5	14.9
Payette	19.5	17.9	9.4
Washington	33.7	21.6	7.1

Table 17. Number of deaths by causes-1972. Source:
Bureau of Vital Statistics, 1975.

County	Total Death	Heart Disease	Malignant Neoplasms	Cerebro Vascular Dis.	Accidental Death	Other
Canyon	604	203	100	77	58	166
Owyhee	59	13	13	6	9	18
Payette	137	60	14	15	15	33
Washington	92	24	16	11	4	37

Table 18. Notifiable diseases by cases-1971 and 1972.
Source: Treasure Valley Comprehensive Health
Planning Agency, Inc.

County	Salmon- ellosis	Shigell- osis	Gonor- rhea	Infectious Hepatitis	Influ- enza	Mumps	Viral URI
Canyon	27	38	246	129	3,302	78	4,538
Gem	0	0	38	20	58	0	0
Owyhee	0	0	17	4	0	0	16
Payette	0	1	33	41	60	2	81
Washington	0	0	41	7	134	1	420

Agricultural Picture

The economies of Canyon and Owyhee counties are principally based on agriculture and agriculture-related industries.

Canyon County is considered the most productive county in the State of Idaho in terms of agriculture and accounts for approximately 10% of the state's agricultural production. This production amounted to approximately \$153 million during the past year. About eighty-four percent or 317,880 acres of the county is farm land according to the 1974 census. 243,353 acres of the county is cropland with the remainder in range land and pasture for livestock.

The average size farm in the county is 130.7 acres. It is considered first in the state in the number of farms (2,251) and second in the amount of livestock.

Owyhee County is ranked 14th in total agricultural receipts in the state. This accounts for approximately \$38 million. The county contains 4,889,920 acres of which 622,153 acres are distributed among 570 famrs. 132,108 acres is in crop land with the remainder used for range land and pasture for livestock. The average size farm is 1,091 acres according to the 1974 census. Tables 19 through 24 summarize pertinent agricultural production information as released in the 1974 census of Agriculture (preliminary report) by the United States Department of Commerce.

Table 19. Use of county land. Source: 1974
Census of Agriculture Report -
Preliminary Report.

	Canyon	Owyhee
Approximate Land Area	370,112 Acres	4,889,920 Acres
Non-farm land	14%	89%
Harvested cropland	52%	2%
All other cropland	13%	10%
Woodland (including pasture)	2%	2%
All other land in farms	20%	1%

Table 20. Selected agriculture summaries for Canyon
and Owyhee Counties. Source: 1974
Census of Agriculture Report -
Preliminary Report.

	Canyon	Owyhee
All Farms (no.)	2,251	570
Land in Farms (acres)	317,880	622,153
Total Cropland (acres)	243,353	132,108
Farms with sales under \$2,500 (no.)	604	73

Table 20 (Continued)

	Canyon	Owyhee
Farm Production Expenses (\$1,000)	\$118,200	\$27,771
Value of Agricultural products sold (\$1,000)	\$153,461	37,962
Average per Farm	\$ 68,174	66,600
Cattle and Calves, Inventory (No.)	133,862	91,033
Hogs and Pigs, Inventory (No.)	5,767	755
Chickens (3 months or older) (No.)	97,036	1,982
Sheep and Lambs (No.)	5,559	13,121
Horses and Ponies (No.)	2,319	1,202

Table 21. Farms and land in farms, 1974, for Canyon and Owyhee Counties. Source: 1974 Census of Agriculture - Preliminary Report.

	Canyon	Owyhee
Value of Land and Buildings (\$1,000)	\$314,612	\$135,679
Average per Farm	139,766	238,034
Average per Acre	990	218
Farms by Size: (No.)		
Under 10 Acres	308	26
10 to 49 "	702	75
50 to 179 "	801	181
180 to 499 "	349	127
500 to 999 "	62	53
1,000 to 1,999 "	21	47
2,000 acres and over	8	61

Table 22. Operator characteristics-1974. Source: 1974
Census of Agriculture - Preliminary Report.

	Canyon Number of Farms	Owyhee Number of Farms
Tenure of Ownership	1,497	362
Full Owner	505	155
Part Owner	249	53
Tenant		
Principal Occupation*	1,388	438
Farming	759	95
Other than Farming		
Average Age of Operator*	51.5 years	50.5 years
*Excludes corporations and other organizations		

Table 23. Selected crops harvested-1974. Source:
1974 Census of Agriculture - Preliminary
Report.

	Canyon	Owyhee
Corn for grain or seed (Acres)	5,928	2,792
(Bushels)	503,414	243,093
Corn for silage, green chop, dry fodder, hogged or grazed (Acres)	13,594	4,505
Wheat for Grain (Acres)	26,980	9,064
Hay (Excluding sorghum hay) and grass silage (Acres)	38,615	47,797
(Tons)	165,213	141,281
Irish Potatoes (Acres)	12,210	10,033
(Hundredweight)	3,428,379	2,909,464
Vegetables, sweet corn, or melons for sale (Acres)	6,588	239
Land in orchards (Acres)	3,856	138

Table 24. Summary of selected items for farms with sales of \$2,500 and over-1974. Source: 1974 Census of Agriculture - Preliminary Report.

	Canyon	Owyhee
Farms by value of sales:		
\$100,000 and over	294	83
40,000 to 99,999	309	113
20,000 to 39,999	294	101
10,000 to 19,999	259	89
5,000 to 9,999	238	64
2,500 to 4,999	253	47
Farm by type of organization:		
Individual	1,451	426
Partnership	97	37
Corporation, including family owned	97	34
Other	2	0
Selected Crops:		
Oats (Acres)	1,076	565
(Bushels)	83,956	24,630
Barley (Acres)	21,322	11,639
(Bushels)	1,533,378	632,846
Alfalfa (Acres)	32,202	31,672
(Tons)	146,583	117,069
Sugar beets (Acres)	23,285	4,657
(Tons)	586,653	92,506
Wild hay (Acres)	338	3,570
(Tons)	852	12,007
Field seeds (Acres)	14,774	7,305

DESCRIPTION OF AGRICULTURAL SERVICES IN TARGET AREA

The development of a "Model Occupational Safety and Health Program for Agricultural Workers" necessitated the assessment of services available within the Idaho counties of Canyon and Owyhee. This assessment of services involved answering the following three basic questions: (1) Who provides occupational safety and health services for agricultural workers in the two-county area? (2) What services are offered? (3) How are services provided and communication with farmers and farmworkers accomplished?

Information gathered from (1) governmental agencies, (2) farm-related businesses, and (3) farm organizations is as follows:

GOVERNMENT AGENCIES

Information was obtained from phone conversations with agency representatives, correspondence and printed documents, and agency visits.

The U.S. Department of Labor (OSHA), District Office - Boise, Idaho

This office enforces the Federal standards for occupational safety and health. Currently there are five standards that apply to agriculture: (1) sanitation in temporary labor camps, (2) storage and handling of anhydrous ammonia, (3) pulpwood logging, (4) slow-moving vehicles, and (5) agricultural tractors, i.e., rollover protection. Routine inspections for compliance with these standards are not being conducted at the present time; however, complaints of violations are investigated.

Idaho State Department of Agriculture - Boise, Idaho

The Idaho State Pesticide Law requires registration of pesticides sold or distributed for use within the state and licensing of commercial applicators and pesticide dealers. There are about 3,500 pesticides registered for use within the state at the present time. Four inspectors conduct routine investigations for compliance with this law in the Treasure Valley.

The 1974 EPA regulations require that all applicators of "restricted" pesticides must be certified. States that wish to certify applicators must develop and administer certification programs that conform with standards set forth by EPA.

Unlike the portion of the Idaho State Law that requires the licensing of commercial applicators, certification applies to farmers, ranchers, orchardists, and professional consultants whenever the use of "restricted" pesticides are involved. The administration of the certification is a function of the State Department of Agriculture.

Idaho Department of Labor and Industrial Services - Boise, Idaho

This Department has the responsibility of enforcing the Idaho Occupational Safety and Health Standards. These standards are only applicable to places of employment maintained by the state and its political subdivisions subject to the Idaho Workmen's Compensation Law. Approximately 5% of Idaho farmers opted to be covered under workmen's compensation. Because so few farmers and ranchers are covered under this program, the department's activities in agriculture are very limited. The University of Idaho's Research and Extension Station at Parma is under its jurisdiction since state personnel are involved.

In 1973 the Department conducted a statewide industrial hygiene survey of Idaho industries to determine the occupational health hazards to which workers are exposed. This survey did not include agriculture. However, it did include agribusinesses such as feed, food, and seed processing plants, meat packing plants, and pesticide applications.

Idaho Department of Health and Welfare - Boise, Idaho

With regard to matters of occupational health and safety, this Department does not have regulatory responsibilities. The services of an industrial hygienist are available to industry by request. Its laboratories offer chemical and biochemical analytical services to industry and the medical community on a fee basis.

Under a federal grant, this department conducted the "Idaho Community Studies on Pesticides, 1967-1973." The purpose of this study was to determine the effects of pesticide exposure on man. The study was confined to Canyon County. At the present time, the department has an EPA contract to (1) survey pesticide usage, (2) develop an analytical method for an experimental pesticide, (3) investigate acute poisoning cases, (4) determine the long-term health effects of persons poisoned by cholinesterase-inhibiting insecticide, and (5) study the management of pesticides and data

processing methods. A local neurologist in private practice serves as a medical consultant on all studies involving pesticides.

Also available from this agency are films dealing with agricultural work. The films are available to agencies and schools throughout the state. During the time period from September 1975 to July 1976, the five films concerned with pesticides were checked out an average of 6 times each, mostly by schools and the district health department. Only a limited number of films deal with health and safety on the farm.

Southwest District Health Department - Caldwell, Idaho

The activities of this District Health Department cover the six-county area of Adams, Canyon, Gem, Owyhee, Payette, and Washington. A wide range of preventive health services are offered, including environmental inspections, public health nursing, immunizations, family planning, etc.

Seven environmentalists are assigned to this district. They conduct routine inspections of farm labor camps for compliance with local and state regulations concerned with water supply, sewage, and solid waste disposal. During the first five months of 1975, 384 water samples were collected and analyzed; 20% of these samples were found to be contaminated. Well owners were then advised of the corrective action that needed to be taken to obtain safe drinking water.

The department also responds to complaints regarding the misuse of pesticides. Complaints of this nature are investigated and referred to other agencies as deemed appropriate. All complaints are followed up until a satisfactory conclusion is reached.

Agricultural Extension Service

The Agricultural Extension Service has offices in both Canyon and Owyhee Counties as well as a State Safety Director in Boise, Idaho.

The extension service role in safety and health is primarily that of disseminating information to farmers, their families, and farm groups. Such information is usually incorporated in bulletins, pamphlets, and letters sent to those on their mailing lists who might find such information useful or who requested it.

They are one of the major sources of OSHA information for farmers. Their efforts include talks to farm groups or those interested in farm activities or problems, preparation of news and magazine articles, radio and TV appearances, and direct contact with farm families.

While there are few educational materials prepared specifically on safety and health, they do make an effort to include it in many of their publications where germane. They are also purveyors of material prepared by other agencies such as the National Safety Council and OSHA.

They have been involved in county programs for training youth under 16 years of age to drive farm tractors (4H and VOag) and in the conduct of a state survey (statistical sample) of farm accidents during 1965-1975. This survey is compatible with other state surveys using the National Safety Council format.

The extension service has no enforcement responsibility and depends upon a voluntary response to its request or disseminated information.

While the extension service does not necessarily contact every farm family in the target area, it would appear to be a major, if not the major, communication link for any farm-oriented program.

AGRICULTURE-RELATED BUSINESSES

A large number and variety of agribusinesses serve agricultural communities throughout the county. These businesses have the potential to form avenues of communication for safety and health information.

To describe the role of these businesses in delivering health and safety information, a number of such operations were visited within the project area.

The following is a descriptive summary of these visits reported by the type of business represented.

Farm Equipment Dealers

There are three farm equipment suppliers in the community: two representatives of major farm machinery manufacturers and the one independent supplier.

The two major suppliers provide evidence of concern for both their employees and customers (farmers). The shops are large, well lighted, and have clean floors with painted lines for traffic. The work spaces contain tools with shields and guards in place. There are also numerous shop safety signs.

When equipment is sold, regardless if it is new or used, one of the line mechanics who services the equipment is to demonstrate the machinery's correct and safe use.

The main selling office and parts counter were well kept. The salespersons are willing to help with various problems, including those concerned with the safe use of a part or product.

The waiting rooms have audiovisual projection equipment with various films on farm equipment use. One film viewed included a section on safety cabs and tractor rollover accidents. Literature on safe use of equipment was also available.

The independent equipment dealer has a one-person operation where many brands of new and used equipment are sold and repaired. The work space is the size of a three-car garage with the parts room in the same area. The shop is crowded with tools and parts, but well kept.

At the time of equipment purchase, the dealer explains correct and safe use to the farmer. Other than personal contact with the customer, there was no other evidence of safety material in his business operation.

Agricultural Chemical Dealers

There are two dealers of agricultural chemicals in the area: one has an aerial applicator service and the other is a member of an agribusiness cooperative.

The flying service, a four-person operation which carries out aerial applications of pesticides, has its major contact with the farmer at the farm. The farmer describes to the flying service his pest problem and they, in turn, prescribe their services. Such services include the type of chemical which is needed and what quantity. The flying service also explains the hazards of the different chemicals they might use to the farmer, and what safety precautions must be taken to avoid accidents.

Aerial applications of pesticides are normally done early in the mornings or in the evenings when there is little or no wind. Radio communications are maintained between the airplane pilot and the crew boss on the ground. A crew boss and two flagmen are assigned to each field to be treated. The planes are equipped with lights for night operations and the ground crews use flash-lights and radios to direct the pilots. Complete records of each pesticide application are maintained by the applicator. Protective clothing, including respirators, are furnished to all employees engaged in mixing, loading, and application of pesticides. An emergency shower is located in the out-of-doors mixing area at the home base.

The cooperative, part of a state organization, employs five people. It sells commercial fertilizers, fuel, and other farm supplies. Farmers can rent chemical fertilizer spreaders and do their own work, or they can have the cooperative spread the fertilizer for them.

There was no readily available literature or displays on chemicals and their safe use.

Seed and Feed Dealers

There is only one major seed and feed store in the community. It sells a wide variety of products, from garden seeds to veterinary supplies. The three employees primarily use personal contact with the customer to promote the correct use of any given product. Most of the veterinary supplies are over the counter goods and it is at this store that many of the farmers receive information on how to treat their sick animals.

This store has truck scales, loading docks, elevators, and grinding equipment. The feed store allows customers to see the operation of grinding and milling of feed, but are reluctant to let the customers get too close to the equipment. The employees use protective masks and heavy-duty shoes when working with the equipment.

Farm Tools and Electrical Suppliers

The one supplier in the community, who is also a small business electrical contractor, employs four people.

As many local farmers do their own electrical work, the company advises on the correct and safe ways of wiring, fusing, and grounding.

Summary

The agriculture-related businesses in this small rural community appear to be safety conscious to the extent of setting good examples of safe and healthy working habits. Beyond this model role, the businesses resort to demonstrating use of machinery, reminding the customer to read the label and follow instructions, providing safety literature, and using audiovisuals. No nonbusiness-related or general safety and health information was evident in any of the establishments.

FARM ORGANIZATIONS

Information on these organizations was obtained through conversations with organization representatives and reports by government agencies, especially the extension service.

Cattleman's Association

The Cattleman's Association is a statewide organization with a chapter in Owyhee County but none in Canyon County. The Owyhee County Cattleman's Association has a mailing list of 250-300 people, and holds two meetings a year, which are attended by most members. They have a statewide magazine which periodically prints health and safety-related articles. Some aspect of ranch health and safety is discussed in each of their meetings. This organization reaches all of the County.

The Cowbelles, an organization composed mainly of cattlemen's wives, has a membership of about 120 women. The organization is active, but does not specifically address health and safety.

4-H

The 4-H program is administered through the County Agents, and has about 150 children active in the Homedale-Marsing area of Owyhee County, and 1,000 rural farm children enrolled in Canyon County. Many of these are not farm children but are from the small towns around the area. The leaders of the organizations are the adults from the surrounding communities. Farm safety and health projects

are available. Few children are enrolled in a safety program at this time, but many projects do involve some health and safety.

Future Farmers of America

The Future Farmers of America (FFA) is supervised by the Vocational Department of the local high schools and is fairly active in teaching safety. The students enrolled in this organization are not necessarily farm children, but may also be local high school students who are interested in learning about farming.

Grange

The Grange is mainly a paternal and social organization. There is one Grange Chapter in the Homedale area (Owyhee County) and eight chapters in Canyon County. Few active farmers are involved.

Members tend to be retired people with small acreages. The Grange attempts to schedule one safety program each year. The past few years a film on pesticide safety has been shown. 20-30 persons attend each meeting.

