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# Epidemiology of Farm-Related Injuries:
## Bibliography with Abstracts

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Centers for Disease Control
National Institute for Occupational Safety and Health

# EPIDEMIOLOGY OF FARM-RELATED INJURIES: BIBLIOGRAPHY WITH ABSTRACTS

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# PREFACE

Agriculture is among the most hazardous occupations in America. In 1990, the most recent year for which data are available, the National Safety Council estimated that 1,300 agricultural workers died from work-related injuries; the fatal injury rate of 42 per 100,000 workers in agriculture is more than four times the rate for all occupations (National Safety Council 1991, 34). For every fatal injury, about 100 additional farmers experience an injury serious enough to require medical attention or keep them from normal activities for at least half a day.

Equally disturbing is the historical trend in farm-related injuries (Baker, O'Neill and Karpf 1984, 63). From 1930 through 1980, when the fatal injury rate from nonfarm machinery *decreased* by 79 percent, the fatal injury rate from farm machinery *increased* by 44 percent.

Several factors probably account for the paucity of sound research on the etiology of farm-related injuries. Human injury is associated with accidents, a phenomenon to which science has devoted little attention because of a widespread belief that these events are unpredictable and unpreventable (National Committee for Injury Prevention 1989, 4). In addition, rural dwellers have been the subject of many negative stereotypes, suggesting that they may be unworthy of the attention of scholars. Historically the countryside has been portrayed as a healthier environment than the city (Knudson 1985, 3). In any case, support for injury research has been minimal (Committee on Trauma Research 1985, 5).

The various professional disciplines working on this topic are relatively isolated from each other (Waller 1987, 35). Much of the agricultural engineering work is unknown to occupational safety and health experts, and much of the epidemiologic research is not regularly available to engineers and safety specialists. Another obstacle is the fact that much farm safety research is not published in the standard periodicals and professional literature. Although some research from each discipline is published in peer-reviewed journals that are indexed in bibliographic databases, an unusually large proportion of farm injury work is "fugitive" literature, appearing only in conference proceedings, government documents, unpublished theses and dissertations, or reports by state health departments, agricultural extension services, or other organizations.

Traditionally, efforts to reduce the toll of farm-related injuries have relied on educational approaches of safety specialists in each state's agricultural extension office and on engineering approaches used by farm equipment manufacturers. Recently, however, public health and occupational safety and health specialists have increased their interest in farm-related injuries (Committee on Trauma Research 1985, 2). Epidemiology and other tools of public health research are being employed to study the causes of farm-related injuries. Interventions designed to address other health problems are being applied to injuries (Committee to Review the Status and Progress of the Injury Control Program at the Centers for Disease Control 1988, 11, 67-69).

We hope that this bibliography will stimulate and facilitate research on farm-related injuries. Despite considerable effort over four years, we no doubt have failed to find every relevant

report. We welcome comments, questions, and copies of additional documents or citations on this subject. For this purpose, please contact David Nordstrom, M.S., M.P.H., at National Farm Medicine Center, 1000 North Oak Avenue, Marshfield, Wisconsin 54449-5790.

The National Farm Medicine Center is a program of the Marshfield Medical Research Foundation and Marshfield Clinic offering research, service, and education programs designed to improve the health and welfare of farmers and other rural Americans. Additional information about the National Farm Medicine Center can be obtained from Barbara Lee, M.S.N., Assistant Director, National Farm Medicine Center, 1000 North Oak Avenue, Marshfield, Wisconsin 54449-5790.

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# INTRODUCTION

## Purpose

The aim of this work is to locate, collect, and compile scholarly research reports on the occurrence and characteristics of farm-related injuries in an indexed bibliography with author's abstracts. The database will be disseminated to researchers, practitioners, and policymakers in several interested disciplines, including epidemiology, engineering, medicine, education, public health, law, and others (Waller 1987, 35-36).

Although farming may be the most hazardous work in the country (Layde 1990, 193), no comprehensive checklist exists on the epidemiology of farm-related injuries. The development of a thorough bibliography will fill this void and will likely stimulate research directed at the causes and consequences of farm-related injuries. After the causal relationships and consequences of farm-related injuries are established, appropriate interventions and policy prescriptions can be developed and implemented. From this perspective, the bibliography is an important step in the process of devising effective prevention strategies.

## Scope

In this work, injury is defined as the unintentional, harmful outcome resulting from the rapid transfer of any type of energy, including kinetic (mechanical), thermal, chemical, electrical, or radiant energy. The bibliography includes some references that focus on chronic exposures and on hazards of the agricultural industry, but all entries have some information on acute trauma. The bibliography does not attempt to cover suicide or homicide. Injuries may be fatal or nonfatal and include such types as fractures, lacerations, amputations, and others. Nonfatal injuries may be of any severity, excluding cumulative trauma disorders. We do not include reports of "accidents" unless humans are harmed in the process. Reports of damage to property or harm to animals are beyond the scope of this reference.

Farm-related injuries are defined as injuries that occur on the farm (outside the home) to farm workers, nonworking farm residents, and visitors to the farm. The definition excludes injuries related to logging and forestry. Our definition of farming is broad, including production agriculture throughout the world. In searching for relevant reports, we use 16 terms and their cognates singly and in combinations: *accident, injury, wound, disease, health, emergency, trauma, poisoning, machine, safety, agricultural, occupation, work, farm, ranch,* and *rural.* Reports on acute poisoning by agricultural chemicals are included, but those on chronic poisoning only are not. The emphasis in this collection is on surveillance and epidemiology; works are excluded if their sole focus is on rehabilitation, biomechanics, prevention and health promotion, toxicology, or agricultural engineering.

**List of Databases**

Using the above scope and terms, we searched the following 18 print and computerized bibliographic databases in several libraries:

(1) AGRICOLA (AGRICultural OnLine Access)
(2) Agricultural Engineering Index
(3) Bibliographic Index
(4) Biological and Agricultural Index
(5) CATLINE (CATalog OnLINE)
(6) Conference Papers Index
(7) Dissertation Abstracts Online
(8) GPO Monthly Catalog
(9) MEDLINE
(10) National Safety Council
(11) NIOSHTIC (NIOSH Technical Information Center Database)
(12) NTIS (National Technical Information Service Database)
(13) Readers' Guide to Periodical Literature
(14) SCISEARCH
(15) Social Sciences Index
(16) SOCIAL SCISEARCH
(17) Subject Guide to Books in Print
(18) World Translations Index

We concentrated on locating works from scientific and technical journals and monographs published in or translated into English. Entries from other languages appear with an English translation of their title in brackets. We obtained full documents, not citations or abstracts only. We examined and rejected more than 100 journal articles and monographs and more than 500 citations or abstracts of journal articles and monographs that did not meet our criteria for inclusion. We do not include nonprint media or, with rare exceptions, articles from other periodicals such as popular magazines, newspapers, or newsletters.

As we located relevant articles, we used two more methods to find other reports. Using 10 carefully selected articles on the epidemiology of farm-related injuries, we used standard citation indexes, SCISEARCH and SOCIAL SCISEARCH, to identify all works citing the articles. Also, whenever a document was reviewed and added to this bibliography, we scanned its references for potential additional publications.

In addition to searching various databases for farm-related injury references, we wrote to approximately 100 individuals involved in farm health and safety issues in the summer of 1988. The letter requested information on, or copies of, "fugitive" literature, including limited circulation reports, analyses, and statistics of the type that are collected by agricultural extension agents and state health departments. We received approximately one dozen responses to this inquiry, primarily state-specific injury occurrence reports. We also wrote to all World Health Organization collaborating centers for occupational health in the United States.

We probed the specialized research collection of the National Farm Medicine Center, a Marshfield Clinic program established in 1981. Staff of the Center directly monitor 40 serials for articles and citations falling within the scope of farm-related injury epidemiology.

**Software**

After assessing various bibliographic database software programs through a literature search and contacts with selected experts, we chose Pro-Cite® to prepare this bibliography. Pro-Cite® met our criteria of adaptability to a diversity of document types, excellent indexing and searching capability, widespread use in academic settings, capacity to store a large number of records, ease of use, and ability to import records from other databases easily. Subsequently we learned that authors of scientific books have begun to disseminate part of their work in diskette format with a read-only version of Pro-Cite®, and we planned to distribute this bibliography in a similar manner. The computer version of the bibliography can be searched with Boolean logic queries, which greatly increases its value to users.

**Coding Form**

We adapted terms used by the National Library of Medicine (1988) to develop a standard coding form (see page 206) with several dozen terms. We also developed a glossary of terms (see page 203) to accompany the form. Using the coding form, a trained abstractor first read and coded each document. An epidemiologist then read and coded the same work, correcting the first reader's assignments if necessary. (In difficult cases, a second epidemiologist was consulted.) Coding of the works in this bibliography occurred from August 1989 through June 1992. For the sake of relative completeness and convenience, we included only works published before or during 1991. We adopted journal title abbreviations used by the National Library of Medicine (1991).

**Number and Description of Entries**

This bibliography includes 343 journal reports and 180 monographs published from 1914 to 1991. Citations are listed as main entries (see figure 1) by year and, within year, alphabetically by primary author. Periodical reports have three-digit entry numbers, and monographs have four-digit entry numbers. In the entries for monographs, "n.p." denotes a document without page numbers. All abstracts in this volume are reprinted from the source reports. In some cases, particularly in earlier years, authors included a summary instead of an abstract. In some instances, we reprinted the summary in whole or in part as the abstract. Of 343 articles, 247 (or 72%) have an abstract reprinted in this bibliography.

Journal articles on farm-related injuries were rare until the 1980s (see figure 2). The 343 journal articles refer to 88 countries on all continents, although locations in North America and Europe are the most commonly mentioned (see figure 3). Within the United States, every state is mentioned in at least one report.

Although the reports appeared in 159 different journals, about half of them were published in 24 journals (see table 1). However, in accord with the injury field's cross-cutting nature, no

single journal contained more than 5% of the articles. Significantly, the names of some leading biomedical journals, such as American Journal of Epidemiology, Lancet, and New England Journal of Medicine, are absent from the list in table 1.

Not surprisingly, most reports describe case series studies. For example, a common report might summarize one clinic or hospital's experience with farm-related injury patients over a set time period from all locations, without regard to geography or population. Only 6 case control studies and 16 cohort studies are cited in the periodical articles in this volume.

Figure 1. – Main Entry Sample

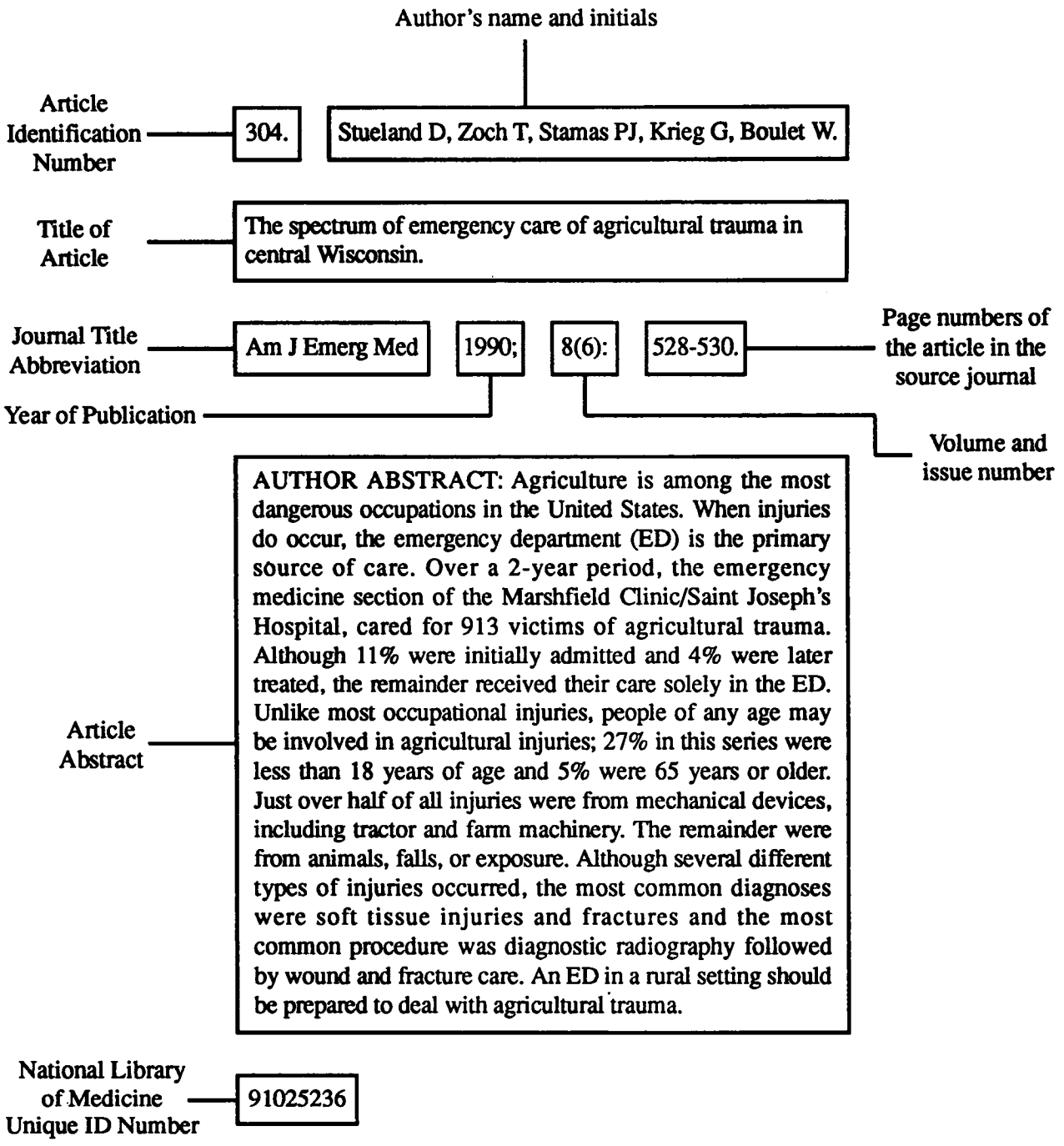
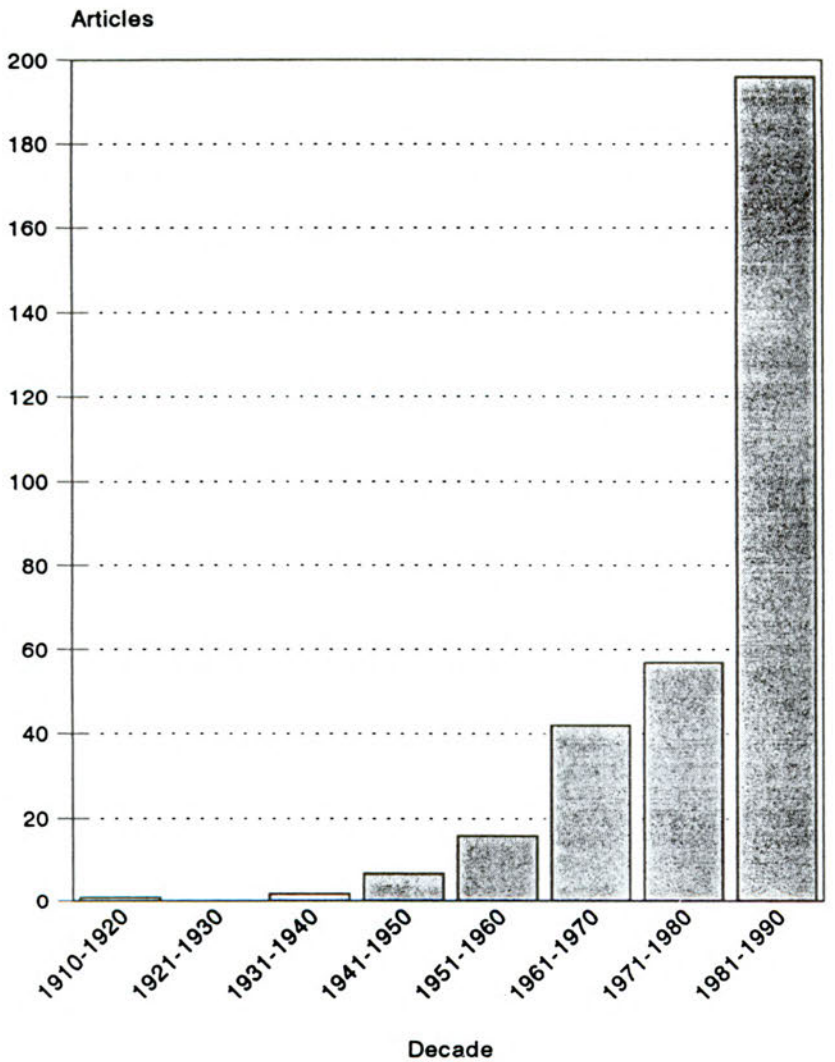


Figure 2. --Number of Journal Articles by Decade of Publication




Note: Graph does not include 22 articles published in 1991.

Figure 3. --Number of Geographic References by Continent or Area

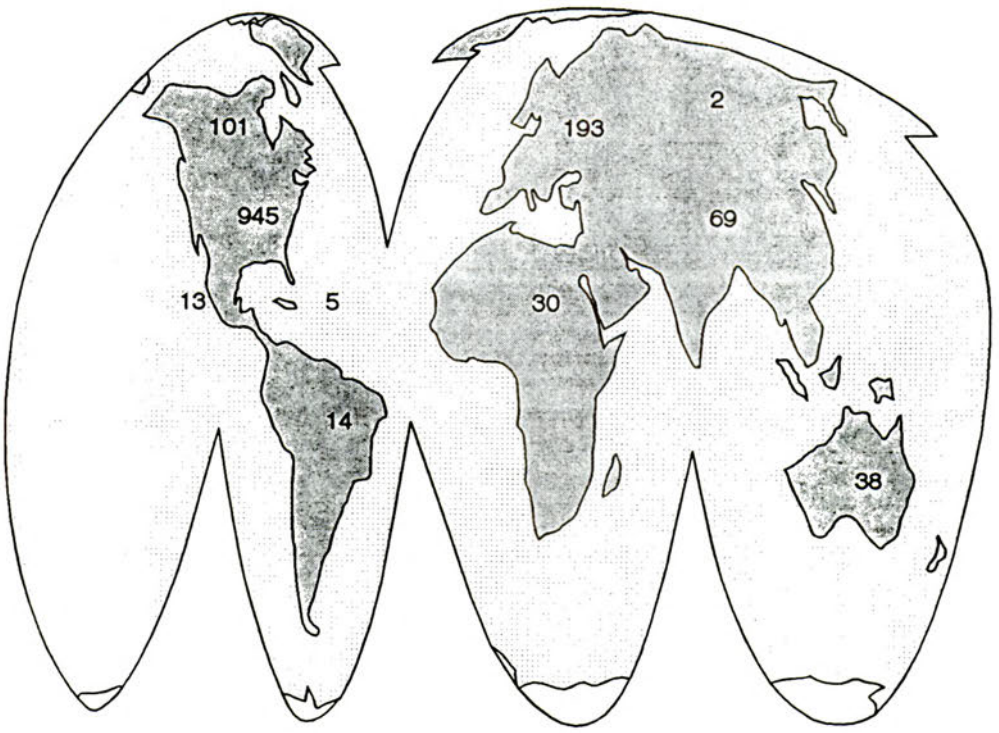


Table 1. -- Number of Articles by Title of Journal

| Journal | Number of References | Percent of Total References | Cumulative Percentage |
|---|---|---|---|
| American Journal of Public Health | 17 | 5.0 | 5.0 |
| American Journal of Industrial Medicine | 15 | 4.4 | 9.4 |
| Journal of Occupational Medicine | 14 | 4.1 | 13.5 |
| Journal of Trauma | 14 | 4.1 | 17.6 |
| JAMA. Journal of the American Medical Association | 10 | 2.9 | 20.5 |
| Journal of Rural Health | 8 | 2.3 | 22.8 |
| MMWR. Morbidity and Mortality Weekly Report | 8 | 2.3 | 25.1 |
| Archives of Environmental Health | 7 | 2.0 | 27.1 |
| Journal of Safety Research | 7 | 2.0 | 29.1 |
| Pediatrics | 7 | 2.0 | 31.1 |
| Scandinavian Journal of Social Medicine | 7 | 2.0 | 33.1 |
| Agricultural Engineering | 6 | 1.8 | 34.9 |
| Canadian Medical Association Journal | 5 | 1.5 | 36.4 |
| Injury: British Journal of Accident Surgery | 5 | 1.5 | 37.9 |
| Journal of the Society of Occupational Medicine | 5 | 1.5 | 39.4 |
| Public Health Reports | 5 | 1.5 | 40.9 |
| Wisconsin Medical Journal | 5 | 1.5 | 42.4 |
| Accident Analysis and Prevention | 4 | 1.2 | 43.6 |
| Annals of Occupational Hygiene | 4 | 1.2 | 44.8 |
| British Journal of Industrial Medicine | 4 | 1.2 | 46.0 |
| Journal of Family Practice | 4 | 1.2 | 47.2 |
| Journal of Occupational Accidents | 4 | 1.2 | 48.4 |
| Minnesota Medicine | 4 | 1.2 | 49.6 |
| Occupational Health | 4 | 1.2 | 50.8 |
| Other Journals (n=135, each with 3 or fewer references) | 170 | 49.6 | 100.4 |
| TOTAL | 343 | 100.4 | |

Most works included in this checklist are original research reports. We have identified 52 review articles and 21 review monographs. However, these reviews tend to focus on only one aspect of the farm injury problem, such as nonfatal injuries in children or adult deaths. Moreover, the median number of references cited in these papers is relatively small, none constitutes a thorough bibliography on the subject of farm-related injury epidemiology.

**Other Bibliographies**

Additional bibliographies could be prepared on aspects of farm-related injury other than surveillance and epidemiology. From our examination of all the reports that were considered for this bibliography, we believe the following areas to be potential candidates: prevention and health promotion, engineering, ergonomics, chronic effects of pesticide poisoning, and rehabilitation.

**Obtaining Full Report**

We are unable to supply copies of full reports cited in this bibliography. Readers are advised to use the following sources:

1) Author or publisher: articles are frequently available directly from the author or publisher.
2) Medical or other research libraries: these facilities often have the material on hand or know where it can be obtained. If available, each journal article entry includes the appropriate National Library of Medicine unique identification number to aid interlibrary loan requests.
3) Government: some U.S. Government-sponsored research reports, including ones out-of-print, are available from the National Technical Information Service, U.S. Department of Commerce.

**Indexes**

To make this checklist as useful as possible, we have included indexes by journal title, name of author (primary and all others), and subject. Subjects are basically those terms included in the coding form (see page 206). In the indexes, we use the letter-by-letter system for alphabetization. Numbers in the indexes refer to main entry numbers of the citations, not page numbers in this bibliography. The diskette version of the bibliography contains two additional indexes, journal abbreviations and report titles. Moreover, as discussed above, users who obtain a diskette version of this database will be able to search the titles or abstracts by a single word or combination of words using logical operators.

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Waller, J. A. 1987. Injury: Conceptual shifts and preventive implications. Annual Review of Public Health 8:21-49.

# ABSTRACTS

1. Hayhurst ER, Scott E. **Four cases of sudden death in a silo.** JAMA 1914;63(18):1570-1572.

NO ABSTRACT.

2. Forney RL. **Accident hazards in agriculture.** Agric Eng 1931;12(2):53-54.

NO ABSTRACT.

3. Powers JH. **The hazards of farming.** JAMA 1939;113(15):1375-1379.

AUTHOR ABSTRACT: Agricultural accidents were responsible for nearly one fourth of all the serious injuries treated at a medium sized rural hospital in the central part of New York State during the years 1929-1938 inclusive. Such accidents showed a definite seasonal variation with a peak during July and August, for which haying, the playing of children and other unclassified activities were largely responsible.

Fifty per cent of all farm accidents occurred either in the barn or in the barnyard.

Routine chores were the most dangerous single motivating activity, with logging and haying next in order of frequency. Farm tools and implements, animals, machinery and vehicles all contributed their share of injuries in about equal proportions. Falls were numerous.

Males were involved with ten times the frequency of females.

Nearly 50 per cent of the patients reached the hospital within two hours.

Fractures comprised one third of all injuries; division of nerves and tendons and partial or complete amputations of fingers and hands were common. The shoulder and upper extremity were injured more frequently than the hip and lower extremity.

The average period of hospitalization was 18.3 days and the average number of outpatient visits was 5.7.

The monetary loss incidental to a serious injury was for most farmers a major financial catastrophe. Twenty per cent were unable to pay anything for their hospitalization and professional care.

The mortality was 5.1 per cent.

4. Creevey K. **Farm accidents.** N Y State J Med 1942;42:2016-2020.

AUTHOR ABSTRACT: 1. Farming is naturally a hazardous occupation. The hazards are increased by poverty, which entails poor training and poor equipment. 2. Accident prevention as applied to industry is not easily applicable to farming, but improvement is possible, perhaps by education. 3. A series of 370 farm injuries treated in the Mary McClellan Hospital, Cambridge, New York, as analyzed statistically, compares closely with a previously reported series from the Mary Imogene Bassett Hospital, Cooperstown, New York. 4. Analysis of the exact causation of injury is presented. The greatest hazard on the farm is falling. 5. Suggestions for decreasing the accident rate on the farm consist chiefly of the application of care and common sense.

5. Palmer RA. **Engineering classification of farm accident hazards.** Agric Eng 1946;27:255-257.

NO ABSTRACT.

6. Young HH, Ghormley RK. **Accidents on the farm.** JAMA 1946;132(13):768-771.

AUTHOR ABSTRACT: Five hundred and seventy-five accidents on the farm caused the persons injured to come to the Mayo Clinic in the nine years from 1935 to 1943 inclusive. Most of the injuries were due to falls, farm

machinery and livestock. Most of the persons when injured were in their most productive years. Accurate statistics of farm accidents are not available, but the mortality rate from them is known to be extremely high. Other industries have reduced their accident rate by eliminating hazards as much as possible and by educating their employees in the safe ways of handling machinery. An educational program for the farmer is the first step in decreasing the number of accidents on the farm.

7. Calandruccio RA, Powers JH. **Farm accidents: a clinical and statistical study covering twenty years.** Am J Surg 1949;78(5):652-660.

AUTHOR ABSTRACT: Six hundred fifty-eight patients with serious injuries due to farm accident, representing one-fifth of all the admissions caused by trauma, were treated at the Mary Imogene Bassett Hospital during the years from 1929 to 1948.

Such accidents showed a definite variation in seasonal incidence with a peak during July and August for which haying, repair and construction of buildings, and children at play around farm machinery were largely responsible.

Routine chores were the most dangerous motivating activities throughout the year. Farm animals, tools and machinery contributed their share of injuries in about equal proportions. Falls were numerous.

Exactly one-half of the accidents occurred either in the barn or barnyard.

Nearly 50 per cent of the patients reached the Hospital in two hours.

Fractures comprised approximately one-third of the 1,527 recorded injuries. Extensive lacerations, division of nerves, tendons and blood vessels, and partial or complete amputation of extremities or portions thereof were common.

The average period of hospitalization was 18.3 days during the first decade of the survey and 14.1 during the second.

The mortality fell from 5.1 to 0.8 per cent.

Many farm patients were able to pay nothing for their hospitalization and professional care.

8. Robinson TCM. **Gathering and evaluating accident data with respect to farm people and farm workers.** Am J Public Health 1949;39:999-1003.

NO ABSTRACT.

9. Hardin CA, Robinson DW. **Compound injuries of the hand due to the mechanical corn picker.** J Kans Med Soc 1950;51:114-118.

NO ABSTRACT.

10. Powers JH. **Farm injuries.** N Engl J Med 1950;243(25):979-983.

AUTHOR ABSTRACT: Six hundred and fifty-eight patients with serious injuries due to farm accidents, representing a fifth of all the admissions caused by trauma, were treated at the Mary Imogene Bassett Hospital during the years 1929-1948.

Such accidents showed a definite variation in seasonal incidence with a peak during July and August for which haying, repair and construction of buildings, and children at play were largely responsible.

Routine chores were the most dangerous motivating activities throughout the year. Farm animals, tools and machinery contributed their share of injuries in that order. Falls were numerous.

Exactly half the accidents occurred either in the barn or in the barnyard.

Nearly 50 per cent of the patients reached the hospital in two hours.

Fractures comprised approximately a third of the 1527 recorded injuries. Extensive lacerations, divisions of nerves, tendons and blood vessels and partial or complete amputations of extremities were common.

The average period of hospitalization was eighteen and three-tenths days during the first ten years of survey and fourteen and one-tenth days during the second.

The mortality fell from 5.1 per cent in the first decade to 0.8 per cent during the second.

11. **Farm accidents.** JAMA 1953;153(1):34-35.

NO ABSTRACT.

12. King HF. **An age-analysis of some agricultural accidents.** Occup Psych 1955;29(4):245-253.

AUTHOR ABSTRACT: Reports on investigations into age variation in accident rates among industrial workers have usually presented data showing overall frequencies of accidents for a department, a factory, or an even wider area. Apart from difficulties which arise through inadequate control of exposure to risk, such data are of little assistance as a guide to practical measures of accident prevention, since no account is taken of age differences in kinds of liability. In this study and analysis was made of nearly 2,000 accidents to workers in agriculture, where there is a wide range of tasks and situations, and a corresponding variety of kinds of accident, to see whether age differences could be established. The results indicated that the prevalent kinds of accidents varied with age, significant differences being found for accident causes, the nature of injury, and the part of the body injured.

13. Snyder HE. **Trauma in rural areas.** Postgrad Med 1955;18:332-339.

NO ABSTRACT.

14. Bloemendaal GJ. **Rural occupational accidents.** S D J Med Pharm 1956;9:209.

NO ABSTRACT.

15. Garber LF. **Data on poison mishaps do not show true rate.** Public Health Rep 1956;71(3):266-270.

NO ABSTRACT.

16. Hatch CS, Jones RM. **Unusual farm machinery injuries.** Am J Surg 1956;91(4):501-508.

NO ABSTRACT.

17. Lubinus L, Peterson W. **Farm accidents.** S D J Med 1956;9:245-251.

PRESENTATION SUMMARY: Mr. Lubinus first presented a very interesting and provocative group of statistics regarding farm accidents in the United States and more specifically in South Dakota. Included were data supporting the fact that agriculture is the third most hazardous industry in the U. S., that there were 14,000 rural accidental deaths in the U. S. during 1954 and that of these 3,800 occurred in the course of an occupational procedure. In South Dakota 86 farm residents were killed in farm accidents in 1953. 59% of these accidental deaths involved farm machines, 25% falls, and 16% livestock. Mr. Lubinus stressed the importance of the 3 E's of safety,

Engineering, Education and Enforcement. Engineering has done a good job in the case of farm machinery and can only go as far without interfering with efficiency, enforcement has little place in farm safety, and so most of the efforts need be continually directed toward education. He also stated that the greatest tragedy of farm accidents is that the family status is nearly always charged unnecessarily as most farm accidents are avoidable. Dr. Lubinus very dramatically illustrated rural accident problems involving human reaction time, gasoline hazards, and tractor hazards by the use of stage demonstrations.

Next, Mr. Peterson discussed some of the hazards and problems attending the recent widespread and extensive use of electricity in agricultural operations. He also effectively illustrated the problems through demonstrations and slides and emphasized the fact that many of properties of electricity are not adequately understood by rural people who are applying its use.

18. Top FH. **Preventive medicine in agriculture.** JAMA 1956;161(14):1357-1360.

AUTHOR ABSTRACT: The health problems of the agricultural worker are numerous and important, and some have not been solved. Better reporting and classification of accidents is essential, for in 1954 there were 1,200,000 injuries on the farm, with 14,000 deaths.

Infections of animals are transmissible to man in many instances. Among the most important of these zoonoses in the United States at this time are anthrax, brucellosis, arthropod-borne encephalitis, Q fever, rabies, salmonellosis, trichinosis, bovine tuberculosis, and tularemia. Progress here also depends on improved reporting.

The farmer is exposed to innumerable new chemicals, including pesticides, growth stimulators, and antibiotics. Greater awareness of their danger is desirable. Skin disease from bites and irritants, pulmonary disease from dusts and pollens, gastrointestinal disease from poor sanitation, and disturbances of mental health assumed to be more common in rural than in urban areas require further investigation. An Institute of Agricultural Medicine has been organized in Iowa in an effort to make sure than special attention will be devoted to these problems.