Farm Bureau

The Farm Bureau does not usually hold meetings, except for those of the Board of Directors. There are many members on the rolls who have no communication with the organization except for insurance.

Commodity Groups

The beet growers, alfalfa seed commission, and other commodity groups have many members but generally only the Board of Directors meet at the local level to discuss organization business. Educationally-oriented meetings are held, at which such subjects as proper pesticide use are discussed. Large attendance is reported at these meetings, and interest is rated as high.

Dairyman's Association

The Idaho Dairyman's Association is not active in this area. However, the wives' auxiliary is. Their primary activity is that of product promotion. Health and safety is not stressed at this level.

This list of area farm organizations is not an all-inclusive list, but does include major organizations with lines of communication to farm families.

It was felt by many of the people contacted in these agriculture-related groups that much of the information about health and safety was not learned in a formal group setting, but was learned on the job or within the family. It was noted by many of these people that farmers are not joiners, per se; thus, multiple exposure to ideas will be limited to purposeful priority items as determined by the farmer and his family.

It was also suggested that health and safety was part of any exchange of new ideas. For example, if a farmer calls in a chemical consultant for information on specific pesticides for a certain crop, then information on safe use of the pesticide would be given at the time. Or, if a farmer bought a piece of machinery, the salesperson would mention safety features and precautions at the time the machinery was delivered.

DESCRIPTION OF OCCUPATIONAL SAFETY AND
HEALTH EXPOSURE OF SELECTED FARM AND
RANCH OPERATIONS, OWNERS AND WORKERS

OPERATIONS

In order to assess the occupational safety and health picture of those who are employed in agriculture, an effort was made to examine the operations of a number of farm and ranch operations. These investigations were conducted informally on a "walk-through" basis.

Agriculture operations are very diverse in the study area with many specialized operations. Irrigation is a necessity in most operations except ranching; therefore, crops with a high dollar return potential are most evident.

As much of the agriculture in the Treasure Valley is associated with row crops such as potatoes, sugar beets, and other vegetables, the intensive nature of seasonal labor is evident. While most operations are becoming more machinery intensive, certain operations such as "final" thinning operations, weeding, and selective harvesting still require hand labor.

Other crops of importance such as fruits, grains, and hops require varying degrees of labor. Fruits, for example, are labor intensive during harvest if for table stock. For canning purposes, they are often picked mechanically. The grains, except for irrigation purposes, require little labor due to mechanization. The typing of hops requires a number of hand operations during the growing season.

Dairy and beef operations are scattered throughout the area and are little different from those seen elsewhere in the West and the Midwest. Most operations, either because of the nature of the operation or the high degree of mechanization, require few people.

Large amounts of fertilizer and pesticides are used, and it appears that much of the work is contracted out by the farmer to professional applicators.

Several farms were selected for visits. The health and safety conditions, and the safety and health problems, if any, were examined.

The dairy farm visited was considered typical of what one would find throughout the area. It was situated on 100 acres of land, had a 160-cow herd, and a limited area (several acres) for herd confinement with minimal housing. Milking was done in a 12-stall "herringbone" milking parlor. This dairy farm was operated by a man and wife team. There was a potential for noise exposure from the tractor used for cleaning and feeding purposes and for bodily injury from handling the animals (feedlot and during milking) and for contracting certain zoonotic diseases from contact with the animals.

Several row-crop farms were visited as there appeared to be a wide variation in size and cropping combinations. As most crops require a number of months from planting to harvest, there was no way to observe and assess the total operation in any one visit. The desirability of multi-cropping is based on different planting and harvest seasons to spread out the work.

Several visits were made to these farms during the planting and growing season when it was expected that the major labor intensive operations would be undertaken. Harvesting operations were not examined in detail as few people are employed due to the high degree of mechanizations.

There is the potential for noise exposures in the seedbed preparations by tractors and their attachments. Tractors in these operations, as in other working conditions produced noise levels of 90-98 dBa. Appendix F contains a record of noise calibrations. During the early growing season, when final crop thinning operations are necessary to assure proper growth or stand of crop and removing competitive weeds, numbers of people are in the field carrying out such operations. Such work requires considerable walking, is subject to climatic elements such as sun and wind, and requires considerable muscular effort and dexterity. Those involved in such work are usually migrant or temporary workers who are part of a work crew under the direction of a "crew chief" who may also act as the contracting agent with the farmer.

The fruit orchards employ considerable numbers of laborers during harvest season, but regular farm operations such as spraying, pruning, and cultivation are done by few as they are specialized, of a seasonal nature, and require considerable expertise.

The storage and grading operations of vegetable, grain, and seed production in most instances are highly mechanized. Most manual labor has been eliminated.

There was no way to select a typical ranch regarding location, size, or operation, so one of the largest operations in the area was selected to give a broad perspective.

The ranch employed two irrigators for five months of the year, and four full-time cowboys. The ranch proper consists of 1,000 acres with 300 acres in alfalfa hay and an additional 100,000 acres of grazing rights on public land. Approximately 1,000 beef cattle and 100 horses graze on the land at any one time.

The machinery consisted of that required for haymaking, minor construction work, and miscellaneous chores.

Considerable independence is expected of and demonstrated by the cowboys. Resourcefulness is a necessity.

Trauma is of concern to the cowboy; there is more concern regarding self-treatment of exposure to elements such as poisonous plants, snake bites, and insect stings. Animal diseases transmittable to man (zoonoses) are also of concern to the ranch personnel.

In summary, the finding of the "walk-through" evaluations is that the "typical" farm accident included cuts from sharp objects (nails, metal, etc.); pinches or minor crushes from mechanical components of equipment, slams from building doors, and dropped objects; and other injuries caused by animals. The "prevalence," or lack thereof, of trauma in the group observed validated the scarcity of accidents appearing at the project clinics and the few cases reported by the state agricultural health and safety survey conducted by the Idaho State Extension Service (1975-1976).

HEALTH AND SAFETY OF FARMERS AND FARMWORKERS

The rationale for obtaining the information in the occupational interviews included:

1. To assess "perceived" occupational health and safety problems associated with agriculture in the area,

2. To identify a specific group or groups of individuals affected by each problem identified,
3. To identify extenuating circumstances and conditions which influence or cause specific problems, and
4. To determine if the persons affected are interested in doing anything about the situation.

Information from farmers and farmworkers was obtained in various ways. Occupational questionnaires were used in addition to informally structured interviews. At the time of the physical exam, the patient was asked to fill out an occupational questionnaire. This occupational questionnaire was modified halfway through the project and used during the last three months. Copies of the original and revised questionnaires, and farmer and farmworker interview formats are contained in Appendix D.

Analysis of the original and revised questionnaires were of questionable validity as they were incomplete, obviously misread, and filled out by both children and adults. Persons were often afraid to answer the questions in writing for fear of putting their jobs in jeopardy. Therefore, only the results of the interviews are included in this report.

Clinic outreach workers interviewed 99 farmers, each of whom owned between 20 and 200 acres of land, and 72 farmworkers who worked on various farms and ranches in the area. The majority of the interviews were conducted in an out-clinic setting with persons known by the outreach worker. Interviewees were contacted at farm meetings, farm sales, labor camps, farms, ranches, homes, and local coffee shops. Approximately two-thirds of the persons contacted are clinic patients.

The outreach workers were instructed to ask specific questions during the interview, but at no time while talking with the interviewee were they to write anything on paper. Immediately after each interview, the outreach worker was instructed to write specific details. Health and safety education was attempted while conducting the interview. Educational concerns addressed included information sources, equipment and chemical safety, and health precautions.

Sex, ethnicity, and estimated age were noted but not asked by the interviewer. Health questions relating to past or present problems with eye, ear, pulmonary, skin, and muscular-skeletal disorders were usually asked of both the farmer and farmworker. All persons who answered affirmatively to problems and who were not receiving care for the problem were encouraged to go to their health care provider.

Other issues addressed were farming experience, safety background, farm information sources, use of safety equipment, and environment exposure problems.

To simplify the reporting of results, sections regarding the farmer (owns farm) and farmworker (works farm but does not own) are first reported separately and then a comparison of the two groups is made.

Farmer Survey Results

Of the 99 farmers interviewed, 74% were male, 56% were over the age of 41 years, and 99% were Anglos (not Mexican-American). The mean age is 44 years, the range is from 20 to 74 years. In the sample, 84% employ 4 or fewer employees and 38% of the farmers have cash crop farms. Figure 2 shows a breakdown of farm information.

In the evaluation of the safety and health experience, both the demographic and farm information data are important.

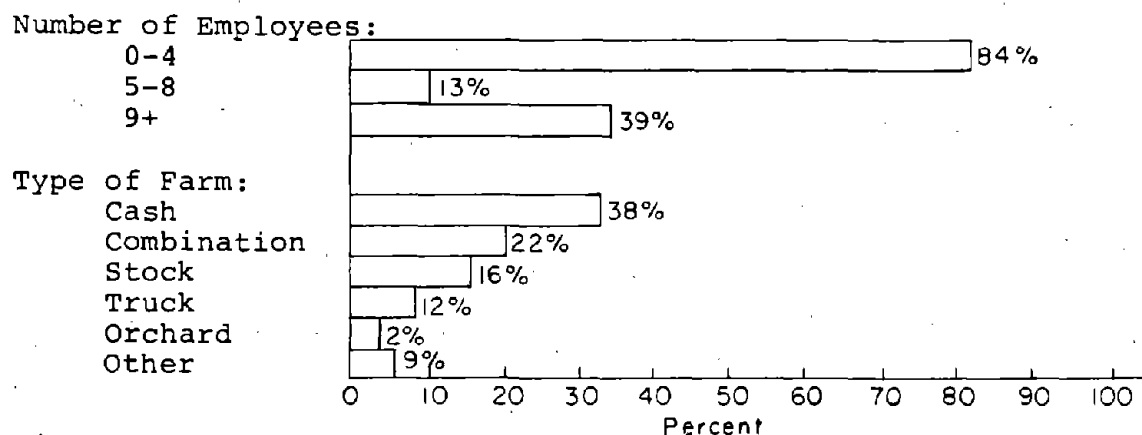


Figure 2. Farm Information.

Thirty-five percent of the farmers interviewed reported they had lost time from work within the last five years from a work-related accident or illness. This loss of time was commonly attributed to machine and animal accidents (60%) and lung or skin problems (30%). The three problems most frequently mentioned as "single problem on their farm" were pesticides, machines, and cattle. There was no particularly outstanding hazard on the farms. Figure 3 illustrates responses to safety experience questions.

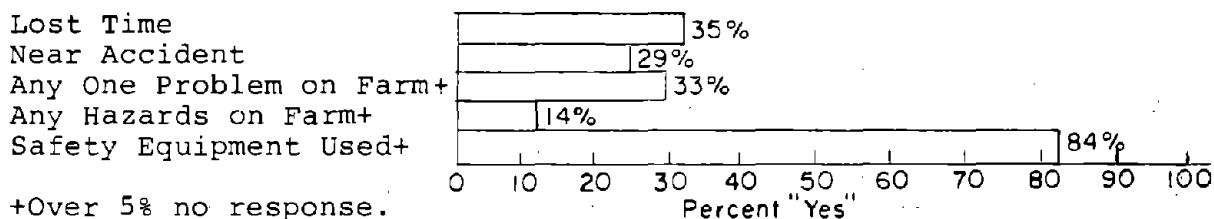
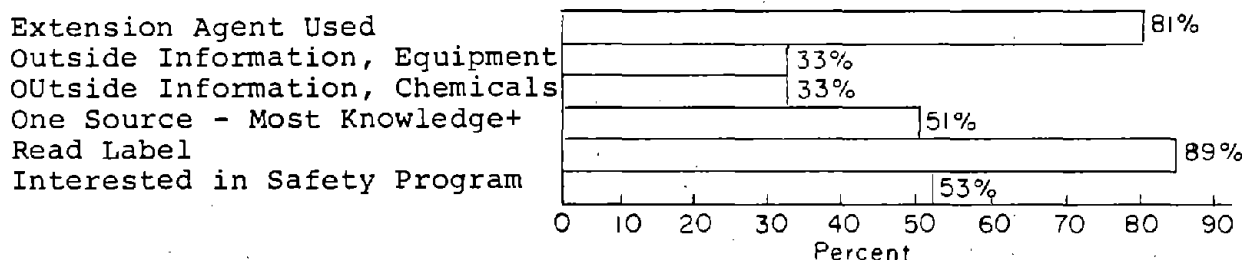


Figure 3. Safety Experience.

As reported in Figure 4, a large majority of farmers use the extension service. Reasons for use include soil sampling, crop care, planting information, canning, and the use of pesticides. An extension agent is seldom contacted for health and safety information. Approximately one-third of the farmers in the sample "reported" receiving outside information regarding equipment and chemicals, while one-half said they received most of their information from one source. Outside information was most commonly given by the extension service, seed company, and veterinarian. Sources of information most frequently cited were from reading materials or from parents or the Grange. Eighty-nine percent reported reading labels on farm equipment and chemicals. Slightly over half were interested in participating in a safety program. The reason most often given for lack of interest was "no time."

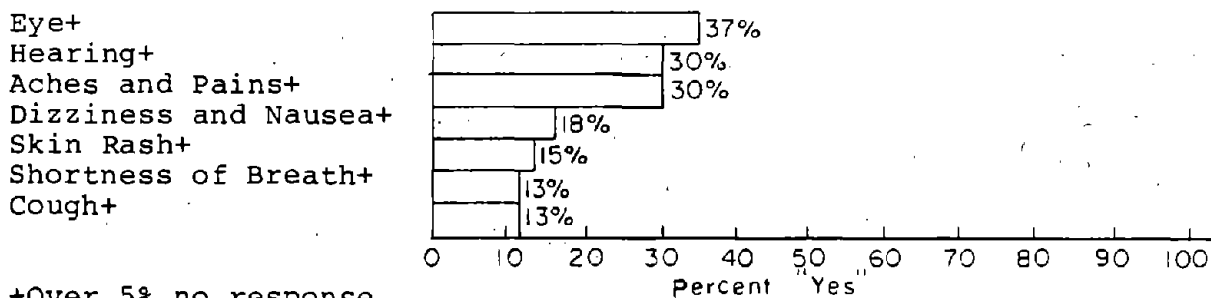


+More than 5% no response.

Figure 4. Sources of Information.

The prevalence of specific "perceived" health problems among farmers is shown in Figure 5. Other agriculture-related problems may be present; yet only select questions were asked. To be kept in mind is the age, sex, size, and occupational variance of the sample.

The most common eye problem was irritation from dirt or dust (12). Aches and pains were often attributed to old age (8)*. The shoulders (7)* and back (5)* were the most frequently mentioned locations of pain. Coughing and shortness of breath were most often related to smoking. Dizziness and nausea was not uncommon during pregnancy or after a drinking bout. Only one farmer reported dizziness and nausea from spraying chemicals.



+Over 5% no response.

Figure 5. Health Problems.

*Figures in parenthesis refer to number of subjects so reporting.

Farmworker Survey Results

Of the 72 farmworkers interviewed, 46% were male, 25% were over the age of 41 years, and 93% were Mexican-Americans. The mean age is 34 years, the range is 58. The typical farmworker reports working an average of 6.5 months per year for an average of 17.5 years. Most of the workers are employed in sugar beets, hops, and onions. Figure 6 shows a breakdown of farming information.

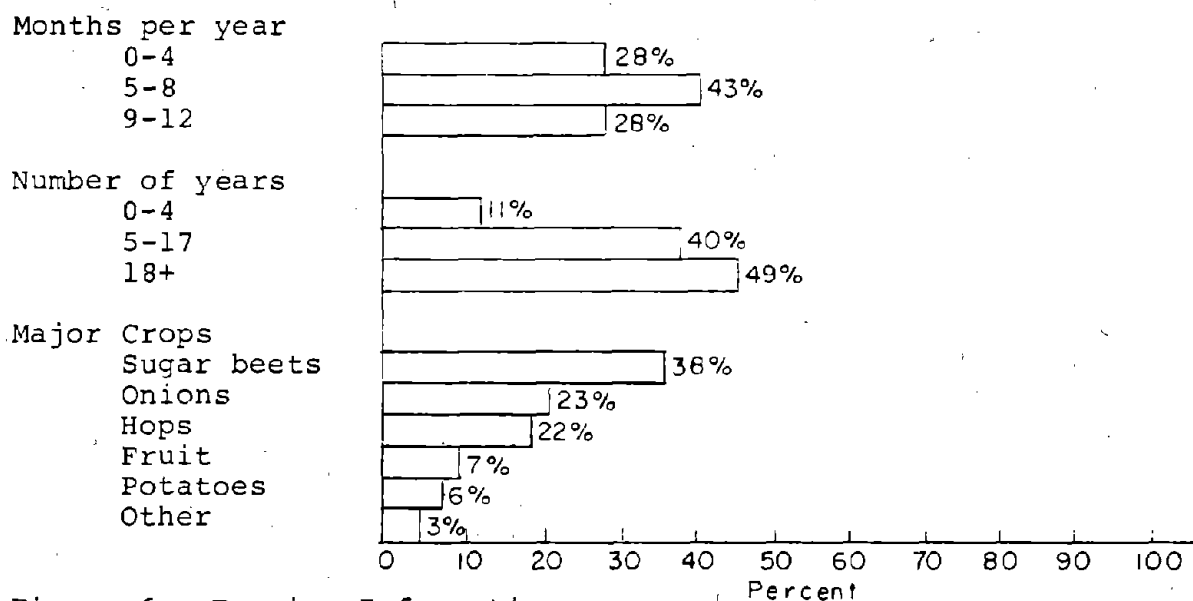


Figure 6. Farming Information.

Seventeen percent of the farmworkers interviewed reported they had lost time from work within the last five years from a work-related accident or illness. One illness was cited. The remainder were accidents. Sprains, eye injuries from branches, implement cuts, and falls from machinery accounted for most of the injuries. A high correlation (correlation value) was found between those who lost time from work and those who believed there was something about their work that was bad for their health or safety. No particular problem was cited more than another. Nearly three-fourths of those sampled reported interest in participating in a safety program.

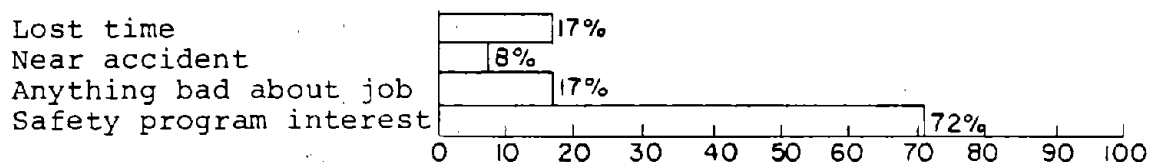


Figure 7. Safety Experience.

Safety equipment and clothing commonly used are those which are inexpensive, easy to purchase, and not awkward. Figure 8 illustrates the use of safety equipment and clothing.

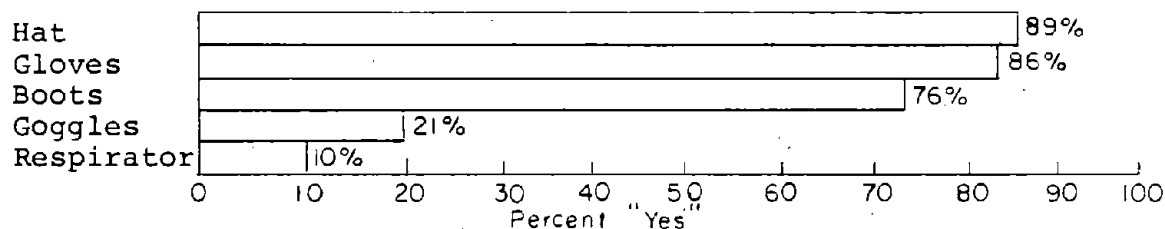


Figure 8. Safety Equipment and Clothing Use.

"Perceived" environmental problems are put into perspective in Figure 9. It may be concluded that environmental conditions are not thought of as a problem.

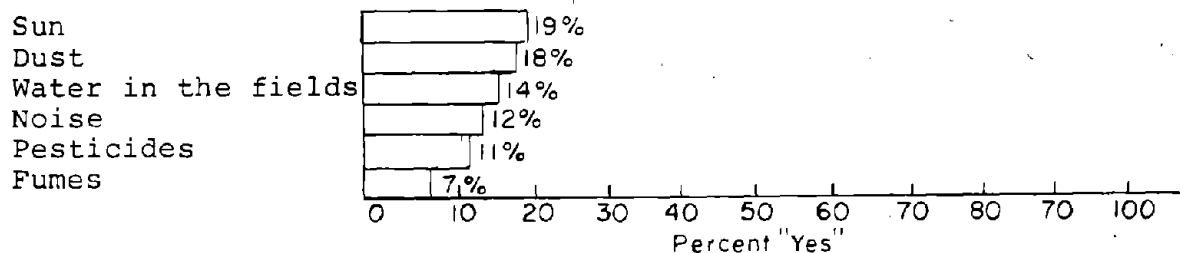


Figure 9. Environmental Problems.

At the time of the interview, the farmworker was asked if he or she received information regarding farm equipment, pesticides, and farm implements from the farmer and/or crewleader. The results are found in Figure 10.

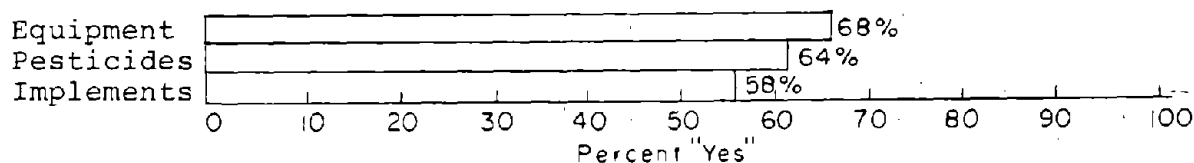
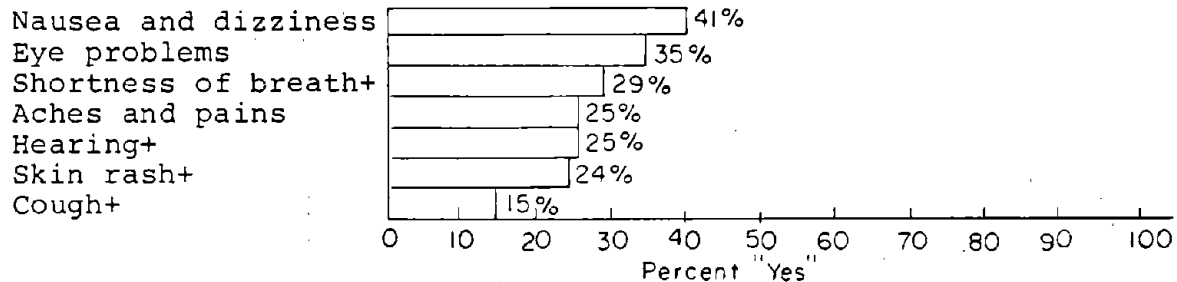


Figure 10. Safety Information.

The prevalence of specific "perceived" health problems among farmworkers is explained in Figure 11. Nausea and dizziness were the most common complaints given; a chronic cough, the most infrequent complaint. Dizziness and nausea were most commonly attributed to sun exposure and to bending. One person believed the symptoms were caused by pesticide exposure. Eye problems were most often attributed to dirt and dust. Smoking was highly correlated with shortness of breath and coughing. There was no significant trend in reports of aches and pains or skin rashes. No one stated that his loss of hearing was due to noise exposure.



+More than 5% no response.

Figure 11. Health Problems.

Farmer and Farmworker Results Compared

All comparable data are summarized in Table 25. The differences between the two groups in age, sex, ethnicity, farm size, crops, and activities should be kept in mind. The "typical" farmer is reported as a 44-year old Anglo male, working with most, if not all, of the farm machinery; the "typical" farmworker is a 34-year old Mexican-American female working on a large sugar beet field.

As compared with farm workers, farmers report more than double the incidents of near accidents and lost time from work due to a farm-related accident or illness. This difference could be accounted for by the kinds of work done, the exposure to farm machinery, and increased risk which often comes with ownership.

A higher percentage of farmworkers than farmers report interest in a farm safety program.

Farmworkers claim to have more problems with dizziness and nausea, shortness of breath and coughing, and skin rashes, while the farmers report more problems with hearing and aches and pains. although a greater percentage of farmers smoke, and smoking is statistically significant ($p \leq .0000$) with chronic cough and shortness of breath, these problems are more frequently reported by the farmworker. The sex difference may account for this discrepancy, but this could be due to an unmeasured factor such as obesity.

Table 25. Comparison of farmer and farmworker data.

	Farmer	Farmworker
Average estimated age	44 years	34 years
Sex ratio (male/female)	73/26	33/39
Race ratio (Mexican-American/Anglo)	1/98	67/5
Smokers (more than half pack per day)*	27%	19%
Lost time from work*	35%	17%
Near accidents*	29%	8%
Interested in farm safety program*	53%	72%
Anything with work unsafe*	14%	17%
Dizziness and nausea*	18%	41%
Eye problems*	37%	35%
Hearing problems*	30%	25%
Chronic cough*	12%	15%
Shortness of breath*	13%	29%
Skin rash*	15%	24%
Aches and pains*	30%	25%
*Percent yes.		

Cross tabulation of all questions was carried out, the results of which showed that there was a statistical difference (p less than .05) between the sample group of farmers and farmworkers in sex, race, lost time, near accidents, interest in safety programs, and dizziness and nausea. The direction of the difference is shown in Table 25.

Other interesting results of the cross tabulation include the correlation between not reading labels and accidents, between reported problems and lost time, and between reading labels and the increased use of the extension agent. Results of chi-square analysis of farmer-farmworker interviews are in Appendix E.

Recommendations for Alteration of Occupational History Form

Based on the project's experience with the occupational history and survey, a refined history has been drawn up and is in Appendix B. If the history is used in another section of the country, additional revisions may be necessary. The history can be filled out by the patient, but it is a more effective tool when a health professional collects and records the information from a personal interview with the subject.

RESULTS AND ANALYSIS

MEDICAL RESULTS

640 persons were examined in 1975-1976 during this project. The age range is 71 years. The mean is 24 years. Males represented 58% of the sample. Mexican-Americans accounted for 77% of the total. These results are illustrated in Figure 12.

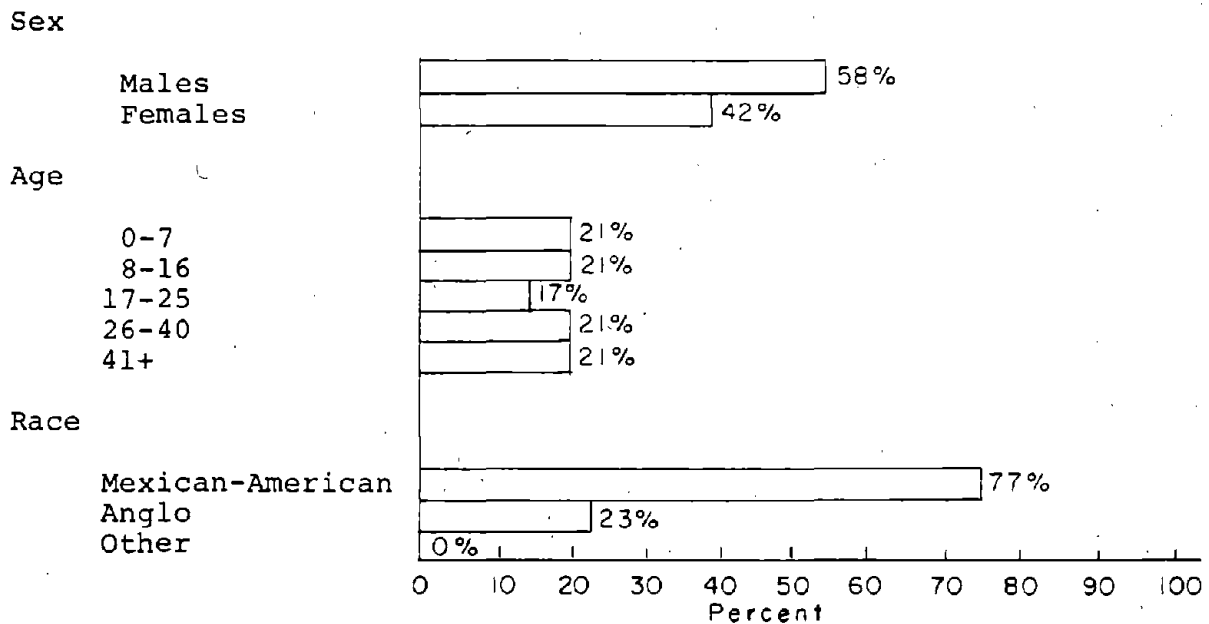


Figure 12. Demographic Breakdown.

Other background information of interest is contained in Table 26.

Table 26. Background Information.

Area	Breakdown	Number	Percent
Agriculture Involvement	Major occupation	241	38
	Spouse or family member of farm person	338	53
	Other	52	8
	Unknown	9	1
	Total	640	
Clinic Site	Homedale	309	48
	Parma	177	28
	Nampa	47	7
	Special*	107	17
	Total	640	
Reason for clinic visit	Well-general physical**	319	50
	Well-NIOSH request	138	22
	Acute problem	138	22
	Chronic problem	45	7
	Total	640	

*Special groups not generally seen at the clinics.

**Includes general physical examination, primarily fire fighter exams. It was necessary for these persons to be agricultural workers.

Table 26 reflects that 38% of the sample were directly involved with agriculture. Nearly half of the exams were conducted in the rural community of Homedale. The section on "reason for clinic visit" reflects the difficulty in getting people to come to the clinic for research reasons, even for a "free physical examination." There were also staff changes during the course of the project, bringing about clinic understaffing. These conditions are not uncommon in a rural health clinic setting and, as a result, accommodations needed to be made. To help resolve the situation, other farming persons not specifically requesting the complete occupational medical examination were included in the project and

evaluated at the completion of the project. In addition, families of farmers and farmworkers were included.

Table 27. Results of laboratory and testing data.

	Number	% of Total Done	% not Normal of those Done	Mean	Range of Normal
Complete physical exam	640	100.0	*	*	*
Systolic blood pressure	493	77.0	7.9	118	140
Diastolic blood pressure	494	77.2	8.3	76	90
Pulse	414	64.7	2.2	78	50-100
Glucose	335	52.3	22.7	105	70-110
BUN	337	52.6	5.4	14	Male 8-24 Female 8-21
SGOT	337	52.6	10.7	26	7-35
Triglycerides	316	49.4	23.4	195	30-250
Hematocrit	458	71.6	19.2	42	Children 33-40 Male 42-52 Female 37-47
Cholinesterase - plasma	148	23.1	0.0	4.71	Male 1.73-5.73 Female 1.20-4.00
Cholinesterase - RBC	144	22.5	0.0	12.22	Male 8.02-17.00 Female 7.40-15.50
PPD	375	58.6	6.9	*	*
EKG	111	17.3	2.3	*	*
Chest X-ray	183	28.6	6.6	*	*
UA Protein	501	78.3	1.4	*	2+
Audiogram	432	67.5	22.4 **	*	*

* Not appropriate.

**5.8% noise suspected.

Findings of Laboratory and Testing Data

A summary of the analyses of laboratory and testing data is contained in Table 27. Problems found upon examination are summarized in Table 28.

Lab data "normal values" were obtained from the laboratory to which the samples were sent. Random samples were taken (usually nonfasting), and if elevated, an attempt was made to get a fasting sample. If several readings were obtained, the lowest value was usually recorded. Only when indicated was lab work done. Explanation of Table 27 follows:

Physical Exams--

As explained in Chapter I, the extent of the work-up varied with age, sex, time, cooperation, and findings. A total of 640 were completed.

Blood Pressure--

Blood pressures were usually taken by the clinic nurse, with the patient in a sitting position. Values were higher in males and increased with age.

Pulse--

Also taken by the clinic nurse. The pulse did not prove to be a very useful indicator of well-being.

Glucose (blood sugar)--

To be noted is that of the 22.7% classified as not normal, 19.7% were above the normal range, 4% of the samples were classified as diabetic and 20% as obese. The diabetics were diagnosed as such, after extensive testing.

BUN--

Only 5.4% were classified as not normal, 3.0% of which were below normal. Of all SMA values recorded, this test yielded the highest percentage of normal values.

SGOT--

Alcohol abuse has been noted to be a recurring problem in our patient population. Over 10% of patient values were above normal.

Triglycerides--

To accommodate for a nonfasting state, an upper cut-off point of 250 mg was used instead of the customary 175. Repeat samples were attempted whenever indicated and the lowest value was recorded. All abnormal values were above 250; the upper range reached 830. 23.4% were above normal.

Hematocrit--

Of the 19.2% abnormal hematocrit readings, 56.0% were above normal. Since approximately 40% of the samples were children under the age of 16 and 42% of the sample were females (some pregnant), it is particularly significant that more readings were above normal than below. Further diagnostic testing was done on some of these patients; some were put on iron supplements if indicated by low hematocrits. The number of patients put on supplements or tested further was not tabulated.

Cholinesterase Plasma and Red Blood Cells (RBC)--

It was originally designed that a baseline would be drawn and subsequent drawings could be measured against the baseline. Only those persons with possible organophosphate exposure in either the past or future were included. Blood was drawn and delivered as instructed by the state pesticide lab. Analysis was done at the state lab, preferably within 48 hours of being drawn.

Some levels were above normal values on plasma or RBC determinations, never both. No attempt was made to evaluate or explain the reasons for the elevation.