19. LaTourette DP. **Industrial injuries of farm workers.** Calif Med 1957;87(3):142-144.

AUTHOR ABSTRACT: Most industrial employees receive physical examinations to evaluate their physical fitness in relation to their work. The farm worker is neglected in this matter, in that he is hired for almost any type of work without physical evaluation. As a result, his accident rate is high. His efficiency at his work is low. His time loss from work because of sickness and accident is high, and the employer pays a very high rate of insurance for the patient's care and his own legal protection.

Physical fitness cards should be carried by all farm laborers so that they would be put in properly graded jobs.

20. Walsh LG, Chalkley THF, Evans AS. **Nonfatal farm accidents: report of a pilot study and review of the literature.** Wis Med J 1958;57:118-126.

AUTHOR ABSTRACT: 1. A study of 66 farm accidents requiring medical care occurring in Dane County, Wisconsin, in the summer of 1956 has been made by means of personal interview, standard questionnaire, and on-the-spot visits. The results of these studies have been compared with those of others reported in the literature. 2. Machines, falls, and animals account for the majority of accidents and often result from unfamiliarity with the object, poor state of repair, and carelessness. 3. In most accidents, human factors outweighed the mechanical. Children and the aged(60 to 69) constituted special risks. Fatigue, working after hours, and hurrying were common in accidents. Medical disability was infrequently associated. 4. The most common injuries were fractures, lacerations, contusions and abrasions in that order. Hospitalization was necessary for only 13 of the 66 (20%), but was expensive since an average hospital stay of 14 days was involved. In all 66 cases, a total of 1,391 days of partial disability resulted, an average of 21 days per accident. Approximately half the victims had total insurance

coverage, and 19 others were partially covered. 5. Few of the accident victims had taken formal training in farm safety. 6. The role of the rural physician in prevention of farm accidents and in minimizing their consequences is discussed.

21. Berry CM. **Agricultural industry - the changing pattern.** Am J Public Health 1959;49(5):616-621.

AUTHOR ABSTRACT: Agriculture is today an industry. The farmer must be considered a worker in industry with individual problems of occupational health. That is the theme of this article, which offers proposals for action.

22. Coe M. **Making agriculture safe: an analysis of the problem and its solution.** J Kans Med Soc 1959;60(2):70-73.

NO ABSTRACT.

23. Wardle NJ. **Safety engineering aspects of farm injuries.** J Iowa Med Soc 1959;49(7):394-396.

NO ABSTRACT.

24. McLaughlin CW Jr., Coe JD. **Farm injuries.** Postgrad Med 1960;27:165-171.

AUTHOR ABSTRACT: Few civilian wounds present more distressing or extensive destruction of tissue than do those caused by injudiciously used farm machinery.

Nonfatal farm accidents most frequently involve the extremities; crushing injuries and thermal and electric burns are also common.

All wounds received in farm accidents are grossly contaminated and carry with them real problems of tetanus and gas infection. The authors discuss the management of these injuries and suggest ways of decreasing the number of farm accidents.

25. Urech E. **[Traumatismes agricoles independants de la mecanisation].** Helv Chir Acta 1960;27:432-440.

AUTHOR ABSTRACT: The study covers 550 farming accidents, all due to other causes than mechanization. The main causes for traumatisms are, in order, cattle, falls, farming instruments and carts. Fractures are particularly frequent; wounds and bruises come next. Combined injuries amount to 3.5%. The limbs are particularly exposed. Then come the head, the neck and the thorax. Children and aged farmers are more often wounded than young adults. Death occurs in 5% of cases. Mechanization has not increased the proportion of injuries.

26. Urech E. **[Les traumatismes dus a la mecanisation de l'agriculture].** Praxis 1960;49(7):169-177.

AUTHOR ABSTRACT: (No English abstract. French and German summaries available in article.)

27. Bartlett LC. **Farm injuries.** Manit Med Rev 1961;41:174-177.

NO ABSTRACT.

28. Cleary JP, Benzmiller JA, Kloppedal EA, Gallagher DJ, Evans AS. **Farm injuries in Dane county, Wisconsin: an epidemiological study**. Arch Environ Health 1961;3:201-208.

AUTHOR ABSTRACT: An epidemiologic study of 105 farm injuries has been made, and certain aspects compared with 125 farms on which no accident occurred.

Machines were the most frequent agent factor, and these usually had been employed in routine chores. Weather and other environmental aspects play little role. The host factors, especially carelessness and hurry, were of greatest importance.

Significant differences were not found between accident and control farms.

The prevention of injuries on the farm is discussed.

29. Knapp LW. **Epidemiological aspect of tractor accidents**. Trans Am Soc Agric Eng 1961;4(2):229-230.

NO ABSTRACT.

30. Top FH. **Occupational health in agriculture**. Arch Environ Health 1961;2:150-154.

NO ABSTRACT.

31. Gordon JE, Gulati PV, Wyon JB. **Traumatic accidents in rural tropical regions: an epidemiological field study in Punjab, India**. Am J Med Sci 1962;243:158-178.

NO ABSTRACT.

32. Knapp LW Jr. **Research methodology and potential in farm accidents**. Ann NY Acad Sci 1963;107:664-669.

NO ABSTRACT.

33. Lucas GL, Wirka HW. **Farm accidents occurring in children**. Wis Med J 1963;62(10):405-409.

AUTHOR ABSTRACT: Sixteen cases of farm accidents occurring in children were evaluated with emphasis on the mechanism of injury, type of wound encountered, and general aspects of treatment. It is noted that proper control of this problem lies in preventive rather than therapeutic measures.

It is questionable whether much can be accomplished toward prevention of farm injuries without more responsiveness of the farmer to safety measures. If the farmer divorced his children from his work around machines, as the factory worker does, a sharp decrease in accidents of this type would occur.

34. Nolen WA. **Farm trauma**. Minn Med 1963;46:337-340.

AUTHOR ABSTRACT: The role of the doctor in preventing farm accidents must be chiefly catalytic. Through contact with his farmer patients he may be able to stimulate interest in safety education; he can certainly warn them of the results of carelessness as seen by a physician. Unfortunately, however, the major contribution the doctor can make will continue to be immediate and skilled repair of injuries.

35. Dervillee E. **[Causes et prevention des accidents du travail en agriculture]**. Gaz Med France 1964;71:691-698.

AUTHOR ABSTRACT: (No English abstract. French abstract available in article.)

36. Dervillee E. **[Le risque accidentel sur les tracteurs]**. Concours Med 1964;86:511-514.

AUTHOR ABSTRACT: (No English abstract. French abstract available in article.)

37. Powers JH. **Hazards to health: the hazards of farming**. N Engl J Med 1964;270(16):839-841.

NO ABSTRACT.

38. **Accident hazards on the farm**. Stat Bull Metrop Insur Co 1965;46:8-10.

NO ABSTRACT.

39. Berry CM. **Organized research in agricultural health and safety**. Am J Public Health 1965;55(3):424-428.

AUTHOR ABSTRACT: It is apparent from the foregoing that safety and health have been largely neglected areas among agricultural populations. A smaller farm population and a larger health and safety potential make it imperative that programs be developed to effect needed improvements. Programs cannot be developed until information is at hand on where the problems are, what they are, how big they are, and with some indication as to how they may best be attacked.

The kinds of problems that are known to exist in agricultural areas are not capable of being grouped into such sharply defined packages that they can be handled by any individual discipline. A multidisciplinary approach calls for a multiplicity of skills, with internal and external coordination and cooperation. Certain specific needs by such a group from extramural areas can be identified.

From an intramural standpoint the maximum performance will require the complete cooperation of able and dedicated workers who are sufficiently mature, personally and professionally, to make the most of the resources at their disposal. Such an organization should be worthy of the professional support from the societies to which those disciplines belong and the financial support of those agencies charged with public health responsibilities.

40. Knapp LW Jr. **Agricultural injury prevention**. J Occup Med 1965;7(11):545-553.

AUTHOR ABSTRACT: Agricultural industries in this country directly utilize the services of 7.1 million workers. In addition, 10 million other workers are engaged in ancillary activities such as the transportation and marketing of agricultural products. Agriculture yearly leads to more fatalities than any other pursuit and to a higher number of nonfatal accidents. The causes of agricultural accidents are by no means unique, but in no small part they relate to farm machinery and equipment. There are many circumstances that mark the agricultural worker as dissimilar to the usual industrial employee. The same principles of accident prevention that are applicable to industry in general apply to agricultural activities, but some distinct measures are requisite. Various features of appropriate agricultural-safety programs are presented.

41. Lucas GL, Wirka HW. **Orthopedic problems in agricultural trauma**. Wis Med J 1965;64(12):471-475.

AUTHOR ABSTRACT: Accidents are responsible for twice as many deaths in persons one to 25 years old as the next two most frequent fatal diseases combined. During the next 20 years of life, accidents are superceded only by cardiac disease as the cause of death. Accidents incurred while at work are responsible for a substantial portion of these deaths, and in this group agricultural mishaps contribute a major portion. The number of agricultural deaths is not only prodigious, but rather than showing a decrease as in some other industrial categories, is actually rising. More importantly, for each agricultural injury resulting in death, there are approximately 100 nonfatal injuries of varying severity. These are responsible for an amount of time lost from work which has been conservatively estimated at 20,000,000 working days per year. The etiologic agents in such accidents excluding motor vehicle accidents on rural highways, are predominately falls and machinery. More fundamentally perhaps, 70 per cent of farm accidents can be ascribed to carelessness, fatigue, and haste; i.e., theoretically preventable.

The concern of the orthopedic surgeon becomes obvious when one notes the nature of the traumatic event and resultant lesion in most farm injuries. It can be seen from this small series of cases that agricultural trauma produces serious musculoskeletal injury. In this report, fundamental principles of surgical treatment, general supportive care, proper splintage, adequate cleansing and debridement of wounds, prevention of infection, and secure fixation of fractures are stressed. Modalities of treatment of such injuries are not likely to improve appreciably in the near future, whereas we can expect some improvement in rural medical facilities. However, until each individual farmer maintains a constant awareness of the danger of his tools and environment and healthy respect for them, farm accidents will continue to occur at a substantial rate.

42. Rees WD. **Agricultural tractor accidents: a description of 14 tractor accidents and a comparison with road traffic accidents**. Br Med J 1965;2(5453):63-66.

AUTHOR ABSTRACT: Fourteen accidents involving agricultural tractors are described.

If a driver is injured when a tractor overturns the chances are shown to be about one in four that he will be killed.

Tractor accidents are shown to have a much higher mortality and serious-injury rate than road-traffic accidents.

Tractor accidents produce injuries of the crush type, and the trunk is more likely to be injured than the head or extremities.

The type of man most likely to be involved in a tractor accident is one who is married, who is an experienced driver, and who is over 30 years old.

Tractors should be provided with safety frames that are strong enough to protect the drivers from being crushed should the vehicles overturn.

43. Hansen M. **Reducing tractor fatalities**. Agric Eng 1966;47:472-474.

NO ABSTRACT.

44. Hayes WJ, Pirkle CI. **Mortality from pesticides in 1961**. Arch Environ Health 1966;12(1):43-55.

AUTHOR ABSTRACT: There were 119 deaths in 1961 possibly related to pesticides, and 111 of them were ascribed to identifiable materials. About 90% of deaths attributed to pesticides were correctly diagnosed as indicated by evidence of adequate exposure, a consistent clinical course, or appropriate laboratory and autopsy findings. Of the 111 reasonably definite cases, 51% were in children under 10 years old; at least 58% involved compounds older than chlorophenothane (DDT); not more than 15% were occupational; and several cases were associated with alcoholic intoxication, mental deficiency, improper storage of the poison, or some other special circumstance. Safer

use of pesticides in this country should be attainable because, especially in children, a few countries already have a lower mortality rate associated with these useful materials.
90087825

45. Knapp LW Jr. **Occupational and rural accidents.** Arch Environ Health 1966;13(10):501-506.

AUTHOR ABSTRACT: It is a fact that the agriculturist's occupation is frequently inherited, with the son following in the father's footsteps. He gains the major part of his training for dealing with the problems of farming accidents through experience and informal observation. In addition, it is obvious that in contrast to the industrial worker, he spends most of his working time alone.

The farmer is not necessarily a healthy person, in the sense that living on a farm makes a person healthy. Rather, the farmer must be a basically healthy person if he is to be able to live on a farm. The problems of working in the heat and cold, dust and fumes, rain and sun, in spite of colds, asthma, allergies, bruises, and zoonotic diseases, makes farming a struggle for physical self-preservation.

Farm accidents should not be regarded as specifically those kinds of injuries produced by agricultural equipment or animals on the farm. Agricultural accidents are not unique, nor do they happen to a unique group of people--they are instead the same kinds of accidents that befall the rest of the population, with the addition of a few which are peculiar to the occupation of agriculture.

Speed in the development of research in accident prevention is imperative. In a determination of factors involved in today's farm accidents, one must remember that the machines being studied are likely to be old in design. Manufacturers of farm equipment are designing machines that will appear on the market five years hence, and in many instances are considerably different from year to year.

We cannot stand still to await a highly sophisticated agricultural accident preventive research methodology to evolve while crude or less refined methods can provide immediate answers to some of the major problems encountered. Much work needs to be done along the lines of reporting accidents and improving techniques of interviewing. Also, the efforts of the finest investigators using the latest techniques will be sterile unless the information gathered is disseminated to the manufacturers of farm machinery and to individual farm workers.

Finally, medical services and rehabilitation programs must be improved for the agricultural worker of America. We can ill afford to lose even a small portion of this labor force when so many people, both at home and abroad, depend upon so few for their food and fiber.
67040047

46. Mainzer W. **Accident prevention in the cowshed.** Br J Ind Med 1966;23(1):24-27.

AUTHOR ABSTRACT: Work accidents were studied at two agricultural settlements in the Haifa area. Most of the accidents were caused by farm animals, particularly by cattle, a fact which is in agreement with a general statistical survey conducted by the Department for Occupational Health of the General Federation of Labour in Israel. However, in the present investigation it was found that the accident rate in cowsheds was more than 10 times higher among the members of a co-operative smallholders' village (Moshav Ovdim) than it was at a collective settlement (Moshav Shetufi) of the same numerical size. Searching for the basic factors involved, it was discovered that the main reason for this striking difference in accident frequency was the faulty design of the small cowshed at the individual farms of the co-operative settlement, which, lacking adequate protective measures, exposes the farmer to close contact with the animals throughout almost all stages of dealing with them.

It is concluded that accidents from handling cattle can be prevented by adhering strictly to the principle of eliminating direct contact between man and animals in the construction of the cowshed and its annexes.
66082293

47. Wilson GS. **Farm safety**. Br J Ind Med 1966;23(1):1-15.

AUTHOR ABSTRACT: Accident and safety are related terms; the higher the accident rate in any industry, the greater is the need for safety measures designed to prevent accidents. This article discusses the accident and safety problems in agriculture, which includes horticulture and forestry.

There is still a tendency among townspeople to think of the countryside as peaceful and tranquil, a place where nothing happens very quickly and far removed from violent death or crippling injury. This pleasant rustic picture has undergone a striking change in the last 30 years owing to considerable agricultural mechanization and the development of chemical pesticides, which have brought new dangers to those who live and work on the land.

Although men have readily adapted themselves to new machines and methods, they have not proved as able to recognize new dangers and learn how to guard against them. In consequence, accidents have increased to such an extent that the whole industry has realized the need for positive preventive measures.

In this country, it is generally accepted that an employer of labour has a responsibility to provide safe working conditions for those he employs. Farm safety legislation goes a little further and usually requires an employer to provide necessary safeguards, with the added requirement on a worker to make use of them.

It is a feature of accident prevention work that it never reaches a stage when it can be regarded as complete. Even when a reduction in accidents has been achieved, the effort must be sustained or the trend will be quickly reversed.
66082292

48. **The health of agricultural workers**. J Occup Med 1967;9(3):137-138.

NO ABSTRACT.
67094715

49. Hardin CA. **Hay baler injuries requiring forequarter amputation**. J Trauma 1967;7(1):164-168.

AUTHOR ABSTRACT: 1) Two cases of hay baler injury requiring forequarter amputation are presented. 2) Berger's anterior approach of forequarter amputation was used, allowing rapid removal of all devitalized tissue and control of hemorrhage. 3) The operative wound should be left open after adequate debridement for drainage. When the granulating tissue is clean, split-thickness skin coverage should be done. 4) No phantom limb pain was seen in either of these cases.
67091186

50. Jones LA. **Fatal accidents on farms, 1965**. Agric Finance Rev 1967;28:54-60.

NO ABSTRACT.

51. Knapp LW Jr., Top FH. **Trauma associated with tractor overturn**. Occup Health 1967;19:129-131.

NO ABSTRACT.

52. McKinnon DA, Robinson DW, Masters FW. **Hay baler injuries**. J Trauma 1967;7(2):265-274.

AUTHOR ABSTRACT: 1) The critical review of 12 cases of trauma produced by hay baler accidents has shown a characteristically devastating pattern of injury to the upper extremity, requiring some form of amputation in 50

per cent of the individuals. 2) The treatment consists of conservation of all viable tissue and bone, followed by reconstruction of the individual defects. 3) If incapacitating injury is to be prevented, greater emphasis must be placed upon safety education of the farmer and safety engineering of the equipment.
67094738

53. Muckala KA. **Farm accidents and their prevention: an epidemiological approach.** Minn Med 1967;50(10):1477-1482.

NO ABSTRACT.
68040473

54. Suchman EA, Munoz RA. **Accident occurrence and control among sugar-cane workers.** J Occup Med 1967;9(8):407-414.

NO ABSTRACT.
67207612

55. **Farm accidents: a continuing problem.** Stat Bull Metrop Insur Co 1968;49:6-8.

NO ABSTRACT.

56. Foss EW. **Accidents to farmers and woods workers in New York state.** Trans Am Soc Agric Eng 1968;11:551-552, 557.

NO ABSTRACT.

57. McFarland TD. **On-farm accidents: how to make the farm machine-man-environment system function as it should.** Agric Eng 1968:581, 614.

NO ABSTRACT.

58. Smithurst BA. **An epidemiological study of 162 tractor accidents in Australia, 1964 to 1966.** Med J Aust 1968;1(2):51-54.

AUTHOR ABSTRACT: Australia is a major agricultural nation, which must employ tractors for efficient farming. This paper has attempted to point out that a definite accident problem exists in their use, but that, in the majority of cases, this risk can be avoided by more care in driving and better stability of the machine. The majority of accidents studied were due to tractors tipping and overturning, or to people falling under the wheels. It is thought that accidents of this type do not present an insoluble problem, and that, in particular, improved tractor design would be a great advantage. The unpredictable and often foolhardy behaviour of tractor drivers, like that of motor-car drivers, is the despair of specialists in preventive medicine and, apart from education and enforcement, it is difficult to know how they can be influenced towards safer driving habits.

In conclusion, it should again be noted that there is a bias in this study, because of the large number of fatal accidents (103 out of 162) which have been analysed. This is unavoidable, and an attempt is being made at present to obtain a clearer picture of the proportion of fatal to non-fatal accidents, as well as accurate figures on accident frequency.
68156010

59. Weiser J. **Tractors and children.** Arch Belg Med Soc 1968;26(3):216-221.

NO ABSTRACT.
69028972

60. Blake J. **Ocular hazards in agriculture.** Opthalmologica 1969;158(1):125-135.

AUTHOR ABSTRACT: A 10-year review of eye injuries in agricultural workers in Ireland revealed that over two-fifths (41.5%) of all serious trauma was caused by bushes - usually the Whitehorn Crataegus Monogyna - with greatest frequency in the months of winter and spring. Farm animals caused only 5.5% and machinery and tools a mere 6.3% of injuries.

When the incidence of trauma was assessed relative to the total number of agricultural workers in each ten years of age the fifth and sixth decades were found to be by far the most vulnerable.

Amongst the individual cases described is one of internal ophthalmomyiasis in an eleven year old farmer's son. The larva of the warble-fly Hypoderma Bovis was seen in the anterior chamber of the boy's eye and subsequent section of the eye disclosed the cystic cavity it had occupied between the sclera and ciliary body.
70061478

61. Cooper DKC. **Agricultural accidents: a study of 132 patients seen at Addenbrooke's Hospital, Cambridge, in 12 months.** Br Med J 1969;4(677):193-198.

AUTHOR ABSTRACT: In a 12-month study 132 patients injured in agricultural accidents were treated at the Accident Service of Addenbrooke's Hospital, Cambridge. Agricultural machinery and implements were concerned in 50% of the accidents and animals in 10%. The state of immunity against tetanus of these patients was found to be extremely low, only 9% being fully immunized, and 56% having never received a course of prophylactic adsorbed tetanus toxoid.

While prevention is obviously the only real solution to accidents of any nature, legislation is not enough to achieve this, and the final responsibility lies with the farmworker to ensure that all safety precautions are followed.
70028856

62. Huston AF, Smith C. **Farm accidents in Saskatchewan.** Can Med Assoc J 1969;100(16):764-769.

NO ABSTRACT.
69167700

63. Jamieson ES. **Orthopaedic problems arising from farm work.** Ann Occup Hyg 1969;12(2):87-93.

AUTHOR ABSTRACT: Because of mechanization, many farm injuries are similar to industrial injuries. The most frequently occurring agricultural injuries are discussed. Man's altered reaction to stress and injury are considered.
69179145

64. Moss CJ. **Machinery hazards.** Ann Occup Hyg 1969;12(2):69-75.

AUTHOR ABSTRACT: Potential accident hazards and health risks in a mechanised agricultural environment are discussed. The improved design of tractors will reduce the risk of overturning, safeguard the driver if accidents do occur and lessen the physiological damage caused by noise, vibration and jolting. Noise-induced hearing loss is found in 50 per cent of tractor drivers and the noise from other agricultural equipment, such as orchard-spraying equipment, various types of barn machinery and chain saws, increases the likelihood of impairment of the hearing. Hazards from the moving parts of machinery, the danger of falls, high dust concentrations in barns and excessive carbon monoxide levels, from the use of petrol engines in enclosed areas, are given as examples of other agricultural risks.
69179143

65. Pfister RG, Hofmeister KM. **A study of accidents occurring to farm people in Michigan.** J Saf Res 1969;1(1):28-41.

AUTHOR ABSTRACT: A stratified random sample of 2,139 farms was used to obtain information on accidents occurring to farm people during the period of June 1, 1967 to May 31, 1968. Accidents occurred at a rate of 13.1 per hundred farms or 29.8 per thousand farm family members. Farm-work accidents occurred at a rate of 20.6 per million man hours exposure. Size or type of farm was not significantly related to the accident frequency rate. Hired labor accident rates were significantly higher than that of the farm family. Male accident rates were higher than female rates, and male youth under 15 years of age significantly higher than the rate of more mature workers. Tractors, automobiles and ladders were the agencies most frequently involved in accidents.

66. Steele-Bodger A. **Hazards of animal handling.** Ann Occup Hyg 1969;12(2):79-85.

AUTHOR ABSTRACT: Agriculture is the country's most hazardous industry. Injuries to stockmen account for the loss of many hours of working time. Some injuries are foreseeable and preventable and stem from ignorance, inexperience, forgetfulness and fear. There is a lack of regulations to safeguard stockmen. Intensive animal husbandry does not enable a man to acquire a familiarity with the individual animal and a knowledge of its particular habits. General criteria for handling animals are available and apply to the direction and speed of approach and the type of touch. Suggested methods of handling a variety of farm animals are given.
69179144

67. Wilson GS. **Safety, health and welfare in agriculture.** Ann Occup Hyg 1969;12(2):129-135.

AUTHOR ABSTRACT: The development of regulations to safeguard the agricultural worker began in 1946 when the government set up an independent committee to examine and recommend measures relating to the safety, health and welfare of persons in the industry. Regulations now exist to protect agricultural workers against a number of the special risks to which they are exposed. Descriptions are given of the most important Acts, and of other means by which the Ministry of Agriculture, Fisheries and Food hope to reduce and prevent accidents on the farm. Likely future developments and the safety problems they will present are considered.
69179141

68. Bible BL. **Farm accidents.** JAMA 1970;214(3):457-458.

NO ABSTRACT.

69. Blake J. **Eye injuries in agriculture.** J Ir Med Assoc 1971;64(418):420-423.

NO ABSTRACT.
71277509

70. Cooper DKC. **Accidents in agriculture.** Injury 1971;3(1):1-8.

AUTHOR ABSTRACT: In 1967 the Ministry of Agriculture, Fisheries and Food reported 8686 accidents and diseases in agriculture in England and Wales, of which 114 (1.3 per cent) were fatal. In a recent 12-month study in Cambridge, 132 patients were seen with injuries resulting while they were engaged in farm work. The types of injury seen and their causes are discussed with particular reference to the design of the agricultural machinery commonly involved. The world literature on the subject is briefly reviewed.
72029740

71. Helmers S, Top FH Sr., Knapp LW Jr. **Ammonia injuries in agriculture.** J Iowa Med Soc 1971;61(5):271-280.

NO ABSTRACT.
71239395

72. Kay K. **Agricultural health and hygiene - with special reference to the Canadian position.** Environ Res 1971;4(5):440-468.

AUTHOR ABSTRACT: This report assesses agricultural health and hygiene from the aspects of demography, legislation, administration, research, and teaching - with special references to the position in Canada. It followed a canvass of the following Canadian sources - Federal Ministries of Health, Labor and Agriculture, Provincial Health and Agriculture Ministries, Attorneys General of the Provinces, Workmen's Compensation Boards, University Schools of Medicine, Engineering and Agriculture, the Canadian Safety Council, and Canadian Chamber of Commerce. The Canadian literature on the subject has been reviewed. Health and hygiene activities are enmeshed with accident prevention (safety) in Canada so a consistent separation of the two fields could not be made.
76002945

73. Namba T, Nolte CT, Jackrel J, Grob D. **Poisoning due to organophosphate insecticides: acute and chronic manifestations.** Am J Med 1971;50(4):475-492.

AUTHOR ABSTRACT: Three patients with organophosphate insecticide poisoning are described. The first patient with Diazinon poisoning and the second with parathion poisoning illustrate the acute manifestations, the criteria for diagnosis, and treatment with pralidoxime and atropine in organophosphate poisoning. The diagnosis of acute organophosphate poisoning is based on a history of exposure to organophosphates, manifestations including miosis and fasciculations, improvement following administration of pralidoxime and atropine (increased tolerance to atropine), and reduction in blood cholinesterase activity. Pralidoxime has been effective in management of many patients with poisoning by parathion and methyl parathion, and in a smaller number with poisoning by Diazinon, EPN, DFP, TEPP; probably Bidrin, carbophenthion, dichlorvos and dimethoate; and possibly mevinphos. The effectiveness of pralidoxime in the management of poisoning in man by malathion, methyl demeton, phosphamidone and azinphosmethyl has not been established. Pralidoxime is effective in reactivating organophosphate-inhibited cholinesterase at the cholinergic synapses, including the central nervous system.

The third patient with polyneuropathy illustrates the possibility of persistent manifestations of organophosphate poisoning. He had been exposed as a chemist to organophosphates and their intermediates, which appear to be the cause of polyneuropathy. In animal experiments some organophosphates caused polyneuropathy. In man, polyneuropathy has been caused frequently by triorthocresyl phosphate and less often by mipafox, but rarely by commercially available organophosphate insecticides, and the cause-result relationship has not been established. The other main persistent effect of organophosphate poisoning has been central nervous system symptoms, which usually follow acute poisoning inconsistently and are mainly of emotional origin.
71179793

74. Sekhon GS. **Head injury peculiar to crude cane crusher ('Kohlu' injury).** J Indian Med Assoc 1971;57(9):326-328.

NO ABSTRACT.
72158916

75. Erisman JG, Huffman WJ. **Emotional immaturity and farm accident involvement.** J Saf Res 1972;4(3):126-132.

AUTHOR ABSTRACT: The role of emotional maturity in the accident involvement of farm operators was studied. Volunteer interviewers collected data on 2,547 male farm operators in an 11-county area of Illinois and on 381 female farm residents in 1 of the counties. All subjects were asked to complete the Revised Huffman Inventory (RHI), which measures emotional maturity, and to supply data on age, size of farm, and 5-year accident history. Emotional immaturity as measured by the RHI was found to increase accident susceptibility of both male farm operators and female farm residents; male farm operators with 4 or more accidents and female farm residents with any accidents has significantly lower mean RHI scores. Farm size was significantly related to accident involvement; operators of larger farms were found to have lower measured levels of emotional maturity and greater accident frequency. Emotional maturity and accident involvement were also significantly related to age, with lower emotional maturity and greater accident involvement demonstrated by farmers in the younger age groups, 15-24 and 25-44. There was no significant relationship between emotional maturity and type of accident reported. Limitations of the study, its implications, and recommendations for the future are discussed.

76. Melvin PM. **Corn picker injuries of the hand.** Arch Surg 1972;104(1):26-29.

AUTHOR ABSTRACT: The corn picking machine can inflict mutilating wounds to the hand. The injuries often cause marked tissue necrosis and are grossly contaminated. The surgeon is faced with an injury which has occurred many hours before and in which uncertain tissue viability makes initial surgical debridement very difficult. There is a high rate of infection in those patients treated with primary skin cover. If tissue viability is in question, delayed skin cover should be used. The dominant hand is most commonly injured. Either traumatic or surgical amputation of one or more fingers is frequent. The thumb and radial side of the hand are more commonly spared than the ulnar side. The remaining fingers are often stiff, sensitive, and of little value to the patient.
72077534

77. Grogono BJS. **Auger injuries.** Injury 1973;4(3):247-257.

AUTHOR ABSTRACT: Attention is drawn to accidents caused by the auger used on the farm and in industry. The worst machine is the portable grain auger which produces severe, mutilating injuries of the forearm, hand or

lower limb. There are large numbers of these portable conveyors in the Prairies, and probably 5000 or more in Manitoba alone. It is likely that some 120 amputations occur each year on the farm, and many of these are due to augers.
73214340

78. Howell JM, Smith ESO. **An agricultural accident survey in Alberta, 1970.** Can J Public Health 1973;64(1):36-43.

AUTHOR ABSTRACT: A method of surveying agricultural accidents is described. The technique involves initiating a report form when medical treatment is begun and completion of the questionnaire by a public health nurse during a home visit.

For twelve months continuous reporting was maintained in the Barrhead-Westlock area and 103 accidents were investigated. The epidemiological features of these accidents are reported. Total incidence was 3.65 accidents per 100 farms per year.
73131168

79. Inoue K. **Factors affecting accident causation in agricultural machine operations.** J Hum Ergol (Tokyo) 1973;2(2):143-157.

AUTHOR ABSTRACT: Protocols of accidents compensated by the Endowment Assurance by the Agricultural Cooperative Insurance Business during the two fiscal years of 1970-71 in Saitama Prefecture were investigated. Sixty-five accidental injuries due to agricultural work were registered during the period, 6 being fatal. Thirty-four detailed replies were then gathered by enquete method. Injuries occurred most frequently during harvesting (42%), tilling (23%), and transportation (11%). Both full-time and part-time farmers engaged as the main workers of their families were involved in accidents, more than 60% occurring among elderly farmers above 40 years of age. Most accidents occurred in the busy farming seasons of late spring-July and of October-November. Fifty-nine percent of the 34 enquete-replying cases pointed to circumstances leading to haste on the day of the injury, 41% of these mentioning schedule delays by bad weather on the foregoing days as a reason. This factor was associated with both outdoor and indoor injuries. This kind of pressure forced by schedule delays proved to be particularly significant for accidents during harvest work, all but one of the eleven harvest accidents due to schedule delays being finger losses caused by combines, threshers, or reaping machines. A greater part of agricultural accidents are thus suggested to be closely related to the seasonal usage patterns of agricultural machines.
75077997

80. Louis DS, Renshaw T. **Injuries to the upper extremity inflicted by the mechanical cornpicker.** Clin Orthop 1973;92:231-234.

NO ABSTRACT.
73195476

81. McElfresh EC, Bryan RS. **Power take-off injuries.** J Trauma 1973;13(9):775-782.

AUTHOR ABSTRACT: Injuries due to entanglement, usually of clothing, in the inadequately shielded or unshielded power take-off shaft are common among the rural population. Data on 49 patients seen at the Mayo Clinic revealed that such injuries include traumatic amputations, multiple fractures, and large skin avulsions, including denudation of genitalia.
73248280

82. Tanga MR, Kawathekar P. **Injury due to bull goring.** Int Surg 1973;58(9):635-636.

AUTHOR ABSTRACT: Various types of injuries caused by cattle horns are described and discussed. Such injuries must be very common, yet none have been reported in the English literature.
74008996

83. Wan TTH, Wright A. **Occupational differentials in chronic disability.** J Occup Med 1973;15(6):493-498.

AUTHOR ABSTRACT: The analysis of occupational differentials in chronic disability was made using data obtained from the 1967 Survey of Economic Opportunity. The study population was restricted to civilian non-institutionalized male family heads between the ages of 25 and 64. Disability rates were age-adjusted. The data revealed that farmers and laborers showed higher prevalence rates for all disabling conditions, with the exception of nervous system disorders, than did persons in other occupations. The severity of disability for each disabling condition was found to vary considerably by occupation, and it was difficult to establish any consistent pattern. The percentage distribution of severity of disability by disabling condition for each occupational category revealed that in some cases occupations presumably very different in nature showed the same percentage of severe limitation due to a particular disabling condition. For example, professionals and managers showed the same percentage of severe limitation due to cardiovascular disorders (32.9%) as did farmers and farm managers.

A multivariate analysis was employed in order to investigate the net effect of occupation on severity of disability. Results showed the influence of occupation on severe disabilities to be substantially reduced after simultaneous adjustment for other variables. Although the analysis of occupation effects indicated that occupation, per se, was not highly predictive of the severity of disability, certain differential risks in severe work limitation were noted for various occupational categories.

The considerable variation in prevalence for each category suggests the need for more pertinent and detailed information concerning the occupation. A more systematic breakdown of occupational categories, using precise job descriptions, might show specific jobs to be vulnerable to greater hazards than others within the same occupational category. More information is needed as to the kind and severity of job hazards present in various occupations. In determining the relationship between occupation and disability, work environment and job mobility may be important factors. Smith and Lillienfield note that prior occupation may influence post-onset work-status. The authors suggest that persons in higher occupational categories, possibly having more control over the working environment, may be more successful in obtaining employment after the onset of disability. It is likely that disabled workers affiliated with labor organizations have better chances for post-onset job placement than workers without such support. Further considerations should be given to the social and psychological environment, as well as the mental and physical requirements of specific occupations, in order to understand the differential effects of occupation on the incidence of disability and consequent activity limitation.
73176515

84. Fasske E, von Bassewitz DB, Bouche W. **Pigeon breeder's disease: a case report with electron microscope findings.** Pneumonologie 1974;150(1):49-59.

AUTHOR ABSTRACT: A case of the acute form of pigeon breeder's disease is presented. Electron microscope studies show the histomorphological substrate of the foreign-body reaction and the immunological cell response caused by the inhaled pigeon material.
74273307

85. Senewiratne B, Thambipillai S. **Pattern of poisoning in a developing agricultural country**. Br J Prev Soc Med 1974;28(1):32-36.

AUTHOR ABSTRACT: Four hundred and seventy-two cases of poisoning were seen over a two-year period in Kandy, Ceylon. The overall mortality was 23.7%. The pattern of poisoning was different from that in western countries in that 49.8% of the cases were due to insecticide poisoning and only 10.7% were due to drugs, including barbiturates. Insecticides accounted for 73.2% and drugs for only 4.5 % of the 112 fatal cases. Of the fatal cases 51.7% were between the ages of 20 and 40 years and only 6.2% were over 50 years. The wastage of economically useful lives indicates the need for a poison centre.
74121369

86. Valenton MJ. **Deep stromal involvement in Dimmer's nummular keratitis**. Am J Ophthalmol 1974;78(6):897-902.

AUTHOR ABSTRACT: During a two-year period, 34 Filipino patients with disk-shaped opacities of the cornea were studied. All were rice field workers who usually had a history of ocular trauma while working in the fields. The keratitis was usually unilateral and was characterized by multiple discoid opacities with subepithelial infiltrates resembling the type of nummular keratitis described by Dimmer in 1905. In Filipinos, however, facet formation in the corneal lesions was not a prominent feature. Furthermore, in 13 patients the centrally located corneal opacities involved the deep stroma and coalesced forming a typical central disciform keratitis similar to herpes simplex disciform keratitis.

A trial of topical corticosteroids in 68% of the patients resulted in the relief of irritation and the lessening of the corneal edema and infiltration. No patient was aggravated by corticosteroid application.
75070989

87. Blake J. **Eye hazards in rural communities**. Practitioner 1975;214(1283):641-645.

NO ABSTRACT.
75196300

88. Chari PS, Kharshiing W, Balakrishnan C. **Wheat thresher hand injuries**. Indian J Med Res 1975;63(6):829-832.

AUTHOR ABSTRACT: A by-product of the Green Revolution has been the increased use of machines for use in agricultural operations. Hurry, ignorance and fatigue contribute to a steady incidence of accidents. The wheat thresher is one such machine causing mutilating hand injuries each harvesting season. The injury combines elements of cutting, crushing, and avulsion of skin and tendons. Treatment is geared to achieve maximum possible salvage of hand function. The management of such injuries is outlined. Our experience shows that though we have been able to save the limb, fix the bones, in proper alignment and give stable skin cover, the functional recovery is poor. At present, the best solution appears to be to promote preventive measures.
76119812

89. Elliot CK. **Rural medicine: a new skill for the practice team in the countryside**. Nurs Mirror 1975;141(3):46-49.

NO ABSTRACT.
75196056

90. Phillips GH, Stuckey WE, Pugh AR. **Farm family accidents: 1967 and 1972.** J Saf Res 1975;7(2):85-89.

AUTHOR ABSTRACT: Statewide studies of accidents involving farm families were conducted in Ohio in 1967 and 1972. Data from these studies were examined to establish accident trends and characteristics of farm families. Results show that accidents to farm people have declined slightly during the 5-year period and that changes are taking place in the types of accidents. Farm size was found to be related to accidents with families on larger farms having more. Farm families with 5 or more members had significantly more accidents than smaller families. Families where heads of households had higher education were somewhat more likely to have accidents, but this difference was not significant. Farm males had more accidents than farm females, and this difference appeared to be related to exposure. Additional research on this and other factors related to farm family accidents is recommended.

91. Whiting WB. **Occupational illnesses and injuries of California agriculture workers.** J Occup Med 1975;17(3):177-181.

NO ABSTRACT.
75134964

92. Lawhorne L. **The health of farmers.** J Iowa Med Soc 1976;66(10):409-418.

AUTHOR ABSTRACT: The occupational diseases associated with farming are summarized here. Cuts and bruises are most plentiful, but fractures, puncture wounds and burns also occur. Noise, vibration, fumes and animals also present special problems. This summary is for reference use.
77007760

93. Rasmussen RW, Cole GA. **The spectrum of agricultural medicine.** Minn Med 1976;59(8):536-539.

AUTHOR ABSTRACT: The agricultural worker is exposed to many disease processes that are unique to his occupation. These processes--accidents, infectious diseases, chemical toxicity, respiratory conditions, and environmental exposures--are reviewed according to their etiologies. An awareness of these problems will allow the physician to deal more effectively with them.
77011316

94. Donham KJ, Rubino M, Thedell TD, Kammermeyer J. **Potential health hazards to agricultural workers in swine confinement buildings.** J Occup Med 1977;19(6):383-387.

AUTHOR ABSTRACT: The following points summarize the findings in this study: (1) Four gases were measured (carbon dioxide, hydrogen sulfide, carbon monoxide, ammonia); each of the gases exceeded the respective TLV in one or more units; (2) Carbon monoxide exceeded the TLV in three of the units when measuring during winter months; (3) Carbon dioxide exceeded the TLV in 10 of the 13 units when measured during winter months; (4) Ammonia exceeded the TLV in two of the units during the summer, and met or exceeded the TLV in 12 of the 13 units during winter measurements; (5) Hydrogen sulfide met or exceeded the TLV in two units during summer measurements and two units during winter measurements; (6) It was very common for more than one gas to be in excess of the TLV in a given unit; (7) A high percentage of dust measured in the confinement units was of respirable size; (8) Interviews indicated a high percentage of swine confinement workers suffer adverse upper respiratory symptoms; (9) In depth clinical work-ups on two swine confinement workers did not reveal the pathogenesis of their symptoms. This preliminary study suggests that swine confinement units are often

contaminated with gases and dusts in sufficient quantities to create an unhealthy work environment. Interviews with workers in these units suggest that a high percentage of individuals suffer at least short term ill effects from work in the units.

Reports from the literature and this preliminary study strongly suggest that occupational health problems exist in confinement feeding. The population at risk includes farmers, their family members, employees, and veterinarians. However, not enough is known to recommend work place standards to assure compliance with the Occupational Health and Safety Act of 1971. More in depth studies are required to fully describe the work environment and to document acute and particularly chronic health conditions that may result from occupational exposure.
77209176

95. McCormick JB, Weaver RE, Hayes PS, Boyce JM, Feldman RA. **Wound infection by an indigenous Pseudomonas pseudomallei-like organism isolated from the soil: case report and epidemiologic study**. J Infect Dis 1977;135(1):103-107.

AUTHOR ABSTRACT: A 27-year-old farmer in the Oklahoma panhandle was pinned under his overturned tractor for 2 hr and received superficial and deep lacerations. He contracted an infection of a pelvic wound with an organism that had cultural and biochemical characteristics identical to those of Pseudomonas pseudomallei. Identical organisms were recovered from soil taken from the site of the accident. The organism isolated from the wound proved to be less virulent in guinea pigs than usual laboratory strains of P. pseudomallei; fatty acid analysis showed a distinctly different pattern from that of laboratory strains of P. pseudomallei. The infecting organism may be a variant of P. pseudomallei or a new species of Pseudomonas.
77095483

96. Postacchini F, Ricciardi-Pollini PT. **Rupture of the short head tendon of the biceps brachii**. Clin Orthop 1977;124:229-232.

AUTHOR ABSTRACT: Subcutaneous rupture of the short head tendon of the biceps brachii is a very rare lesion, with only five cases previously reported. The case of a 67-year-old farmer whose tendon ruptured following a mild muscle effort is presented. The degenerative changes revealed by histological examination of the injured tendon were so severe as to lead to the conclusion that its tensile strength must have fallen considerably prior to rupture. The most characteristic clinical signs of this rupture are a sizeable bulge in the middle third of the injured arm, and a hollow in the site normally occupied by the short head of the biceps. Suture of the ruptured tendon to that of the coracobrachialis led to full recovery.
78082834

97. Schubert B, Minard JJ, Baran R, Verret JL, Schnitzler L. **[Onychopathy of mushroom-growers]**. Ann Dermatol Venereol 1977;104(10):627-630.

AUTHOR ABSTRACT: Particular nail damage appeared in patients working on mushroom beds.

In five cases, all similar, the recent use of plastic bags containing the growing medium, seems to be the origin of this onychopathy. Onycholysis with latero-distal "usure des ongles", koilonychia, longitudinal splitting with sometimes splinter haemorrhages are the most specific changes.

Chemical damage by phytosanitary products or fungi infection have no significant part in these abnormalities; their cause is traumatic, representing occupational stigmata mark, and results from repeated rubbing of the nails in workers lifting up heavy plastic bags.
78143119

98. **Death in a farm worker associated with toxic gases from a liquid manure system - Wisconsin.** MMWR 1978;27(6):47-48.

NO ABSTRACT.

99. Abrams HK. **Together with the farmers: social and rural medicine in Japan.** Comp Med East West 1978;6(1):23-31.

AUTHOR ABSTRACT: Japan emerged from feudalism a century ago. Farmers comprise 20 percent of the population of 110 million. The agricultural cooperative movement sponsors 118 hospitals in rural areas. Of these, the Saku Central Hospital is the largest, and provides leadership to a vigorous rural health movement. Its unique outreach program and its contributions to rural health are described, together with remarks about Japan's health situation generally. There may be lessons here for America.
79044522

100. Carlson ML, Petersen GR. **Mortality of California agricultural workers.** J Occup Med 1978;20(1):30-32.

AUTHOR ABSTRACT: The mortality of white male farm laborers and farm operators in California for the years 1959 to 1961 was examined. Cause-specific mortality rates were calculated in order to identify diseases which might be of occupational importance. The mortality rate from respiratory diseases in the farm laborer groups (employees) was triple the rate in the farm management group (employers or self-employed individuals). Accidental deaths were also increased in the farm laborer group. Hazards of the agricultural industry which could contribute to accidents and respiratory disease were reviewed.
78088896

101. Dalton ML Jr., Bricker DL. **Anhydrous ammonia burn of the respiratory tract.** Tex Med 1978;74(9):51-54.

AUTHOR ABSTRACT: The common fertilizer, anhydrous ammonia, is also an extremely toxic poison. Following accidental exposure, severe burns of the exposed skin, the eyes, and the respiratory tract are quite common. During the past seven years we have treated six of these patients, three of whom required tracheostomy and management using a mechanical ventilator. The symptoms and physical findings are described, as is a three-course plan of management, beginning with the initial management at the stage of the accident progressing to emergency room care and, finally, mechanical ventilator therapy in the surgical intensive care unit. Physicians practicing in rural areas should be alert to the danger of anhydrous ammonia and should be quick to recommend tracheostomy in patients who have any degree of respiratory insufficiency following exposure to anhydrous ammonia. Rules for avoiding injury are also included.
79036052

102. Ebong WW. **Falls from trees.** Trop Geogr Med 1978;30(1):63-67.

AUTHOR ABSTRACT: A prospective review of sixty consecutive patients who fell out of trees in a year was made. Fall from tree is an occupational hazard of traditional farmers, a rare cause of trauma, but a common cause of severe, crippling and often multiple injuries. It frequently resulted in spinal injury, and was the commonest cause of traumatic quadriplegia and paraplegia. The risk of fall and of sustaining spinal injury increased with age. Some school children also fell from fruit trees but they generally stood a better chance of getting away with relatively minor injuries. Methods of preventing or minimising the risk of this injury in farmers are highlighted.
78229883

103. Kalenak A, Gordon SL, Miller SH, Greer RB III., Graham WP III. **Power take-off injuries.** J Trauma 1978;18(2):134-136.

AUTHOR ABSTRACT: Power take-off injuries are uncommon, but serious and potentially fatal. Seven cases are reported demonstrating the violent trauma that can be incurred. The danger associated with use of machines with this and other power equipment is emphasized. Safety shields should be improved, and operators educated about the importance of retaining the shields and using the machinery properly at all times.
78133060

104. Letts RM, Gammon W. **Auger injuries in children.** Can Med Assoc J 1978;118(5):519-522.

AUTHOR ABSTRACT: A 6-year review of auger injuries in Manitoba children revealed that 23 children sustained major injuries resulting in amputation of 17 limbs. Auger injuries are the main cause of traumatic amputation in children in Manitoba. Improved safety education for the entire farm family as well as better design of safety shields would decrease this carnage.
78125329

105. Mamtani R, Malhotra P, Gupta PS, Jain BK. **A comparative study of urban and rural tetanus in adults.** Int J Epidemiol 1978;7(2):185-188.

AUTHOR ABSTRACT: An analysis of 240 patients, aged 15+, admitted to the tetanus ward of Irwin Hospital, New Delhi, with clinically diagnosed tetanus is reported. 134 patients (55.8%) came from rural areas and 106 (44.2%) from urban areas. The male-female ratio for both groups was approximately 2:1. Rural patients were younger, showed a longer incubation period and experienced a lower crude case fatality rate. Traditional practices like the application of cow dung to wounds, ear piercing and tatooing, and chronic ear infections were important factors in developing tetanus, demonstrating a need for health education in rural communities.
78241277

106. Mohanty S, Sharma R, Rao CJ, Mukherjee KC. **Head injury by sugar cane crushing machine (Kohlu injury).** Neurol India 1978;26(2):71-73.

NO ABSTRACT.
79053356

107. Perea A, Maly J, Demling R. **Epidemiology of burn injury in rural Wisconsin.** Wis Med J 1978;77(7):62-63.

NO ABSTRACT.
78252215

108. Bergqvist D, Hedelin H. **Trends in blunt abdominal trauma among hospital in-patients.** Scand J Soc Med 1979;7(1):33-39.

AUTHOR ABSTRACT: To analyse changes in background factors, injury pattern, and prognosis regarding blunt abdominal trauma in Sweden, the 30-year postwar (1946-75) development was investigated in a rural district. 396 patients were treated, showing a great increase during the last 5 years. The highest frequency was seen in patients

aged 11-20 years. Abdominal trauma occurred most commonly during July and August. The growing aetiological importance of road accidents is shown. Equestrian accidents were common early in the period and again towards the end. The incidence of cerebrally confused patients increased. The organs most commonly traumatized were kidney, liver, and spleen. The frequency of multiple intra-abdominal injuries and also associated extra-abdominal injuries increased with time. There was a tendency towards shorter hospital stays. Mortality rates did not change during the period, even though injuries have become increasingly severe (judged by the Injury Severity Score). It is concluded that the improved care of patients compensated precisely for the increased severity of injuries, as reflected in mortality.
79159341

109. Campbell DC II., Bryan RS, Cooney WP III., Ilstrup D. **Mechanical cornpicker hand injuries.** J Trauma 1979;19(9):678-681.

AUTHOR ABSTRACT: The mechanical cornpicker causes tearing and crushing hand injuries. Fifty-one patients treated at Mayo Clinic for these injuries from 1962 to 1975 were studied with regard to mechanism and extent of injury, treatment methods, and long-term results. Some amputation occurred at the time of injury in 36% of hands, and in 73% of the remainder following treatment. Initial treatment in nearly all cases consisted of debridement, tetanus prophylaxis, and antibiotics, and 73% of hands required some form of delayed surgical treatment. Antibiotics did not appear to be helpful. Eighty-nine per cent of injuries occurred in October and November. Carelessness was the most common cause given by farmers for their injuries. Excluding four permanently disabled patients, the average length of disability was 135 days. Eighty-nine per cent of patients experienced some permanent impairment of hand function. The mechanical cornpicker is described, and the importance of its proper use and physician's emphasis on accident prevention as well as treatment are stressed.
80029867

110. Erisman G. **Three comments received on farm tractor safety factors [letter].** Am J Public Health 1979;69(8):824.

NO ABSTRACT.
79207032

111. Hoskin AF, Miller TA. **Farm accident surveys: a 21-state summary with emphasis on animal-related injuries.** J Saf Res 1979;11(1):2-13.

AUTHOR ABSTRACT: Farm accident surveys were conducted in 21 states using standardized definitions, forms, and sampling techniques. The pooled data included 24,703 farms on which 4,176 injuries or illnesses were recorded. Information on exposure to farm work was also collected and was used to calculate detailed work injury rates. An overall rate of 18.8 work injuries per million man-hours of exposure was found. Of the 2,760 work injuries, 18% were animal-related and 414 in-depth bi-level reports on these injuries were available for analysis. A computer program called TREESEARCH was used to identify characteristics and circumstances of animal accidents that occur with statistically significant frequency.

112. Karlson T, Noren J. **Farm tractor fatalities: the failure of voluntary safety standards.** Am J Public Health 1979;69(2):146-149.

AUTHOR ABSTRACT: There are no governmental standards for operator protection which require compliance by farm tractor manufacturers. To see how the Wisconsin farming population fares under voluntary safety

standards, death certificate data were used to determine rates of tractor-associated fatal injuries. The injury death rate associated with tractors on farms increased from 10.9 per 100,000 male farm residents during 1961-1965 to 13.6/100,000 during 1971-1975 ($p < .05$). Deaths associated with overturning tractors were most common; with death rates of 6/100,000 male farm residents for 1961-1975. The rise in tractor-associated death rates shows that voluntary safety standards are not protecting the farm population.

Rollover protective structures (ROPS) are designed to protect operators when tractors overturn but under voluntary safety standards these ROPS are sold only as optional accessory devices. Current Occupational Safety and Health Administration regulations which require ROPS for employees operating tractors do not protect self-employed farmers and their families. It is recommended that the government require all tractors sold to be equipped with ROPS as is currently the case in England and Sweden.
79101529

113. Karlson T, Noren J. **Three comments received on farm tractor safety factors [letter].** Am J Public Health 1979;69(8):824-825.

NO ABSTRACT.
79207033

114. Niiranen M. **Perforating eye injuries caused by occupational accidents treated at Helsinki University Eye Hospital 1970-1977.** Graefes Arch Clin Exp Ophthalmol 1979;211(4):313-324.

AUTHOR ABSTRACT: This study concerns perforating eye injuries caused by occupational accidents in the years 1970-1977. These injuries represented 40% of all perforations treated during this period at Helsinki University Eye Hospital. The results were compared with the previous series from this hospital for the years 1950-1951 and 1930-1939.

Of the patients 92% were males, a slight percentage decrease from the fifties. The youngest age group, 16-25 years, was also the largest (30%). Earlier the next age group, 26-35 years, was largest.

The proportion of workers in building construction with eye injuries increased remarkably to 26.6%. Metalworkers made up another large group affected by eye perforations (24.5%). Agricultural work lost its importance as the cause of perforations as compared with the previous decades.

The commonest cause of eye accidents was still hammering. Flying objects, especially metal splinters, were important causes now as well as in the previous series.

Prognosis was much better in the present series than earlier: 60% of patients achieved vision of 0.5 or better, as compared with 40% in the fifties and 20% in the thirties.
80151423

115. Pfister RG. **Three comments received on farm tractor safety factors [letter].** Am J Public Health 1979;69(8):823.

NO ABSTRACT.
79207030

116. Schnieder RD. **Three comments received on farm tractor safety factors [letter].** Am J Public Health 1979;69(8):823-824.

NO ABSTRACT.
79207031

117. Tator CH, Edmonds VE. **Acute spinal cord injury: analysis of epidemiologic factors.** Can J Surg 1979;22(6):575-578.

AUTHOR ABSTRACT: The authors studied the epidemiologic aspects of acute spinal cord injury in 358 patients admitted to the Toronto General and Sunnybrook hospitals between 1948 and 1973. The ages of the patients ranged from 14 to 89 years (median 32 years) and the male:female ratio was 4.5:1. The most frequent causes of injury were traffic accidents (34.4%), accidents at work (29.3%), sports-recreational injuries (15.4%) and falls at home (9.8%). Several epidemiologic factors were identified which are important for developing programs to reduce the frequency of cord injury. In particular young persons should be made more aware of the risks they run as automobile drivers and of the hazards of diving in shallow water, middle-aged workers in the construction industry are at risk of spinal cord injury from falls and elderly farmers are at risk of falling from lofts or being crushed by overturned tractors.
80044405

118. American Conference of Governmental Industrial Hygienists Agriculture Health and Safety Committee. **Solomon's baby--the farmer....** Am Ind Hyg Assoc J 1980;41(1):A4.

NO ABSTRACT.
80127127

119. Anderson JM, Schutt AH. **Spinal injury in children: a review of 156 cases seen from 1950 through 1978.** Mayo Clin Proc 1980;55(8):499-504.

AUTHOR ABSTRACT: We reviewed 156 cases of spinal injury sustained by children aged 14 years and younger. Analysis included the following: categorizing injury as an orthopedic (112), a neurologic (2), or a combined (42) problem; site along spinal column at which injury occurred; cause of injury (most commonly automobile accident and fall); referral pattern and hospital stay; immediate and rehabilitative therapy; complications; and deaths. The frequency of spinal injury in children increases with age. The mode of injury in urban and rural environments varies. Spinal injury is a serious problem and has an associated high mortality and a high complication rate. Most of the spinal injuries are preventable, and the incidence of complications can be lessened when special attention is given during the initial hospitalization to respiratory and urinary tract infections, decubiti, and behavior of the children.
80252935

120. Bergqvist D, Hedelin H, Lindblad B. **Blunt renal trauma: changes in aetiology, diagnostic procedure, treatment and complications over thirty years.** Scand J Urol Nephrol 1980;14(2):177-180.

AUTHOR ABSTRACT: In a rural area with a relatively stable population, 216 persons were hospitalized for blunt renal trauma over a 30-year period (1946-75). In the final 10 years the frequency of such trauma increased, as also did the proportions of females and younger patients (11-30 years old). In the final 5 years the overall incidence was 6.2 cases per 100000 inhabitants and year. Motor traffic accidents were increasingly the cause of blunt renal trauma. Injuries from compression showed a stable frequency. Renal trauma attributed to blows varied with the incidence of accidents involving horses and sports. Treatment was mainly conservative, except in major injuries. Emergency excretory urography was rarely used during the first 10 years of the study, but thereafter with increasing frequency. Early complications were seen only during the first 20 years of the study.
81152882

121. Davies JE, Enos HF. **Pesticide monitoring and its implications.** Occup Health Saf 1980;49(3):68C-68E, 68H.

NO ABSTRACT.
80144149

122. Mohanty S, Rao CJ, Kumar A. **Problems with penetrating injuries of the head in rural India.** J Indian Med Assoc 1980;74(6):107-108.

NO ABSTRACT.
81008041

123. Morgan DP, Lin LI, Saikaly HH. **Morbidity and mortality in workers occupationally exposed to pesticides.** Arch Environ Contam Toxicol 1980;9(3):349-382.

AUTHOR ABSTRACT: Utilizing cause-of-death information and responses to questionnaires addressed to survivors, mortalities and health impairments in a cohort of workers occupationally exposed to pesticides were compared to occurrences in workers not pesticide exposed, over the period 1971-1977. Seventy-two percent of 2,620 pesticide-exposed workers, and 75% of 1,049 "controls", recruited in 1971-73, were accounted for either by returned questionnaire or mortality. Disease incidence rates were studied in relation to broadly defined occupational subclasses, and to serum concentrations of organochlorine pesticides (OCI) measured at the time of recruitment.

Death by accidental trauma was unusually frequent among pesticide applicators. Mortalities from cancer and arteriosclerosis were not detectably different from those observed in the controls. Among survivors, dermatitis and skin cancer were unusually common in structural pest-control operators. Internal cancer was no more frequent in the intensively pesticide-exposed workers than in the controls, but if appeared to occur at an unusually high rate in workers characterized as "possibly pesticide-exposed".

There were apparent associations between high serum pesticide OCI levels measured in 1971-73 and the subsequent appearance of hypertension, arteriosclerotic cardiovascular disease, and possibly diabetes. This could imply a causal role of any of the pesticidal and other environmental stresses to which these workers were exposed.

The limitations of this type of followup study are discussed.
80241022

124. Perry BC, Chrisinger EW, Gordon MJ, Henze WA. **A practice based study of trauma in a rural community.** J Fam Pract 1980;10(6):1039-1043.

AUTHOR ABSTRACT: A three-month study of trauma seen by a rural family practice in an isolated community found that 17.3 percent of all visits were for treatment of injuries. Falls caused the most injuries (28.7 percent), but accidents involving motorcycles, horses, and automobiles caused the more severe injuries. Orthopedic problems, lacerations, and eye injuries accounted for 64.0 percent of the injuries. Consultation was obtained in 9.9 percent of the episodes. This paper offers a model of trauma surveillance utilizing practice based studies and presents information that underscores the need for more intensive training in trauma care for family practice residents who plan to enter rural practice.
80183931

125. Singh KP, Sinha KI. **Accidents in agriculture.** J Indian Med Assoc 1980;75(1):4-6.

AUTHOR ABSTRACT: One hundred and twenty-six cases of farm accidents are reported. The cause of accidents and the severity of the injuries are analysed. The prevention of the accidents are discussed and compensation to the injured worker is suggested.
81143587

126. **Deaths associated with liquid manure systems - United States.** MMWR 1981;30(13):151-152, 157.

NO ABSTRACT.
81244628

127. Cliff KS. **Agriculture - the occupational hazards.** Public Health 1981;95(1):15-27.

AUTHOR ABSTRACT: People employed within the agricultural industry are exposed to a wide variety of occupational hazards. Despite a declining level of manpower in the industry due to an increase in mechanization this has brought with it its own special problems relating to accidents. Increased technology in the field of pesticide control have brought problems of systemic chemical poisoning, whilst infectious and non-infectious diseases also present other sources of hazards to agricultural workers.

Evidence from various sources would suggest that some accidents are not chance happenings, but as in many other industrial accidents are due to a failure to observe regulations and codes of good practice. Prevention therefore is of major importance in the agricultural industry, as in other industries. Prevention is now a function of the Health and Safety Executive through its Agricultural Safety Inspectorate, and whilst legal powers are available to the Inspectorate, clearly education and persuasion are preferred. It is now common practice in many counties to have "Joint Farm Safety Committees" comprising not only employers represented through the National Farmers' Union, but the employees represented through the National Association of Agricultural and Allied Workers as well as representatives of the Agricultural Safety Inspectorate. Through these joint committees preventive programmes can be arranged aimed at specific accident problems or accident prevention in general. Such joint co-operation can and does go a long way to reducing the problem of agricultural industries, disease and hazards through education, but as with all accident prevention it is the individual who must exercise care and responsibility.
81151575

128. Morse DL, Woodbury MA, Rentmeester K, Farmer D. **Death caused by fermenting manure.** JAMA 1981;245(1):63-64.

NO ABSTRACT.
81050041

129. Murphy DJ. **Farm safety attitudes and accident involvement.** Accid Anal Prev 1981;13(4):331-337.

AUTHOR ABSTRACT: Many safety educators firmly believe that good safety attitudes are a must if people are to avoid accidents in the workplace and elsewhere. This idea has evolved mainly from the industrial safety movement and has been adopted in most fields of safety. However, this fundamental adage has never been tested in agriculture. A random sample of Pennsylvania farmers were asked their attitudes toward nationally recognized farm safety concepts. The Semantic Differential Attitude Test was the instrument used to collect the data. Four hundred and ninety-three respondents indicated they have about the same attitudes toward farm safety concepts

regardless of their accident involvement and regardless of other variables studied. The results of this study suggest that the apparent high priority given to safety attitude development as a primary means of accident prevention should be re-examined.

130. Nachlas NE, Schlenker JD. **The mechanical cornpicker.** Ill Med J 1981;159(6):371-374.

AUTHOR ABSTRACT: With the advent of the corn combine, the incidence of cornpicker injuries has declined over the past 20 years. As the result of increased storage costs for shelled corn from the combine, the cornpicker and its associated injuries may again become prevalent. Three patients are presented in order to illustrate injury severity and the poor prognosis despite early aggressive reconstructive procedures. Prevention of these injuries through safety counseling is most important.
81239277

131. Scamoni G, Dahms G, Graehn V. **[Exposure to noise in agriculture].** Z Gesamte Hyg 1981;27(11):815-818.

AUTHOR ABSTRACT: The number of persons exposed to noise in agriculture has increased significantly during recent years in the GDR. It may be estimated that over one-third of all those engaged in material production are exposed to noise. At 25% of the work-force, agriculture technicians represent the largest group of workers subject to noise.

Self-propelled agricultural machinery and tractors account for the largest proportion of workplaces subject to noise.

Statistics for occupational illness show that in 1979 agriculture, forestry and food production had the highest incidence of hearing impairment resulting from noise of any branch of the economy. Forty-three percent of those affected were agricultural technicians.

The conclusions reached concerning measures to counter hearing impairment resulting from noise are contained in the planned steps for overcoming occupational illnesses in agriculture, forestry and food production drafted by the Occupational Hygiene Centre for Agriculture, Forestry and Food Production in 1980.
82225908

132. Thelin A. **Work and health among farmers: a study of 191 farmers in Kronoberg County, Sweden.** Scand J Soc Med [Suppl] 1981;22:1-126.

NO ABSTRACT.
81274584

133. Weiss HB. **Human exposures to pesticides: a 1979-1980 report of the Wisconsin Division of Health.** Wis Med J 1981;80(12):12-15.