The blood samples for these determinations were kept refrigerated until analyzed. The two clinics that did most of the exams are in remote farming communities with no public transportation. Therefore, samples were hand carried by staff personnel in ice chests modified for this purpose. Also, because of time and distance problems, samples could not be drawn on Fridays or before holidays. In spite of this, all but 7 of the samples were suitable for analysis when delivered at the laboratory, though some were hemolyzed. Only 2 were totally useless. In 5 samples the plasma was usable.

It is felt that drawing baseline levels of cholinesterase did not prove to be a valuable tool in assessing "borderline" cases of pesticide poisoning, as was hoped. Even when drawn on patients with signs or symptoms of organophosphate toxicity, no abnormalities were found. There may be some reluctance on the part of the workers to report suspected poisoning out of fear of losing work, but there are many workers who say they have been poisoned with neither physical findings nor lab confirmation of organophosphate exposure. In addition, much field work is done in heat and sun, and the signs and symptoms of heat exhaustion and sun stroke are similar in many ways to those of organophosphate poisoning, especially in the milder cases. Only a few blood samples were drawn on people with

these symptoms; all cholinesterase levels on these persons were normal. During the time of the study, baseline cholinesterase determinations were collected on workers with symptoms. There were no positive signs or symptoms that lead to suspicion of these workers having ever been exposed to organophosphates. All charts were received with this consideration in mind. The results of the 148 cholinesterase readings for the total of 373 adult examinations are in Appendix D.

To be considered for future cholinesterase testing is ALCHOLEST, a simplified screening test for determination of plasma cholinesterase. A far more simple method, this test should be done before the Michel method. Only if a "suspicious" or decreased reading is obtained should a more elaborate method be carried out.

PPD (tuberculin skin test)--

68.7% of the sample group had skin tests for tuberculosis (PPD or Tine) applied, and at least 6.9% of this group reported positive reactions. There may have been more unreported cases since all tests were not read by staff personnel. The patients were told to report back in 48 hours if any redness or swelling appeared. Some patients did not have skin tests applied because of previously reported positives. The positives were usually on people who reported never having had a skin test before; only 2 persons were believed to be "converters" from previous negative tests. Unfortunately, this is sometimes difficult to determine from the clinical charts.

EKG (electrocardiograms)--

Electrocardiograms were generally done on persons over 40 years of age or on persons whose medical histories or physical examinations indicated a possible need for one. Of the 111 tests done, 2.3% were reported abnormal. This was quite low, considering that in this same study group 6.5% were classified as hypertensive. Not all the patients with hypertension had an EKG, although a definite attempt was made to do the test. Patients in our population, especially older men, are sometimes more concerned and apprehensive about any type of heart test than other medical tests. It should also be remembered that many of the men in the working age group came to the clinic for exams to qualify as fire fighters and did not want any additional tests that might prove them unfit for this relatively well-paying line of part-time work.

Chest X-rays--

Only 28.6% of the sample group had chest X-rays taken, even though all adults had them ordered and scheduled. In most cases the patient had to go to a different location for the X-ray, often on a different day, taking additional time from work. Of those obtained, 6.6% were abnormal. Some abnormalities were already known conditions; some were presumably new findings, though some were the first X-rays to be taken. The abnormal rate may have been much lower among the 71.4% who did not bother to have X-rays taken. If there was a definite medical indication for X-rays, transportation was usually arranged and follow-up pursued until the X-ray was done. No follow-up was attempted on "routine" chest X-rays ordered and not obtained.

UA Protein--

After considerable discussion, it was decided to report as abnormal proteinuria only those findings registering 2+ or greater on a dipstick. On any patient showing more than a "trace," follow-up was attempted and if other readings were obtained, the lowest was recorded. Of the total patient sample, 78.3% had a dipstick and 1.4% showed 2+ or greater proteinuria. Persistent proteinuria had further diagnostic work done if possible. No relationship to agricultural work was demonstrated.

Audiogram--

Sixty-eight percent of the sample group had audiometric screenings. Of these, 22.4% were classified as abnormal; 5.8% of these were classified as possibly being noise related, either by history of noise exposure or by the pattern of hearing loss. Unfortunately, this was considered by clinicians to be unreliable testing due to many factors. These factors included: (1) Different methods of recording audiogram results were used in different clinics. At times they were inconsistent within the same clinic, making it next to impossible for a reviewer unfamiliar with the system to evaluate the findings. (2) Some full audiograms were done because the screening audiograms (2,000 and 4,000 cycles, 45-25 dB) were abnormal; but, this was not consistent and no note was made on the chart. Also, if the screening audiogram was abnormal and no full audiogram was done, there was not sufficient data for the reviewer to make an evaluation of the possible cause of hearing loss. (3) Inexperienced personnel administered the audiograms. Although attempts were made to correct this, it has been previously noted that high staff turnover is a chronic problem, especially in the

summertime when many of these evaluations were done. (4) Unavoidably high noise levels in the clinics frequently interfered with reliable audiogram testing. However, testing was done in spite of this, thus creating unreliable results. (5) Patient histories were not consistent with audiogram findings in several cases. Where the pattern of hearing loss was consistent with noise exposure, the agricultural history was sometimes filled out denying any noise exposure. Several agricultural histories that stated hearing loss due to noise exposure had normal audiograms. The agricultural history forms used were not specific enough to give even a rough estimate of the other kinds of work a field worker might do or might have done in the past. For example, many of these people may additionally work in sheet metal plants, food processing plants, and other factories with high noise levels. There was no attempt to identify these people in this study. (6) No follow-up audiograms were done on the abnormals even though there were physical findings at the time to explain the hearing loss (otitis media, serous otitis, etc.) (7) Complete audiograms are so time consuming that they were given only when the staff had time, instead of being given to every patient whose records indicated the need for one.

Medical Problems

When positive findings were identified from the results of the physical examinations, they were further analyzed. Medical problems selected for analysis were those having relevance to local agricultural practices and to general disease entity. The results of the analysis are summarized in Table 28.

Table 28. Summary of analysis of problems found on examination.

Problem	No	Yes	Percent of Total "Yes"	Past	Present	Agricultural Related
Conjunctivities	625	9	1.5	5	4	1
Pterigium	625	9	1.5	1	8	1
Otitis media	581	56	8.8	35	21	-
Otitis externa	631	6	1.0	5	1	-
Sinusitis	631	6	0.9	4	2	-
Headache	578	57	8.9	37	20	-
Chronic cough	610	27	4.3	7	20	1
Shortness of breath	613	24	3.8	8	16	3
Rash	593	43	6.7	20	23	6
Joint-motor limit	623	13	2.0	8	5	2
Muscle strain	618	18	2.8	14	4	-
Severe trauma	602	34	5.3	33	1	4
Chronic UTI	628	8	1.2	2	6	-
Birth defect	634	2	0.3	2	-	-
Joint pain	595	41	6.4	24	17	1
Dizziness	42	22	3.4	13	9	1
Insomnia	15	12	1.9	3	9	-
Neuro-psychiatric	592	23	3.6	6	17	-
Diabetes	614	26	4.0	2	24	-
Hypertension	599	41	6.5	1	40	-
Obesity	516	124	19.4	2	122	-
Smoking	476	95	14.9	-	95	-

After an occupational history, medical history, and review of systems were completed, a physical examination was done. Copies of the forms are in Appendix A.

Attempts were made to complete a medical and occupational history on each patient but many times the histories were incomplete or inaccurate. Many children were seen without their parents; adult males of working age were seen primarily for fire fighter exams and as a result were reluctant to give any history or relate any symptoms that might disqualify them. In addition at times there was a significant language barrier between clinician and patient.

Positive responses to complaints were divided into agriculture related and nonagriculture related. From the information

on the records it was often impossible to determine occupational relationship so a reasonable "guess" had to be made. Much information was missed because direct questions were often not asked or not recorded. Also, subjective patient complaints had to be judged on their validity by the clinician.

Conjunctivitis--

Any inflammation of the conjunctiva of the eye. All types of conjunctivitis (from allergies, contacts, infections, etc.) were considered together. Most of these cases resolved without specific treatment and were felt to be viral infections by the clinicians at the time of examination. The number of cases of conjunctivitis recorded is probably lower than the actual number of cases because knowledgeable persons often do not seek medical care for this problem, especially if they know the cause. Conjunctivitis is a common hazard in field workers because of exposure to wind, sun, dust, and possibly chemicals.

Pterigium--

An abnormal vascular membrane over the eye that is believed to grow in response to chronic irritation from wind and dust. The cases recorded as significant were the ones where the pterigium extended on to the cornea or interfered with vision. It was noted by the clinicians that, especially early in the examination phase of this project, pterigium was disregarded as unimportant and not noted in the record. It was felt that this problem was more prevalent than this study would indicate because of the increased exposure of agricultural workers to irritants such as sun, wind, and dust.

Otitis Media--

An infection of the middle ear which most commonly occurs in children. It was felt that the actual incidence of otitis media in these children was actually much higher but histories were often unobtainable. In no case was it felt to be agriculturally related.

Otitis Externa--

An inflammation of the ear canal. Medical attention is sought only for the more severe cases of otitis externa so the actual incidence of this problem is believed to be much higher. None of these cases could be related to agricultural work.

Sinusitis--

An inflammation of the sinuses of the head. Only the most severe cases of sinusitis were diagnosed and treated. All types (infections, allergic, chronic) were included together. Few cases, if any, were confirmed by X-rays. Little, if any, further diagnostic work was done to determine the cause of the sinusitis. None were felt to be agriculturally related.

Headache--

All complaints of headache although entirely subjective. It was felt that more headaches related to work in the fields should have been found, as this is a recurring problem in our patient population. It is possible that questions regarding headaches were not asked specifically in the review of systems.

No specific etiology was determined in some of these cases, especially those with only past history of headaches. Of those differentiated, most were diagnosed as tension headaches. No one had neurologic deficits at the time of examination.

Chronic Cough--

All coughs even though the evaluation was subject to considerable individual clinician judgment at the time of examination. Actually only one of these cases was felt to be agriculturally related. Chronic cough was usually associated with smoking.

Shortness of Breath--

All shortness of breath. Asked as a subjective question, it was subject to individual judgment at the time of examination. Dyspnea upon exertion was considered during the physical examination as a part of the total review of body systems.

Skin Rash--

All types of rashes and skin lesions including: infectious, infestation, contact and allergic dermatoses, urticaria, and others. Six cases were totally agriculture related, the highest incidence of any problem category. Agriculture relationship is circumstantial and no attempt was made to reproduce the symptoms by controlled testing.

Joint-Motor Limitation--

Diagnosed only if it were the presenting complaint with all joints grouped together. Two of this group are considered agriculturally related. Questions used in the review of systems were vague in this limitation area.

Muscle Strain--

Any muscle strain. Medical attention was not sought for many problems in this area. The review of systems used does not ask specific questions in this area, and many past muscle problems could be missed. Muscle strain is difficult to prove or disprove clinically; thus the diagnosis is not often used by most clinicians.

Severe Trauma--

Lacerations, fractures and other trauma severe enough to interfere with future functioning. The review of systems includes all hospitalizations, surgical procedures, and chronic problems, so most problems in this area should have been recorded on the patients in the study group. It is felt that clinics such as these do not see as much severe trauma as emergency rooms see in farming areas.

Chronic Urinary Tract Infection--

Usually seen in females in the study group. There was no indication that this was agriculturally related. The incidence in the study group seemed to be lower than in the total patient population seen.

Birth Defects--

Only significant defects of the extremities were considered. There was no attempt to relate this to any kind of agriculture-related activity or exposure.

Joint Pain--

All joint pain. A total of 41 positives were recorded; one was considered to be agriculturally related. Joint pain is likely to be reported as a problem only if it is a major or presenting complaint. It is felt that joint pain is a much more common problem than indicated here. Many farm workers accept joint pain as an expected consequence of their work and seek medical attention only for severe cases. Age is also a contributing factor to joint pain.

Dizziness--

This symptom was not checked on the review of systems. Reported only in cases where this symptom (or lack of it) was medically important since there was no attempt to classify the dizziness as to a certain time or circumstances of onset; for example, when working in fields after they had been sprayed.

Insomnia--

Not included in the standard review of systems so it was recorded only if it were medically indicated. No specific questioning was done to elicit the exact setting preceding the insomnia.

Neuro-psychiatric--

Combined for tabulation purposes, but all 23 positives were in the psychiatric area, mostly "anxiety" and "depression." Neurological examination, done routinely, included deep tendon reflexes and cranial nerve evaluation. Further evaluation was left to the examiner's discretion.

Diabetes--

Diagnosis made only if the patient were under drug therapy for diabetes at the time of the examination. None of these cases was childhood onset diabetes, and most were obese. No tabulation was made on how many were on insulin therapy.

Hypertension--

Diagnosis made only if the patients were on drug therapy at the time of the examination, or the diagnosis and previous therapy were instituted by the clinic. A diagnosis of hypertension is made only after at least three blood pressure readings are elevated and after other evaluation is made.

Obesity--

Defined by the clinician at the time of examination and based individually on body structure and weight in relation to standard tables. Not all patients with weight 25% or more over desirable had a diagnosis of obesity so the actual incidence could have been higher had the data been interpreted differently.

Smoking--

Included in the review of systems, but often left blank. A smoking history was considered positive if more than one-half pack per day was smoked. It has been noted that many patients who deny smoking are seen smoking elsewhere, so actual incidence may be higher.

Summary of Statistical Analysis

Many variables were included in the analysis of the medical findings.

The Medical Data Coding Sheet (Appendix C) enumerates these variables and their corresponding coding and recoding categories.

The information was coded and keypunched, and the IBM 360/65, using SPSS (Statistical Package for the Social Sciences), was programmed for (1) chi-square analysis and (2) single and multiple analysis of variance.

Tables 29 and 30 summarize the most noteworthy positive findings of the statistical analysis.

Because of the nature of the study, no controls were used, thereby making it difficult to make any solid conclusions based on statistical results. Furthermore, the clinicians' gathering of data was not standardized to any great degree, and the recording of data in the medical records was not done the same way by any two clinicians. The medical check list (Appendix B) was instituted too late in the study to be of much use. Yet another factor to be mentioned is the variability of equipment (audio equipment, centrifuge, etc.) within the three clinics and multiplicity of outside laboratory services used.

Table 29. Chi-square summary of notable positive correlations.*

Findings	Age	Race	Sex	(p<.05) Agriculture Involvement**
Positive PPD	26-40 yrs	Mexican-	---	Yes
Noise-suspected	41+ yrs	American	---	Yes
hearing loss	41+ yrs	"	Males	No
Smoking	41+ yrs	"	Males	Yes
Otitis media	0-7 yrs	---	Males	No
Headaches	41+ yrs	---	Females	No
Severe trauma	26-40 yrs	Anglo	Males	Yes
Joint pain	41+ yrs	---	---	Yes
Hypertension	41+ yrs	---	---	---
Obesity	41+ yrs	---	Females	Yes

---No correlation.

* Only diagnoses and symptoms with positive values in 5% or more of the sample populations were included in this table.

** Yes, 50% or more working time is devoted to farm work.

Table 30. Analysis of variance, summary of notable positive correlations (age and sex adjusted).

	Age	* + Blood Pressure	* + Glucose	* + BUN	* + SGOT	+ Trigly- cerides	* + Hemata- crit	Chol Pl	+ Chol RBC
Age		<.001	<.01	<.05	NS	<.01	<.001	<.01	NS
Sex	NS	<.01	<.001	<.01	<.01	NS	<.001	NS	NS
Race	NS	<.05E	<.05	NS	<.05	<.01	<.001	<.01	NS
Agricultural- ly involved	<.001	NS	NS	NS	NS	NS	<.001	NS	NS
Smoke	<.001	NS	NS	.033	INS	<.001	<.001	NS	NS
Otitis Media	<.01	NS	NS	NS	NS	NS	NS	NS	NS
Headache	<.001	NS	I<.001	I<.001	NS	<.001	INS	NS	NS
Chronic cough	<.01	NS	NS	NS	NS	NS	NS	NS	NS
Rash	NS	NS	NS	NS	NS	NS	NS	NS	NS
Severe trauma	<.01	NS	NS	NS	NS	NS	NS	NS	NS
Joint pain	<.001	.008E	NS	NS	NS	NS	.041	NS	NS
Hypertension	<.001	<.001	I .003	NS	NS	.049	NS	NS	NS
Obesity	<.001	<.001	.013	NS	.004	<.001	<.005	<.05	.054
Clinic site	<.001	<.05	NS	<.01	NS	NS	.011	.01	NS

Only diagnoses and symptoms with positive values in 5% or more of the sample population were included in this table.

*Sex adjusted.

+Age adjusted.

E Only with diastolic reading.

I Interaction with sex (act differently in males and females).

A primary objective of the medical examination, however, was not to show the ill health of those persons involved in farmwork. What was needed were baseline indicators of health status. As mentioned before, clinical information was needed to illustrate to the medical personnel: (1) the need for education and behavior change among the patient population, and (2) the need to look at a rural farmworker in a broader perspective. For example, if it were shown that skin rashes occur in 90% of women between the ages of 26 and 41 years working in the fields, patient education would include such things as the use of protective equipment and clothing by all women working in the fields.