AUTHOR ABSTRACT: Surveillance and reporting of acute human health effects resulting from pesticide exposures is difficult from both a medical and administrative perspective. This report describes an evolving system of collecting and organizing pesticide incident reports in Wisconsin and presents information based on a decade of Worker's Compensation data and 1979-1980 pesticide incident reports from the Department of Agriculture, Trade and Consumer Protection. There is much room for improvement in both the quantity and quality of the data pertaining to acute pesticide exposure incidents.
82109320

134. Baker SP, Samkoff JS, Fisher RS, Van Buren CB. **Fatal occupational injuries**. JAMA 1982;248(6):692-697.

AUTHOR ABSTRACT: Deaths resulting from work-related injuries during a one-year period in Maryland were identified and reviewed. Of 148 workers killed, all but two were male. Transportation vehicles were involved in 41% of the deaths, with road vehicles accounting for 25% of the total. Other major groups involved nonroad land vehicles (16%) and firearms, primarily handguns (11%). Two thirds of the workers died at the scene or were dead on arrival at the hospital. Head injuries were the most common cause of death. Eleven percent of the workers tested had blood alcohol concentrations of 0.08% by weight or greater. The majority of the deaths involved either hazards that are not addressed by the Occupational Safety and Health Act of 1970 or workers in categories that are excluded by law from regulation under this act.
82242439

135. Beatty ME, Zook EG, Russell RC, Kinkead LR. **Grain auger injuries: the replacement of the corn picker injury?** Plast Reconstr Surg 1982;69(1):96-102.

AUTHOR ABSTRACT: Corn picker injuries, although more infamous, are less frequent than those produced by the grain auger. The former rarely occurs in other than adult males who are responsible for their carelessness, whereas the grain auger injury frequently involves innocent and uninformed youths. We report 4 arms, 4 forearms, 5 hands, 24 digits, 2 legs, 4 feet, and 4 toes injured by a grain auger in 24 patients. Multiple-level injuries accounted for the larger number of injuries than patients. Twelve amputations or devascularizations were reattached or revascularized successfully. Not all amputations had attempts at reattachment because of the severe crushing of the part and/or stump that was present in all patients to varying degrees. All wounds were heavily contaminated and were treated with voluminous irrigation and adequate debridement. Serial debridements were needed prior to coverage in several patients. Prevention is the best treatment, but given early aggressive care, many injured can regain a high level of function.
82083008

136. Burmeister LF, Morgan DP. **Mortality in Iowa farmers and farm laborers, 1971-1978**. J Occup Med 1982;24(11):898-900.

AUTHOR ABSTRACT: Death certificate analyses of white California males aged 20 through 64 dying from 1959 through 1961 indicated unusually high mortality rates in farm laborers from respiratory diseases and accidents. To determine whether this mortality pattern is pervasive among agriculturally employed workers, similar analyses in Iowa from 1971 through 1978 were completed. Only mortality from work-related accidents was found to be excessive; respiratory disease deaths were no more frequent than among the general population. The reason for high respiratory disease mortality in California remains unknown. The two worker populations differ with respect to ethnic background, socioeconomic status, mobility and accessibility of medical care. Worker exposures to agricultural chemicals and to dust are substantial in both regions, but are qualitatively different. One or more of these factors could account for the different rates of respiratory disease mortality.
83085057

137. Donham KJ, Knapp LW, Monson R, Gustafson K. **Acute toxic exposure to gases from liquid manure**. J Occup Med 1982;24(2):142-145.

AUTHOR ABSTRACT: Liquid manure storage is a common component of confinement systems for swine, beef, dairy, and veal operations. A mail questionnaire to a sample of swine producers indicated that more than 85,000 people in Iowa and an estimated 500,000 in the United States work in livestock confinement systems that use liquid manure storage. Deaths and illnesses in people with acute exposure to toxic gases emanating from the liquid manure

have been recently reported. This communication reports results of the investigation of six such incidents. Hydrogen sulfide appears to be the main toxic substance involved, and agitation of the liquid manure is important in creating an acutely severely toxic environment. Preventative measures must include worker education and limitation of human exposure through control of environmental and human factors.
82121933

138. Donham KJ, Mutel CF. **Agricultural medicine: the missing component of the rural health movement.** J Fam Pract 1982;14(3):511-520.

AUTHOR ABSTRACT: Agricultural medicine encompasses the anticipation, recognition, diagnosis, treatment, prevention, and community health aspects of health problems peculiar to agricultural populations. Members of the agricultural population have been heretofore ignored in organized health efforts unless they happened to also be a member of a social, racial, or economic minority. However, members of the agricultural population encounter daily a variety of occupational and environmental health hazards, such as toxic chemicals and zoonotic infectious agents. The health status of the agricultural subgroup of the rural population is poorer than is commonly believed. For example, compared with other populations, members of this subgroup have excess rates of chronic illness, excess disability from respiratory conditions, and the highest death rate from occupationally related accidents. If a true improvement in the health of the agricultural population is to be realized, then its unique health problems must be recognized, and specific clinical, preventive, and community health aspects of its problems must be dealt with.
82144316

139. Gupta RC, Bhasin SK, Khanka BS. **Drive-belt or patta injuries.** Injury 1982;13(6):495-499.

AUTHOR ABSTRACT: With increasing electrification and mechanization in rural areas, industrial drive-belt or patta injuries have posed a serious problem. Most of these severe injuries come to hospital. Eighty-eight cases admitted to the SRN Hospital which is attached to MLN Medical College, Allahabad, over 3 years from 1977 to 1979 have been reviewed. This type of injury constituted 3.22 per cent of the total rural orthopaedic accidents (36.27 per cent of total accidents) and involved, exclusively, growing children and young people of working age. It was directly responsible for 9.09 per cent of deaths. This serious and disabling accident usually resulted from neglect or carelessness of workers and lack of adequate safety measures.
82264193

140. Jeyaratnam J, De Alwis Seneviratne RS, Copplestone JF. **Survey of pesticide poisoning in Sri Lanka.** Bull World Health Organ 1982;60(4):615-619.

AUTHOR ABSTRACT: This study included a sample survey of the clinical records of patients admitted to the different hospitals in Sri Lanka, and showed that approximately 13000 patients are admitted to hospital annually for pesticide poisoning and that each year 1000 of them die. Suicidal attempts account for 73% of the total, and occupational and accidental poisoning accounts for 24.9%. It is recommended that urgent action be taken to minimize the extent of the problem.
83051253

141. Koivunen D, Nichols WK, Silver D. **Vascular trauma in a rural population.** Surgery 1982;91(6):723-727.

AUTHOR ABSTRACT: Most reports on vascular trauma from metropolitan centers indicate that prompt repair of injuries contributes to significant limb salvage. A review of 89 cases of vascular trauma seen during the past 10 years revealed higher amputation and complication rates than are usually experienced at urban centers. The

University of Missouri Health Sciences Center serves a predominately rural area of 10,000 square miles. The average delay between injury and arrival at the center was 3.4 hours. Farm and industrial accidents accounted for 16% of the cases, motor vehicle accidents 33%, and penetrating wounds from guns, knives, and glass the remainder. Eighty-two percent of the injuries involved extremities, and 12 of 116 injured vessels were veins. Arteriography was performed in 34% of the patients. Surgery consisted of primary repair or autogenous vein graft in 60% of the vessels and ligation in approximately 35%. Thirteen primary amputations were performed for extensive tissue damage. There were six additional delayed amputations, yielding an overall amputation rate of 16.4%. The mortality rate was 5.6%, with deaths occurring only in patients with multiple severe injuries. The complication rate associated with vascular repair was 12.4%. Most complications and all deaths and amputations occurred in patients suffering trauma from farm, industrial, and motor vehicle accidents. These patients also had longer times in transit. The increased amputation and complication rates appear to be related to the severity of injuries and the time lapse before initiation of definitive therapy.
82199988

142. Lings S. **Pesticide lung: a pilot investigation of fruit-growers and farmers during the spraying season.** Br J Ind Med 1982;39(4):370-376.

AUTHOR ABSTRACT: A fruit-grower with large, atypical lung infiltrations and lung fibrosis triggered off an investigation of fruit-growers during the spraying season. An interview was carried out together with a Wright peak flow meter test and an x-ray examination of the chest. No fewer than 156 spray preparations were used by the group; individual fruit-growers used between three and 27. In connection with spraying, 41% of subjects had one or other type of symptom; peak flow was reduced in 19% and x-ray changes were seen in 24%. A questionnaire was returned by 132 of 235 farmers. Of these, 60 had worked with biocides, 72 had not. A non-significant higher frequency of symptoms was found among those who used biocides. The results would indicate that biocides (or "pesticides") can give rise to a lung disease, "biocide lung," which comprises (1) pneumonia, radiologically demonstrable by more or less transient round infiltrations and (2) chronic progressive lung fibrosis.
83048891

143. Miller CW. **Heat exhaustion in tractor drivers.** Occup Health 1982;34(8):361-365.

NO ABSTRACT.
83037861

144. Pedersen MB, Simonsen J. **Accidental death in fermentation tanks: report of two cases.** Med Sci Law 1982;22(4):283-284.

AUTHOR ABSTRACT: Two cases of accidental drowning in fermentation tanks are described. During the fermentation different toxic gases are generated among which carbon dioxide is supposed to be most dangerous since it is colourless and odourless. Special problems concerning fermentation of slurry are pointed out and precaution during work with these tanks is recommended.
83061816

145. Rowe RG, Cliff KS. **Agricultural accidents in Dorset--review of a pilot study.** J Soc Occup Med 1982;32(3):119-123.

AUTHOR ABSTRACT: During the study period, 49 people were identified as having attended a hospital accident and emergency department in Dorset after being involved in an agricultural accident. Of this total, 4 required

admission to hospital as a result of their accident (8 per cent), 34 people (excluding the 4 admitted) required continuing medical care either from a hospital or their family doctor (70 per cent). Seventeen people (35 per cent) were classified as having major (serious) injuries and 32 people (65 per cent) had minor injuries. Forty-one per cent of the people attending were male workers in the age group 15-20 years.
83011318

146. Schrottmaier J. **Protection from silo gas.** Ergonomics 1982;25(1):89-105.

AUTHOR ABSTRACT: In Austria each year five to ten people die because of fermentation gases in silos. This is why the BVPA-Wiselburg was instructed by the Ministry of Agriculture and Forestry to research into safety equipment for silos to reduce accidents. Measurements of the composition and concentration of gases during the filling or opening of more than 70 different silos were made. Also, simulation experiments were performed to gain knowledge of the influence of the cover or hatch position, the contents of the silo and the outside wind conditions on the out-flow of the gas. The effects of technical devices such as blowers, flaps, etc. to prevent accidents were studied and encouraging results were found.
83027260

147. Sjoflot L. **The tractor as a work-place: a preliminary report on a survey among Norwegian farmers and tractor drivers.** Ergonomics 1982;25(1):11-18.

AUTHOR ABSTRACT: The results of a national survey of Norwegian farmers are given. The survey was undertaken because of the lack of information on the farmers' own opinions of tractors, tractor operation and working environment; of the age, condition and time in use of tractors and different equipment; of the farmer's and tractor driver's health conditions and their opinions on recent ergonomics developments. The survey results provide the basis for deciding future research and development and also to assign priorities.
81138203

148. Tournier-Lasserve C, Veillard JM, Samouth M, Schino MD. **[A misestimated aspect of tropical traumatology: abdomen penetrating injuries caused by buffalo horn. Review of 64 Cambodian cases.]**. Med Trop 1982;42(2):161-167.

AUTHOR ABSTRACT: These injuries are frequent in Cambodia; they are work casualties and patients are most often young males (65 p. 100 under 20 years). In half of the cases there is no visceral damage and when it happens it is, in 76,7 p. 100 of the cases, limited to a single viscus. Rules of treatment are not much different from those of war surgery and must take in account the socio-economic and cultural environment.
82271321

149. Walker RB, Raines D. **Childhood accidents in a rural community: a five-year study.** J Fam Pract 1982;14(4):705-708.

AUTHOR ABSTRACT: Childhood accidents were monitored over a five-year period in a rural West Virginia primary care center. A population of 1,410 families with children up to 12 years of age was followed. Lacerations, musculoskeletal injuries, and head injuries were the most common injuries. Accidents were relatively more frequent within families with lower income levels and in single-parent households. The data suggest specific preventive strategies for this rural population.
82169314

150. **Farm-tractor associated deaths - Georgia.** MMWR 1983;32(37):481-482.

NO ABSTRACT.
83297204

151. **Irrigation-pipe-associated electrocution deaths - Washington.** MMWR 1983;32(13):169-171.

NO ABSTRACT.
83166923

152. Adala HS. **Ocular injuries in Africa.** Soc Sci Med 1983;17(22):1729-1735.

AUTHOR ABSTRACT: Injuries to the eye can cause severe damage because of the delicate structure of ocular tissues. Such injuries may often cause impaired vision or sometimes total loss of vision, in addition to other incapacities. Traumatic blindness therefore assumes an unusual socio-economic dimension. In Africa, injuries have their own peculiarities regarding aetiology, severity and management. More than 80% of injuries occur in rural areas where the necessary services are generally unavailable. This paper surveys the types, occurrence and impact of ocular injuries and suggests how they should be treated.
84073320

153. Berry R. **Stress and safety down on the farm.** Psychol Today 1983;171:21.

NO ABSTRACT.

154. Blair SJ, Allard KM. **Prevention of trauma: a cooperative effort.** J Hand Surg [Am] 1983;8(5, Pt 2):649-654.

NO ABSTRACT.
84033979

155. Cox J. **Risks to health in rural areas.** Practitioner 1983;227(1383):1473-1477.

NO ABSTRACT.
84070342

156. Gainor BJ. **Hay baler trauma to the upper extremity: a roller injury.** J Trauma 1983;23(12):1069-1071.

AUTHOR ABSTRACT: The mechanism of upper extremity trauma in three patients from a round hay baler is analyzed in relation to previously described experimental models of wringer or roller injury. One patient sustained an avulsive injury with typical tearing of soft tissues. Thermal insult from roller friction heat and the duration of exposure were significant factors determining the extent of tissue injury in the other two patients.
84090330

157. Hagley SR, South DL. **Fatal inhalation of liquid manure gas.** Med J Aust 1983;2(9):459-460.

AUTHOR ABSTRACT: Modern methods of intensive livestock production involve the storage of liquid wastes. The digestion of this manure by anaerobic bacteria produces a highly toxic mixture of gases, the most dangerous of which is hydrogen sulphide. We report the case of a young man who died after inhaling liquid manure gas.
84039180

158. Jackson FC. **Farm and ranch injuries in West Texas.** Tex Med 1983;79(9):51-54.

AUTHOR ABSTRACT: It is estimated that each of the 223,000 farm and ranch workers in Texas will sustain at lest one serious injury in 1982, and that one accidental death will occur for every 1,000 of its farm laborers; both family members and hired workers are affected.

These statistics for Texas reflect the experience for the country as a whole. The agricultural industry, with more than 3.5 million workers, is the third most hazardous occupation after mining and construction.

While there has been a gradual decline in agricultural injuries and deaths in the United States during the past decade, particularly following improvements in safety features on tractors and farm machinery, accidental injuries and deaths in rural areas remain disturbingly high.
84045499

159. Krinsky WL. **Dermatoses associated with the bites of mites and ticks (Arthropoda: Acari).** Int J Dermatol 1983;22(2):75-91.

NO ABSTRACT.
83184948

160. Layton TR, Elhauge ER. **Hay baler injury.** Pa Med 1983;86(3):30, 32.

NO ABSTRACT.
83220331

161. Miller CW. **Diseases of sprout pickers.** Occup Health 1983;35(3):120-121.

NO ABSTRACT.
83193537

162. Owen GM, Hunter AGM. **A survey of tractor overturning accidents in the United Kingdom.** J Occup Accid 1983;5:185-193.

AUTHOR ABSTRACT: Farm tractor overturning accidents reported by Health and Safety Executive Inspectors in Britain over an eight year period were classified and analysed. In the largest category of accidents the tractor driver had taken his machine beyond its safe operating limits; in the second category he made an error of judgement while the tractor was within its safe limits. The first category is probably unusual among occupational accidents in that no guidance exists on the safe limits for a tractor, and the driver has to rely on guesswork. A typical example of when a tractor has been operated beyond its safe limits is when a two-wheel drive tractor with roller

behind it starts to slide downhill on a slippery grass slope and finally overturns. The only known method of predicting the slope at which sliding will start is by using a test instrument currently under development. All types of accident found in the reports are tabulated and discussed.

163. Whorton MD, Obrinsky DL. **Persistence of symptoms after mild to moderate acute organophosphate poisoning among 19 farm field workers.** J Toxicol Environ Health 1983;11(3):347-354.

AUTHOR ABSTRACT: Exposure to 2 organophosphate pesticides occurred when entry into a cauliflower field was permitted 4 h after application of highly toxic chemicals. It resulted in acute illness of mild to moderate degree in 19 farm workers, including 3 children and 1 pregnant woman. There were no fatalities. Two to three months were required for recovery from major symptoms and return to normal acetylcholinesterase levels. An exception was the persistence of eye symptoms in the majority 4 mo after the day of exposure.
83189192

164. **Leading work-related diseases and injuries - United States.** MMWR 1984;33(16):213-215.

NO ABSTRACT.
84167698

165. Barss P, Dakulala P, Doolan M. **Falls from trees and tree associated injuries in rural Melanesians.** Br Med J 1984;289(6460):1717-1720.

AUTHOR ABSTRACT: Falls from trees and other tree related injuries are the most common cause of trauma in some parts of rural Melanesia. A four year review of all admissions for trauma to the Provincial Hospital at Alotau, Milne Bay Province, Papua New Guinea, showed that 27% were due to falls from trees, and a further 10% were due to related injuries, such as being struck by a falling branch or a coconut. A questionnaire distributed to rural health centres showed that during the study period at least 28 villagers died from falls from trees before reaching hospital. Head and chest trauma were common causes of death. Many injured patients were boys. Forearm fractures were the most common injuries, but more serious injuries were also frequently encountered. Trees responsible for most deaths and injuries included the coconut palm, betel palm, mango, and breadfruit.

There are many strategies for preventing such injuries; perhaps the most important is to stop small boys climbing tall trees. Such falls are a serious occupational hazard for many subsistence farmers.
85098445

166. Doyle Y. **Farming and industrial accidents in the midlands during 1981 - a pilot study.** Ir Med J 1984;77(9):277-283.

AUTHOR ABSTRACT: During 1981, six hundred and two farming, industrial and chainsaw injuries were treated in four midland general hospitals (twenty-eight of these female). Two hundred and fifteen were major injuries and three hundred and eighty seven were minor. Farming accounted for two hundred and six of the injuries, industry for three hundred and forty and chainsaws for fifty seven.

There was a peak of farming accidents during the summer months and a peak of industrial accidents in the 16-25 year age group. Thirty six of the fifty seven saw injuries were serious injuries to the head, neck and trunk.

There were five fatalities during the year, three farming and two industrial, in the region. The majority of injuries could have been avoided.
85006235

167. Gallagher RP, Threlfall WJ, Spinelli JJ, Band PR. **Occupational mortality patterns among British Columbia farm workers.** J Occup Med 1984;26(12):906-908.

AUTHOR ABSTRACT: To examine mortality risks for farm laborers proportional mortality ratios (PMRs) were calculated for 2,328 British Columbia farm workers who died at age 20 years or over during the period 1950 through 1978. Significantly fewer deaths than expected from degenerative heart disease (PMR = 91, $p < .01$) and from all cancers combined (PMR = 78, $p < .001$) were observed. Deaths from bronchitis and emphysema (PMR = 70, $p < .05$) were also fewer than anticipated. Elevated risks of death were found for accidents (PMR = 129, $p < .001$), for homicide (PMR = 242, $p < .01$), and for pneumonia (PMR = 146, $p < .001$).
85082383

168. May JJ, Pratt DS. **The American farmer and respiratory disease.** Pulmon Med Technol 1984;1:37-45.

NO ABSTRACT.

169. Mayba II. **Hay balers' fractures.** J Trauma 1984;24(3):271-273.

AUTHOR ABSTRACT: Two cases of fractures of the sternum and T12 vertebra are presented, which appear to be a characteristic combination of injuries to farmers when hay bales fall on them. The mechanism of injury proposed is a severe forward flexion, producing vertebral collapse at the dorsolumbar junction, and fracture of the sternum from direct trauma against the steering wheel. These fractures should always be suspected in persons injured while baling hay. It is proposed to call this complex of injuries hay balers' fractures. Preventive measures suggested are: operator caution when hay bales are lifted; addition of locks to the loader forks; increasing the size of the loader, or placing a screen or cage over the operators to keep hay bales from falling on them.
84164980

170. Nylander G, Vilkki S, Ostrup L. **The need for replantation surgery after traumatic amputations of the upper extremity--an estimate based upon the epidemiology of Sweden.** J Hand Surg [Br] 1984;9(3):257-260.

AUTHOR ABSTRACT: Reports in the literature give different views of the frequency of serious amputation injuries of the upper extremity. In Sweden the vast majority of work injuries are registered by the Swedish Labour Market Insurance. All registered serious amputation injuries of the upper extremity in Sweden (8 million inhabitants) during 1979 were investigated in this study. For comparison the frequency of all amputation injuries (work and leisure) of the upper extremity in a county of Sweden (0.4 million inhabitants) during five years (1976-1980) were studied. The overall (work and leisure) incidence in Sweden is fourteen serious amputation injuries of the upper extremity per million inhabitants annually, i.e. a total number in the country of 110 cases per year. The frequency is lower in the areas of the largest cities and substantially higher in regions with sawmills, mechanical industry and/or agriculture. Thus, estimation of the total incidence based upon single counties or smaller regions may be misleading. Replantation would have been technically possible in more than 70% of the cases, but attempts at replantation were only carried out in less than 10% of the serious cases. This study emphasizes the importance of a referral of all patients with a suitable injury of the upper extremity to microsurgically trained handsurgeons.
85081697

171. Petel B, du Boullay T, Petel H, Lombard F, Gaubert J. **[Traumatic pulmonary evisceration in a child. A report on two cases]**. Chir Pediatr 1984;25(2):79-82.

AUTHOR ABSTRACT: Two cases of pulmonary traumatic evisceration are reported. The question is about exceptionels lesions very spectacular and good tolerated.

Successively the mechanism, the treatment and the after-effects are discussed.
84259645

172. Saari KM, Aine E. **Eye injuries in agriculture**. Acta Ophthalmol Suppl (Copenh) 1984;161:42-51.

AUTHOR ABSTRACT: To study eye injuries we reviewed the case records of 662 patients with eye injuries treated at the Department of Ophthalmology, Central Hospital of Tampere between the years 1972 and 1979. Of the whole material 96 (14.5%) were agricultural workers, 74 (77%) male and 22 (23%) female, with the mean age of 43 years. The mean annual incidence of eye injuries in agriculture was 3.46 per 10, 000 people which was higher than in industry (1.9 per 10,000 people) but lower than in construction (5.28 per 10,000 people). The use of AIV solution was the most frequent cause of eye injury in farming (6/ 10) and was the most common cause of all chemical eye burns in agriculture (6/7). Cow butting with horn caused all eye injuries in dairying; 50% of these were perforating eye injuries. In lumbering, forest work or a flying piece of wood at chopping caused eye injuries in 29 cases including 19 cases with blunt ocular trauma and 8 cases with perforating eye injuries. Hammering was the most frequent cause of injury in repair work (7/16). Unilateral blindness was seen in 17 cases (17.7%). It was caused mostly by cow butting with horn (6 cases) or lumbering (5 cases). The importance of employment of protective eye screen or glasses also in agriculture is pointed out.
84227211

173. Saari KM, Parvi V. **Occupational eye injuries in Finland**. Acta Ophthalmol Suppl (Copenh) 1984;161:17-28.

AUTHOR ABSTRACT: In Finland 11.9% of all industrial accidents in 1973 were eye injuries including superficial eye injuries (79.2%), ultraviolet burns of the cornea (3.9%), eye burns (3.6%), blunt ocular trauma (2.5%), wounds (2.4%), and post-traumatic infections (5.8%). Eye injuries constituted 34.3% of all industrial accidents which needed only ambulatory treatment and 17.5% of all industrial accidents causing an absence for 1-2 days. In 1981 2.1% of all compensated industrial accidents (incapacity for work 3 days or more) were eye injuries. Most compensated eye injuries occurred in manufacturing and in construction work (80.4%) and 8.5% occurred in agriculture. The annual incidence rates of compensated accidents to the eyes (accidents x 1 000/number of employees) were highest in several branches of metal industry (4.96--6.88), excavating and foundation work (6.88), and in logging (5.64). Compensated eye injuries were caused by machines (32.8%), hand tools (25.6%), other equipment and constructions (4.8%), work environment (23.6%), chemical substances (10.8%), and other accidents (2.3%).
84227207

174. Simpson SG. **Farm machinery injuries**. J Trauma 1984;24(2):150-152.

AUTHOR ABSTRACT: Agriculture is the most hazardous occupation in North America, with a work injury death rate higher than that of any other major industry. Farm machinery is involved in approximately half of all farm injuries. A Canadian series of 42 farm machinery injury cases hospitalized in Saskatoon, Saskatchewan, in 1980 showed that tractors were most frequently involved. Injuries resulting from power take-offs and grain augers were particularly severe and disabling. Amputations were the most common injuries associated with power take-offs, while crush injuries and compound fractures of the distal extremities were the most common auger-related injuries. Most of these injuries could have been prevented by the incorporation of automatic protective devices such as safety

shields. It is recommended that the federal governments of Canada and the U.S. require manufacturers to equip farm machinery with approved safety features.
84115007

175. Stubbs HA, Harris J, Spear RC. **A proportionate mortality analysis of California agricultural workers, 1978-1979.** Am J Ind Med 1984;6(4):305-320.

AUTHOR ABSTRACT: There are few published reports of epidemiologic studies of the risks of agricultural work. Members of this occupational group have been of special concern because of their exposure to pesticides, some of which are mutagens and animal carcinogens. A previous proportionate mortality study of California agricultural workers was based on deaths recorded among white males of this occupational group during 1959-1961. We have conducted a proportionate mortality analysis of all deaths recorded during 1978-1979 among California farm workers and farm owner/managers. In general, the findings of our study are consistent with those of the previous study. For farm workers, we found proportionate mortality ratios (PMRs) which were consistently elevated for all race and sex categories (in which there were 6 or more decedents) for deaths due to motor vehicle accidents, all respiratory disease, and all infective and parasitic diseases. The PMRs for the former three causes of death were also found to be elevated across several race and sex categories for farm owner/managers. We also found a significant and consistent deficit of deaths among farm workers and farm owner/managers due to arteriosclerotic heart disease. The proportionate cancer mortality ratios (PCMRs) for cancer of the stomach and cancer of other lymphatic tissue were elevated, although not necessarily statistically significant, for several race and sex categories among farm workers and farm owner/managers. The PCMR for cancer of the cervix was statistically significant for white female farmworkers.
85043807

176. Woodward A, Dorsch MM, Simpson D. **Head injuries in country and city: a study of hospital separations in South Australia.** Med J Aust 1984;141(1):13-17.

AUTHOR ABSTRACT: The incidence of head injury in South Australia was estimated from hospital separation (discharges, transfers and deaths) data for 1980 and 1981. The rate of hospital separation of patients with head injury in these years was high by international standards, and was 33% greater for country residents than for residents of the Adelaide metropolitan area. Marked differences in separation rates were observed between different age, sex and occupational groups. On the basis of indirect measures of injury severity, the injury severity threshold for admission to hospital with head injury appeared to be similar in country and city hospitals. An attempt was made to estimate the number of people seriously disabled by head injury each year. The findings raise questions about the concentration of acute surgical and long-term rehabilitation services in the city, at the expense of country areas; they also provide a starting point for further, analytical studies of head injury.
84245258

177. Bamford M. **First aid and fruit farming.** Occup Health 1985;37(4):162-167.

NO ABSTRACT.
86066302

178. Cogbill TH, Busch HM Jr. **The spectrum of agricultural trauma.** J Emerg Med 1985;3(3):205-210.

AUTHOR ABSTRACT: During the past 6 years, 375 patients were hospitalized with injuries resulting from farm accidents. The mechanism of injury was farm animal in 135 patients (36%), tractor in 89 (24%), corn picker or auger in 57 (15%), power take-off in 29 (8%), other farm machinery in 50 (13%), and miscellaneous in 15 (4%).

Injury severity score (ISS) of 25 or greater was calculated for 29 individuals (8%). Eleven groups of surgical subspecialists performed 539 procedures. Eight patients (2.1%) died as a result of their injuries. All eight deaths occurred after tractor accidents secondary to pelvic fractures, head and spinal cord injury, or blunt chest trauma. Thirty-nine patients (10%) were left with serious permanent disability.

Unnecessary morbidity and mortality in many cases were attributed to excessive prehospital care times within a largely rural area. Better prevention by farmer education and the initiation of mandatory safety devices on agricultural equipment may lower the incidence of farm accidents. Major agricultural trauma is frequent and diverse and is optimally managed in a regional trauma center.
86141549

179. Cogbill TH, Busch HM Jr., Stiers GR. **Farm accidents in children.** Pediatrics 1985;76(4):562-566.

AUTHOR ABSTRACT: During a 6 1/2 year period, 105 children were admitted to the hospital as the result of trauma that occurred on farms. The mechanism of injury was animal related in 42 (40%), tractor or wagon accident in 28 (26%), farm machinery in 21 (20%), fall from farm building in six (6%), and miscellaneous in eight (8%). Injury Severity Score was calculated for each patient. An Injury Severity Score of greater than or equal to 25 was determined for 11 children (11%). Life-threatening injuries, therefore, are frequently the result of childhood activities that take place in agricultural environments. The most common injuries were orthopedic, neurologic, thoracoabdominal, and maxillofacial. There was one death in the series, and only one survivor sustained major long-term disability. Such injuries are managed with optimal outcome in a regional trauma center. Educational programs with an emphasis on prevention and safety measures may reduce the incidence of farm accidents.
86015849

180. Coye MJ. **The health effects of agricultural production: I. The health of agricultural workers.** J Public Health Policy 1985;6(3):349-370.

NO ABSTRACT.
86034559

181. Delzell E, Grufferman S. **Mortality among white and nonwhite farmers in North Carolina, 1976-1978.** Am J Epidemiol 1985;121(3):391-402.

AUTHOR ABSTRACT: Death certificate information identified 9,245 white and 3,508 nonwhite men who died in North Carolina during 1976-1978 and who had been farmers. The distribution of deaths from various causes among these men was compared to that of other male decedents in the state. For both white and nonwhite farmers, proportional mortality ratios (PMRs) were elevated for tuberculosis (whites, 1.6; nonwhites, 1.7), diseases of the skin and subcutaneous tissue (whites, 2.5; nonwhites, 1.5), and external causes (whites, 1.2; nonwhites, 1.1) and were decreased for cancers of the esophagus (whites and nonwhites, 0.5) and large intestine and rectum (whites and nonwhites, 0.7). White farmers had an increased relative frequency of melanoma (PMR = 1.2) and other skin cancer (PMR = 1.8), while nonwhite farmers had an increased relative frequency of melanoma (PMR = 6.3), brain cancer (PMR = 2.3), and leukemia (PMR = 1.9). In addition, among decedents under 65 years of age, both white and nonwhite farmers had an elevated proportional mortality ratio for prostate cancer (whites, 1.6; nonwhites, 1.3).

Many of these results are consistent with observations from other studies. Some of these findings, particularly those for nonwhites, warrant further evaluation, including detailed investigation of possibly related farming practices.
85248343

182. Goodman RA, Smith JD, Sikes RK, Rogers DL, Mickey JL. **Fatalities associated with farm tractor injuries: an epidemiologic study**. Public Health Rep 1985;100(3):329-333.

AUTHOR ABSTRACT: Death certificates were used as a source of information to characterize fatalities associated with farm tractor injuries in Georgia for the period 1971-81. In this period, 202 tractor-associated fatalities occurred among residents of Georgia; 198 of these persons were males. The annual tractor-associated fatality rate for males based on the population of male farm residents was 23.6 per 100,000; rates of fatal injury increased with age for this population. Persons whose primary occupation was other than farming accounted for more than half of all tractor-associated deaths.

Fatal injuries occurred throughout the year but predominantly during the planting and harvesting months. Injuries occurred throughout the day (7 a.m. to midnight), with a peak at 4 p.m. to 5 p.m. Most fatal injuries, 76 percent, resulted when tractors overturned. Fatalities were attributed to crushed chest, exsanguination, strangulation or asphyxia, drowning, and other injuries. Current safety standards for the operation of farm tractors are limited; rollover protective canopies are not required for farm owners or their family members. Descriptive epidemiologic information obtained from death certificates can be used to define injury determinants and to suggest approaches for the further study and prevention of specific types of injuries.
85217114

183. Helgerson SD, Milham S Jr. **Farm workers electrocuted when irrigation pipes contact powerlines**. Public Health Rep 1985;100(3):325-328.

AUTHOR ABSTRACT: For accidental electrocutions in Washington State from 1950 to 1979, the standardized proportionate mortality ratio for farmers compared with the general population was found to be 226 in a recent report. This excess mortality rate in Washington State was investigated by the authors, who reviewed death certificates and associated local newspaper reports of all farmers killed by electrocution during 1950-79 and of all persons killed by electrocution during 1970-79. Selected employers, next of kin, and public utility personnel were also interviewed.

In Washington State 42 farmers were electrocuted during the years 1950-79; 23 of them were killed while working near irrigation pipes that came into contact with overhead electrical lines. During 1970-79 there were 15 irrigation pipe-associated (IPA) electrocutions among farmers and 15 among farm workers. The average age of farmers who suffered IPA electrocutions, 33.2 years, was less than the average age of farmers whose electrocutions were not associated with irrigation pipes, 48.9 years. Among persons less than 20 years old, IPA electrocutions were more common than any other type of electrocutions. During the months of April through September, 93 percent of the IPA electrocutions occurred as compared with only 61 percent of other types of electrocution.

Among measures for the prevention of these electrocutions are education of the population at risk and changes in methods of irrigation.
85217113

184. Hogan DJ, Lane PR. **Allergic contact dermatitis due to a herbicide (barban)**. Can Med Assoc J 1985;132(4):387-389.

AUTHOR ABSTRACT: Canadian farmers are using increasing amounts of herbicides. Often they do not use adequate skin protection. Two cases of severe allergic contact dermatitis due to the herbicide barban are described. Patch testing with various substances, including barban, confirmed the diagnosis. Sensitization studies in guinea

pigs and in one of the authors showed that barban is a potent sensitizer. It is recommended that if skin contact with barban occurs the skin be washed immediately with soap and water.
85124198

185. Jeyaratnam J. **Health problems of pesticide usage in the Third World.** Br J Ind Med 1985;42(8):505-506.

NO ABSTRACT.

186. Kizer KW. **Health problems of agricultural and forestry workers.** West J Med 1985;143(5):693-694.

NO ABSTRACT.
86098833

187. Knudson T. **A harvest of harm: the farm-health crisis.** Des Moines Register 1985:1-11.

NO ABSTRACT.

188. Kraus JF. **Fatal and nonfatal injuries in occupational settings: a review.** Annu Rev Public Health 1985;6:403-418.

NO ABSTRACT.
85199385

189. McKnight RH, Hetzel GH. **Trends in farm machinery fatalities.** Agric Eng 1985;66(5):15-17.

NO ABSTRACT.

190. Nesterov VA, Kamushkina LV, Poddubnyi NP. **Present-day problems of invalidity with rural population.** Sante Publique (Bucur) 1985;28(4):329-336.

AUTHOR ABSTRACT: The work is part on the researches of the Chair of Social Hygiene and Health Care Organization of "The Red Army" Kuban Medical Institute, which in the sixties drew up a method of study for primary and general invalidity. The work shows the state of general invalidity in an urban place and in some rural ones. The indices of invalidity afford a picture of the population's health state and reflect the quality and efficiency of prophylactic treatment. The organization of invalidity prophylåxis and the social and medical recovery of the invalids should rely on the principles of the dispensary follow-up.
87019286

191. Rivara FP. **Fatal and nonfatal farm injuries to children and adolescents in the United States.** Pediatrics 1985;76(4):567-573.

AUTHOR ABSTRACT: Agriculture is the second most dangerous occupation in the United States, and unlike other occupations, children make up a significant portion of the work force. This study presents national data on the morbidity and mortality due to farm injuries to children and adolescents $<=19$ years of age. Data sources used

were 1979 to 1981 mortality statistics from the National Center for Health Statistics, farm injuries treated in emergency rooms as reported to National Electronic Injury Surveillance System (1979 to 1983), farm deaths investigated by the Consumer Product Safety Commission, and the 1980 census. Nearly 300 children and adolescents die each year from farm injuries, and 23,500 suffer nonfatal trauma. The fatality rate increases with age of the child; the rate for 15- to 19-year-old boys is double that of young children and 26-fold higher than for girls.

More than half (52.5%) die without ever reaching a physician; an additional 19.1% die in transit to a hospital, and only 7.4% live long enough to receive inpatient care. The most common cause of fatal and nonfatal injury is farm machinery. Tractors accounted for one half of these machinery-related deaths, followed by farm wagons, combines, and forklifts. Overall, 10% of children with nonfatal injuries require hospitalization, and one in 30 children younger than age of 5 years with a farm injury is hospitalized or dies. The magnitude of the problem requires the evaluation of a number of preventive strategies including legislation and improvement of emergency care in rural areas.
86015850

192. Stoskopf CH, Venn J. **Farm accidents and injuries: a review and ideas for prevention.** J Environ Health 1985;47(5):250-251.

AUTHOR ABSTRACT: The rate of accidental deaths among farmers has increased, making farming one of the most hazardous occupations in America today. Much of the literature has focused on injuries and deaths caused by three types of machinery: tractors, augers and corn pickers. The hazards associated with each type of machine are reviewed briefly. The ideas which have been offered for injury prevention can be grouped under four headings: 1) improved medical care; 2) inspection of farms; 3) farmer education and 4) improved equipment design. Opposing philosophies of safety are discussed, and the authors conclude that regulations mandating the redesign of farm equipment have the best chance of preventing farm injuries in the most cost-effective manner. Five suggestions are made that would make machinery safer for farm workers.

193. Yesalis CE III., Lemke JH, Wallace RB, Kohout FJ, Morris MC. **Health status of the rural elderly according to farm work history: the Iowa 65+ rural health study.** Arch Environ Health 1985;40(5):245-253.

AUTHOR ABSTRACT: In a geographically defined survey of 3,097 rural Iowans who were at least 65 yr of age, we examined the association between prior farm experience (=> 25 yr) and various measures of current health status; we controlled for age, current working status, and, where appropriate, smoking and alcohol consumption. Health status was indexed by self-reported morbid conditions, symptoms, and physical function. After controlling for smoking behavior, it was found that both men and women with previous farm exposure currently experience a greater prevalence of all nine respiratory symptoms employed in the study relative to non-farmers. Farm men report a lower prevalence of Parkinson's disease and prostate conditions, but report a greater prevalence of stroke and a lower level of self-perceived health status. Women with a farm work history experience a greater level of physical function and fewer symptoms associated with mental illness. Overall significant benefits as well as risks associated with a history of farm work were identified. However, of those who survived to age 65, extended exposure to farm work did not have a major impact on the overall current health status of men and women.
86049523

194. Agger WA, Cogbill TH, Busch HM Jr., Landercasper J, Callister SM. **Wounds caused by corn-harvesting machines: an unusual source of infection due to gram-negative bacilli.** Rev Infect Dis 1986;8(6):927-931.

AUTHOR ABSTRACT: The infectious complications in 23 patients with mutilating wounds due to trauma during corn harvesting were compared with those in 41 patients with factory-related hand injuries of similar severity.

Initial cultures revealed bacterial growth in 89% of the agricultural wounds and in 63% of the factory wounds. A mean of 3.8 initial bacterial species were isolated per corn-harvesting wound vs.0.9 species per factory wound. Gram-negative rods were recovered from 81% of the agricultural wounds; the commonest of these organisms were Enterobacter species and Xanthomonas maltophilia. Only 7% of factory-wound cultures grew gram-negative rods. Osteomyelitis, all with gram-negative rods, developed in five (22%) of the patients with farm injuries but did not occur in patients with factory wounds. More gram-negative rods were recovered from environmental cultures of corn-harvesting machines and corn plants than from those of factory machinery.
87093727

195. Bamford M. **Death on the farm**. Nurs Times 1986;Aug 6:19-20.

ARTICLE ABSTRACT: Farming has a worse record of accidents than mining. Why is it so dangerous and how can nurses help to improve the record?

196. Busch HM Jr., Cogbill TH, Landercasper J, Landercasper BO. **Blunt bovine and equine trauma**. J Trauma 1986;26(6):559-560.

AUTHOR ABSTRACT: During the past 6 years 134 patients were admitted as the result of bovine (cow) and equine (horse) trauma. The mechanism of injury was fall from horse in 45 patients, animal assault in 42, animal kick in 39, and animal-drawn vehicle accident in eight. Injury Severity Score (ISS) ranged from 1 to 41 and was greater than or equal to 25 in 11 patients. One hundred seventeen operative procedures were performed by ten groups of surgical subspecialists. Mortality was nil. Ideal management of these injuries includes treatment in a regional trauma center and an educational program of preventive measures.
86254366

197. Cogbill TH, Busch HM Jr., Stiers GR. **Farm accidents [letter]**. Pediatrics 1986;77(5):784-785.

NO ABSTRACT.

198. Hansen RH. **Major injuries due to agricultural machinery**. Ann Plast Surg 1986;17(1):59-64.

AUTHOR ABSTRACT: Agricultural accidents are a frequent cause of severe injury. Sixty-four patients with such injuries were seen from October 1981 through September 1984. The patients ranged in age from 2 to 73 years. The highest incidence of injury occurred during spring planting (May through June) and fall harvesting (September through October). The tractor and grain auger were the most common injuring agents. The upper extremity was the most common site of injury, followed by the lower extremity. Because such injuries are usually of a crushing nature and are heavily contaminated, extensive debridement and irrigation are essential in their care.
90197004

199. Heeg M, ten Duis HJ, Klasen HJ. **Power take-off injuries**. Injury 1986;17(1):28-30.

AUTHOR ABSTRACT: Accidents with power take-off mechanisms often cause very serious injuries. In this study the clinical data and circumstances of the accidents of 14 patients who suffered a power take-off accident were analysed. From a total of 38 fractures, three primary and three secondary amputations were necessary. Fifty per

cent of the accidents were due to human negligence, indicating the need not only for better safety shields but also for improved safety practices.
87032320

200. Letts RM. **Degloving injuries in children.** J Pediatr Orthop 1986;6(2):193-197.

AUTHOR ABSTRACT: Degloving injuries are uncommon but serious and are being encountered with increasing frequency in children. A 5-year review of experience with degloving injuries on the Orthopaedic Service at the Winnipeg (Manitoba, Canada) Children's Hospital revealed 16 patients who had sustained this trauma in association with fractures. Twelve of these children had typical anatomical degloving. However, six patients had an associated concealed degloving or so-called "physiological degloving," with disruption of the underlying skin vasculature but no actual disruption of the skin surface. The most common causes of degloving injuries were being run over by a motor vehicle and farm machinery accidents. The diagnosis and proper management of the degloved extremity, especially when accompanied by underlying fracture, are essential in children if morbidity and limb loss are to be minimized.
86168856

201. Monk AS, Morgan DDV, Morris J, Radley RW. **The cost of accidents in agriculture.** J Agric Eng Res 1986;35:245-257.

AUTHOR ABSTRACT: Estimates are presented of the overall extent and cost of farm accidents in Great Britain. Information was obtained on all 56 fatal accidents and on 791 non-fatal accidents reported to the Health and Safety Executive between 1 July 1981 and 30 June 1982. Visits were made to 805 farms to obtain information on unreported accidents.

It is estimated that around 85000 accidents occurred on British farms in the survey year, an overall rate of 0.72 accidents per holding. About 60% of the accidents involved personal injury. Half the accidents involved tractors and field machinery. Under the regulations prevailing at the time, only 5% of the accidents were reportable.

The total cost of these accidents to the British economy is estimated to L94 million, with L62 million of this being borne by the farmer/ employers. Damage to property was the predominant cost element at L44 million, accounting for nearly half the overall cost.

202. Mowbray DL. **Pesticide poisoning in Papua New Guinea and the South Pacific.** Papua New Guinea Med J 1986;29(2):131-141.

AUTHOR ABSTRACT: The literature is reviewed for reported cases of poisoning by pesticides in Papua New Guinea (PNG) and other South Pacific countries. Further instances of human poisoning by pesticides are reported and placed in an overall perspective. Pesticides are not a major cause of poisoning in PNG. Considering the amounts of pesticides used in each country, the incidence of poisoning in PNG appears low compared with that in Western Samoa and Fiji, but high in comparison with Australia and New Zealand. As in Western Samoa and Fiji many of the cases of pesticide poisoning in PNG are intentions (suicide or homicide) rather than accidental. The main problem pesticide is paraquat. In PNG changes in the previous regulations, an educational campaign and cooperation from the main supplier have lessened the chances of paraquat poisoning. New regulations should, if adequate, further restrict the availability to untrained persons of the concentrated formulation of this widely used herbicide and of other hazardous or toxic pesticides. Importers of pesticides will have to comply with registration requirements. Establishment of a Poisons Information Centre is suggested. Studies involving determination of pesticide residues in humans and effects on other species in PNG are reported. Organochlorine residues have been detected in fat, milk and blood samples of humans and in wildlife. Decreased cholinesterase levels have been

reported in a few exposed persons. Poisoning of species other than man has been reported. In the largest reported poisoning many cattle which had been sprayed with 'diazinon break-down-products' were killed.

203. Murphy DJ. **Working unsafely on the farm.** Appl Agric Res 1986;1(1):2-5.

AUTHOR ABSTRACT: Farm work accidents are often blamed on the unsafe work behavior of farm workers. The implication is that if workers used safer procedures, accidents would be greatly reduced. Consequently, considerable effort has been made to encourage workers to use only safe working procedures. This article discusses fundamental tenets of human behavior with application to agricultural safety. The thesis is that unsafe work behavior by farm workers is the norm and not likely to change.

204. Paulson JA. **Farm accidents [letter].** Pediatrics 1986;77(5):784-785.

NO ABSTRACT.
86205159

205. Payton G. **Farm injuries.** Emerg Med Serv 1986;15(7):28-33.

NO ABSTRACT.

206. Schafer SR, Kotrlik JW. **Factors affecting farm safety practices.** J Saf Res 1986;17(3):123-127.

AUTHOR ABSTRACT: In spite of safer equipment and increased numbers of safety education programs, farm accidents continue to occur at alarming rates. The purpose of this study was to identify the safety practices used by farmers and to determine what factors influenced the use of those safety practices. A random sample of 154 farm operators in Beauregard Parish, Louisiana, was interviewed regarding their safety practices, and a safety index score was derived from their answers. Stepwise multiple regression was used to determine the relationship between the safety index score and the following variables: years involved in farming, acres cultivated, age, education level, income level, involvement in a farm accident, and participation in a farm safety program. Participation in a farm safety program, more acres cultivated, and higher income were all significantly related to higher safety index scores. The authors recommend that farm safety program directors target operators of smaller farms and operators with lower income levels for future programs, as well as that increased emphasis be placed on farm safety education in general.

207. Stallones L, Pratt DS, May JJ. **Reported frequency of dairy farm-associated health hazards, Otsego County, New York, 1982-1983.** Am J Prev Med 1986;2(4):189-192.

AUTHOR ABSTRACT: We surveyed a self-selected sample of dairy farm owners/residents to determine the feasibility of establishing a surveillance system that would identify health risks common to this type of farming activity. Data obtained included demographic characteristics of the farm families, number of milk cows, prevalence of selected respiratory diseases, and farm-related injuries among farm owners. Despite a low overall response rate (45 percent), farm owners/residents reported a higher prevalence of respiratory conditions than that of the United States as a whole. Male farm owners were less likely to smoke than U.S. white males as a whole. The number of farm owners reporting farm-related injuries during a one-year period (9 percent) was similar to previous reports.
88269317

208. **Traumatic occupational fatalities - United States, 1980-1984.** MMWR 1987;36(28):461-470.

NO ABSTRACT.
87257643

209. Cryer PC, Fleming C. **A review of work-related fatal injuries in New Zealand 1975-84--numbers, rates and trends.** N Z Med J 1987;100(816):1-6.

AUTHOR ABSTRACT: Deaths resulting from work-related injuries during 1975 to 1984 in New Zealand were identified and reviewed. Nine hundred and eighty-six members of the workforce (workers) were killed at work during this period. This excluded deaths resulting from traffic-related injuries on public roads which occurred during a person's work activity and injuries which occurred whilst travelling to or from work. The estimated average work-related fatal injury rate for New Zealand was 7.2/100000 workers/year. Variations in fatal injury rate by year of injury, age, sex and race were observed. Occupation and industry fatality rates were also estimated and gross variations by occupation were found. Those occupations with the highest estimated rates included helicopter and agricultural pilots, demolition labourers, deer cullers and commercial deer shooters. These rates are likely to be biased to some degree. Occupations with the largest number of workers killed during this 10 year period were farmers (109), fishermen (79) and forestry workers (68).
87116650

210. Dubrow R, Sestito JP, Lalich NR, Burnett CA, Salg JA. **Death certificate-based occupational mortality surveillance in the United States.** Am J Ind Med 1987;11(3):329-342.

AUTHOR ABSTRACT: Surveillance of cause-specific mortality patterns by occupation and industry through the use of death certificate records is a simple and relatively inexpensive approach to the generation of leads as to potential occupational disease problems. Researchers from the National Institute for Occupational Safety and Health (NIOSH) have been working with the National Center for Health Statistics, other federal agencies, and state health departments on a number of programs to foster the development of standardized, routine coding of occupation and industry entries on death certificates by state health departments. Thirty-one states and the District of Columbia are now doing such coding. These data are being analyzed currently by investigators at NIOSH and at individual state health departments for the purpose of hypothesis generation on occupation-disease relationships. The proportionate mortality ratio method is the predominant method being used, as appropriate denominator data are not generally available. This type of surveillance is particularly useful for the study of occupation and industry groups for which it is difficult to assemble cohorts, such as groups that are predominantly non-union and in small workplaces. Limitations of this surveillance include its inappropriateness for monitoring those occupational diseases which are not often fatal, and the limited scope and accuracy of death certificate information.
87210161

211. Edmiston S, Maddy KT. **Summary of illnesses and injuries reported in California by physicians in 1986 as potentially related to pesticides.** Vet Hum Toxicol 1987;29(5):391-397.

AUTHOR ABSTRACT: As a result of legislation in the early 1970's, physicians are required to report all cases of illness or injury which may have been a result of exposure to pesticides. The California Department of Food and Agriculture receives these reports through a variety of reporting mechanisms and compiles them into an annual data base. In 1986, 2099 illness/injury reports were received by the Worker Health and Safety Branch of the California Department of Food and Agriculture. After investigation by the County Agricultural Commissioners' staff, 1065 (51%) were determined to be confirmed cases of occupational illness/injury related to pesticide exposure. In addition, there were also 146 (7%) cases of non-occupational pesticide-related illness/injury, 424 (20%) cases

determined to be unrelated to pesticide exposure, and 464 (22%) cases for which there was insufficient information to determine a cause and effect relationship. The number of confirmed cases of pesticide-related illness/injury decreased by nearly 30% from the corresponding 1985 figures. This apparent decrease is an artifact of the classification scheme employed for 1986. The change is primarily a result of a reduction in the number of field worker cases determined to be confirmed pesticide-related exposures. In previous years most investigations of pesticide application history for grape vineyard worker dermatitis cases were confined to a history from the last field worked prior to visiting a physician. This method assumes no latency period between exposure and onset of symptoms and/or that the worker immediately visited a physician at the onset of symptoms. Based on field studies conducted in 1986, it was determined that grape vineyard workers with dermatitis rarely visit a physician as soon as symptoms are noticed; they often wait for a week or more. In addition workers often cannot remember an exact field location coinciding with the onset of symptoms. Thus, a field application history of the last field worked prior to seeing a physician for medical attention could be misleading in determining a relationship between pesticide exposure and the dermatitis experienced. For 1986, unless evidence identified a specific vineyard as the location of the onset of dermatitis, the cases were classified as cases with insufficient information to determine a relationship. If this type of case had been handled in a manner similar to last year, the number of cases would have been similar. Of these 464 cases with insufficient information, 318 involved dermatitis experienced by field workers in grape vineyards. These cases represent a real problem to vineyard workers. However, the causal role of pesticides cannot be determined at this time. Further investigation including a prospective epidemiology study is planned.
88072033

212. Edmonson MB. **Caustic alkali ingestions by farm children.** Pediatrics 1987;79(3):413-416.

AUTHOR ABSTRACT: Liquid lye drain cleaners responsible for a childhood epidemic of household ingestions in the early 1970s are now marketed in drastically reduced alkali concentrations and packaged in child-resistant containers. However, farm and industrial caustic agents continue to be sold without poison prevention safeguards, as exemplified by dairy pipeline cleaners (liquid NaOH/KOH concentrations 8% to 25%) used routinely on dairy farms. In this study, the ingestion epidemiology of farm/industrial v household caustic alkali products was compared in a population that included farm children. Forty-three children were admitted from 1973 to 1983 to four rural hospitals for nonintentional caustic alkali ingestion. Farm products constituted 23% of all products and 43% of all drain/pipe cleaners ingested. Dairy pipeline cleaners were the single most common causative substance, injuring ten toddlers (mean age 1.6 years), perforating the esophagus in two. Liquid dairy pipeline cleaners were usually ingested in tiny amounts from nonchild-resistant containers or drinking glasses at evening milking time. In contrast, household drain cleaners were associated with fewer ingestions, with all serious complications related to highly concentrated products not available on the consumer market after 1975. Poison prevention strategies successfully applied in the 1970s to household drain cleaners should be redirected and modified for farm-related caustic alkali agents. Preventive measures are suggested by the highly specific pattern of injury and the small, defined population at risk.
87146101

213. Field WE, Purschwitz MA. **Cost of farm and rural injuries.** Public Health Rep 1987;102(6):642-644.

AUTHOR ABSTRACT: It is time that the expertise developed in other industries to address the injury problem is applied to agriculture. More farmers die or are left permanently disabled due to their work than are longshoremen, fire fighters, police officers, pilots, and persons in other high-risk occupations, including the Armed Forces. Approximately four farmers die every day, and a much larger, unknown number are left with serious physical impairments. Agricultural fatalities must be followed up, just as fatalities in other high-risk occupations are.

214. Hallett AL. **Survey of health and safety behaviour of potato farmers in Carleton county, New Brunswick.** Can J Public Health 1987;78(5):345-349.

AUTHOR ABSTRACT: Male farmers have different mortality patterns and occupational hazards than other working men. I examined the safety behaviour of a group of farmers, regarding machinery and pesticides, their health complaints and the prevalence of specific accidents.

I randomly selected 43 Carleton County potato growers and personally interviewed them during the summer of 1985. I found a widespread non-compliance with industrial and government recommendations for safe use of pesticides, use of tractors without roll-over protection, carbon monoxide exposure, hand injuries, complaints of stress,
musculoskeletal problems and hearing impairment.

With farming, the residence and the workplace are the same, so family members as well as individual farmers are at risk: 30% of farmers who stored pesticides in winter kept them in the basement of their homes. Children were also victims in tractor, machinery and pesticide accidents.
88079766

215. Inancsi W, Guidotti TL. **Occupation-related burns: five-year experience of an urban burn center.** J Occup Med 1987;29(9):730-733.

AUTHOR ABSTRACT: Mortality for burns in the United States has not improved appreciably since 1955 among men, and the rate of decline among women appears to be slowing. Although one-quarter of all serious burns result from occupational accidents, few systematic epidemiologic studies of occupational burns have been conducted. We reviewed 232 cases of occupational burns among the 1,076 civilians seen as outpatients or admitted to the Regional Burn Treatment Center of the University of California Medical Center in San Diego from 1977 to 1982. Scalds were the most common type of burn overall and in women, but flame-related burns resulted in the highest average percent body surface area burned and were more common in men; tar-related, flame-related, chemical, and electrical burns affected men almost exclusively. Electrical burns were disproportionately severe, as measured by time lost from work, fatalities, and permanent disability, in relation to their frequency and amount of body surface area involved. Contact burns were more frequent in younger persons. Hispanics were overrepresented compared with their representation in the general population. Occupational associations included scalds due to hot grease among restaurant workers, tar burns among roofing workers, electrical burns among farm workers, and injuries reflecting hazards to firefighters and electricians. The number of days off work after hospitalization correlated closely with the number of days hospitalized, which in turn correlated significantly with percentage of body surface area burned. The typical burn victim in San Diego is a white male aged 21-30 who suffers a scald or flame-related burn as a semi- or unskilled worker, who spends 2 weeks in hospital and is off work for another 2 weeks, but who has no permanent disability. Hispanic men and roofing workers appear to be at excess risk. Occupation-related burns are potentially fatal but usually avoidable. More attention should be paid to prevention.
88061752

216. Jansson BR. **The yield of systems for continuous and periodic injury surveillance in emergency care with emphasis on farm-work-related accidents.** Scand J Soc Med 1987;15(4):247-252.

AUTHOR ABSTRACT: The objective was to analyse the medical consequences, sequence of events and contributory and background factors of farm-work-related accidents. The study is part of a project to develop systems for continuous and periodic injury surveillance in Swedish public health care. Altogether 163 patients were treated for injuries sustained in accidents on 2454 farms during a one-year period. The five most common injurious agents were: material, tools, machinery, foreign bodies and animals. Half of the injuries were due to the victims' having slipped on a floor or on equipment with tools or other objects or to tripping. Reported contributory factors were unsuitable methods of working, failure to use personal safety equipment, deficient inspection, lack of safety

devices, design deficiency and haste. Farms consisting of more than 50 hectares (120 acres) were over-represented. The results illustrate the numerous risks associated with work on farms and indicate the need to improve occupational safety in this sector.
88070493

217. Jeyaratnam J, Lun KC, Phoon WO. **Survey of acute pesticide poisoning among agricultural workers in four Asian countries.** Bull World Health Organ 1987;65(4):521-527.

AUTHOR ABSTRACT: The study investigated the extent of acute pesticide poisoning in selected agricultural communities in Indonesia, Malaysia, Sri Lanka and Thailand, as well as the contributing factors, because it is believed that this type of poisoning is a major problem in developing countries, but not in the industrialized countries, despite their extensive use of pesticides. The study confirmed the existence of this problem, which was found to be due to inadequate knowledge of the safe practices in the use of pesticides among users and to the lack of suitable protective clothing for use by agricultural workers in hot and humid climates.
88080781

218. Langworthy JR, Maligro D. **Survey of occupational injuries on a large pineapple plantation during the harvesting season.** Hawaii Med J 1987;46(2):52, 55.

NO ABSTRACT.
87193757

219. Massoud A, Wassif SM, El-Rida AMS, Khalifa SMA, El-Badawy AA, Nassif MMM. **Health hazards among agricultural workers in Sharkia Governorate.** J Egypt Soc Parasitol 1987;17(2):651-655.

AUTHOR ABSTRACT: Among the three hundred examined agricultural workers in this study, 77.0% were found to have iron deficiency anaemia, 68.0% had dermatosis, 42.0% parasitic infections, 34.0% bronchitis and 15.7% had suffered from trauma and accidents.
88089083

220. Matos EL, Loria DI, Albiano N, Sobel N, de Bujan EC. **Pesticides in intensive cultivation: effects on working conditions and workers' health.** Bull Pan Am Health Organ 1987;21(4):405-415.

AUTHOR ABSTRACT: A survey was made of greenhouse workers in the province of Buenos Aires, Argentina, in order to assess the safety of pesticide application procedures and their possible effects on health. This work also served as a pilot project that helped to determine the feasibility of doing a similar nationwide survey.

Two population groups were studied, these being 154 people growing flowers for cutting and another 188 raising ornamental potted plants. Members of both groups generally lived in the places where they worked and were predominantly Oriental. Interviews conducted with group members sought information about demography, personal habits, the types of tasks performed, pesticides used, protective measures taken, and possible pesticide-related health effects.

The results confirmed that the work done by both study groups involved extensive exposure to a wide range of pesticides and suggested that the number of products used had increased substantially since 1964. The data also indicated that both study groups made indiscriminate use of a wide range of pesticides, took inadequate protective measures, and experienced a wide range of acute and chronic intoxication symptoms. Such symptoms were far less common among those applicators who took adequate protective measures than among those who did not.
88150354

221. Notkola VJ, Husman KRH, Laukkanen VJ. **Mortality among male farmers in Finland during 1979-1983.** Scand J Work Environ Health 1987;13(2):124-128.

AUTHOR ABSTRACT: In this study the cause-specific mortality of male farmers in Finland was compared with the mortality of all economically active men. Mortality was also examined by size of farm, by type of farm production, and by geographic area. It was shown that, compared to the mortality of all economically active men, that of the farmers was generally low. The only exception was mortality due to respiratory diseases, for which the mortality rate of the farmers was about 40-50% higher than that of all economically active men. The rate ratio, which was higher for those men with small farms, was almost independent of the cause of death. The rate ratio was highest for farmers in eastern and northern Finland. Assessed by type of farm production, the differences in mortality were small. It was supposed that the high rate ratio of respiratory deaths among farmers was, at least partly, work-related. The high mortality of the men with a small farm was shown to be associated with the higher proportion of smokers among this group of farmers.
87263278

222. Rettig BA, Klein DK, Sniezek JE. **The incidence of hospitalizations and emergency room visits resulting from exposure to chemicals used in agriculture.** Nebr Med J 1987;72(7):215-219.

AUTHOR ABSTRACT: This study was designed to determine the incidence of hospitalizations and emergency room visits resulting from exposure to chemicals used in agriculture which occurred recently within a 21-county area of central Nebraska. Forty-eight cases were identified, which translated into an annual incidence rate of 1.35 cases per 10, 000 population. Anhydrous ammonia was the chemical most frequently cited as responsible for exposures.
87287415

223. Rivara FP, Mueller BA. **The epidemiology and causes of childhood injuries.** J Soc Issues 1987;43(2):13-31.

AUTHOR ABSTRACT: Injuries are the leading cause of death in children and adolescents after the first year of life. For individuals of all ages, the costs from motor vehicle injuries alone, when compared to other leading causes of death, are second only to the costs of cancer. Injuries are discussed within the conceptual framework of the events surrounding the injury and the classic epidemiological parameters of host, agent, and environment. Important host factors for childhood injuries include age, sex, behavioral characteristics of the child, family background, and use of drugs and alcohol. The environment encompasses the socioeconomic environment of the child, the physical environment, and the legislative environment. Specific agents or vectors of injury are discussed, including fireworks, poisoning, flammable fabrics, hot tapwater, farm equipment, and firearms. Approaches to injury prevention are suggested, both for research investigation and child advocacy.

224. Saftlas AF, Blair A, Cantor KP, Hanrahan L, Anderson HA. **Cancer and other causes of death among Wisconsin farmers.** Am J Ind Med 1987;11(2):119-129.

AUTHOR ABSTRACT: Computerized mortality listings for Wisconsin for 1968-1976 were used in proportional mortality ratio (PMR) and proportional cancer mortality ratio (PCMR) analyses to evaluate mortality patterns among Wisconsin farmers. Examination of PCMR trends by per capita county level of agricultural production was limited to the youngest birth cohort (1905-1958) and cancer sites associated with farming exposures in either the present or previous analyses. Among all Wisconsin farmers, significantly decreased PMRs were seen for tobacco- and alcohol-related causes of death, while excesses occurred for accidental causes, asthma, and cancer of the stomach, prostate, eye, and lymphatic and hematopoietic systems. Elevated PCMR's for leukemia and all lymphopoietic cancer and cancers of the stomach, rectum, eye occurred in farmers born 1905-1958, while deficits were observed

for cancer of the pancreas and the category, "all other cancers." Increases in PCMR's with level of various agricultural activities were largely associated with cancers of other lymphatic tissue (2/3 of which were multiple myeloma) and the rectum. Certain agricultural exposures were also positively associated with deaths due to cancers of the prostate, brain, lymphosarcoma and reticulosarcoma, and all lymphopoietic cancers. No positive PCMR gradients were observed for leukemia and malignancies of the stomach and eye. Modern chemical practices in farming may account for some of the patterns noted.
87153364

225. Shilling S, Brackbill RM. **Occupational health and safety risks and potential health consequences perceived by U.S. workers, 1985.** Public Health Rep 1987;102(1):36-46.

AUTHOR ABSTRACT: Data from the Health Promotion and Disease Prevention Questionnaire, part of the 1985 National Health Interview Survey, were used to report worker's perceptions of occupational risk in their present jobs. This information will be used to monitor progress between 1985 and 1990 toward achieving broad goals in health promotion and disease prevention.