In the final analysis, no particularly startling cause-effect relationships between farmwork and ill health were demonstrated. What was once again shown are the relationships between obesity, hypertension, diabetes, joint pain, headache, high blood pressure, elevated glucose and triglyceride levels, smoking, sex, and age. Not illustrated in this study, but contained in a voluminous amount of medical research, are the controllable variables of diet, exercise, and relaxation techniques which can, in turn, eliminate or reduce the incidence of diseases and symptoms listed above. Certainly, agricultural chemicals may increase blood pressure readings, or the stress involved with the instability of migrant farmwork may lead to hypertension, or the poverty level income may be a contributing factor to obesity; no specific agriculture "health hazard", besides trauma from farm accidents, can be shown to have a definite cause-effect relationship on the health of the worker.

RESULTS OF EDUCATION AND PROMOTION

Activities and their degree of success will be reviewed in this section. No recording logs or schedules were used, as the project was not only undergoing constant revisions and overhauls, but also the educational effort was a responsibility delegated to many different staff members, consultants, and community agencies. Also to be remembered is that the results of the interviews, occupational histories, and medical examinations were first necessary to demonstrate to the staff there was indeed a need for occupational health and safety education.

Educational and promotional activities which were undertaken by the clinics included:

1. In-staff training regarding diagnosis and treatment of agriculture-related problems.
 - a. The Idaho Department of Labor showed a one-hour presentation on pesticide application, safety, poisoning, and treatment.
 - b. The Idaho State Pesticide Laboratory demonstrated and explained the significance, technical aspects, and preparation of cholinesterase drawings.
 - c. Agriculture specialists reviewed farm safety and health and its relationship to primary, secondary, and tertiary health care centers.
 - d. Staff working sessions were conducted on communicable diseases of particular concern in rural farming areas and on symptoms, accidents, and illnesses caused by occupationally induced agents. (Charts resulting from these sessions are in Appendix E.)
 - e. Staff clinicians addressed the group on zoonotic diseases.
 - f. Feedback and the progress and findings of the project were reported on six occasions.
 - g. Orientation regarding agriculture--related medical protocol was given to the staff by the medical director at the beginning of the project. On three occasions it was necessary to re-orient as protocol changed.
 - h. Relevant journal articles concerning agricultural occupational health were shared by staff members.

Comment: In-staff education was weak. Parts c, d, and h were attempted too late in the project. There are so many areas of interest to practitioners in a primary health center that occupational health can only comprise a small part of total educational activities. Although not technically evaluated, the group is now more occupationally aware and resourceful.

2. Project promotions to get farmworkers and farmers to come to the clinic for a physical examination.
 - a. Three news releases in each of the four newspapers.
 - b. Radio announcements on two Spanish-speaking programs.
 - c. Announcements in five clinic newsletters.
 - d. A thousand door-to-door visits at the labor camps and homes were made by the four outreach workers and the health educator. At these times, pamphlets were handed out, notice of the physical exams was given, and questions regarding Ag/OSH were answered.
 - e. Local coffee shops, farm sales, farm meetings, county fairs, and fiestas were attended to promote the project.

Comment: Promotion had to be kept at a low pitch, as media-advertising is unprofessional and federally sponsored programs are often not well received in this area of the country. Nevertheless, the project had reasonable promotion. The primary target was the farmworker; the secondary target was the farmer. Even with the non-cost incentive, it was difficult to "sell" the program.

3. Individual patient health education at the time of the physical examination and interview.
 - a. At the time of the physical examinations, pesticide, noise, dust, and sun exposure and protection were discussed. Lifting, sanitation, preventive care, and smoking were also discussed whenever necessary and possible. The occupational history was designed to facilitate education.
 - b. The interview was also designed to facilitate education. Various types of exposure to farm health hazards were emphasized in addition to farm safety and knowledge sources.

4. Community education regarding health and safety on the farm and ranch.
 - a. Slide show presentations were made to approximately 250 farmworkers at their homes. Although a slide show was developed by the clinics for project use, a better EPA show was procured and used.
 - b. Being conducted concurrently with this project was the Idaho Farm Survey by the Agriculture Extension Service. As part of their project, news releases regarding agricultural occupational health and safety were in the papers regularly. As a result, little was put in the news media under this project.
 - c. Presentation of a well-received talk on "Livestock Diseases Contagious to Man" at the annual meeting of the Owyhee County Cattleman's Association. Subsequent to the presentation, an article for the state journal was written.
 - d. Educational agricultural occupational health and safety implications of the project were reported to the state meeting of health educators.
5. Agribusiness facilitation of safety and health promotion. As evidenced by the survey of farm business and farmer interview results, some safety education can be done by agribusinesses. Orientation of employees regarding teaching and demonstration could be of great benefit to the consumer. Various business concerns emphasize safety education, but more "assume" proper use and disregard safety teaching.
6. Promotion of agricultural OSH activities by local government, health agencies, and farm-related organizations.
 - a. Agency contacts were made to facilitate inter-agency cooperation in farm-related OSH education. Agencies included the migrant summer school program, the migrant education resource center, Idaho Migrant Council, district health department, schools, extension service, and others.

- b. Surveys of governmental agencies and farm organizations were conducted, one reason being for promotion of agricultural OSH activities.

Comment: Operational scopes of agencies, organizations, and institutions can cause them to lose some perspective of their responsibilities. Perhaps with a little prodding they will assume health and safety responsibilities.

7. Education by industrial hygienist, clinicians, and other health personnel at the time of routine or emergency on-site visits to agricultural operations.

Comment: Education or "spreading the word" is the name of the game, but to be effective, it needs to be done by everyone at any place--not just in the examining room by the doctor. During the farm "walk-throughs", education was emphasized just as it was at the time of farmer and farmworker interviews. In cases of suspected poisonings and accidents, the outreach worker visited the home or work place. Safety education is most effective in these circumstances.

In summary, the educational component went as well as could be expected. The recommendations section includes modifications based on our experiences.

RESULTS OF INDUSTRIAL HYGIENE - ENVIRONMENTAL ACTIVITIES

In reviewing the notes and observations made from the walk-through of about 20 agricultural enterprises in the target area and comparing with other such operations in other sections of Idaho and the United States, it is evident that across-the-board recommendations are not applicable in most instances due to farm and farmer diversity.

While there are many instances where trauma, exposure to pesticides, and a potential to contract a zoonotic disease is possible, one does not find clinical or statistical evidence to support any widespread agricultural occupational safety and health program. However, there is evidence that farmers, their families, and their employees are injured and are ill according to recent surveys and as seen in the Community Health Clinics, Inc. experience.

In support of the rationale, re: limited programs based upon limited evidence, it is worth noting that in a fixed industrial setting where a machine, process, or material has been determined to be hazardous, the risk factors can quite easily be determined (environment, population at risk, duration of exposure, work patterns, etc.) because of the usual uniformity and predictability of such operations. The "danger-envelope"* to the workers, bystanders, and society can be assessed.

In the agricultural setting, most operations are out-of-doors or in structures where there are few environmental controls. Work patterns are highly unpredictable, for work with the same machine or operation (either by the same or different worker) and the time exposures to any given hazard are unpredictable. Many operations are not only part of a more complex series of events, but are even seasonal by nature, and in some instances may never be repeated again due to the ever-changing patterns of agriculture either on a given farm or in an agricultural region. The "danger-envelope" as described for an industrial operation is definable in a limited number of farm operations.

A handbook of agricultural activities (components) should be developed which would provide a basis for analyzing farm operations and assembling the individual occupational safety and health parameters (including unique parameters) from which a composite for all farms could be developed.

Each of the activities-such as operating specific machinery, handling animals, and working in different natural environments-has definable occupational risks and worker envelopes.

The use of components to describe activities such as operating a combine or driving a tractor (harrowing, plowing, hauling, cultivating, etc.) would permit index figures to be assembled for most combinations as found on farms anywhere in the United States.

*Worker envelope is defined as that area in which an occupational hazard is considered to exist which is detrimental to the worker.

Similar data sheets could be developed as regards farm structures, ranging from the enclosed confinement animal and poultry housing units (where workers may spend a considerable amount of time) and storage and grading sheds (which may have seasonal use) to machinery and tool sheds of small but general use to the farmer or his employee.

This type of descriptive data could be used as well for pesticides, animal handling, fruit (citrus) and nut farms, and specialties, including work in nurseries and greenhouses.

With the development of such data sheets, individual yet total farm occupational safety and health programs could be developed for individual workers. Educational material could be produced on individual operations, assembled in a group representative of the farm being inspected, and overall plans established to correct or maintain an optimum occupational safety and health program for the employer and employee of that farm.

Many of the educational pieces of literature so created could be distributed to the farmer and his employees through the extension service, which could coordinate specific materials compatible to their program; through agribusinesses, where such data would fit with a particular machine, product, or application procedure; and through primary health care facilities, wherein diagnostic information (cause-related) could assist the primary care person and advice could be given to the patient regarding further exposure or alternative work patterns.

National, state, and local organizations with concerns and responsibilities for the safety of the farmer, his family, and employees could serve as the instigators and coordinators of the overall program, provide publicity, and establish a support base for these programs.

Personnel with an understanding of occupational safety and health problems and agricultural activities will be needed to evaluate changing farm conditions and produce useable data from which priorities can be set. Existing industrial formats and observation techniques appear to be inadequate to describe the agricultural picture and worker exposures, particularly as evidenced in the intermittent work patterns and isolation of the worker in farming.

CONCLUSIONS AND RECOMMENDATIONS

PROJECT LIMITATIONS

Mentioned throughout the report are some of the limitations of the project. These limitations include changes of personnel (both at the local and national level), time needed for research, instrument clearance, remoteness of facilities, farmworkers' fears over job loss, and so forth. The list of project limitations could go on, but it is more beneficial to stress the accomplishments and demonstrate the practical application of a farm-oriented occupational health and safety program in a health-care setting.

PROJECT EVALUATION IN VIEW OF PRACTICAL APPLICATION

Replication of the Community Health Clinic, Inc. model design should not be the goal of other health facilities. The model was designed for research purposes to find workable and staff-accepted diagnostic and educational tools in every day patient management. The objectives of the project, as put forth in the abstract, will be evaluated individually and the groundwork for an agricultural OSH program in a health care setting will be laid.

Listing of the six objectives, evaluation of each, and practical applications is as follows:

1. To assess how an agricultural occupational safety and health program can be delivered to a farming community.

This objective is covered in the following five objectives. In summary, this project demonstrates how rural health facilities could deliver such a program, referring to community agencies, organizations, and individuals when necessary. The responsibility for occupational assessment and education in terms of physical evaluation lies with the health practitioner, who in turn uses him or herself, the staff, and community resources to deliver agricultural OSH services.

2. To evaluate how medical persons (physicians, nurse practitioners, etc.) can assess the physical well-being of farm-related persons (what to look for, what questions to ask the patient...).

This area of the project is difficult to evaluate because of inadequate documentation in the record, variability of physical assessment among health practitioners, and nonstructure of the physical examination until too late into the project. At the beginning of the project, medical persons were relatively unaware of the implications of farm work on the well-being of the farmer-farmworker. This pilot program made the clinician aware of this facet of the patient care. This awareness appears to be the most important factor in the incorporation of an agricultural OSH program. From awareness comes recognition and acknowledgement of specific farm-related accidents and illnesses, and patient teaching in this area. Incorporation of an awareness of agricultural occupational safety and health problems with very few added skills and tools is what can be reasonably expected from the health practitioner because of the myriad situations facing the clinician with each patient.

In-staff educational working sessions on rural health problems heightened interest, knowledge, and skills, as did integration of medical checklists upon physical evaluation. Occupational history also served as a tool to help assess the physical well-being of farm-related persons. Copies of the worksheets, occupational histories, and medical checklists are in the appendices.

If a health system wishes to use any of these tools, it is suggested that the worksheets be adapted to their geographical area, and that the medical checklist and revised occupational history be used.

3. To pinpoint "perceived" and "real" agriculture-related illnesses and disabilities in both farmer and farmworker populations.

To account for these agriculture-related illnesses and disabilities, the occupational questionnaires and interviews were used in addition to physical assessment. Physical assessment uncovered very few farm-related health or safety problems. The occupational questionnaires revealed very few problems. The tool which did reveal numerous real and perceived problems was the interview. The overlap of rural life, farmwork, farm recreation, and nonfarm jobs and hobbies with health problems makes it difficult to assess what caused the health problem. However, 28% of the 171 persons interviewed acknowledged to have lost work in the past five years because of a farm-related accident or illness. Twenty-six percent have felt dizzy and nauseous while working in the fields, and 3% complained of eye problems while working on the farm.

4. To carefully examine migrant farmworkers' problems and the workers' responses to a safety and health program.

Because migrant farmworkers often have other type problems in addition to those shared with the established farmworkers, this segment of the population was examined more carefully. It should be noted that the migrant seems to be settling-out and joining the seasonal and permanent labor force who stay in the area year round. Migratory patterns in the Treasure Valley are often within the valley, rather than regional or nationwide. An interesting scheme of poor health among migrants is illustrated in Figure 13. With limitations, this scheme can also be applied to the nonmigrant farmer-farmworker.

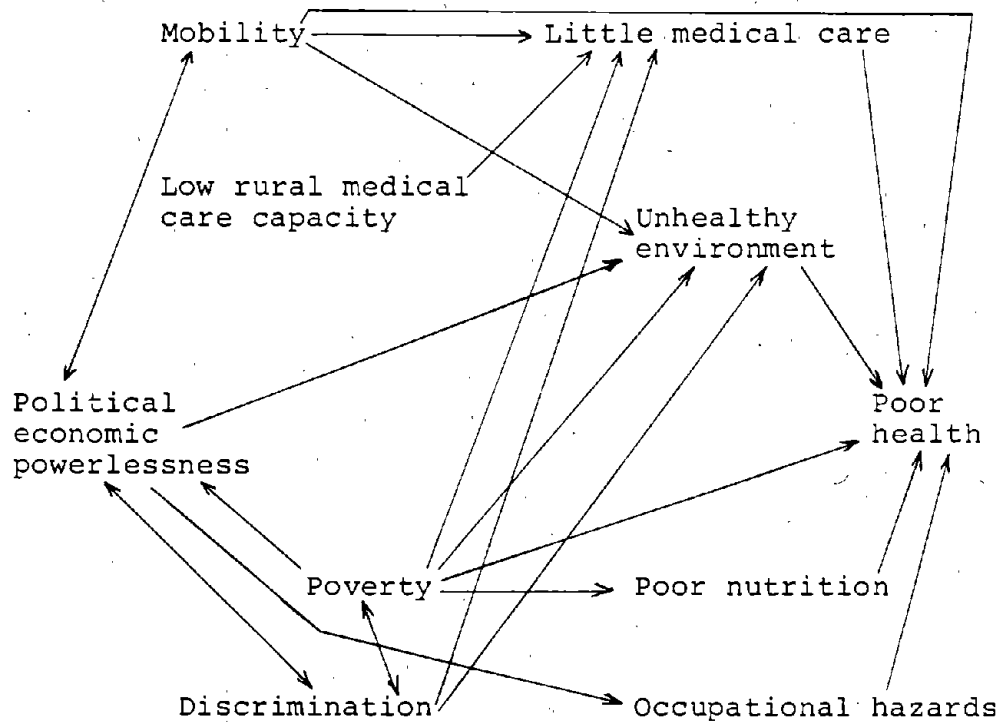


Figure 13. Causal scheme of poor health among migrants (Shenkin, B. Health Care for Migrant Workers, p. 27).

In view of the model in Figure 13, it is no wonder health and safety at work is not the migrant's highest priority. The top priority among the migrant is getting work and then working quickly so that the family is fed. This priority often over-shadows such practices as proper protection (if it interferes with work), proper re-entry time, and worker demands for adequate sanitation facilities, rest periods, minimum wages, and child labor law enactment. The trusting relationship of the farmworker to his/her crew leader or boss needs to be considered. Educational achievement is often low and certain dependencies are often necessities. Because of the almost "caste" hierarchy in farming, it is necessary for the farmers/crew leaders to make the changes and create a healthful working environment for the worker. Education and training need to take place at the worker's level, but if it's not coupled with action by the owner/leader, healthier working conditions are almost impossible to create. Mass political organizations and unionization can bring about change, but education, training, and owner/leader concern must also play an active role.

No distinction was made between migrant and other farmworkers on the interview form but about half were migrants. Therefore, when looking at such farmworker data as 72% being interested in a farm safety program, one can assume that the migrant opinion approximates the figures put forth in the total interview. However, the power and resources to make positive changes is more important than interest in changes, although much more difficult to achieve.

Suggestions for dealing with the migrant situation in agricultural occupational safety and health matters include looking at the problems as part of an overall scheme and involving the owner/crew leaders in any such programs. Consider the power structure, cultural life-styles, and living priorities. Work toward reasonable environmental changes as well as individual behavioral changes.