The proportions of currently employed persons who perceived exposure to health-endangering substances, work conditions, or risks of injuries were reported for age, race, sex and occupation groups. Occupational groups were further characterized by the proportion of men and women who reported specific exposures (such as exposure to chemicals or to loud noise) and specific health consequences of exposure (such as risk of developing cancer or hearing impairment).

Greater proportions of men than women reported perceived risk from exposure to health-endangering substances, work conditions, and injuries in their present job. Also, a greater proportion of workers perceived risk of injury in their present job than other occupational risk categories. The greatest proportions of perceived exposure to occupational risk were reported by farm operators and managers, police and firefighters, and by workers in forestry and fishing occupations. Among workers reporting perceived exposures, chemicals, noise, and risk of injuries from vehicles were cited by the greatest proportion of workers, as were such health consequences as lung and respiratory problems and hearing impairment.

Data from this study may be used to target employment groups for health promotion or education and to develop indepth studies of specific occupational groups to reduce or prevent risk at the worksite.
87118713

226. Smith N. **The incidence of severe trauma in small rural hospitals.** J Fam Pract 1987;25(6):595-600.

AUTHOR ABSTRACT: Trauma is the third leading cause of death in the United States, and yet relatively little is known about its epidemiology, especially in rural areas. A retrospective study was done in five Washington and Idaho communities to determine the incidence of severe trauma seen in small rural hospitals. Records were reviewed for the year 1983 on all trauma patients (565 cases) who were either admitted to or transferred from these hospitals. The study area included five hospitals and 30 physicians, serving a population of 57,600 people over 7,396 square miles. Each patient's injuries were rated according to the Injury Severity Score (ISS), a standardized trauma index. Of the cases reviewed, 3.4 percent of the cases had an ISS greater than or equal to 20, reflecting severe multisystem trauma, 14.7 percent had an ISS of 10 to 19, ie, severe trauma limited to one body system or multisystem trauma of a less-critical nature. There were 30 patients (5.3 percent) with critical head injuries, 24 patients (4.2 percent) with major chest injuries, and 21 patients (3.7 percent) with serious abdominal injuries. The results showed that each individual physician or hospital did not see the severe cases often, but that when they occurred, these types of injuries necessitated an experienced, rapid response on the part of the hospital staff. This finding has significant implications for trauma management in rural communities.
88061133

227. Stark AD, Chang H-G, Fitzgerald EF, Riccardi K, Stone RR. **A retrospective cohort study of mortality among New York State Farm Bureau members.** Arch Environ Health 1987;42(4):204-212.

AUTHOR ABSTRACT: A retrospective cohort study was conducted to examine mortality among 18,811 male farm owners and operators in New York State from 1973-1984. Farm Bureau membership lists were used to identify the study population, and vital status was determined through record linkage with death certificate and motor vehicle files. The comparison group consisted of the 1980 United States Census population of men who resided in the same towns as did the farmers. The results indicated that the study cohort experienced fewer than the expected numbers of deaths overall and for each major cause category except accidents. Specific causes with significant mortality deficits included cancer of the lung (standardized mortality ratio [SMR] = 47.0); diabetes mellitus (SMR = 57.5); ischemic heart disease (SMR = 65.3); bronchitis, emphysema, and asthma (SMR = 26.7); and cirrhosis of the liver (SMR = 29.7). The only specific cause with a significantly elevated mortality was accidents other than motor vehicle (SMR = 146.5). The investigation differs from previous research in method, setting, and population, but the pattern of findings is generally consistent with that of other studies.
88022933

228. Swanson JA, Sachs MI, Dahlgren KA, Tinguely SJ. **Accidental farm injuries in children.** Am J Dis Child 1987;141(12):1276-1279.

AUTHOR ABSTRACT: Eighty-seven children with 88 farm injuries presented to our emergency room in Rochester, Minn, from November 1974 to July 1985. Seventy-four accidents (84.1%) occurred in boys, and 14 (15.9%) in girls. Ages ranged from 1 to 16 years. Farm machines involved included corn augers in 37 accidents (42.0%); tractors, 22 (25.0%); power takeoffs, ten (11.4%); conveyor belts, five (5.7%); and miscellaneous, 14 (15.9%). Fractures and lacerations were the most common injuries, occurring in 55 (62.5%) and 30 (34.1%), respectively. Significant long-term disability occurred in 36 (40.9%). Eleven children required multiple reconstructive surgical procedures; two died. Preventive measures that can be employed by physicians, family members, educators, and legislators are discussed.
88074168

229. Une H, Schuman SH, Caldwell ST, Whitlock NH. **Agricultural life-style: a mortality study among male farmers in South Carolina, 1983-1984.** South Med J 1987;80(9):1137-1140.

AUTHOR ABSTRACT: After reviewing the death certificates of 2,820 South Carolina agricultural workers (including farmers, farm workers, and others in the agricultural industry) aged 35 to 84 during 1983-1984, we calculated proportional mortality ratios (PMRs). Among both white and nonwhite farmers in South Carolina, the PMR was significantly higher for cerebrovascular disease (whites, PMR = 1.20, $P < .05$; nonwhites, PMR = 1.43, $P < .001$) and lower for all malignant neoplasms (whites, PMR = 0.86, $P < .05$; nonwhites, PMR = 0.78, $P < .001$). In addition, external causes of death were elevated, attaining statistical significance for white farmers (PMR = 1.51, $P < .001$). Significantly lower PMRs for all malignant neoplasms are attributed to fewer deaths from cancers related to smoking (buccal cavity and pharynx, esophagus, lung, and bladder) and colon and rectal cancers among both white and nonwhite farmers. White farmers did not show significantly elevated PMRs for cancers of the lymphatic and hematopoietic systems found in other studies in the Midwest. These data suggest that agricultural life-style can be improved for the prevention of strokes and for external causes of death.
87319824

230. **American Academy of Pediatrics Committee on Accident and Poison Prevention: Rural injuries.** Pediatrics 1988;81(6):902-903.

NO ABSTRACT.
88217453

231. Cole DC, McConnell R, Murray DL, Anton FP. **Pesticide illness surveillance: the Nicaraguan experience.** Bull Pan Am Health Organ 1988;22(2):119-132.

AUTHOR ABSTRACT: In 1984, work designed to expand cholinesterase screening activities and improve the reporting of pesticide poisonings was initiated in Nicaragua's Leon-Chinandega region as a pilot project.

Using a field tintometric method, 1,960 workers were screened for whole blood cholinesterase. The percentage with low cholinesterase activity levels (50% or less) increased sharply during the peak spraying season. Airfield workers were most affected, though a noteworthy share of certain agricultural workers were also found to have low levels. Workers who used certain kinds of personal protective equipment were significantly less affected ($p < .05$)

In addition to these survey findings, six deaths and 396 pesticide-related poisonings were reported in the Leon-Chinandega region in 1984. This indicated a relatively high rate of 74.6 poisoning cases per 100,000 inhabitants, 84% of them occurring in October-December. Ninety-four percent of the cases reported via questionnaires were occupationally related, small farms being the most affected. Methyl parathion was implicated in roughly half of these cases, two-thirds of which were due to dermal exposure.

Policy recommendations derived from the initial results reported here include reduction of methyl parathion use, installation of closed systems for safer aircraft loading, provision and use of clothing that protects the skin against exposure, and restriction of pesticide work by minors.

232. Cordes DH, Rea DF. **Health hazards of farming.** Am Fam Physician 1988;38(4):233-244.

AUTHOR ABSTRACT: The U.S. farm work force numbers approximately 6.5 million. The health risks connected with their farm tasks are many and varied. Accidents and illnesses are caused by tractors, specialized farming equipment, chemicals, zoonoses, fungi, sensitizers, and the environment of confinement buildings. The scattered nature of the work force makes preventive measures difficult to implement.
89022719

233. Davies JE. **A global need: farm worker safety.** Am J Ind Med 1988;13(6):725-729.

NO ABSTRACT.
88267230

234. Davis JB Jr., Howell CG, Parrish RA. **Childhood farm injury: the role of the physician in prevention.** Am Surg 1988;54(4):192-194.

AUTHOR ABSTRACT: Farm-related trauma occurs in more than 25,000 children per year with almost 300 patients dying from these preventable injuries. The incidence of associated farm-machinery injuries and fatalities is increasing at an alarming rate with the majority occurring in young boys during the summer months. Between 1979-1985, 234 patients with traumatic injuries were admitted to our Pediatric Surgery Service. Seven of these, six boys and one girl, age ranges from 2-15 years were treated for severe farm-related injuries. Modified injury severity score was calculated with an average score of 31.5 (range 9-66). Four patients sustained or required amputation of a major extremity(ies) as a result of the injury. The patients had multiple long bone fractures with

associative neurologic or abdominal injury. One patient exsanguinated from massive liver lacerations. Five of the six surviving patients are disabled to varying degrees because of the injuries. This report provides support for the establishment of federal safety standards for farm-related equipment. Guidelines for prevention are outlined. We believe that the child physician is obligated to encourage education programs in farming communities on safety measures and further should endorse the application for farms.
88181843

235. de Kort WL, Sangster B. **Acute intoxications during work.** Vet Hum Toxicol 1988;30(1):9-11.

AUTHOR ABSTRACT: Information on acute intoxications during work in the Netherlands has been gathered from 4 sources during a 1-year period: 1. The registration of occupational accidents of the Directorate-General of Labour, by reviewing reports on accidents involving chemicals; 2. The Netherlands Poison Control Centre of the National Institute for Public Health and Environmental Hygiene, by tracing back consulting physicians; 3. The Dutch Centre for Health Care Information, by searching their data base for hospital admissions with relevant admission diagnoses and 4. A large Occupational Health Service, which for this purpose recorded incident cases in the population under care. During the period of investigation 5 deaths were reported: 1 case of hydrogen cyanide intoxication, 1 case of carbon dioxide intoxication, and 3 cases of hydrogen sulfide intoxication in combination with oxygen deficiency (nearby a liquid manure tank). At least 690 (supposed) acute intoxications during work occurred, which in 84 cases resulted in hospital admission. The total number of hospital admissions for supposed unintentional acute intoxications by chemicals, usually encountered in workplaces, in the Netherlands in 1984 was at least 477. Substances most often involved belonged to the groups of pesticides, lung and/or skin irritant liquids/vapors/gases and asphyxiants. The working branches most often involved were agriculture and market gardening sectors, (chemical) industries, repair and retail trade and some governmental services (police, fire brigade, defense personnel). The results show considerable underreporting in official statistics on acute intoxications during work.
88179442

236. Denis WB. **Causes of health and safety hazards in Canadian agriculture.** Int J Health Serv 1988;18(3):419-436.

AUTHOR ABSTRACT: Agriculture remains one of the most hazardous occupations in the world, even in industrialized countries. One of the major differences between Canadian agriculture and most other sectors of the economy is that the vast majority of farmers are self-employed. Consequently their particular relations of production are expected to have an impact on the issue of work health and safety. After a review of the nature and extent of work accidents, deaths, illness, and injuries in farmers and farm workers, the article focuses on the causes of such hazards. These causes are analyzed with reference to individual, institutional, and structural factors. The author argues that institutional and structural factors seem to be of paramount importance in explaining the severity of farm health hazards.
89007275

237. Doyle Y, Conroy R. **A one year survey of accidents on Irish farms and their medical outcome.** J Occup Accid 1988;10:199-208.

AUTHOR ABSTRACT: During a one year prospective survey of farming accidents in four sample Irish counties, 451 non-fatal cases were presented to four hospital accident and emergency (A & E) departments. There were eight mortalities. The majority (59%) of non-fatal accident cases were full or part-time farmers, but 14% of the non-fatal, and 50% of the fatal cases were aged 16 years or less. Most accidents occurred on dairy and mixed farms, and falls, blows, tractors and animals caused these accidents. Lack of safety equipment, including roll-over-

protective-structures on tractors was a feature of many accidents. Admission to hospital accounted for 28% of cases and almost 80% of these required surgical procedures or transfer to a specialist unit. Over half those discharged from the A & E departments required at least two re-visits to hospital outpatient departments.

A sustained educative campaign for the Irish farming community is needed to highlight these hazards. This should be backed up with more incentives for safe work practices and stringent legislation for abuse of the safety regulations.

238. Friesen RW, Ekong CEU. **Spinal injuries due to front-end bale loaders.** Can Med Assoc J 1988;138(1):43-46.

AUTHOR ABSTRACT: Of 22 patients admitted to Plains Health Centre, Regina, from January 1979 to April 1986 with spinal injuries due to farming accidents, 7 had injuries related to tractor-mounted front-end bale loaders. In contrast, none of the 12 patients admitted with farm-related spinal injuries from 1974 through 1978 had injuries related to bale loaders. All seven injuries occurred when a front-end loader was used to move a large, round hay bale. In each case when the loader arms were raised past the horizontal plane the bale rolled back onto the unprotected tractor operator. There were five thoracic injuries, one cervical injury and one lumbar injury. All seven bony injuries healed. Four of the patients had permanent neurologic sequelae; two of the four had paraplegia. All seven patients suffered disability that impaired work performance; all five farmers suffered some loss of income. None of these injuries would have occurred if available safety equipment had been in place.
88079727

239. Goonetilleke G. **Winnowing-fan injuries in Polonnaruwa.** Ceylon Med J 1988;33(3):118-120.

AUTHOR ABSTRACT: Fifty-two patients were injured by paddy winnowing fans during a period of two years. The commonest site of injury was the hand. More than one third of these patients were disabled as a result of the injury. There were no deaths. These injuries are preventable.
89168538

240. Gordon G, Indeck M, Bross J, Kapoor DA, Brotman S. **Injury from silage wagon accident complicated by mucormycosis.** J Trauma 1988;28(6):866-867.

AUTHOR ABSTRACT: Infection due to farm machinery injuries may be caused by microorganisms found in soil or decaying vegetable material. A case of injury due to entrapment of a young boy in a silage wagon is reported here. His injuries were complicated by infection with Aspergillus species, Absidia species, Rhizopus species (the latter two are members of the Mucorales order), and Pseudomonas maltophilia. Successful treatment of his infection followed aggressive surgical debridement of the anterior abdominal wall, amphotericin B, hyperbaric oxygen therapy, and surgical closure utilizing delayed placement of split-thickness skin grafts.
88259329

241. Gorsche TS, Wood MB. **Mutilating corn-picker injuries of the hand.** J Hand Surg [Am] 1988;13(3):423-427.

AUTHOR ABSTRACT: Our experience with 15 patients who had acute mutilating hand injuries from corn-picker machines is reviewed. Three injury patterns were defined. Type I involved severe injury to all digits of the hand, including the thumb; type II injuries involved amputation of all fingers, in whole or in part, but with sparing of the thumb; and type III injuries involved amputation of multiple fingers with sparing of the thumb and at least one other digit. Attempts at revascularization or at complex reconstruction of the injured digits in the period immediately after

injury failed in all 15 patients. The most satisfactory results in patients with type I injuries were obtained by complex reconstructive procedures such as toe-to-hand transfer. Patients with type II injuries were best treated with construction of a mitten-type hand by various methods. Patients with type III injuries were best treated by amputation of the devascularized digits.
88244330

242. Goulding R. **Accidental pesticide poisoning: the toll is high.** World Health Forum 1988;9(4):526-530.

AUTHOR ABSTRACT: Accidental poisoning with pesticides causes much illness and loss of life every year. Residues of toxic chemicals are responsible for some of the damage, but more significant is the exposure of workers handling the products. Every country should have enforceable regulations on the marketing and use of pesticides, and primary health care personnel should be able to respond effectively to causes of poisoning wherever they occur.
89302494

243. Jacobsson B, Schelp L. **One-year incidence of occupational injuries among teenagers in a Swedish rural municipality.** Scand J Soc Med 1988;16(1):21-25.

AUTHOR ABSTRACT: The aim of this study was to investigate occupational injuries among teenagers in a defined population and geographical area with regard to incidence and severity and to compare our registration system with that of the Swedish Occupational Injury Information System. All occupational accidents in the age group 15-19 years were registered at public health centres. We found a higher incidence compared to school accidents in the older population. Part-time work, lack of experience, temporary employment, unskilled work, and age-specific behavioural patterns are factors that might explain the higher incidence rate. The highest rates were found in service, military and unspecified occupations. Only 25% of the work-related accidents in our study were registered by the Swedish Occupational Injury System (ISA). It seems possible to reduce the number of accidents through the instigation of fairly simple measures. The coverage of the registration by the ISA seems to be incomplete.
88159196

244. Jansson BR. **Safety education and training of Swedish farmer-loggers.** J Soc Occup Med 1988;38(4):113-117.

AUTHOR ABSTRACT: The aim of the study was to test a model for safety education of farmer-loggers. The project was prompted by the high rate of fatal accidents and severe injuries among farmer-loggers and the difficulty in recruiting them to ordinary safety courses. The courses were planned and organized by representatives of the agricultural and forestry organizations, the Local Safety Inspectorate and the public health services. The participants were recruited locally in each district. One trial group and one control group were randomly selected and compared for six variables. The courses were held close to the participants' farms. The majority had little or no previous education in occupational safety. The courses contributed to an increased safety consciousness and the participants reported improved methods of working. The most important factors for the result were the location of the courses, the recruitment procedure and realistic exercises with demonstrations on major risks.
89179942

245. Jansson BR, Jacobsson BS. **Medical consequences of work-related accidents on 2454 Swedish farms.** Scand J Work Environ Health 1988;14(1):21-26.

AUTHOR ABSTRACT: The medical consequences of accidents related to work on 2454 farms in two Swedish rural municipalities were studied. The objectives were to describe the nature and scope of the injuries incurred,

to collect data for the health planning procedure, and to test a local system for continuous injury surveillance in emergency care. All the injuries of 163 patients during the period 1 January --31 December 1983 were analyzed with regard to diagnosis, severity, medical treatment, hospitalization, and temporary and permanent disability. Wounds, contusions, fractures, foreign bodies, sprains, and strains constituted the main diagnostic groups. Injuries to the fingers, head and face (including the eyes), feet, and legs dominated. Six percent of the patients were admitted to the hospital. Seventy-five patients were put on temporary disability for a total of 2431 d. For 62 of these patients the injuries were classified as minor. Permanent disability was observed in 4% of the cases. The study emphasizes the importance of registry criteria when one is comparing different injury surveillance systems. The majority of the injuries could have been prevented by the proper use of appropriate personal safety equipment. The results may serve as a basis for general measures to improve local safety consciousness.
88178010

246. Kent P, McCollum PT, Sanfey H, Tarif H, Moore DJ, Shanik DG. **Traction injuries to the brachial artery caused by power take-off mechanisms.** Injury 1988;19(4):289-291.

AUTHOR ABSTRACT: The brachial artery was damaged by the power take-off (PTO) mechanism of agricultural tractors in four patients who presented to the vascular unit within a 6-month period. The probable mode of injury was acute compression secondary to clothes catching in the unguarded universal joint of the PTO shaft. Three of the four cases had associated fractures of the humerus. In all cases there was severe, local soft tissue damage with partial or complete rupture of biceps or triceps and in three patients skin loss was extensive. Eventual outcome following surgery was poor, reflecting the serious nature of these injuries. One patient died from pulmonary embolism. A further patient required amputation of his forearm after an unsuccessful attempt to revascularize the arm 23 h after injury. Of the remaining two, only one has full function of his arm.
89154712

247. Koh KBH, Vaikunthan R, Sengupta S. **A freak accidental injury to the spinal cord.** Med J Malaysia 1988;43(3):246-249.

AUTHOR ABSTRACT: This report outlines a rare injury where the victim sustained a complete spinal cord transection caused by a sharp penetrating instrument.
89201056

248. Landercasper J, Cogbill TH, Strutt PJ, Landercasper BO. **Trauma and the veterinarian.** J Trauma 1988;28(8):1255-1259.

AUTHOR ABSTRACT: A survey of all American Veterinary Medical Association members in Minnesota and Wisconsin was conducted by questionnaire to document injuries resulting from animal treatment. Of 995 respondents, 64.6% had sustained a major animal-related injury. Seventeen per cent were hospitalized within the last year. Of those hospitalized, 25.3% required a surgical procedure. Hand injuries were most common in a veterinarian's career (52.6% of respondents), followed by trauma to the arms (27.6%), and the head (20.8%). The thorax (8.3%), genitalia (3.9%), and intra-abdominal viscera (2.8%) were injured less often.

Operative procedures were frequently required to treat veterinarian injury from animal patients. Thirty-five per cent of veterinarians required treatment for suture of lacerations, 10% for reduction of fracture/dislocation, and 5% for dental work in their career. One craniotomy and one carotid artery repair were necessary.

Mechanism of injury was animal kick (35.5%), bite (34%), crush (11.7%), scratch (3.8%), and other interesting causes (14.9%). These included the patient pushing, goring, head butting, running over, and falling on the veterinarian. Additional work-related hazards included zoonotic disease, autoinoculation of live brucella vaccine, and self-inflicted scalpel injuries from sudden patient movement. The most common animals involved were bovine

(46.5%), canine (24.2%), and equine (15.2%). Lost days from work secondary to animal injury averaged 1.3 days (range 0-180 days) in 1986 and 8.5 days (range 0-365 days) during the veterinarian's career.

Job-related automobile accidents also occurred. Veterinarians averaged more than 300 miles driven per week, and only 56% reported following the speed limit. Fifteen per cent did not wear seat belts.

Self-treatment of injuries was common. Four per cent of veterinarians reduced their own fractures and dislocations, 20% sutured their own lacerations, and 67.5% self-administered antibiotics.

Reduction of animal-related injury may be possible through formal course work in graduate education, liberal use of tranquilizers, and increased utilization of mechanical devices for patient restraint.
88317046

249. Maddy KT, Edmiston S. **Selected incidents of illnesses and injuries related to exposure to pesticides reported by physicians in California in 1986.** Vet Hum Toxicol 1988;30(3):246-254.

AUTHOR ABSTRACT: California collects data on most occupational and many non-occupational illnesses and injuries related to pesticide exposure. Most of the occupational incidents are investigated by local agencies. A thorough investigation is conducted on all pesticide-related cases that meet "priority" guidelines: death; hospitalization of 1 or more persons for more than 24 hours with treatment; or 5 or more people with symptoms seeking medical care as a result of the same incident. This report summarizes the priority cases determined to be related to pesticide exposure during 1986. Of the 67 described incidents, involving 583 people ill, 26 (38%) were related to exposure to pesticides applied indoors (residences, offices), either by commercial pest control companies, employees or homeowners. Nearly 200 people (33%) became ill and more than 200 people were evacuated as a result of these types of applications. Most of these incidents were a result of careless application techniques and not following label instructions. Four other incidents, with 33 people ill, were the result of spills in retail stores. In all 4 cases, store employees tried to clean the spill without wearing protective clothing. Two other cases involved exposure via a pesticide being put in a food container. Nineteen of these type of incidents involved a pesticide product containing an organophosphate; most often chlorpyrifos (8 incidents), diazinon (3 incidents), and malathion (5 incidents). There were also 10 cases that resulted from suicide; eight different pesticides were involved. Five incidents involving agricultural workers, as well as 4 incidents involving non-agricultural workers, were primarily the result of allowing pesticides to drift from the target field. Other agricultural-related cases resulted from carelessness on the part of the pesticide handler and violations of laws and regulations in California.
88265812

250. Nehez M, Boros P, Ferke A, Mohos J, Palotas M, Vetro G et al. **Cytogenetic examination of people working with agrochemicals in the southern region of Hungary.** Regul Toxicol Pharmacol 1988;8(1):37-44.

AUTHOR ABSTRACT: The team performed medical examinations, including cytogenetic examinations, on 55 people working professionally with agrochemicals in eight farmers' cooperatives of County Csongrad in the southern region of Hungary. The people exposed to spraying in a closed space showed no increase in chromosome aberrations. There was an increase in chromosome aberrations in workers exposed to these agrochemicals in open fields. No conclusions regarding workers' health can be drawn from these data. Regulations designed to prevent accidents with agrochemicals are more effective for closed spaces than for the open fields.
88218282

251. Notkola VJ, Husman KR. **Mortality among female farmers in Finland in 1979-1985.** Scand J Soc Med 1988;16(3):187-191.

AUTHOR ABSTRACT: In this study cause-specific mortality of female farmers in Finland was examined by size of farm, by type of farm production, and by geographic area. It was shown that mortality of female farmers was

higher for those with small farms. In particular, mortality due to cardiovascular diseases, diseases of the respiratory system and mortality due to accidents, poisonings and violence was slightly increased (statistically not significantly) among those with small farms. Assessed by type of farm production, the differences in mortality were small. Mortality differences among female farmers were smaller than among male farmers.
89058589

252. Okonkwo CA. **Spinal cord injuries in Enugu, Nigeria - preventable accidents.** Paraplegia 1988;26(1):12-18.

AUTHOR ABSTRACT: This is a review of 72 patients who were treated for Spinal Cord Injuries in the University of Nigeria Teaching Hospital, Enugu, Nigeria, during the period January 1980 to January 1985. There were 20 patients who had tetraplegia as a result of their injuries and 52 with paraplegia. All the patients were treated conservatively.

The catchment area of the hospital is in the rain forest belt of West Africa where tall palm trees grow. Palm tree climbers use jigs which are woven from palm fronds. The climbing jigs are prone to snapping during periods of low humidity between the months of November and March. During this period of the year the tensile strength of the jigs is greatly reduced.

Our experience is that the commonest cause of spinal cord injury is a fall from palm trees. Climbers should be educated about the time related jig failure, falls and subsequent spinal cord injury.

Alternative sources for stronger materials for weaving jigs, and increased growing of shorter species of palm trees from which harvesting of palm nuts take place at ground level are advocated.
88176091

253. Paulson JA. **The epidemiology of injuries in adolescents.** Pediatr Ann 1988;17(2):84-86, 89-96.

AUTHOR ABSTRACT: Injuries are the major health problem of adolescents. Injuries are the leading cause of death in the adolescent age group and the leading cause of potentially productive years of life lost in the nation. Non-fatal injuries are also very common, generating frequent physician visits, hospital admission, and high medical care costs. The road is the most dangerous environment for teens where motor vehicle occupants, motorcyclists, pedestrians, and bicyclists all sustain frequent injuries. Alcohol and other drugs are often contributing factors to these injuries. Head and spinal cord injury result in many permanent disabilities. At school, children usually sustain nonfatal injuries in sports activities. Injuries at home are less common among adolescents than among younger children. The farm environment is an understudied, but dangerous environment. There is a need for standardization of data sets and age grouping within data sets to better understand the epidemiology of injuries in adolescents.
88143791

254. Purschwitz MA, Field WE. **Safety spending: is agriculture being shortchanged?** Agric Eng 1988;69(7):10, 18.

AUTHOR ABSTRACT: Few would argue that agriculture presents risks to workers that are among the very highest to be found in any industry. Yet the level of federal funding for occupational safety in farming appears to fail to reflect the need for greater concern and positive action to prevent them.

255. Stout-Wiegand N. **Fatal occupational injuries in US industries, 1984: comparison of two national surveillance systems.** Am J Public Health 1988;78(9):1215-1217.

AUTHOR ABSTRACT: This paper compares the results of analyses of 1984 fatalities as identified in the National Institute for Occupational Safety and Health (NIOSH) National Traumatic Occupational Fatality (NTOF) data base with those of the Bureau of Labor Statistics' Annual Survey of Occupational Injuries and Illnesses (AS) for 1984. The fatality rates for industries were similar in both analyses; however, differences in number of injuries suggest underrepresentation in the AS of fatal injuries in several, high-risk industries. Differences and similarities in methods and results between the two national surveillance systems are described and their application to research and injury prevention are discussed.
88307735

256. **Fatalities attributed to methane asphyxia in manure waste pits -Ohio, Michigan, 1989.** MMWR 1989;38(33):583-586.

NO ABSTRACT.
89343879

257. Bredfeldt RC, Heath AE, Junker JA, Cuddeback GL. **Childhood farm injuries: a neglected aspect of patient and resident education.** Fam Med 1989;21(3):217-220.

AUTHOR ABSTRACT: Since family physicians are often the primary health providers for children residing in rural areas, one might expect family practice residencies to include in their curricula some teaching in regard to the prevention of childhood farm injuries. To assess how family practice residencies are currently responding to childhood farm injuries, the authors undertook a survey of the program directors of the nation's 380 residency programs. Of the 332 returned questionnaires, only three (0.9%) reported any formal instruction in the prevention of childhood farm injuries, despite the fact that 102 programs (30.7%) stated that at least 50% of their graduates practiced in rural communities. In addition to the survey, specific proposals are made regarding what residencies can do to initiate teaching in the prevention of farm injuries in children.
89306255

258. Brown SK, Ames RG, Mengle DC. **Occupational illnesses from cholinesterase-inhibiting pesticides among agricultural applicators in California, 1982-1985.** Arch Environ Health 1989;44(1):34-39.

AUTHOR ABSTRACT: California pesticide illness investigation reports involving toxicity category I or II organophosphate and carbamate pesticide exposures among agricultural pesticide applicators were reviewed for the years 1982-1985. The pesticides associated with each illness were recorded, and the exposures were classified as chronic, short-term, or accidental. Illnesses were associated with a range of pesticides, including both organophosphates and carbamates in both toxicity categories I and II. Approximately 19% of the illnesses were due to accidents. Overall, the analysis identified a need for improving occupational health surveillance and the regulations governing worker health and safety.
89133566

259. Cogbill TH, Strutt PJ, Landercasper J, Landercasper BO. **Injuries from horses and cows.** Complic Orthop 1989:112-114, 120.

AUTHOR ABSTRACT: Over an 8-year period, 158 patients were admitted to a trauma center for treatment of orthopedic injuries related to the handling of horses and cows. Mechanism of injury included falls from horses, bovine and equine assaults, and animal kicks. Fractures of upper and lower extremities predominated. Serious craniocerebral, maxillofacial, thoracic, and abdominal injuries were also treated. In 107 patients, 140 inpatient procedures were performed. There were no deaths. Complications, including 5 wound infections and 5 bony nonunions, were observed in 25 patients.

260. Cryer PC, Fleming C. **Work-related fatal injuries on New Zealand farms.** J Occup Health Safety Aust NZ 1989;5(1):21-25.

AUTHOR ABSTRACT: The circumstances of 237 fatal injuries which occurred on New Zealand farms between 1975 and 1984 are described. Many were vehicle related. Over 50% had some tractor involvement. Tractor overturns are particularly important due to the large number of these events. Many of these occurred when the safe operating conditions of the tractor were exceeded. Preventive strategies are discussed and it is recommended that greater use of enclosed cabs on tractors be encouraged.

261. Cryer PC, Langley J. **Work-related fatal injuries on New Zealand farms.** J Occup Health Safety Aust NZ 1989;5(3):196-197.

NO ABSTRACT.

262. Doyle Y, Conroy R. **Childhood farm accidents: a continuing cause for concern.** J Soc Occup Med 1989;39(1):35-37.

AUTHOR ABSTRACT: Farms in Ireland remain a dangerous environment for children despite increasing publicity about farming hazards based on international research. A one year prospective study on farm accidents was carried out in four Irish accident and emergency departments. During this time, four deaths and 62 cases of injury aged 15 years and under were seen. Half the cases required admission to hospital; tractor accidents were common and serious. Most injuries occurred to the extremities but 13 (21 per cent) had multiple injuries. Forty-three (69 per cent) of the children required outpatient follow-up and twenty-seven of these (63 per cent) had more than one outpatient re-visit.

The Irish farming community is still unappreciative of the risks to their children on the farm, and urgent attention needs to be directed towards educational and legislative measures to improve the safety profile of Irish farms.
89237134

263. Doyle Y, Conroy R. **The spectrum of farming accidents seen in Irish general practice: a one-year survey.** Fam Pract 1989;6(1):38-41.

AUTHOR ABSTRACT: A one-year prospective survey of farming accidents in three Irish counties recruited 37 general practitioners in a wide geographical sample. The response rate to the survey was 84%. There were 319 accident cases seen by the general practitioners in the survey period, and 175 (55%) of these were farmers. Children accounted for 52 (16%) of all accident cases. The majority of cases (256, 80%) were treated by the general practitioner, and the spectrum of injuries treated was very broad. Many injuries required extensive suturing

and follow-up of soft-tissue injuries. General practitioner coroners were involved with five fatal farm accident cases. It is concluded that the Irish rural general practitioner is providing a significant trauma service to farm accident victims, and is a valuable source of information on these incidents. The general practitioner would be a local source of expertise in a health education campaign directed at increasing the awareness among the farming community on the extent of farm accident morbidity and mortality. Continuing education for rural general practitioners should be directed towards regular updates on trauma management.
89232438

264. Doyle YG, Conroy RM. **Prevention of timber felling and chainsaw-related accidents in the Republic of Ireland.** Accid Anal Prev 1989;21(6):529-534.

AUTHOR ABSTRACT: A one-year prospective survey in four rural Irish counties was performed between January 1 and December 31, 1986, to analyse chainsaw accidents in a representative sample of domestic chainsaw users. Of the 62 accident cases recorded, the largest group were farmers, followed by a medley of self-employed "loggers" and domestic users. Every age group was represented, the commonest age group being 16-30 years. One of three female cases was an old-aged pensioner, and three other cases were aged under 12 years. Two of the latter cases had been using the saw when the accident occurred. Most injuries were sustained to the lower extremities, mostly due to a slip or misdirection of the saw. Of the 27 cases admitted to a hospital. 25 (93%) required surgical procedures with an average inpatient stay of eight days. Only 2 (3%) of the 62 cases wore an item of protective gear; in both cases, this was steel capped boots that were unsuitable for protection against chainsaw injuries. First aid at the accident site was very inadequate. The research indicates few of the cases were competent to use a power saw, and there was a general lack of appreciation of the risks associated with these implements and a disregard for safety procedures. While new forthcoming legislation on safety at work may improve safety standards in the future, a substantial proportion of chainsaw users in Ireland are currently at risk from further accidents.
90197786

265. Doyle Y, Moore A. **Farm accidents in an Irish county.** J R Soc Health 1989;109(4):128-130.

AUTHOR ABSTRACT: Between 1977-87, 17 farm accident deaths were recorded in a county of population 52,379 in the north-east of Ireland. In 1986, a further 150 non-fatal cases were recorded in the county during a national survey of non-fatal farm accidents. Tractors were the commonest cause of fatal and non-fatal accidents and the latter were frequently serious. Although 63% of fatal, and 60% of non-fatal accidents occurred to farmers, 31% of fatal and 15% of non-fatal cases were farmer's children, and these were mainly under 12 years old. The commonest age group of fatal cases was between 1-15 years, and of non-fatal cases between 46-60 years. The latter age group is representative of the national age group of Irish farmers.

There were fewer than three deaths in this series which were beyond the control of the deceased or their guardian, and many non-fatal accidents were associated with risk taking by the deceased. The very low profile afforded farm safety at all levels in Ireland is inappropriate as there is no evidence that farm accidents have decreased either in number or severity in recent years. Examples of non-accidental deaths on the farm are presented to illustrate the need for personal alarm systems for the elderly farmer; furthermore, a 'distressed farmer' scheme run by farming interests is recommended for farmers whose social isolation and financial worries have become an unbearable burden to them.
90064398

266. Feldman MK. **Dr. Allen Van Beek. Saving lives and limbs in rural Minnesota.** Minn Med 1989;72(4):211-213.

NO ABSTRACT.
89238297

267. Grieshop JI, Winter DM. **Agricultural pesticide accidents and prevention in Ecuador.** Accid Anal Prev 1989;21(4):394-398.

AUTHOR ABSTRACT: Accidents due to the misuse and abuse of agricultural pesticides is a worldwide problem. Although data gaps exist, there is an ever-growing body of information on the incidence and nature of pesticide-caused poisonings in the developing countries of the world. The information gathered in a field study in Ecuador, South America, among rural-based users of pesticides contributes to the understanding of the problem. Factors that contribute to accidental poisonings are detailed and described and are related to accident prevention efforts.
89351232

268. Hoffer E, Taitelman U. **Exposure to paraquat through skin absorption: clinical and laboratory observations of accidental splashing on healthy skin of agricultural workers.** Hum Toxicol 1989;8(6):483-485.

AUTHOR ABSTRACT: Data concerning 15 consecutive cases of single exposure of the skin or eyes during work to paraquat solutions are presented. Urine and serum were analysed for paraquat in all these cases at the laboratory of the Israel Poison Information Center. From these data it is apparent that a single exposure of healthy skin to paraquat solutions caused only local lesions. No systemic effect was detected in these patients.
90077460

269. Hopkins RS. **Farm equipment injuries in a rural county, 1980 through 1985: the emergency department as a source of data for prevention.** Ann Emerg Med 1989;18(7):758-762.

AUTHOR ABSTRACT: Incidence rates of injury related to farm machinery were estimated for Athens county, Ohio, using data generated as part of the National Electronic Injury Surveillance System (NEISS) of the Consumer Product Safety Commission. The study period was 1980 through 1985. The service area of the principal hospital in the county, which participates in NEISS, closely approximates the population of the county. The population of the entire county and the rural farm population, bases on US Census data, were used as denominators in calculation of rates. There were 147 injuries related to farm machinery over a six-year period, 14 of which were coded as occupational. One hundred twelve (84.2%) of these injury victims were men. The annual incidence rate per 1,000 rural farm resident population was 25.6 per 1,000 for children under the age of 14 years and was 55.6 per 1,000 for adults 25 to 34 years. Annual rates for adults age 35 and up ranged from 13 to 19 per 1,000 rural farm residents. The annual number of tractor rollover injuries decreased during this study period, while the annual numbers of other tractor injuries did not change. Hospital emergency department visits can be used to document the need for and to evaluate injury prevention measures.
89285720

270. Jansson B, Svanstrom L. **Evaluation of a system for injury surveillance in Swedish emergency care.** Scand J Soc Med 1989;17(1):7-11.

AUTHOR ABSTRACT: A system for continuous and periodic injury surveillance in Swedish emergency care has been evaluated based on a case study of accidental injuries on 2454 farms during a one year period. The evaluation

procedure comprised registry completeness, measurement errors, trend analysis and calculation of risk. The results indicate that the structure of the registry system permits analysis of registry completeness, but further development is needed concerning the staffing and organising problem. The importance of registry inclusion criteria when one is comparing different injury surveillance systems was noted. Limitations applied to calculation of accident frequency rates per million hours work. The results show that there will be a high drop-out rate if the collection of data is not simultaneously combined with an injury control programme. The registry system could serve as a basis for periodic surveys and trend analysis. Further development of a continuous system based on reporting immediately at the injury reception centre should be
considered. A coordinated system involving both continuous and periodic data seems to leave the flexibility both to identify certain risk environments or risk groups and to analyse the circumstances involved of specific accidental injuries, e.g. in agriculture.
89222345

271. Kurtz PH, Esser TE. **A variant of mass (epidemic) psychogenic illness in the agricultural work setting.** J Occup Med 1989;31(4):331-334.

AUTHOR ABSTRACT: California experiences episodes of suspected agricultural field worker poisonings annually. These episodes are not only disruptive to ongoing agricultural operations, but the prospect of such poisoning is a source of great concern to workers, employers, and government agencies alike. Three episodes of group illness are examined in which actual poisoning does not seem to be involved. Factors contributing to the generation of these episodes include fear, uncertainty, incomplete understanding of hazards, and social pressures. Physicians can minimize extended disability for workers by reassuring victims and waiting until circumstances are verified before issuing statements which may further alarm or add to already existing fears.
89235812

272. Layde P. **Epidemiology of farm injuries.** Marshfield Clinic Bull 1989;20:4-12.

NO ABSTRACT.

273. Lee HS. **Acute pancreatitis and organophosphate poisoning - a case report and review.** Singapore Med J 1989;30(6):599-601.

AUTHOR ABSTRACT: The association between acute pancreatitis and organophosphate (OP) poisoning may still not be widely recognised. A case of organophosphate (diazinon) poisoning presenting as acute pancreatitis is described. The diagnosis of OP was not made during admission to hospital as the history of exposure to OP was not obtained then. Obtaining the history of OP exposure is most important. Recognising the OP poisoning can present as acute pancreatitis may be lift-saving in a critically ill patient.
90246239

274. Marwick C. **Educating farmers, physicians who treat them, about rural life's potential health hazards.** JAMA 1989;261(3):343.

NO ABSTRACT.
89081413

275. Millea TP, Kucan JO, Smoot EC III. **Anhydrous ammonia injuries.** J Burn Care Rehabil 1989;10(5):448-453.

AUTHOR ABSTRACT: Anhydrous ammonia is a relatively common cause of chemical injuries. Most injuries are the result of accidental exposure, frequently in the course of work. Exposure to anhydrous ammonia may produce serious injury to the eyes, respiratory system, and integument. Anhydrous ammonia injuries occurring in a predominantly agricultural region are reviewed. The pathophysiology of anhydrous ammonia injury is reviewed. Therapeutic modalities are described. Guidelines to prevent or minimize injury are delineated.
90009001

276. Moses M. **Pesticide-related health problems and farmworkers.** AAOHN J 1989;37(3):115-130.

AUTHOR ABSTRACT: 1. Migrant and seasonal farmworkers are primarily ethnic minorites who are excluded from federal laws that protect other workers. Farmworkers live and work under substandard conditions that place them at increased risk of pesticide-related illness. 2. Agriculture uses 80% of all pesticides in the U.S. Handlers who mix, load and apply pesticides as well as workers cultivating and harvesting crops sprayed with them are at risk of acute poisoning or even death from their exposures. Drift and run-off of agricultural pesticides pollute the air, soil and water, creating additional hazards to workers' families, community, residents, and the environment. 3. Chronic effects, including cancer in adults and children, adverse reproductive outcomes, delayed neuropathy and neurobehavioral effects, are also associated with occupational and environmental exposure to pesticides.
89165903

277. Murphy DJ, Huizinga MA. **A new approach to collecting farm accident data.** J Saf Res 1989;20(1):21-29.

AUTHOR ABSTRACT: Since the early 1940s, newspaper clippings and personal interview surveys have been the primary methods for collecting agricultural accident data. Accident data forms and survey procedures were standardized during the late 1960s, and many statewide surveys were conducted throughout the 1970s. In recent years, the implementation of the standardized survey procedure has become difficult and appears to no longer be viable. A personalized mail survey approach was recently tested in Pennsylvania with excellent results. The personalized mail survey research procedures may become an efficient, long-term method of agricultural accident data collection.

278. Pratt DS. **Receiving lines and broad-brimmed hats.** J Rural Health 1989;5(3):189-191.

NO ABSTRACT.

279. Rafnsson V, Gunnarsdottir H. **Mortality among farmers in Iceland.** Int J Epidemiol 1989;18(1):146-151.

AUTHOR ABSTRACT: A retrospective cohort study was performed to determine the cause of death among 5923 farmers in Iceland. Information on deaths occurring between 1977 and 1985 was obtained through the Statistical Bureau of Iceland. The vital status could be ascertained for all subjects in the study. Expected death rates were calculated, based on the national rates for males in the corresponding age groups and calendar years.

The number of deaths from all causes, malignant neoplasms, lung cancer, ischaemic heart disease, respiratory diseases and accidents was less than expected in the total cohort and in nearly all subcohorts. There was no statistically significant excess risk, however: SMR for skin cancer was 2.30, SMR for Hodgkin's disease was 1.71, for leukaemia SMR was 1.60, and for brain cancer SMR was 1.23 in the total cohort.

The results are in agreement with those of most previous studies of farmers, but because of the short follow-up time, the excess risk found for deaths from skin and haematological malignancies did not reach statistical significance. Further follow-up is planned in the future.
89254221

280. Salmi LR, Weiss HB, Peterson PL, Spengler RF, Sattin RW, Anderson HA. **Fatal farm injuries among young children**. Pediatrics 1989;83(2):267-271.

AUTHOR ABSTRACT: Death certificate data concerning farm-related injury deaths among children 0 to 9 years of age in Wisconsin and Illinois for the period of 1979 to 1985 were reviewed. Average annual farm-related injury death rates were 3.2 per 100,000 rural children in Wisconsin (62 deaths) and 1.5 per 100,000 in Illinois (32 deaths). Rates were three times higher among boys than girls. The occurrence of two harvest-related peaks and the absence of fatality in children less than 1 year of age suggest that presence of children on the farm when supervision is diminished is a key factor in farm-related fatalities. Moving machinery (tractors, wagons, and trucks) was the source of injury in approximately 55% of all deaths. Drowning accounted for 15% of all farm-related deaths. Two fatalities related to gravity box wagons could have easily been prevented with simple safety devices. These findings suggest a need for developing environmental interventions in farms. This will require the allocation of more resources to farm safety programs and a revision of current farm safety legislation.
89112928

281. Seminario P. **Worker death and injury toll cries for remedy**. AFL-CIO News 1989;Mar 18:11.

NO ABSTRACT.

282. Smith DM. **Accidents to children in agriculture [letter]**. J Soc Occup Med 1989;39(1):38.

NO ABSTRACT.
89237135

283. Sniezek JE, Horiagon TM. **Medical-examiner-reported fatal occupational injuries, North Carolina, 1978-1984**. Am J Ind Med 1989;15(6):669-678.

AUTHOR ABSTRACT: Fatal occupational injuries are a major public health problem in the U.S. Utilizing a medical examiner database from North Carolina, 1,233 fatal work-related injuries were identified in a 7-year time period. Twelve percent of these deaths were in out-of-state residents. For men, highest risk industries were forestry/ fishing, agriculture, trade, and transportation/public utilities/ communications. Only 4% of deaths occurred in women. The most common manner of death in women was homicide. Highest-risk industries for women were agriculture, trade, and transportation/public utilities/ communications. Of 902 decedents tested, alcohol was found in 11%, and 7% had levels at or above 100 mg%. Because of its completeness, the North Carolina Medical Examiner System is a useful tool to use in the surveillance of fatal occupational injuries.
89320443

284. Stallones L. **Education, equipment modification and injury control among farm workers in Kentucky.** J Occup Accid 1989;10:293-303.

AUTHOR ABSTRACT: Little evaluation of education programs targeted at safety of agricultural workers has been attempted. Further, there is very little reported regarding evaluation of equipment modification in reducing agricultural injuries. This paper presents an intervention classification strategy using existing data to begin the process of designing an appropriate surveillance scheme for fatal and nonfatal agricultural injuries in Kentucky. For fatal agricultural injuries occurring between 1979-1985, 31.9% were classified as requiring intervention by "education only", 26.3% were classified as requiring intervention including "education and equipment modification", and 36.6% were classified as requiring "equipment modification only", in order to reduce severity or prevent the injuries. For nonfatal agricultural injuries which occurred on a random sample of Kentucky farms during 1978, 43.8% were classified as requiring "education only", 44.9% were classified as requiring "education and equipment modification", and only 11.2% requiring "equipment modification only" as intervention strategies for prevention or reduction of severity of the injuries. Existing data can be used to begin the evaluation process but ongoing surveillance systems must be designed with intervention strategies as one consideration in order that appropriate data be obtained.

285. Stallones L. **Fatal unintentional injuries among Kentucky farm children: 1979 to 1985.** J Rural Health 1989;5(3):246-256.

AUTHOR ABSTRACT: The hazards of farming among adults have been well described, but less has been published regarding the nature of farm injuries among children. Fatal farm injuries in Kentucky among children under 14 years of age usually have involved agricultural equipment, primarily tractors. The average annual age specific rates for fatal injuries in Kentucky among farm children ranged from 14.8 per 100,000 to 28.5 per 100,000 for boys, and from 11.8 per 100,000 to 3.1 per 100,000 for girls. Many of these deaths could have been prevented by not allowing children to ride on tractors, or by using infant and child restraints in motor vehicles. In the older age groups (10 to 14 years of age), many deaths were due to drowning, so drowning prevention programs could reduce the number of fatal injuries. Exposure to environmental hazards differ for farm children and prevention programs in this population need to target those special hazards.

286. Tevis C, Finck C. **We kill too many farm kids.** Success Farm 1989;87(3):18A-18P.

NO ABSTRACT.

287. Trent RB. **Locations of fatal work injuries in the United States: 1980 to 1985.** J Occup Med 1989;31(8):674-676.

AUTHOR ABSTRACT: Surveillance of injury at work is beset with problems of method and definition. As a result, national agencies have widely varying estimates of the number of fatal work injuries in the United States. One plausible method for identifying fatal work injuries is to use the Place of Injury variable, which is entered on all US death certificates but is not encoded by the National Center for Health Statistics. To use this method, one would assume that work injuries largely occur at "typical work sites," ie, places coded as industrial, farm, and mine and quarry. Data to test this method were derived from the National Traumatic Occupational Fatality data base maintained by the National Institute for Occupational Safety and Health. Analysis of this data base showed that work-related fatal injuries mostly occur in places where many non-work-related injuries also occur. Only about one third of fatal work injuries took place at locations coded as industrial, farm, and mine and quarry. As a method for identifying fatal work injuries, the Place of Injury variable appears to have little value.
89341918

288. Waller AE, Baker SP, Szocka A. **Childhood injury deaths: national analysis and geographic variations.** Am J Public Health 1989;79(3):310-315.

AUTHOR ABSTRACT: Twenty-three causes of injury mortality in children ages 0-14 in the United States were analyzed by age, race, sex, and state of residence for the years 1980-85. Motor vehicles caused 37 per cent of all injury-related deaths and were the leading cause of injury mortality in every group except children younger than one year, for whom homicide was the leading cause. Male death rates were at least four times female rates for suicide, unintentional firearm injury, and injuries related to farm machinery or motorcycles. The drowning rate among Whites was almost twice that of Blacks for ages 1-4, but in the 10-14 year age group the drowning rate for Blacks was over three times that of Whites. In general, the highest injury death rates were in the mountain states and the south. Between 1980 and 1985, the suicide rate in the 10-14 year age group more than doubled.
89132892

289. White G, Cessna A. **Occupational hazards of farming.** Can Fam Physician 1989;35:2331-2336.

AUTHOR ABSTRACT: A number of occupational hazards exist for the farmer and farm worker. They include the hazards of farm machinery, biologic and chemical hazards, and social and environmental stresses. Recognizing of these hazards will help the family physician care for farmers and their families.

290. Bell CA, Stout NA, Bender TR, Conroy CS, Crouse WE, Myers JR. **Fatal occupational injuries in the United States, 1980 through 1985.** JAMA 1990;263(22):3047-3050.

AUTHOR ABSTRACT: The National Traumatic Occupational Fatality surveillance project was designed to gather demographic, employment, and injury information from death certificates for all deaths due to injuries at work in the United States. Approximately 7000 workers have died each year during the 6-year period from 1980 through 1985: 94% were men, and 6% were women. Unintentional injuries caused the deaths of 83% of the men and 50% of the women. Eleven percent of the men and 39% of the women died from homicide. While the greatest number of deaths occurred in the group aged 20 through 34 years, fatality rates were highest among those aged 70 years and older. Expressed as deaths per 100000 workers, annual fatality rates for black workers (7.7) were slightly higher than for white workers (6.5). The four industrial groups with the highest fatality rates were mining (31.9); transportation, communication, and public utilities (25.4); construction (24.0); and agriculture, forestry, and fishing (20.7).

From 1980 through 1985 the annual traumatic occupational fatality rate fell 23%.
90258192

291. Brennan SR, Rhodes KH, Peterson HA. **Infection after farm machine-related injuries in children and adolescents.** Am J Dis Child 1990;144(6):710-713.

AUTHOR ABSTRACT: Infection played an important role in prolonging hospitalization and increasing morbidity in 68 children injured in farm settings. Predominantly gram-negative enteric organisms, group D streptococci, and anaerobic organisms were isolated in cultures of specimens obtained from wounds. Infection was more often associated with severe injuries of the large bones of the extremities than in amputation injuries of the digits and crush or rollover injuries when the skin barrier was intact. The occurrence of infection in farm injuries was associated with prolonged hospitalization for parenteral antibiotic therapy, multiple surgical debridements with a need for general anesthesia, and permanent disability (decreased range of motion and loss of limbs and digits). Early aggressive surgical debridement and antimicrobial therapy guided by isolation and sensitivity testing of the major organisms are required because of polymicrobial invasion of vascularly compromised tissue.
90266827

292. Eisma TL. **NIOSH alert explains hazards of manure pits.** Occup Health Saf 1990;59(7):49.

NO ABSTRACT.
90356215

293. Emanuel DA, Draves DL, Nycz GR. **Occupational health services for farmers.** Am J Ind Med 1990;18(2):149-162.

AUTHOR ABSTRACT: There are many unmet health needs in the farming community, needs that are peculiar to the agriculture industry. Health research and regulations to protect the safety of the farmer have lagged far behind those for other sectors of our economy. At a time when health needs are increasing, there is a decreasing availability of hospitals, physicians, nurses, and other health care personnel. The ability of the rural section to pay for these services is also declining. The evidence calls for a multifaceted solution, with improved cooperation and understanding on the part of the consumer as well as the provider. The regional health network is one system that may help solve some of these dilemmas.
90386164

294. Fuortes LJ, Merchant JA, Van Lier SF, Burmeister LF, Muldoon J. **1983 occupational injury hospital admissions in Iowa: a comparison of the agricultural and non-agricultural sectors.** Am J Ind Med 1990;18(2):211-222.

AUTHOR ABSTRACT: An occupational injury surveillance project was conducted in 15 of Iowa's 99 counties. Trained abstractors reviewed the medical records of persons admitted for trauma to hospitals during 1983. Based on these chart reviews, subsequent mail-out questionnaires and phone contacts were made, and rate estimates for occupational injury hospitalization for farmers and non-farmers were generated.

The 1980 U.S. census data for occupation and market area data for the sample hospitals were used for the rate calculations. Approximately 14.7% of hospitalizations for trauma in the sample area were for work-related injuries. Farmers were hospitalized for occupational injuries at a rate of 1,521/100,000 compared to non-farmers at a rate of 497/ 100,000.

There were no significant differences in the mean number of days per hospitalization for farmers versus non-farmers, (7.4 days for farmers and 6.7 days for non-farmers). Based on the questionnaire data, farmers were much less likely to receive any form of remuneration for injury, (odds ratio = 0,26, $p < 5 \times 10\text{-}6$). Farmers also reported less time off from work, with a mean of 79 days compared to non-farmers with a mean of 289 days.
90386170

295. Geller JM, Ludtke RL, Stratton T. **Nonfatal farm injuries in North Dakota: a sociological analysis.** J Rural Health 1990;6(2):185-196.

AUTHOR ABSTRACT: The 1980s has not been a particularly prosperous decade for many farm operators. Due to shifts in the agricultural economy, many farmers have experienced farm foreclosure and rural displacement; while many more are at serious risk of losing their farms. Within the context of the agricultural crisis, this study examines the impact of economic hardship on the probability of experiencing a farm injury. Specifically, we hypothesized that farm operators who were experiencing economic distress would be more likely to experience a farm injury. Data from the North Dakota Rural Life Poll (n=450) was used to estimate the incidence of farm accidents, as well as examine the relationship between selected farm operator characteristics and the incidence of a farm accident. The data suggests that younger farm operators with higher debt-to-asset ratios are significantly

more likely to experience a farm accident. The study goes on to examine some of the dynamics of this relationship, and implications for farm safety education are addressed.
91159563

296. Gunderson P, Gerberich S, Gibson R, Adlis S, Carr P, Erdman A et al. **Injury surveillance in agriculture.** Am J Ind Med 1990;18(2):169-178.

AUTHOR ABSTRACT: Information on agricultural trauma is limited and difficult to find. Planning for effective prevention strategies and evaluation is compromised by lack of a good surveillance system. Several agencies and organizations have provided some data. Although their summation is at best an approximation of the real situation, a critical review of current data bases is presented. The literature is also reviewed attempting to characterize agricultural trauma. This characterization was classified into: 1) case descriptions, 2) reviews of general articles on the hazards of farming, and 3) descriptive surveys of agricultural injuries. A summary of the available literature still leaves a rather superficial understanding of the entire injury picture. A new approach to surveillance is necessary to overcome past deficiencies. A combined modality approach is suggested, utilizing on-site survey, mail survey, telephone interviewing, and medical record verification. Trial applications of two such systems in Minnesota are described.
90386166

297. Jansson B, Eriksson CG. **Accident involvement and attitudes towards hazards and countermeasures in a Swedish rural population.** Scand J Soc Med 1990;18(2):139-142.

AUTHOR ABSTRACT: Research on the resistance to implementation of effective injury control measures is needed. An important task is to identify factors or circumstances that influence the possibilities of taking active safety measures, and also factors that may limit or hinder such efforts. The objective of this study was to describe the farmers' own attitudes towards farm accident hazards and their interest in participating in preventive measures. The study is part of a project to develop systems for injury surveillance and control in Swedish emergency care. A standardised questionnaire for telephone interviews was used. All patients who had consulted an emergency department during a one-year period for injuries caused by accidents on 2,454 farms in two Swedish rural municipalities were interviewed. The results demonstrated that adults, especially young adults with small children, seem to be most conscious of accident risks and best motivated for participation in active safety measures, e.g. safety education.
90312093

298. Jeyaratnam J. **Acute pesticide poisoning: a major global health problem.** World Health Stat Q 1990;43(3):139-144.

AUTHOR ABSTRACT: The global problem of acute pesticide poisoning has been confirmed as extensive by a variety of independent estimates. Further, it is also recognized to be a problem confined to the developing countries. Most estimates concerning the extent of acute pesticide poisoning have been based on data from hospital admissions which would include only the more serious cases. The latest estimate by a WHO task group indicates that there may be 1 million serious unintentional poisonings each year and in addition 2 million people hospitalized for suicide attempts with pesticides. This necessarily reflects only a fraction of the real problem. On the basis of a survey of self-reported minor poisoning carried out in the Asian region, it is estimated that there could be as many as 25 million agricultural workers in the developing world suffering an episode of poisoning each year. This article emphasizes the need to control the problem on a collaborative basis by all concerned, including national governments, agrochemical industries, international agencies, scientists and victims.
91049743

299. Jones MW. **A study of trauma in an Amish community**. J Trauma 1990;30(7):899-902.

AUTHOR ABSTRACT: An analysis of 272 Amish admissions to a community hospital over a 3-year period revealed 60 to be trauma related. The majority of the accidents were unique to the Amish community, with 26.7% horse and buggy related. Falls accounted for 20%, "hay hole" falls 8.3%, power saw injury 8.3%, and horse drawn farm equipment 6.7%.

The Amish are an exceptional group whose religious beliefs disallow the use of many modern conveniences such as automobiles and electricity. As with the general population, transportation played a major role as the main source of trauma in the Amish group; however, overall mortality and morbidity appear to be less.
90339535

300. Layde PM. **Beyond surveillance: methodologic considerations in analytic studies of agricultural injuries.** Am J Ind Med 1990;18(2):193-200.

AUTHOR ABSTRACT: A major impediment to current efforts to lower the toll of injuries in agricultural workers is a fundamental lack of knowledge of the causes and risk factors associated with these injuries. Surveillance systems and other descriptive efforts can provide useful information on the scope and spectrum of agricultural injuries but can seldom identify specific factors, such as faulty machinery, risky behaviors, or particularly hazardous environments, which can be the focus of preventive efforts. Since few analytic epidemiologic studies of the causes of agricultural injuries have been conducted to date, a large number of focused, carefully designed studies, of both cohort and case-control design, will be needed to develop the information on which effective interventions can be based. This paper highlights certain methodologic barriers to effective analytic studies of agricultural injuries and suggests approaches to addressing these methodologic concerns.
90386168

301. Levine RS, Hersh CB, Hodder RA. **Historical patterns of pesticide epidemiology research from 1945 to 1988**. Epidemiol 1990;1(2):181-184.

AUTHOR ABSTRACT: Review of four questions faced by pesticide epidemiologists from 1945 to 1988 shows a transition from maternal to paternal concerns in Agent Orange reproductive research, greater emphasis on accidents than suicide in acute-injury research, and an apparent focus away from diagnoses specific to women in both occupational mortality and cancer research. Further study of such historical research trends might assist both causal inference and the ethical evaluation of epidemiologic research.
91159563

302. Maddy KT, Edmiston S, Richmond D. **Illness, injuries, and deaths from pesticide exposures in California 1949-1988**. Rev Environ Contam Toxicol 1990;114:57-123.

AUTHOR ABSTRACT: Data on human acute illness/injury and death associated with pesticide exposure in California for the 40-yr period, beginning with 1949, were reviewed. Even though California has better data of this type than most government jurisdictions in the world, there are some shortcomings. In the early part of this period, nonoccupational data were scant because poison information centers were just being developed. Also in the early period, many occupational exposures were not recorded in state statistics although a good system to allow for such reporting was in place. California data currently available still do not take into account (i) persons who are exposed and become ill, but do not visit a physician or call a poison center, and (ii) most occupational exposures of the self-employed, U.S. military employees, U.S. government employees, maritime workers, and interstate railroad workers.

In 1987, 268,092,595 kg of pesticides were sold and estimated as used in the state. Although the amount of pesticides used annually in California is estimated to have increased 4-fold in this 40-yr period, it is believed that the actual number of pesticide-related occupational illnesses/yr increased very little. Cholinesterase inhibitors and methyl bromide were most often involved in the more serious occupational systemic poisonings throughout the time period.

Well-educated and trained farmers and other pesticide handlers as well as a strict regulatory system have contributed to keeping the number and the extent of pesticide exposure in check, considering the widespread use of pesticides, some of which are quite toxic and potentially hazardous if misused.

In 1987, there were 1,507 cases of occupational illness identified, with 744 of these demonstrating systemic toxic symptoms. In 1987, approximately 17,000 human pesticide exposure incidents, almost all of which were nonoccupational, were handled by poison control centers. It is estimated that about 30 to 60% developed signs or symptoms. Occupational deaths for the past 10 yr have averaged about 1/yr. Suicides by use of pesticides are estimated at 15/yr, and nonsuicides, nonoccupational deaths are estimated at 5/yr.

This paper does not address chronic effects such as cancer induction, developmental effects, or reproductive effects that may be suspected as being the result of pesticide exposure. Data presented in this report may be useful in estimating the number of poisonings that may occur in other geographic settings. Numerous variables that must be considered in making such estimates are discussed.
90099941

303. Maizlish N, Moses M. **Fieldworker exposure to pesticides [letter].** J Occup Med 1990;32(2):87, 90, 94.

NO ABSTRACT.
90155562

304. Manwaring JC, Conroy C. **Occupational confined space-related fatalities: surveillance and prevention.** J Saf Res 1990;21(4):157-164.

AUTHOR ABSTRACT: The National Institute for Occupational Safety and Health (NIOSH) investigates selected workplace fatalities through the Fatal Accident Circumstances and Epidemiology (FACE) project. This surveillance project is designed to collect descriptive data on selected fatalities using an epidemiologic approach, to identify potential risk factors for work-related death, to develop recommended intervention strategies, to disseminate findings that increase employer and employee hazard awareness and to reduce the risk of fatal injury in the workplace. From December 1983 through December 1989, 55 confined-space events, resulting in 88 deaths, were investigated through the FACE project. In these events only three of the workers who died had received any training in confined space safety. Additionally, only 27% of the employers had any type of written confined space entry procedures. Where written procedures did exist they were either not implemented, inadequate, or both. Because many employers and workers were not aware of the hazards associated with confined spaces, basic NIOSH recommendations published in 1979 that would have prevented the fatalities were not followed. These data underscore the importance of developing and implementing comprehensive confined-space entry procedures and educating workers and supervisors on following safe work procedures to reduce the number of occupational confined space-related fatalities.

305. May JJ. **Issues in agricultural health and safety.** Am J Ind Med 1990;18(2):121-131.

NO ABSTRACT.
90386162

306. McDermott S, Lee CV. **Injury among male migrant farm workers in South Carolina.** J Community Health 1990;15(5):297-305.

AUTHOR ABSTRACT: A record review and interview survey were carried out to determine the impact of injury on the health of male migrant workers in the Ridge area of South Carolina. Thirteen percent of the men's visits to the Rural Migrant Clinic were for injuries. A larger number, sixty percent, of men's visits to the local Emergency Room were due to injuries. Documentation of alcohol and drug use or the circumstances of the injury was more complete on the Emergency Room records than on the Clinic records.