5. To find methods to increase clinician interest in occupationally related accidents and illnesses.

As mentioned in objective two, the clinician needs to be a pivotal point in diagnostic and educational agricultural occupational safety and health endeavors. Methods of clinician motivation were examined. The motivational methods which proved most helpful included rural health work sessions, project feedback, in-service education, agriculture-related case reviews, and definitive assessment tools. Periodic review is necessary.

6. To integrate preventive health measures such as "health education" into an agricultural type population, both at the time of a medical encounter and on the farm or ranch.

Educational efforts need to be part of every existing operation--from agencies to organizations to health facilities. Within the above objective, the health facility will be focused on but the total interaction effect of all community institutions cannot be overlooked.

Health and safety education can be a complex process as it often involves attitude and behavior change. This education at the health facility can be done on a one-to-one level or on a group level. It can utilize printed materials, audiovisual, mass media, or discussions formally or informally and be done by a pharmacist, doctor, nurse, outreach worker, health educator, or farm expert in many other combinations of ways. To be effective, however, the health message has to be appropriate and delivered by a credible source. Appropriateness takes on the dimension of need, worthwhileness, intelligibility, and feasibility.

A. The health message needs to vary depending upon the life-style, demographic background, types of farming, and exposure to agricultural occupational safety and health problems. What need not vary so much is who delivers the message and how. The optimal person to do the educating is the clinician. The best way is a one-to-one family discussion using educational aids (films, pictures, flipcharts, pamphlets, etc.). If a clinician is not qualified or doesn't have the time, another staff person (who has established credibility) can carry out educational sessions using the same educational aids. By utilizing the occupational history and physical evaluation, an "educational prescription" can be written by the clinician and "filled" by the appropriate person. If a larger number of persons need education in a particular area or on a particular subject, a group session can be held. In health clinics, however, the persons who need information the most will often come to the facility only when absolutely necessary. It is during the visit that education must take place, as the chances of the person coming back for an education session are slim.

Therefore, at the time a clinician sees each patient, educational considerations, including agricultural occupational safety and health, should be made.

B. These factors should be given special attention. Home, farm, and working visitations can be made, after which valuable information can be shared with medical staff. Also, the educational process with the patient can be put into motion. As in diagnostic evaluations, eyes and minds need to be open and the proper questions must be asked if educational avenues are to be used.

The health center should also be aware of and utilize existing agencies such as the extension service, Environmental Protection Agency, Occupational Safety and Health Administration, and various agriculture commissions. The veterinarian should be utilized as an educational source.

Suggestions to other facilities wishing to carry out agricultural occupational safety and health education include strong clinician involvement--either at the teaching level or "educational prescription" level. If outreach services are available, organizations and individuals should be given consideration and encouragement. Agricultural occupational safety and health educational aids should be available to clinic personnel and to patients. Such materials include audiovisuals and pamphlets on pesticides and other agricultural chemicals, farming equipment, back and neck injuries, and protection against the elements (sun, dust, water, etc.). Use of the occupational history and medical checklist may assist in facilitation of education.

SUMMARY

More agricultural occupational safety and health research needs to be done, and the results of these research efforts need to be put into practice. Regulatory agencies need to take different approaches in various parts of the country and more information needs to reach the people. Training of medical people needs to encompass agricultural occupational safety and health perspectives. Educational efforts must be made at every junction of medical care. The list of needs concerning agricultural occupational safety and health are many.

This project, which addresses the development of "A Model Occupational Health Program for Agricultural Workers," helps to show some of the complexities of factors affecting the health of agricultural workers as well as some of the possible approaches of improving the health status and work environment of the farmer/(rancher)/farmworker.

Not all questions could be answered; not all avenues could be explored. An initial model design has been developed, and using this groundwork, a health-care provider can incorporate agricultural occupational safety and health considerations into the delivery of health care.

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1. Local, state and national sources of geographic, demographic and agriculture statistics
2. Government regulations in agriculture
3. Agriculture health and safety
4. Health delivery (including education) in rural farming areas
5. Cultural implications of the Mexican-American migrant and seasonal farmworkers on health and safety

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APPENDIX A

COMPONENTS OF CLINIC RECORDS

Community Health Clinics, Inc. uses a problem orientated medical record system. Standardized recording forms used in the medical record include the following:

- Problem List
- Adult History and Review of Systems
- Data Base Sheet

ADULT HISTORY AND REVIEW OF SYSTEMS

NAME _____	MONTH/YEAR _____	CHART NO. _____
ALLERGIES	CONSTITUTIONAL	RESPIRATORY
Medicines _____	Fatigue _____	Recurrent cough _____
_____	10 lb.wt. loss _____	Raises phlegm _____
Other _____	Decr.appetite _____	Short of breath _____
_____	Chills/fever _____	Wheezy _____
IMMUNIZATIONS	HABITS & SAFETY	TB contact _____
DT Booster _____	Cigarettes _____	Hist. Pneumonia _____
Other _____	_____	Hemoptysis _____
_____	ETOH	CARDIOVASCULAR
_____	Disposes old med. _____	Chest pain w. exertion _____
PAST HISTORY	Med/chem locked up _____	Palpitations _____
Gonorrhea _____	Seat belt in car _____	DOE _____
Syphillis _____	_____	Orthopnea _____
Hepatitis _____	_____	Ankle swelling _____
TB _____	ENDOCRINE	Nocturnal cough/sob _____
Malaria _____	Incr. thirst _____	Phlebitis _____
Typhoid _____	Incr.urination _____	Leg cramps exercise _____
Polio _____	Heat intol. _____	Hx. of murmur _____
Rheumatic fever _____	Cold intol. _____	G.I.
In bed 10 _____	10 lb.wt.incr. _____	Pain/discom.swallowing _____
HOSPITAL & OPERATIONS	Hair/skin/nail change _____	Heartburn/indigest. _____
_____	DERM	Fatty food intol. _____
_____	Persistent rash _____	ABD pain _____
NEUROLOGY	Hives _____	Vomiting blood/coffee gr. _____
Headaches _____	HEME	Change in b.m.'s _____
Fits/con's/uncon _____	Unusual bleeding _____	Constipated _____
Tremor _____	Lumps in neck/or. _____	Freq. diarrhea _____
Hist. of stroke _____	Hist.trans.Rx. _____	Bloody/black stool _____
MSKEL	OBS	Hemorrhoids _____
Joint aches/swelling _____	Pregnancy # _____	G.U.
_____	Abortions # _____	Greater than 2xnocturia _____
GYN	Complications _____	Hesitancy _____
LMP	_____	Hematuria _____
Reg.menses/vag. bleeding _____	_____	Hist. of pyelo. _____
No.birth control _____	_____	Stones/bgravel _____
Vag. discharge _____	_____	
Dyspareunia _____	_____	

ADULT HISTORY (Continued)

Diagnosis	Phys.	Hosp.	Date

FAMILY HISTORY

	Maternal			Paternal			Sibs	Children			
	Mother	Grand-father	Grand-mother	Father	Grand-father	Grand-mother					
Age											
Age of death											
Bleeding											
Cong. ABN											
Deafness											
Mental retard.											
Seizures											
Kidney disease											
Gout											
HBP											
Rheumatic fever											
Early M.I.											
Heart disease											
DM											
TB											
Cancer											
Allergies											
Breast											
Bowel											

ADULT DATA BASE

PATIENT'S NAME _____ CHART # _____

		DATE
VITAL SIGN	Height/weight BP/pulse Temp/Resp.R. Frame/Ideal wt.	
SKIN	Skin	
LYMPH	Lymph	
	Visual Acuity	
EYES	Fundi Conj/eom., etc.	
EARS	Hearing Canals TM'S	
NOSE	Nose	
MOUTH	Tongue/b. mucose Gums/teeth Tonsils/pharynx	
NECK	Thyroid Glands Carotids	
RESP.	Visual/structure Aus/per.	
BREAST	Nipples/mass	
	JVP	
	PMI/heaves	
CARDIO- VASCULAR	Rhyme/ht. sounds Murmur/ex. sounds Pulses/bruits	
ABDOMEN	LKS Aus./Pal.	
GENITAL	Penis/secondary sex Rectal/prostate Testes/hernia	
PELVIC	BUS/vagina/cervic Adnexae uterus	
	Gait/tremor	
NEURO	DTR's/Babinski C.Nerves/sensory	
MUSCULO- SKELETAL	Motor/joints Varices/edema	
	Pap/G.C.culture	
SCREENING	Tine/PPD Other	
HEME	HCT/Hbg. WBC/smear	
	Micro	
URINE	Dip stick Culture	
STOOL	Occult blood/culture	

ADULT DATA BASE (Continued)

BACTI.	Throat/Other SMA 12	
CHEM.	Glucose Creatinine Other	
X-RAY	CXE Other	
MISC.		

APPENDIX B

AGRICULTURE OCCUPATIONAL SAFETY AND HEALTH REPORTING FORMS

These forms were used throughout the course of the project to record and gather information.

Health Profile

This form was used for accounting purposes, as a cross check for clinicians, and a form to facilitate record pulling upon recording medical data.

Medical Checklist Re: Agriculture Related Problems

The clinicians designed this list to serve as a guideline in looking for and recording possible farm related medical problems.

Occupational History

The occupational history was used in conjunction with the medical history, but unlike the medical history it was filled out by the patient. This history was changed midway through the project as the original history proved useless. This form was not too much better and therefore the REVISED history was designed.

Revised Occupational History

This form was not used in the project but it is the suggested form for future use.

Farmer Interview Recording Sheet--Farmworker Interview Recording Sheet

These forms were used to record occupational information obtained from talks with farmers and farmworkers. The interview was resorted to as the occupational histories yielded little information.

ADULT HEALTH PROFILE
COMMUNITY HEALTH CLINICS, INC.

Name _____ Date _____
Age _____ Sex _____
Clinic or Site _____ Migrant Farmworker _____
Seasonal Farmworker _____
Clinic No. _____ Other Agricultural _____

If done, check:

History
Agricultural history
Health Ed. Session
Complete P.E.
Pelvic, Breast, Pap
Visual Acuity
Screening Audiogram
Full Audiogram
Urinalysis
Hematocrit
SMA-18
VDRL

Stool guaiac
PPD
Chest X-ray (In ___ Out ___)
EKG
Pulmonary functions
Cholinesterase baseline
Other lab tests
Specify:

DT vaccination checked

Diagnoses: Well _____
Other (list) _____

\$ value, accounting _____ Examiner(s) _____

If health profile is complete, please tag with magenta tape.

MEDICAL CHECKLIST
COMMUNITY HEALTH CLINICS, INC.

Name _____

Chart No. _____ Age _____ Date _____

	No or never	Present now	Present in past	Workdays lost because of	Explanation
EYES Ptervgium Cataracts Arcus sentilis Visual acuity Conjunctivitis Trauma or foreign body in eye					
EARS Ear infection or serous otitis Hearing audiogram Tinnitus Tympanic membrane					
PULMONARY PROBLEMS Cough (acute or chronic) s.o.b., d.o.e. Signs of emphysema Smoking Exposure to fumes, dust					
DERMATITIS Rash (chronic or acute) Itching Hives					
MUSCULOSKELETAL RE- LATED TO ACCIDENTS Arthritis-joint pains Limited motion in joint of extremity Fractures Severe cuts Back or neck strain					

COMMENTS _____

OCCUPATIONAL HISTORY
COMMUNITY HEALTH CLINICS, INC.

Date _____

Interviewer _____

WORKER IDENTIFICATION

Name _____ Last _____ First _____ Middle _____

Address _____ zip _____

Home phone _____ Age _____ Sex: Male _____ Female _____

OCCUPATIONAL HISTORY

YES NO

1. Have you worked in the fields or in other agricultural related work in the past month? _____
Doing what? _____

2. Have you worked in agriculture for more than 5 years? How long? _____

3. Have you ever worked in an area doing farm related work where you were exposed to the following: _____

Fumes (exhaust, carbon monoxide, machinery)	_____	_____
Noise (canning factory, tractors)	_____	_____
Heat (temperatures more than 100° outside)	_____	_____
Dust (from discing, harrowing)	_____	_____
Pesticides, sprays (specify)	_____	_____

4. If working with pesticides in or an area recently treated with pesticides, did you wear special or protective clothing? _____

Are your clothes clean at the start of a day? _____

Do you shower after work day? _____

Do you use a mask or respirator? _____

5. Have you ever been made aware of the safety hazards while working in farm related work? _____
How? _____

6. Do you think that anything about your job is bad for your health? Please list. _____

1. _____
2. _____
3. _____

OCCUPATIONAL HISTORY (Continued)

YES NO

7. Have you had any illnesses or injuries in the past which you relate to your work?
Please list:

1. _____
2. _____
3. _____

8. Have you worked in the following crops or done the following in the past 5 years?

Orchards (apples, cherries)

Row crops (beets, hops, onions, beans, etc.)

Machinery

Move sprinklers

Other (please list)

REVISED
OCCUPATIONAL HISTORY FOR FARMERS-FARMWORKERS
COMMUNITY HEALTH CLINICS, INC.
(Please circle the correct response)

1. About how many months each year do you spend working on the farm (in the fields) or a ranch? None 1-4 5-8 9-12

2. How many years have you worked in farming or ranching? None 1-4 5-17 18+

3. Have you had any jobs besides farming? (factory work, etc.) Yes
No What? _____

4. What kinds of farms have you worked on and how long?

Dairy	_____	Years
Poultry	_____	Years
Livestock	_____	Years
Orchard	_____	Years
Cash grain	_____	Years
Potatoes	_____	Years
Sugar beets	_____	Years
Hops	_____	Years
Onions	_____	Years
Vegetables	_____	Years
General	_____	Years

5. Do you own your own farm or ranch? Yes No

If yes, what kind and what size? _____

6. Please circle the machines you have operated.

Tractor	_____	Years
Potato digger	_____	Years
Combine	_____	Years
Corn chopper	_____	Years
Weld torch	_____	Years
Others	_____	

7. Have you ever been hurt while working on a farm or ranch? Yes No

How? _____

8. What injuries were bad enough to be seen by a doctor or other health professional? _____

9. Have you ever been made sick from something on the farm or ranch?

REVISED (Continued)

- | | | |
|---|-------|-------|
| The sun | Yes | No |
| The water | Yes | No |
| An animal | Yes | No |
| Pesticides | Yes | No |
| Other chemicals | Yes | No |
| Bad weather | Yes | No |
| Over work | Yes | No |
| Other | What? | _____ |
| 10. Do you work with or around any pesticides or other chemicals? | Yes | No |
| | When? | _____ |
| 11. If you do work with pesticides or other chemicals, do you read the label and dispose of the container properly? | Yes | No |
| 12. Do you ever work around noise so loud that you and other people have trouble talking with one another? | Yes | No |
| | When? | _____ |
| 13. Do you ever work in excess dust (from plowing, threshing grain, etc.)? | Yes | No |
| | When? | _____ |
| 14. Do you wear any of the following while working in the fields? | | |
| Hat | Yes | No |
| | When? | _____ |
| Gloves | Yes | No |
| | When? | _____ |
| Boots | Yes | No |
| | When? | _____ |
| Ear plugs or muffs | Yes | No |
| | When? | _____ |
| Goggles | Yes | No |
| | When? | _____ |
| Respirator | Yes | No |
| | When? | _____ |
| 15. Do you have any of the following problems when working or soon after? | | |
| Nausea and/or dizziness | Yes | No |
| Burning or watering eyes | Yes | No |
| Hearing problems | Yes | No |
| Chronic cough | Yes | No |
| Difficulty breathing | Yes | No |

REVISED (Continued)

Skin rash	Yes	No
Aches and pains in joints or muscles	Yes	No
16. Did you or do you smoke more than a half pack of cigarettes each day (average)?	Yes	No

FARMER INTERVIEW RECORDING SHEET
COMMUNITY HEALTH CLINICS, INC.

Name _____ Age _____

Approx. # of employees (incl. family) _____ Date _____

Location _____ Type farm _____

SAFETY	YES	NO	EXPLAIN
1. Any lost time from work in past 5 years because of farm related accident or illness? (self, family member, employee)			
2. Extension agent used?			
3. "Outsider" inform you of equipment safety?			
4. "Outsider" inform you of farm chemicals?			
5. Do you follow directions on chemical labels?			
6. Any near accidents?			
7. Any hazards on your farm?			
8. Any safety equipment used? (what, % of time)			
9. Has one person or group of persons given you most of your farm safety knowledge?			
10. Any activity or equipment that has given the greatest safety problems?			
11. Interested in participating in a farm safety program? (extent)			

COMMENTS _____

FARMER INTERVIEW RECORDING SHEET (Continued)

HEALTH	YES	NO	EXPLAIN
1. Are there times while working in the fields that you become dizzy, sick to the stomach, have blurred vision or become weak? (when, what do you do?)			
2. Have you ever got something in your eye while working in the fields? Do your eyes burn or water while working?			
3. Is your hearing good? (ask if they would like an audiogram) Have you ever had an ear-ache? Do your ears feel stopped up?			
4. Do you have a cough that doesn't seem to go away? How long? If yes, ask if they smoke. When it is aggravated, ask if they have seen a clinician about it. Any increased shortness of breath while working? Any difficulty breathing?			
5. Do you have any skin rashes or do you remember having a rash? If yes, where? from what? Have you ever thought you have had a skin problem because of sprays or chemicals?			
6. Do you have any aches or pains in muscles or joints which limit your work? (where? Are you able to relate it to work or injury?)			
7. Are there any other problems you have which maybe related to your work?			

FARMWORKER INTERVIEW RECORDING SHEET
COMMUNITY HEALTH CLINICS, INC.

Name _____ Age _____ Sex _____

Approx. months/years in agriculture _____

Location _____ Major crops _____

SAFETY	YES	NO	EXPLAIN
1. Any lost time from work in past 5 years because of farm related accident or illness?			
2. Any near accidents?			
3. Has a farmer or crewleader ever told you of any dangers of: Farm equipment Farm implements Pesticides			
4. Have you ever had any problems with: Too much sun Field dust Too much noise Pesticides Fumes (CO, etc.) Water in the field Other			
5. Do you think that anything about your job is not safe or bad for your health?			
6. Do you ever use any safety equipment such as: Eye goggles Gloves Boots Hats Respirator mask (When used? If not, why not? Who supplied?)			
7. Would you be interested in participating in a farm safety program?			

Name

FARMWORKER INTERVIEW RECORDING SHEET (Continued)

HEALTH	YES	NO	EXPLAIN
1. Are there times while working in the fields that you become dizzy, sick to the stomach, have blurred vision or become weak? (when, what do you do?)			
2. Have you ever got something in your eye while working in the fields? Do your eyes burn or water while working?			
3. Is your hearing good? (ask if they would like an audiogram) Have you ever had an earache? Do your ears feel stopped up?			
4. Do you have a cough that doesn't seem to go away? How long? If yes, ask if they smoke, when it is aggravated, and if they have seen a clinician about it. Any increased shortness of breath while working? Any difficulty breathing?			
5. Do you have any skin rashes or do you remember having a rash? If yes, where? from what? Have you ever thought you have had a skin problem because of sprays or chemicals?			
6. Do you have any aches or pains in muscles or joints which limit your work? (where? Are you able to relate it to work or injury?)			
7. Are there any other problems you have which maybe related to your work?			

APPENDIX C

COMPUTER CODING SHEETS AND SUMMARY TABLES OF STATISTICAL ANALYSES

The Statistical Package for the Social Sciences was the statistical program used for analyses of the medical and occupational data. The coding formats were designed accordingly.

Medical Data Coding Sheet

A guide to record the medical data from the chart to the IBM recording sheets.

Farmer Interview Coding Sheet--Farmworker interview coding sheet

Guides to record occupational information from talks with farmers and farmworkers.

Results of Chi-Square Analysis of Farmer-Farmworker Interviews

Results of correlations between recorded items from the interviews at $p \leq .05$.

Descriptive Data-Medical

Results of descriptive medical data.

Age Adjusted Analysis of Covariance of Medical Data

Results of analysis of variance with adjustment for age. Only those variables with "Significant" age influence were adjusted and recorded.

Analysis of Variance (No Adjustment) of Medical Data

Results of analysis of variance with no adjustments.

Chi-Square Cross Tabulations-Medical Data

Results of Chi-Square analysis of medical data.

Summary of all Analysis of Variance (Single and Multiple) Medical Data

Results of all analysis of variance with adjustments for age and sex.

MEDICAL DATA CODING SHEET

<u>Column #</u>	<u>Subject</u>	<u>Codes</u>	<u>Recodes</u>
1	Site	1) Homedale 2) Parma 3) Nampa 4) Special	-
2-6	Patient number	-	-
7	Sex	1) Male 2) Female	-
8-9	Age	-	1) 0-7 years 2) 8-16 years 3) 17-25 years 4) 26-40 years 5) 41+
10	Race	1) Mexican-American 2) Anglo 3) Other	1) Mexican-American 2) Anglo
11	Agricultural involvement	1) Major occupation 2) Family member of 1 3) Other 4) Unknown	1) Major occupation 2) Family member of 1 3) Other
12-14	Systolic blood pressure	-	-
15-17	Diastolic blood pressure	-	-
19-20	Pulse	-	-
21-23	Glucose	-	-
24-25	BUN	-	-
26-27	SGOT	-	-
28-30	Triglycerides	-	-
31-32	Hematocrit	-	-
33-35	Cholinesterase plasma	-	-
36-39	Cholinesterase RBC	-	-

MEDICAL DATA CODING SHEET (Continued)

<u>Column #</u>	<u>Subject</u>	<u>Codes</u>	<u>Recodes</u>
40	PPD	1) - 2) Done, presumed (-) 3) +, now or past 4) Not done	1) - 2) done, presumed (-) 3) +, now or past
41	EKG	1) Normal 2) Abnormal-significant 3) Not done	1) Normal 2) Abnormal-significant
42	Chest X-ray	1) Normal 2) Abnormal-significant 3) Not done	1) Normal 2) Abnormal significant
43	U/A Protein	1) Normal 2) 2+ 3) Not done	1) Normal 2) 2+
44	Audiogram	1) Normal 2) Not normal-noise suspicion 3) Not normal-noise suspicion 4) Not done	1) Normal 2) Not normal-noise suspicion 3) Not normal-noise suspicion
45	Smoking	1) No 2) Yes, pack/day 3) Not recorded	1) No 2) Yes, ½ pack/day
46-47	Percentile-height	-	-
48-49	Percentile-weight	-	-
50	Conjunctivitis	1) No	1) No
51	Pterigium	2) Not recorded	
52	Otitis Media	3) Yes, now	2) Yes (3-6)
53	Otitis Externa	4) Yes, only in past	
54	Sinusitis	5) Yes, strong suspicion of agricultural relationship - Now	

MEDICAL DATA CODING SHEET (Continued)

<u>Column #</u>	<u>Subject</u>	<u>Codes</u>	<u>Recodes</u>
55	Headache		
56	Chronic cough	6) Yes, strong suspicion of agricultural relationship - Past	
57	Shortness of breath		
58	Rash		
59	Joint motor limitation		
60	Muscle strain		
61	Severe trauma or fracture		
62	Chronic urinary tract infection		
63	Birth defects, extremities		
64	Joint pain		
65	Dizziness		
66	Insomnia		
67	Neuro-psychiatric		
68	Diabetes		
69	Hypertension		
70	Obesity		
71	Major reason for coming	1) Well-other 2) Well-NIOSH 3) Acute problem 4) Chronic problem 5) Acute-ag related 6) Chronic-ag related 7) Unknown	1) Well-other 2) Well-NIOSH 3) Acute problem 4) Chronic problem 5) Acute-ag related 6) Chronic-ag related related
72	Type data	1) Clinical 2) Outreach	- -

FARMER DATA SHEET

<u>Column #</u>	<u>Subject</u>	<u>Codes</u>
1	Site	1) Homedale 2) Parma 3) Nampa 4) Special 5) Occupational history only
2-6	Patient number	-
7	Sex	1) Male 2) Female
8-9	Age	-
10	Ethnicity	1) Mexican-American 2) Anglo 3) Other
11	Lost time	1) Yes
12	Near accident	2) No
13	Interest in program	3) Not answered
14	Dizzy, Nausea . . .	1) Yes 2) No 3) Not answered
15	Eye problems	
16	Hearing problems	
17	Cough	
18	Smoke	
19	Shortness of breath	3) Not answered
20	Skin rash	1) Yes 2) No 3) Not answered
21	Aches & pains	
22	Number of employees	
23	Type farm	1) Orchard 2) Truck 3) Cash 4) Stock 5) Combination 6) Other

FARMER DATA SHEET (Continued)

<u>Column #</u>	<u>Subject</u>	<u>Codes</u>
24	Extension agent used	1) Yes
25	Outsider inform-- equipment	2) No
26	Outsider inform-- chemicals	3) Not answered
27	Read labels	1) Yes
28	Any problem #1	2) No
29-32	Hazards	3) Not answered
33	Problem - fumes	
34	Problem - water	
35	Any one thing bad	
36	Use - goggles	1) Yes
37	Use - glasses	2) No
38	Use - boots	3) Not answered
39	Use - hat	
40	Use - respirator	
41	Type data	1) Clinical 2) Outreach
42	Type history	1) Farmer 2) Farmworker

FARMWORKER DATA SHEET

<u>Column #</u>	<u>Subject</u>	<u>Codes</u>
1	Site	1) Homedale 2) Parma 3) Nampa 4) Special 5) Occupational history only
2-6	Patient number	-
7	Sex	1) Male 2) Female
8-9	Age	-
10	Ethnicity	1) Mexican-American 2) Anglo
11	Lost time	1) Yes
12	Near accidents	2) No
13	Interested in program	3) Not recorded
14	Dizzy, Nausea	
15	Eye problems	
16	Hearing problems	
17	Cough	1) Yes
18	Smoke	2) No
19	Shortness of breath	3) Not recorded
20	Skin rash	
21	Aches and pains	
22-23	Months/years in agriculture	-
24-25	Years in agriculture	-
26-28	Farmer or crewleader told:	
	equipment	1) Yes
	implements	2) No
	pesticides	3) Not recorded

FARMWORKER DATA SHEET (Continued)

<u>Column #</u>	<u>Subject</u>	<u>Codes</u>
29-32	Problems: sun dust noise pesticides	1) Yes 2) No 3) Not recorded
33	Safety equipment used	1) Yes 2) No 3) Not answered
34	One person--most knowledge	1) Yes 2) No 3) Not answered
35	Type data	1) Clinical 2) Outreach
36	Type history	1) Farmer 2) Farmworker

DESCRIPTIVE DATA - MEDICAL

	n	Mean	S.D.	Min.	Max.	Range
Age	640	24.03	17.56	0.0	71.0	71.0
Syst. B.P.	493	118.15	19.97	80.0	210.0	130.0
Dias. B.P.	494	76.10	13.66	0.0	140.0	140.0
Pulse	414	77.88	10.77	54.0	130.0	76.0
Glucose	335	104.62	45.24	52.0	384.0	332.0
BUN	337	14.15	5.00	6.0	61.0	55.0
SGOT	337	25.91	11.97	6.0	99.0	93.0
Trig	316	194.96	125.05	44.0	830.0	786.0
Hematocrit	458	42.45	5.96	15.0	65.0	50.0
Chol.-plasma	148	4.71	1.01	1.8	7.6	5.8
Chol.-R.B.C.	144	12.22	1.99	8.4	17.6	9.2

ANALYSIS OF VARIANCE (No Adjustment) - MEDICAL DATA

	Age	⁺³ +1-1 Sys BP	⁺³ +2-1 Dias BP	Pulse	⁻⁴⁻³ +2-1 Gluc.	⁺³ +1 BUN	⁺³ +2-1 SGOT	⁺² +1 Trig.	⁺⁴⁻³ +1-1 Hema	⁺⁴ +2-1 Chol- pl	Chol- RBC
Site	<0.001	<0.01	0.05	NS	NS	<0.01	NS	NS	<0.001	NS	NS
Age		<0.001	0.001	NS	<0.01	<0.05	NS	<0.01	<0.001	<0.01	NS
Sex	NS	<0.01	0.01	NS	<0.001	<0.01	<0.01	NS	<0.001	NS	NS
Race	NS	NS	0.05	NS	<0.05	NS	<0.05	<0.01	<0.01	<0.01	NS
Ag-Invol	<0.001	<0.001	0.01	NS	<0.01	NS	NS	NS	<0.001	<0.05	NS
PPD	<0.01	NS	NS	NS	NS	<0.05	NS	NS	NS	NS	NS
EKG	NS	<0.05	0.01	NS	NS	NS	NS	NS	NS*	NS*	NS*
Chest	<0.01	<0.05	0.01	NS	NS	NS	NS	NS	NS	NS	NS
U/A Prot.	NS	NS	0.01	0.05	NS*	NS*	NS*	NS*	NS*	-	-
AVD	<0.001	<0.01	0.01	NS	NS	<0.01	NS	NS	<0.01	NS	NS
Smoke	<0.001	<0.01	0.05	NS	NS	NS	NS	NS	<0.001	NS	NS
Conj	<0.01*	NS*	NS*	NS*	NS*	NS*	NS*	NS*	NS*	NS*	<0.05*
Pterigium	<0.01*	NS*	0.05*	NS*	NS*	NS*	NS*	NS*	NS*	NS*	NS*
Otitis Media	<0.01	NS*	NS*	NS*	NS*	NS*	NS*	NS*	<0.01	NS*	NS*
Otitis Extern	0.05	NS*	NS*	0.01*	NS*	NS*	NS*	NS*	NS*	-	<0.05*
Sinusitis	NS*	NS*	NS*	0.01*	NS*	NS*	NS*	NS*	NS*	NS*	NS*
Headache	<0.001	<0.01	<0.01	NS	<0.01	0.01	NS	<0.01	<0.01	NS*	NS*
Ch Cough	<0.01	NS	NS	NS	NS	NS	NS	NS	NS	NS*	NS*
SOB	<0.001	<0.01	0.01	NS	NS	NS	NS	NS	<0.01	NS*	NS*
Rash	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS*	NS*
Jt. Motor	<0.01	0.05	<0.05	NS	NS*	NS*	NS*	NS*	NS*	NS*	NS*
Muscle St.	<0.001	NS	<0.05	NS	NS	NS	NS	NS	<0.01	NS*	NS*
Sv. Trauma	<0.01	NS	NS	NS	NS	NS	NS	NS	<0.01	NS	NS
Chronic UTI	<0.01*	NS*	<0.05*	NS*	<0.01*	NS*	NS*	<0.01*	NS*	-	-
Birth Defect	NS*	NS*	NS*	NS*	-	-	-	-	<0.05*	-	-
Joint Pain	<0.001	<0.05	<0.01	NS	NS	NS	NS	NS	NS	NS*	NS*
Dizziness	<0.01	NS	NS	NS	NS	NS	NS	NS	NS	NS*	NS*
Insomnia	NS	NS	NS	NS*	NS*	NS*	NS*	NS*	NS*	NS*	NS*
Neuro-psy	<0.01	NS	<0.05	NS	NS	NS	NS	NS	<0.05	NS*	NS*
Diabetes	<0.001	<0.001	<0.001	NS	<0.001	NS	NS	<0.01	NS	NS*	NS*
Hypertension	<0.001	<0.001	<0.001	NS	<0.01	<0.05	NS	<0.05	<0.01	NS	NS
Obesity	<0.001	<0.001	<0.001	NS	<0.01	NS	NS	<0.01	<0.001	<0.05	NS
Reason Come	<0.001	<0.001	<0.001	0.05	<0.01	NS	<0.01	NS	<0.01	<0.01	NS

NS Non significant.

* Less than 10 observations in at least one of the categories.

+ Has positive relation with age-- +2 has positive relation with Mexican-Americans, +3 has positive relation with males, and +4 has positive relation to agricultural work group, gr.1.
 - Has negative relation with age: -2 has negative relation with Mexican-Americans, -3 has negative relation with males, and +4 has negative relation to agricultural work (Group 2).

AGE ADJUSTED ANALYSIS OF COVARIANCE OF MEDICAL DATA

	Sys BP	Dias BP	Gluc.	BUN	SGOT	Trig.	Hema	Chol- RBC
Agriculture involved**	0.018	NS	0.002	NS	NS	NS	<0.001	NS
Smoking**	NS	NS	NS	NS	NS	NS	<0.001	NS
Conjunctivitis	NS	NS	NS	NS	NS	NS	NS	0.013
Pterigium	NS	NS	NS	NS	NS	NS	NS	NS
Otitis Media	NS	NS	NS	NS	NS	NS	NS	NS
Otitis Externa	NS	NS	NS*	NS*	NS*	NS*	NS*	0.019*
Sinusitis	NS	NS	NS*	NS*	NS*	NS*	NS	NS*
Headache**	NS	NS	<0.001	0.004	NS	<0.001	NS	NS
Chronic Cough	NS	NS	NS	NS	NS	NS	NS	NS*
SOB	NS	0.039	NS	NS	NS	NS	NS	NS
Rash**	NS	NS	NS	NS	NS	NS	NS	NS
Joint-Motor	NS	NS	NS	NS	NS	NS	NS	NS
Muscle strain	NS	NS	NS	NS	NS	NS	NS	NS
Severe trauma	NS	NS	NS	NS	NS	NS	0.06	NS
Chronic UTI	NS	NS	0.003	NS	NS	0.023	NS*	NS*
Joint pain**	NS	<0.005	NS	NS	NS	NS	NS	NS*
Dizziness	NS	NS	NS	NS	NS	NS	NS	NS*
Insomnia	NS	NS	NS	NS	NS	NS	NS*	NS
Neuro-psychiatric	NS	NS	NS	NS	NS	NS	NS	NS
Diabetes	<0.001	<0.001	<0.001	NS	NS	0.008	NS	NS
Hypertension**	<0.001	<0.001	<0.001	NS	NS	0.049	NS	NS
Obesity**	<0.001	<0.001	<0.001	NS	0.027	<0.001	0.054	0.054
Reason for coming**	<0.001	<0.001	<0.001	0.029	0.032	NS	NS	NS

* Less than five observations in at least one of the categories.

** Five percent or more of total sample have or had the complaint.

SUMMARY OF ALL ANALYSES OF VARIANCE (Single and Multiple) - MEDICAL DATA

Indep. Var.	Age	** Sys BP	** Dias BP	Pulse	** Gluc.	** BUN	** SGOT	+ Trig.	** Hema	Chol- pl	+ Chol- RBC
Site	<0.001	<0.01	<0.05	NS	NS	<0.01	NS	NS	<0.001	NS	NS
Age-Category		<0.001	<0.001	NS	<0.01	<0.05	NS	<0.01	<0.001	<0.01	NS
Sex	NS	<0.01	<0.01	NS	<0.001	<0.01	0.01	NS	<0.001	NS	NS
Race	NS	NS	<0.05	NS	<0.05	NS	0.05	<0.01	<0.01	<0.01	NS
Ag-Involved	<0.001	NS	NS	NS	NS	NS	NS	NS	I<0.001	0.05	NS
Smoke	<0.001	NS	NS	NS	NS	0.033	INS	NS	<0.001	NS	NS
Conj	<0.01	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.013
Pterigium	<0.01	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Otitis Media	<0.01	NS	NS	.01 ^o	NS	NS	NS	NS	NS	NS	NS
Otitis Exter	0.05	NS	NS	<0.01	NS	NS	NS	NS	NS	-	0.019
Sinusitis	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Headache	<0.001	NS	NS	NS	I<0.001	I<0.001	NS	<0.001	I NS	NS	NS
Ch. Cough	<0.01	NS	NS	NS	NS	NS	NS	NS	I NS	NS	NS
SOB	0.001	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Rash	< NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Lt. Motion	<0.01	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Muscle Strain	<0.001	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Sv. Trauma	<0.01	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Chronic UTI	<0.01	NS	NS	NS ^o	0.01	NS	NS	0.023	I NS	-	NS
Birth Defect	-	-	-	NS ^o	-	-	-	-	-	-	-
Joint Pain	<0.001	NS	0.008	NS	NS	NS	NS	NS	0.041	NS	NS
Dizziness	<0.01	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Insomnia	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Neuro-psy	<0.01	NS	NS	NS	NS	NS	NS	NS	0.05	NS	NS
Diabetes	<0.001	<0.001	<0.001	NS	I<0.001	I NS	NS	0.008	NS	NS	NS
Hypertension	<0.001	<0.001	<0.001	NS	I 0.003	NS	NS	0.049	NS	NS	NS
Obesity	<0.001	<0.001	<0.001	NS	0.013	NS	0.004	<0.001	0.005	<0.05	0.054
Reason Come	<0.001	<0.001	<0.001	0.05	I 0.012	NS	NS	NS	NS	<0.01	NS

^o Less than 10 observations in at least one of the categories.

I Interaction with independent variable and sex--act differently on independent variable effect between male and female.

+ Age adjusted (Assume no interaction between independent variable and age).

* Controlled for sex.

CHI-SQUARE CROSS TABULATION - MEDICAL DATA

	Site	Sex	Age	Race	Ag-Inv.	Reason Come	PPD	EKG	Chest	U/A Pro	Aud	SMK
PPD	<0.001	NS	<0.001	<0.01	<0.01	<0.001						
EKG	NS	NS	NS+	NS	NS	NS						
Chest	<0.001+	NS	0.05+	NS	NS	0.05						
U/A P	NS	NS*	NS*	NS*	NS*	NS*						
Aud	<0.001	<0.001	<0.001	<0.05	<0.001	<0.01						
SMK	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001						
Conj	NS	NS*	0.052	NS*	<0.05*	NS*	NS+	NS*	NS*	-	NS+	NS*
Pter	NS	NS*	<0.001	NS	<0.01	<0.01	0.052	NS	NS	-	<0.05+	<0.05*
Ot.Med.	<0.01	<0.01	<0.001	NS	<0.05	NS	NS+	NS+	NS+	-	NS+	<0.01
Ot.Ex.	NS	NS*	NS	NS	NS*	<0.05	-	-	-	-	NS+	NS
Sinus.	NS	NS*	NS*	NS*	NS*	NS*	-	-	-	-	NS+	NS*
Head.	<0.001	<0.001	<0.001	NS	NS	<0.001	NS	NS+	NS*	I NS	NS	NS
Ch.Co.	<0.01	NS	<0.01	<0.001	NS	<0.001	<0.01	NS*	NS	-	NS	<0.001
SOB	NS	NS	<0.001	<0.05	<0.01	<0.001	NS	NS	NS	-	NS	<0.001
Rash	NS	NS	NS	NS	NS	<0.001	NS+	NS+	NS+	-	NS	NS
Lt.Mo.	NS	NS	<0.05	<0.01	NS	<0.05	NS*	NS*	NS*	-	NS*	<0.01
Muscle	<0.05	NS	<0.001	NS	NS	<0.01	NS	NS	NS	-	<0.05	0.05
Sv.Tr.	<0.001	<0.01	<0.01	<0.05	<0.001	NS	NS	NS	NS	-	NS	<0.05
Ch.UTI	NS	NS*	<0.05	NS	NS*	NS*	-	-	-	-	NS+	NS
Bir.D.	-	-	-	-	-	-	-	-	-	-	-	-
Jt.Pn.	<0.05	NS	<0.001	NS	<0.05	<0.001	NS	NS	NS	-	NS	NS
Diz.	0.05	NS	NS+	NS	NS	NS	-	NS*	NS*	-	NS*	NS
Insom.	-	<0.05	NS+	NS*	NS+	NS*	-	-	-	-	NS+	NS*
Neur.	NS	NS	NS	NS	NS	<0.001	NS	NS	NS	-	NS	NS
Diab.	<0.01	<0.001	<0.001	NS	NS	<0.001	NS	NS	NS	-	NS	NS
Hyper.	<0.05	NS	<0.001	NS	NS	<0.001	NS	<0.05	NS	<0.05*	<0.001	NS
Obesity	<0.001	0.001	<0.001	NS	<0.01	<0.001	<0.05	NS	NS	NS*	NS	NS

* At least one of the categories is less than 10.

+ Regrouping has been done in order to get valid χ^2 value.

- Little observation.

APPENDIX D

RESULTS OF CHOLINESTERASE DRAWINGS

Male - Cholinesterase Plasma

Male - Cholinesterase Red Blood Cells

Female - Cholinesterase Plasma

Female - Cholinesterase Red Blood Cells

RESULTS OF CHOLINESTERASE DRAWINGS

Male - Cholinesterase Plasma

<u>Reading</u>	<u>Number</u>	<u>Percent</u>
<2.6	1	0.9
2.6 - 3.5	10	8.9
3.6 - 4.5	37	32.7
4.6 - 5.5	45	39.8
5.6 - 6.5	17	15.0
>6.5	<u>3</u>	<u>2.7</u>
TOTAL	113	100.0

Normal Range 1.7 - 5.7

Study Range 1.8 - 6.8

RESULTS OF CHOLINESTERASE DRAWINGS

Male - Cholinesterase Red Blood Cells

<u>Reading</u>	<u>Number</u>	<u>Percent</u>
<8.0	1	0.9
8.0 - 8.9	2	1.7
9.0 - 9.9	5	4.4
10.0 - 10.9	28	24.8
11.0 - 11.9	27	23.9
12.0 - 12.9	14	12.4
13.0 - 13.9	15	13.3
14.0 - 14.9	7	6.2
15.0 - 15.9	9	8.0
16.0 - 16.9	3	2.7
>17.0	<u>2</u>	<u>1.7</u>
TOTAL	113	100.0

Normal Range 8.0 - 17.0

Study Range 1.4 - 17.6

RESULTS OF CHOLINESTERASE DRAWINGS

Female - Cholinesterase Plasma

<u>Reading</u>	<u>Number</u>	<u>Percent</u>
<3.4	2	4.9
3.4 - 4.3	20	48.8
4.4 - 5.3	13	31.7
5.4 - 6.3	5	12.2
>6.3	<u>1</u>	<u>2.4</u>
TOTAL	41	100.0

Normal Range 1.2 - 4.0

Study Range 2.4 - 6.6

RESULTS OF CHOLINESTERASE DRAWINGS

Female - Cholinesterase Red Blood Cells

<u>Reading</u>	<u>Number</u>	<u>Percent</u>
<8.5	2	5.0
8.5 - 9.4	2	5.0
9.5 - 10.4	9	21.9
10.5 - 11.4	6	14.7
11.5 - 12.4	6	14.7
12.5 - 13.4	6	14.7
13.5 - 14.4	3	7.0
14.5 - 15.4	3	7.0
15.5 - 16.4	2	5.0
>16.4	<u>2</u>	<u>5.0</u>
TOTAL	41	100.0

Normal Range 7.5 - 15.5

Study Range 8.4 - 17.0

APPENDIX E

MEDICAL WORKSHEETS

Designed to facilitate clinician training in agricultural safety and health and to serve as quick and easy to use as reference guides.

Zoonotic Diseases Worksheet

Specific Rural Problems Worksheet

ZOO NOTIC DISEASES - COMMUNITY HEALTH CLINICS, INC.
Compiled from various medical reference tests. September, 1976.

	Disease	Rx	Occurrence	Source	Incubation	Prevention	Comments
Anthrax "Malignant Pustule"	Character- istic skin lesions can be systemic	PCN Tetracy- cline	Uncommon in Idaho, endemic elsewhere	Spores, soil and hides	Within 7 days	Vaccine available, destruction of contami- nated hides	Spores sur- vive in acid soil indef- initely
Brucellosis	Continued irregular fever of variable duration; headache, weakness	Tetracy- cline	Occupation- al disease of live- stock handlers	Cattle, swine, sheep, goats, horses	Highly variable	Care in handling contaminated products, eliminate infected animals	Rare cause of death, but causes much dis- ability
Lepto- spirosis	Fever, chills, headache, severe malaise	PCN Strepto- mycin	Not often diagnosed but occurs in a rural population	Farm animals, especially urine	Usually 10 days	Avoiding contamina- ted water, urine, & animals	Immuniza- tion of farm animals prevents disease but not neces- sarily renal shedding
Q Fever	Acute febrile disease, pneumoni- tis and dry cough	Tetra- cycline	Endemic in several states; occurs more fre- quently than re- ported	Often air- borne from in- fected tissues	2-3 weeks	Strict hy- gienic measures with in- fected tissues	

ZOO NOTIC DISEASES (Continued)

	Disease	Rx	Occurrence	Source	Incubation	Prevention	Comments
Rabies	Almost invariably fatal, acute encephalomyelitis	Intense supportive medical care	Uncommon in man	Raccoons foxes bats dogs skunks	2-8 weeks	Immediate complete wound cleansing, vaccine if indicated	Rabbits, squirrels, chipmunks, rats & mice rarely infected, send head of suspicious biting animal to state lab packed in ice
Rocky Mtn. Spotted Fever	Sudden onset, moderate to high fever, persists 2-3 weeks, maculo-papular rash begins on palms & soles	Tetracycline	Most frequent in Southeastern U.S.	Ticks	3-10 days	Check for ticks every 3-4 hours, remove completely	Several hrs. (4-6) of attachment of the tick (or crushed tissues) are required before infection, incidence follows tick season
Colorado Tick Fever	Acute febrile, biphasic usually mild	Symptomatic	More common than Rocky Mtn. Spotted Fever	Ticks	4-5 days	Removal of ticks	Incidence follows tick season
Salmonella	Acute gastroenteritis, abdominal pain, fever, diarrhea	Symptomatic, rarely antibiotic	Common world-wide disease	Domestic & wild animals & man, esp. cows & chickens	12-36 hours	Thorough cooking, esp. meat & eggs, pasturize milk	

ZOONOTIC DISEASES (Continued)

	Disease	Rx	Occurrence	Source	Incubation	Prevention	Comments
Tetanus	Painful muscle contractions, abdominal rigidity	Supportive, tetanus immune globulin	Relatively uncommon	Soil & intestines of animals	10-14 days	Active immunization T/G if not immunized at time of injury	Recommended immunization schedule 2 initial doses 4 wks apart, 3rd dose 8-12 ms. later, booster every 5 yrs if injured
Toxoplasmosis	Infection seldom causes illness, in early pregnancy causes abortion, later brain damage	Sulfonamides used experimentally may work	Clinical disease, unusual	Rodents dogs, cats swine cattle sheep goats	Unknown	Thorough cooking of meat & avoidance of cat feces	
Trichinosis	Clinical disease variable mild febrile, can be fulminating eye symptoms	Thiabendazole	Variable	Swine, bear & many other animals	About 9 days	Careful processing & cooking of raw meat, esp. pork	
Tularemia	Sudden & dramatic onset of chills & fever	Streptomycin	Occurs in USA year round	Numerous wild animals, esp. wild cotton tails, flies & ticks	Usually 3 days	Avoid drinking raw water, tick & fly bites, care in skinning rabbits	

COMMUNITY HEALTH CLINICS, INC. NAMPA, IDAHO, September, 1976.

	Exposure to Wind, Sun, and Dust Spores	Plants	Agri- cultural Chemicals	Livestock	Vibration & Noise	Equipment	Anti- biotics in Feed	Hard Out- door Work
Eyes	Pterigium conjuncti- vitis corneal abrasions	Conjunc- tivitis corneal abrasions	Conjuncti- vitis/ miosis of Organophos- phate poisoning (cataracts of poison- ing) Bipyridyls	Trichino- sis		Trauma	Allergic reaction	
Ears	External otitis	Cheat grass			Tinnitus hearing			
Respir- atory	Soil fungi far- mers lung/ chronic cough/ asthma	Asthma	Irritation bronchitis asthma/ ammonia	Allergic reaction Q fever		Fumes, smoke		
Gastro- intes- tinal GI		Ingestion of poisons	Ingestion of poisons	Salmon- ella tapeworms TB			E. coli resistance	
Skin	Cancer	Poison ivy other contact dermati- tis	Anhydrous ammonia burns/ pesticide allergy/ irritants	Allergies anthrax ringworm Rocky Mt. Sp.Fever ins,bites		Lacera- tions	Allergic reaction	

	Exposure to Wind, Sun, and Dust Spores	Plants	Agri- cultural Chemicals	Livestock	Vibration & Noise	Equipment	Anti- biotics in Feed	Hard Out- door Work
Muscū- lar Skele- tal				Injuries tetanus	Pilonidal cysts/ back pain	Trauma		Degenera- tive arthritis
Neurolo- gical	Headaches		Toxic effects	Encephal- itis/ rabies	Headaches decreased hearing Raynauds phenomen- on			
FUO	Heat stroke			Brucel- losis Leptos- pirsis Q Fever Tularemia				Colorado tick fever Rocky Mt. Spotted Fever

APPENDIX F
NOISE SURVEYS

COMMUNITY HEALTH CLINICS, INC.
103 16th Avenue South
Nampa, Idaho 83651

NOISE SURVEYS
CDC-99-74-27

EQUIPMENT

International, Farmall 856 with cab, 140hp, 2,200 rpm, May 1, 1975.

DESCRIPTION

Conditions at time sound level measurements were made.

Tractor was equipped with a spray tank on both sides. The spraying operation was followed by rippling and harrowing. Sound levels were found to be 72dba at idle and 95 dbA at work.

EQUIPMENT

John Deere 3020, no cab, 67hp, 2,000 rpm, June 24, 1975.

DESCRIPTION

Conditions at time sound level measurements were made.

Tractor was equipped with spray tank on both sides. Liquid fertilizer was being applied as a side dressing to corn. Back turned blades cut the soil prior to the flow of fertilizer. Sound levels were found to be 81dba at idle and 93-95 dbA at work.

EQUIPMENT

John Deere 4010, no cab, 94hp, 2,000 rpm, June 24, 1975.

DESCRIPTION

Conditions at time sound level measurements were made.

Tractor was equipped with spray tanks on both sides. Liquid fertilizer was being applied as side dressing to beets. Sound levels were found to be 79dba at idle and 93.5dba at work.

EQUIPMENT

John Deere 4020, with cab, 120hp, 1,900 rpm.

DESCRIPTION

Conditions at time sound level measurements were made.

Tractor was equipped with an anhydrous tank in front center. Forward turned blades cut soil prior to application of the anhydrous ammonia. Sound level measurements were found to be 81dba at idle and 96.5-98.0dba at work.

NOTE: All sound measurements were made on the A scale of the meter at slow response in the hearing zone of the tractor operator. A General Radio 1565-B Sound Level Meter calibrated with a General Radio 1562-A Calibrator was used for this purpose.