Interviews with 116 migrant workers were carried out in the camps during the summers of 1986 and 1987. Male migrant workers had similar rates of work related accidents as other hired farm workers in the United States. However, male migrant workers have more episodes of personal violence than black males living in other types of rural settings. Heavy drinking was associated with these violent episodes. Over 83 percent of the episodes of personal violence occurred in the camps after dark.

It is suggested that camp conditions with poor sanitation, crowding, lack of recreational outlets, and high presence of available alcohol contributes to the high rates of injury in this group of men.
91036136

307. Murphy DJ, Seltzer BL, Yesalis CE. **Comparison of two methodologies to measure agricultural occupational fatalities.** Am J Public Health 1990;80(2):198-200.

AUTHOR ABSTRACT: Agricultural occupational fatalities in Pennsylvania for the years 1985-87 were followed up. Supplemental data concerning the occupation of the deceased and circumstances of the fatal accident were obtained from a family member. The number of fatalities designated as agriculturally and occupationally related by the National Traumatic Occupational Fatality (NTOF) system was compared with the number of fatalities identified by using alternative criteria for classification of agriculturally and occupationally related fatalities. There may be nearly a 30 percent error in the NTOF method resulting in a 20 percent undercount.
90119880

308. Myers JR. **National surveillance of occupational fatalities in agriculture.** Am J Ind Med 1990;18(2):163-168.

AUTHOR ABSTRACT: Agriculture is one of the most hazardous industries in the United States. Although estimates vary, all reporting agencies show agriculture having an occupational fatality rate three to five times higher than that of the general private sector. The National Institute for Occupational Safety and Health (NIOSH), Division of Safety Research's National Traumatic Occupational Fatalities (NTOF) data base monitors occupational fatal injuries in all industries in the United States through death certificates. Uniform case-selection criteria are applied nationwide. NTOF shows that for the years 1980 through 1985, agriculture had a work-related fatality rate of 20.7 deaths per 100,000 workers compared with 7.9 deaths per 100,000 workers for the private sector U.S. work force. Age-specific rates indicate that the risk of a fatal occupational injury increases with age for agricultural workers. Workers over 64 years old have an average annual rate of 55.7 deaths per 100,000 workers. Other uses of the surveillance system, as well as its limitations, are discussed.
90386165

309. Nashold RD. **Injury deaths among farmers.** Wis Health Stat 1990;6(3):4.

NO ABSTRACT.

310. Patel R, Mohan D. **Epidemiological studies and design of agricultural implements.** J Occup Accid 1990;12:151.

AUTHOR ABSTRACT: This study reports the results of the use of epidemiological data in determining priorities for designing safer agricultural equipment. A household survey was undertaken to study the morbidity patterns in a group of nine villages outside Delhi comprising a population of 25,000 persons (3500 families). Every family was visited once every two weeks to determine cases of morbidity. The injury data were analysed in depth for all agricultural injury cases. The survey was continued for one year. Based on this data the fodder cutting machine and grain threshing machine were selected for improvements in the design for ensuring safer working conditions.

Two designs of the fodder cutting machine have been evolved: one for retrofitting the existing units and the second is an attempt at a completely new design. The designs are based on the understanding that passive measures are likely to be more successful in rural areas. It is expected that users will not actively undertake specific actions to increase safety every time they use the machine. Ergonomic principles have been used to make the work easier so that uncomfortable postures are not used.

The paper also details our experience in evolving the acceptability of new designs among the farmers. In addition, we also relate our experiences in trying to introduce improvements in designs among the local manufacturers.

311. Pratt DS. **Occupational health and the rural worker: agriculture, mining and logging.** J Rural Health 1990;6(4):399-417.

AUTHOR ABSTRACT: More than 50 million Americans live in rural areas. These rural residents often work for small businesses or in the extraction industries (farming, mining, and logging). Because of the size of the businesses, the mandate of the Occupation Safety and Health Administration (OSHA) does not cover these workers and they are seldom afforded the same protection as urban workers. This review focuses on the special health problems facing farm workers, farmers, miners, and loggers. Farm workers are often ill and are affected by psychological illness, injuries, parasites, skin diseases, and the dangers of agrichemicals. Farm owners also face the hazards of stress and have very high rates of suicide. In addition, they are often injured on the job and suffer the highest rate of job related fatality of any work group. The complex farm environment presents a continuous threat to the lungs. This danger has worsened with the increased use of confinement buildings for poultry, hogs, and cattle. As farming has changed with increased mechanization, attendant medical problems have arisen. These "illnesses of innovation" are important. Mining and logging also are dangerous occupations with acute and chronic problems including respiratory illness, vascular problems, and malignancy. The decade of the 1990s must be one of increased attention to rural occupational health care and research.
91056506

312. Purschwitz MA, Field WE. **Scope and magnitude of injuries in the agricultural workplace.** Am J Ind Med 1990;18(2):179-192.

AUTHOR ABSTRACT: Agricultural work injury data are less available than data for other industries, so an overview of existing data is provided. Agriculture has the highest annual work death rate of all industries, 52 per 100,000 workers, which is five times the combined rate for all industries. Tractor-related injuries are the leading types of fatal injuries; injuries involving agricultural machinery, animals, and trucks are the leading types of non-fatal injuries. Victims of fatal accidents range in age from less than 1 year to over 90. Research needs are discussed, including the need for comprehensive surveillance.
90386167

313. Purschwitz MA, Lee BC, Schmelzer JR. **Agricultural injury prevention: the need for greater cooperation and involvement.** J Rural Health 1990;6(3):221-229.

NO ABSTRACT.

314. Rhodes KH, Brennan SR, Peterson HA. **Machines and microbes. Still serious hazards to youths on the farm.** Am J Dis Child 1990;144(6):707-709.

NO ABSTRACT.
90266826

315. Rust GS. **Health status of migrant farmworkers: a literature review and commentary.** Am J Public Health 1990;80(10):1213-1217.

AUTHOR ABSTRACT: I made a computerized search of MEDLINE files from 1966 through October 1989 followed by a review of this literature. Four hundred eighty-five articles were scanned; 152 were found specifically related to migrant families, while another 51 articles addressed the health of agricultural workers or farmers in general. Solid data exist on dental health, nutrition and, to a lesser extent, childhood health. Data also were prominent in several disease categories including certain infectious diseases, pesticide exposures, occupational dermatoses, and lead levels in children.

Estimates of the size of the migrant and seasonal farmworker population vary widely. Basic health status indicators such as age-related death rates are unknown. Prevalence rates of the most common cause of death in the United States have yet to be studied. More research in needed into the health problems and health status of migrant and seasonal farmworker families.
90379397

316. Seltzer BL, Murphy DJ, Yesalis CE III. **A methodology for the collection of supplemental information on agricultural fatalities.** Am J Ind Med 1990;18(2):201-209.

AUTHOR ABSTRACT: Due to the lack of a standardized methodology to identify agriculturally related fatalities and the inaccuracy of data from death certificates, NSC's and NIOSH's estimates of the level of agriculturally related fatalities conflict, and the validity of both is subject to criticism. A follow-up survey with the next of kin of 107 potential agricultural fatalities, from a pool of 150 Pennsylvania cases, has been conducted. This paper details the methods and success in gaining supplemental information. Next of kin were generally willing to provide the information (67%), with both telephone (66%) and mail (68%) methods generating comparable levels of cooperation. The optimal time frame for finding current addresses and telephone numbers as well as for gaining cooperation appeared to be about 1 year after the fatality. However, a retrospective investigation of up to 3 years past the anniversary of the fatality produced an acceptable rate of cooperation. How the collected data compares with fatality data for agriculture published by NSC and NIOSH has been addressed in another paper.
90386169

317. Stallones L. **Surveillance of fatal and non-fatal farm injuries in Kentucky.** Am J Ind Med 1990;18(2):223-234.

AUTHOR ABSTRACT: This report describes one approach to establish a surveillance method of farm injuries. The surveillance system is designed to be used to evaluate ongoing prevention activities related to education, training, and equipment design. To define the subset of information to be included in a surveillance system, existing

data were analyzed. The mortality data were death certificates and the morbidity data were from the Farm Accident Survey conducted in 1978, (National Safety Council forms and sampling design). Limitations of the data currently available are discussed; information needs for an agricultural injury surveillance system are presented.
90386171

318. Stoke J. **Problems in agricultural health.** IIAMRH J 1990;14(1):12-16.

NO ABSTRACT.

319. Stueland D, Zoch T, Stamas P Jr., Krieg G, Boulet W. **The spectrum of emergency care of agricultural trauma in central Wisconsin.** Am J Emerg Med 1990;8(6):528-530.

AUTHOR ABSTRACT: Agriculture is among the most dangerous occupations in the United States. When injuries do occur, the emergency department (ED) is the primary source of care. Over a 2-year period, the emergency medicine section of the Marshfield Clinic/St. Joseph's Hospital, cared for 913 victims of agricultural trauma. Although 11% were initially admitted and 4% were later treated, the remainder received their care solely in the ED. Unlike most occupational injuries, people of any age may be involved in agricultural injuries; 27% in this series were less than 18 years of age and 5% were 65 years or older. Just over half of all injuries were from mechanical devices, including tractor and farm machinery. The remainder were from animals, falls, or exposure. Although several different types of injuries occurred, the most common diagnoses were soft tissue injuries and fractures and the most common procedure was diagnostic radiography followed by wound and fracture care. An ED in a rural setting should be prepared to deal with agricultural trauma.
91025236

320. Thelin A. **Epilogue: agricultural occupational and environmental health policy strategies for the future.** Am J Ind Med 1990;18(4):523-526.

AUTHOR ABSTRACT: Farmers' health and safety are critical public health problems that have historically been ignored in the United States and in many countries by health policy developers. The challenges to reduce the hazards are significant. However, by mobilizing the resources, the public will, and the structure to carry out preventive programs, progress is possible. Sweden has shown that research, education, engineering, and regulation have resulted in significant reductions of tractor rollover deaths, chainsaw injuries, and hearing loss.
91063430

321. Varghese M, Mohan D. **Occupational injuries among agricultural workers in rural Haryana, India.** J Occup Accid 1990;12:237-244.

AUTHOR ABSTRACT: This study reports the results of an epidemiological study of farm worker's injuries conducted over a period of one year in a rural population of 25,000. Of the 573 persons who sustained farm equipment related injuries 72 persons had injuries with severity of AIS 2 or greater. A majority of the latter injuries were due to tractors, fodder cutters and other powered equipment. Minor injuries were largely due to hand tools. Most farmers took treatment from local bone setters and healers. Cases of AIS > 2 were followed to observe their long term outcome. Results show that the sequelae of fractures, crush injuries and amputations among farmers are different from those of urban dwellers. The morbidity period of injuries which would normally have taken 3-4 weeks with professional orthopaedic management was 6-8 weeks and even 5-6 months in some cases. Injured

farmers went to hospitals only after local treatment had not given relief. Details of factors associated with injury and treatment are presented along with possible countermeasures which are possible in the socioeconomic milieu in which these farmers work.

322. **NIOSH alerts on workplace hazards: falls through skylights and roof openings, deaths of farm workers in manure pits, and exposure to dimethylformamide.** MMWR 1991;40(8):142-143.

NO ABSTRACT.
91148573

323. Brison RJ, Pickett CWL. **Nonfatal farm injuries in Eastern Ontario: a retrospective survey.** Accid Anal Prev 1991;23(6):585-594.

AUTHOR ABSTRACT: A one-year retrospective survey was conducted to study the incidence of, and potential risk factors for farm-related injuries. One hundred thirteen dairy and beef farms in Eastern Ontario were surveyed using a personal interview. Information was collected on demographic characteristics of the farm owner, workers, and family; characteristics of the farm operation; and information on behaviours potentially affecting injury risk. The crude rate of injury was 9.6 per 100 person years. Significantly higher rates of injury were found for: owner-operators of farms (RR = 2.9; $p < 0.001$); male sex (RR = 3.8; $p < 0.001$); living/working on a beef as opposed to dairy farm (RR = 2.3; $p = 0.01$); farm owners in the age groups of $<30$ and $>70$ years ($p=0.05$), full-time as opposed to part-time beef farm owners (RR = 4.2; $p = 0.02$); and full-time owners of beef as opposed to dairy farms (RR = 2.4; $p = 0.03$). Common patters of injury included accidental falls (E880-8); lacerations, bruises, and crush injuries from working with cattle (E906) or from agricultural machinery (E919.0); and foreign body injuries to the eye for which medical treatment was sought, were treated in a hospital-based emergency department. This information would support efforts to establish an emergency-department-based surveillance system for farming injuries in our setting.
92126165

324. Ciesielski S, Hall SP, Sweeney M. **Occupational injuries among North Carolina migrant farmworkers.** Am J Public Health 1991;81(7):926-927.

AUTHOR ABSTRACT: A population-based cross-sectional study of occupational injuries among a random sample of 287 migrant farmworkers demonstrated frequent obstacles to health care; 65% (11/17) of the more seriously injured subjects did not receive prompt care or never received care. Subjects not receiving prompt care were twice as likely to have incomplete recovery. Employers covered medical expenses for only 5/13 (38%) of the injured workers, and only 3/15 were compensated for lost work. This study indicates that comprehensive Workers' Compensation coverage is urgently needed in North Carolina.
91273222

325. Cogbill TH, Steenlage ES, Landercasper J, Strutt PJ. **Death and disability from agricultural injuries in Wisconsin: a 12-year experience with 739 patients.** J Trauma 1991;31(12):1632-1637.

AUTHOR ABSTRACT: During a 12-year period, 739 patients were admitted to a referral trauma center as the result of injuries incurred while farming. There were 608 (82%) male patients and 131 female patients. Ages ranged from 1 to 89 years including 160 patients (22%) less than 16 years old and 78 patients (11%) more than 65 years old. The injury mechanism was a farm animal in 225 (30%), farm machinery in 168 (23%), a tractor in 120 (16%), a fall in 77 (10%), a power take-off in 47 (7%), a cornpicker in 42 (6%), and miscellaneous in 60 (8%).

There were 16 (2%) deaths attributable to the agricultural accident. Tractors were involved in eight of these deaths, falls in four, power take-offs in three, and farm machinery in one. Furthermore, 159 (22%) patients were left with significant permanent disability including orthopedic problems in 131 patients, neurologic deficits in 22, and pulmonary disability in 6. Agricultural trauma is frequent and diverse with unique injury mechanisms. Life-threatening injuries are often seen and permanent disability is common. Effective injury prevention must focus on farmer education, additional mandatory safety features on agricultural equipment, and appropriate design of rural trauma systems.
92085334

326. Cordes DH, Rea DF. **Farming: a hazardous occupation.** Occup Med 1991;6(3):327-334.

AUTHOR ABSTRACT: Physicians with patients who work in rural areas need to be aware of the potential for illness and injury and be well-versed in preventive measures necessary to help keep these patients well. Physicians also need to be aware that the family's principal worker is not the only one exposed to the work hazards. The family joins in the duties of the farm and shares the risks. Physicians can play an important role in reinforcing the need for safe agricultural work practices.
92055117

327. Cummings PH. **Farm accidents and injuries among farm families and workers: a pilot study.** AAOHN J 1991;39(9):409-415.

AUTHOR ABSTRACT: 1. Farm accident facts traditionally have been difficult to collect because of the wide array of farm family and non-family involvement in farming practices. 2. Areas commonly involved in farm related accidents include farm machinery, tractor overturns, farm animals, farm trucks, hand and power tools, household items, chemicals, and garden equipment. 3. Two purposes of this descriptive study were to examine, over a 1 year period, the demographic features and types, severity and mechanisms of injury among farm families and their workers in a representative county in South Carolina, and to develop a two part mail-out questionnaire for data collection relative to farm work related accidents. 4. The researcher concluded that farm accidents are sparsely researched; that traditional data collection methods are difficult, expensive, and time consuming; and that mail-out questionnaires are not a very effective method of collection data relative to farm accidents, since farmers proved very reluctant to report accidents.
91362715

328. Demers P, Rosenstock L. **Occupational injuries and illnesses among Washington state agricultural workers.** Am J Public Health 1991;81(12):1656-1658.

AUTHOR ABSTRACT: In Washington state 29,451 workers' compensation claims were filed by farm workers between 1982 and 1986. Five percent of claimants were under 18 years of age, including 1.3% under the age of 16. Agricultural workers were found to be at higher risk than other workers in the state for fatal injury (relative risk [RR] = 2.5, 95% confidence interval [CI] = 1.7-3.7), sprains and strains (RR = 1.4, CI = 1.3-1.4), fractures (RR = 2.3, CI = 2.2-2.4), dislocations (RR = 1.9, CI = 1.7-2.2), concussions (RR = 1.9, C = 1.6-2.3), amputations (RR = 2.5, CI = 2.0-3.1), dermatitis (RR = 4.3, CI = 4.0-4.7), systemic poisoning (RR = 3.4, CI = 3.1-3.7), respiratory disease (RR = 1.7, CI = 1.0-2.9), and tendonitis (RR = 1.2, CI -= 1.1-1.4).
92081902

329. Etherton JR, Myers JR, Jensen RC, Russell JC, Braddee RW. **Agricultural machine-related deaths.** Am J Public Health 1991;81(6):766-768.

AUTHOR ABSTRACT: Analysis of 1980-1985 death certificate data for the United States indicated that an average of 369 occupational deaths per year involved agricultural machinery as the external cause of death. Out of all agricultural machine-related deaths, tractors accounted for 69 percent. Over half of these tractor-related deaths were rollovers. There is a need for public health programs to affect greater use of rollover protective structures (ROPS) on farm tractors.
91229157

330. Gustafsson B, Lindgren G, Lundqvist P. **Near-accidents in agriculture: A survey of Swedish studies.** Swed J Agric Res 1991;21:85-93.

AUTHOR ABSTRACT: The incidence of accidents in Swedish agriculture is much higher than in many other industries, stressing the importance of accident prevention in agriculture. One method of collecting data for prevention work is near-accident reporting. Up to now, most Swedish near-accident studies in agriculture have been published only in Swedish. The present article summarizes the results of five Swedish near-accident investigations, comprising studies on field work, livestock handling and greenhouse cultivation.

In the investigations reported here, the interviewers have made personal visits, every day or every other day for a fortnight, to the farms or enterprises involved in the studies.

The investigation involving experiences tractor drivers found that mounting and alighting, as well as coupling and uncoupling implements are activities in which near-accidents are more common than in other work operations. Near-accidents were also common when mounting and alighting from combine-harvesters. In two investigations of livestock handling, milking and moving the animals proved to be the work operations where most near-accidents were recorded, often a consequence of two small space when performing the work operations. A study of greenhouse workers showed that the common causes of near-accidents were slippery surfaces, uneven surfaces and obstacles in the gangways between the plant beds.

The studies illustrate that the near-accident technique can be very useful for demonstrating the distribution of accidents according to work operations more quickly than an analysis of accident statistics. This technique also discloses which equipment details should be modified or exchanged in order to prevent accidents.

331. Harker C, Matheson AB, Ross JAS, Seaton A. **Accidents in the workplace.** J Soc Occup Med 1991;41(2):73-76.

AUTHOR ABSTRACT: A prospective survey of patients attending the central Accident and Emergency Department and Eye Casualty Department in Aberdeen was made to determine the contribution of accidents at work to the workload of the departments and to estimate risks of injury in different industrial sectors. Work-related injuries accounted for 16.5 per cent of new patients attending the general accident department and 21.7 per cent of those attending eye casualty. Analysis by industrial sector led to estimates that almost one in 10 workers employed in manufacturing industries and in agriculture/forestry/fishing will attend casualty in the course of a year for a work-related injury. The relatively low-risk service sector, because of the large numbers of people employed, contributed the greatest number of individuals with work-related injuries. Two industries had very high rates of specific and preventable injuries - food and fish processing with an estimated 17 knife lacerations per 100 per annum and mechanical engineering with 60 eye injuries per 1000 per annum. We give reasons for believing that our estimates of risk in the different industrial sectors are conservative.
91269763

332. Hawk C, Gay J, Donham KJ. **Rural youth disability prevention project survey: results from 169 Iowa farm fatalities.** J Rural Health 1991;7(2):170-179.

AUTHOR ABSTRACT: Agriculture is now the most hazardous occupation in the United States and it is the only one in which children not only comprise a significant part of the work force, but also live and play at the work site. Annually, 23,500 pediatric agricultural injuries are reported, with nearly 300 fatalities (Rivara, 1985). The Rural Youth Disability Prevention Project was designed to use innovative, community-oriented methods to address the unique problems of child safety in agriculture. Toward this end, a survey instrument was designed to gather data both to assist in program development and to serve as a pretest for the subsequent evaluation. Analysis of these data indicated several issues to target for intervention efforts. One is lack of supervision--more than 40 percent of children who operate equipment do so unsupervised. Approximately 30 percent of children more than 3 years old play alone in work areas, and 80 percent of these children play near machinery in operation. Another issue is operation of farm machinery by very young children--respondents' children began operating equipment at an average age of 12 years. Coupling this with the finding that the parents believe their children are not capable of operating equipment until age 15 exemplifies the most important issue, the disparity between parents' levels of safety knowledge and safety behavior. Using the survey data to increase local involvement, efforts are being directed toward facilitating an ongoing, community-sponsored intervention program to empower farm families to effect their own solutions.
92194257

333. Iowa Department of Public Health. **Agricultural injuries.** Iowa Med 1991;81(2):74.

NO ABSTRACT.
91177697

334. Kelsey TW, Jenkins PL. **Farm tractors and mandatory roll-over protection retrofits: potential costs of the policy in New York.** Am J Public Health 1991;81(7):921-923.

AUTHOR ABSTRACT: Tractor roll-overs are the leading cause of fatal farm accidents, accounting for more than one-fourth of all agriculturally related deaths. Most of these deaths could be prevented if the tractors were equipped with roll-over protective structures (ROPS). This study estimates the number of tractors in New York without ROPS, projects their retirement, and then estimates the number of lives which would be saved if ROPS were retrofitted on old tractors. The basic costs associated with mandating ROPS are calculated from these estimates. The minimum economic cost of mandating ROPS is $511,136 per life saved for the retrofits, and an additional $253,254 per life saved for every $1 million spent annually on enforcement. It is concluded that a policy mandating ROPS on all tractors would be expensive, but should be considered with particular attention to the need for and cost effectiveness of enforcement.
91273220

335. Merchant JA. **Agricultural injuries.** Occup Med 1991;6(3):529-539.

NO ABSTRACT.
92055130

336. Purschwitz MA, Field WE. **Fatal farm injuries to older workers.** Work 1991;2(1):47-53.

AUTHOR ABSTRACT: The following list summarizes the major points that have been discussed: 1) A significant percentage of fatal farm injuries involve older persons; thus, these people are at risk for having a fatal farm injury. 2) Tractor accidents account for the majority of deaths. Other machinery accidents are the second most common cause of fatalities. 3) Most deaths occur at the middle or end of the week. 4) The greatest number of accidents occurs right before lunch and dinner, when a person is most in need of a break. 5) Accident frequency is highest in those months when seasonal labor demands are highest. 6) Fatal accidents generally result in instant or quick death; therefore, medical attention must be prompt.

337. Rosenblatt PC, Lasley P. **Perspective on farm accident statistics.** J Rural Health 1991;7(1):51-62.

AUTHOR ABSTRACT: The frequently cited statistics on farm accidents are based on definitions of farms accidents and on sources of data that exclude some events that could be called farm accidents and that represent only some of all the defensible perspectives on health risks in farming. As a contribution to exploring alternative perspectives on farm accident statistics, mailed surveys of 2,016 Iowa farm operators provided information on accidental injuries in their farm operations during the year preceding the survey. The majority of injuries were home treated, and hence were not events that would be reflected in accident statistics based on medical records. The data allow a breakdown by age, thus enabling an estimate of farm accident rates for children, youth, and the elderly, people whose accidents are typically excluded from farm accident statistics. Data are also presented that provide a farm operator's perspective on farm accidents, showing that many farm operators had knowledge about accidents through their own close calls and through their efforts to assist others who had farm accidents. The farm operator's perspective is also reflected in data indicating greater concern about chemical and air quality health risks than about risks from farm machinery and livestock.

338. Russell J, Conroy C. **Representativeness of deaths identified through the injury-at-work item on the death certificate: implications for surveillance.** Am J Public Health 1991;81(12):1613-1618.

AUTHOR ABSTRACT: This research investigated the accuracy of the injury-at-work item on the death certificate for surveillance of occupations injury deaths in Oklahoma during 1985 and 1986.

Representativeness of occupational injury deaths identified by death certificates was assessed by comparing these deaths with all occupational injury deaths identified through death certificates, workers' compensation reports, medical examiner reports, and OSHA records for categories of occupation, industry, and external cause of death.

Certain external causes of death (e.g., motor vehicle traffic deaths) and certain occupations (e.g., farming) and industries (agriculture and services) are more often underidentified through death certificates.

The findings of this study support Baker's observation that no single data source contains all deaths or all the data elements necessary to describe occupational injury deaths. Data sources may be combined to improve representativeness through more complete case ascertainment.
92081891

339. Sterner S. **Farm injuries: how can the family farm be made a safer place?** Postgrad Med 1991;90(2):141-150.

AUTHOR ABSTRACT: Life on a working farm is not all pastoral serenity. Fatigue, time pressures, and malfunctioning equipment plague farmers during planting and harvest seasons and are often factors in accidents. Children usually help with the farm work and care of animals and often play near hazardous equipment, so they may be involved in accidents with machinery or livestock. Dr. Sterner describes typical farm injuries and some methods that may help in prevention.
91319638

340. Stueland D, Layde P, Lee BC. **Agricultural injuries in children in central Wisconsin.** J Trauma 1991;31(11):1503-1509.

AUTHOR ABSTRACT: Agriculture is widely recognized as one of the most dangerous occupations in the United States. The risk of agricultural trauma extends beyond the adult work force to include farm children. During a 2-year study of agricultural trauma conducted at the Marshfield Clinic/St. Joseph's Hospital, 246 (26.9%) of all agricultural injury victims were children (age less than 19 years). Teenagers were at greatest risk, but there were also many injuries among preschool children under the age of 6 years. Injuries occurred most often during the summer months, on weekends, and during the evening hours from 6:00 pm to 10:00 pm. There were relationships between the body part injured and the age of the child as well as between the agent associated with the injury and the age and gender of the child. Preschool farm children are particularly liable to experience head and neck trauma, and injuries resulting from falls. Any successful effort to address either the prevention or treatment of agricultural trauma will need to consider that children have a unique pattern of injuries that differs from that of adults. 92046220

341. Stueland D, Lee B, Layde PM. **Surveillance of agricultural injuries in central Wisconsin: epidemiologic characteristics.** J Rural Health 1991;7(1):63-71.

AUTHOR ABSTRACT: We implemented a hospital-based agricultural injury surveillance system in central Wisconsin in November 1986. The geographic area of the study is heavily agricultural, with a predominance of dairy farmers. This report describes the epidemiologic characteristics of the 913 patients seen during the first two years of the surveillance system. The majority of patients were male (77%), between the ages of 19 and 65 years of age (68.4%), and either the owner/operator of the farm (42.4%) of the spouse of the owner/operator (10.5%). Falls accounted for the greatest number of injuries in children younger than 16 years of age and in those older than age 65, while animals were the most frequent cause of injury in those between the ages of 16 and 65 years. Injuries were most likely to occur in the months of June, July, and August, which together accounted for 37 percent of the total number of injuries. Despite the limitations of the descriptive data derived from surveillance systems, such information may be useful for determining the magnitude of a health problem and suggesting hypotheses to account for the apparent distribution of disease and injury.

342. Upadhyay MP, Karmacharya PCD, Koirala S, Tuladhar NR, Bryan LE, Smolin G et al. **Epidemiologic characteristics, predisposing factors, and etiologic diagnosis of corneal ulceration in Nepal.** Am J Ophthalmol 1991;111(1):92-99.

AUTHOR ABSTRACT: Corneal ulceration is one of the most frequent causes of blindness in developing countries. Between September 1985 and Augurs 1987, 405 patients with corneal ulceration were examined at Tribhuvan University Teaching Hospital in Kathmandu, Nepal. Males and females were equally affected. The most common predisposing cause of ulceration was corneal trauma, usually with organic agricultural materials. Microorganisms were grown from 324 (80%) of the ulcers. Pure bacterial cultures were obtained from 256 (63.2%) of the patients, whereas pure fungal cultures were obtained from 27 (6.7%) of the patients. In 41 patients (10.1%), corneal cultures yielded a mixed growth of bacteria and fungi. Of a total of 398 bacterial isolates, 124 (31.1%) were positive for Streptococcus pneumoniae, the most commonly isolated organism in the series. Other frequently isolated bacteria included Staphylococcus epidermidis, S. aureus, and Pseudomonas species. Of 68 positive fungal isolates obtained, 32 (47.0%) were identified as Aspergillus species. Candida species and Fusarium species were less commonly seen. 91090195

343. Zejda JE, Semchuk KM, McDuffie HH, Dosman JA. **A need for population-based studies of health and safety risks in Canadian agriculture [editorial].** Can Med Assoc J 1991;145(7):773-775.

NO ABSTRACT.
92005079

1001. McNeill JM. **Farm and farm home safety, 1941-1944: a list of references.** Washington, D.C.: United States Department of Agriculture Library, 1945; Library List No. 14. 21 p.

NO ABSTRACT.

1002. Day EL, Barber EL. **Personal risks: accidents and sickness.** In: Physical risks in farm production: selected references, 1930-1948. Washington, D.C.: United States Department of Agriculture Library, 1949; Library List No. 49. 29 p.

NO ABSTRACT.

1003. Roy P. **Selected environmental and human factors associated with the incidence of accidents to farm people in Pennsylvania [doctoral dissertation].** The Pennsylvania State University, 1957. 241 p.

NO ABSTRACT.

1004. Baker RH, Stuckey WE. **Accidents to farm people: 29,361 reasons for a safety program.** Columbus, Ohio: Agricultural Extension Service, The Ohio State University, 1958; Bulletin 385. 8 p.

AUTHOR ABSTRACT:

* One-sixth of the farm families in Ohio had an accident during 1957.
* 88 percent of these accidents required a doctor's care while 25 percent required hospitalization.
* 56,052 days labor was hired to replace labor of injured persons.
* 73 percent of the accidents occurred to men and boys.
* 25 percent of the accidents occurred in the home, 44 percent on the farm outside the home, and 31 percent while away from the farm.
* 28 percent of the injuries resulted from a fall.
* Farm machinery, including the tractor, was involved in 21 percent of the accidents while the auto and truck accounted for 8 percent.
* For every 68 non-fatal accidents there was one fatal accident.

1005. Steinbrunner CJ. **Safety -- by education or regulation.** Proceedings of: 1960 Annual Meeting of the American Society of Agricultural Engineers, June 12-15, 1960, Columbus, Ohio. St. Joseph, Michigan: American Society of Agricultural Engineers, 1960; ASAE Paper No. 60-114. 5 p.

NO ABSTRACT.

1006. Ontario Department of Agriculture. **Ontario farm accident survey.** Toronto, Ontario: Ontario Department of Agriculture, [1961?]. 30 p.

NO ABSTRACT.

1007. Rush JD. **Farm accidents in the United States**. Washington, D.C.: U.S. Government Printing Office, 1962; Agricultural Economic Report No. 17. 62 p.

AUTHOR ABSTRACT: 1. The number of farm-accident fatalities is not declining in proportion to the decline in farm population, partly because of the increasing average age of people on farms. The annual mortality from farm accidents is estimated at from 60 to 70 per 100,000 of farm population. Nonfatal injuries, including both lost-time and no lost-time accidents, occur to about a third of the farm population annually. The lost-time injuries involve about 19 percent of the farm population; while the more serious nonfatal accidents, those resulting in permanent disabilities, destroy or reduce the earning power of about 3 percent of the farm population annually.

2. Rural environmental situations are more hazardous than urban situations. Farms are isolated, with little supervision of work and not much opportunity for an injured person to obtain first aid promptly. Secondary highways are often hazardous and, though there is less traffic, even on the most improved rural highways it is less controlled than urban streets. The high rate of accidents to farm people is also related to the pattern of farm work, which is more of a family job running more nearly around the clock than the job of a wage earner in town.

3. Accident rates are high among our farm youth. For the United States more than half of the annual mortality to young people between the ages of 15 and 24 is due to accidents.

4. Perhaps 80 percent of our farm accidents result from carelessness or failure to deal with hazards safely. Many accidents are avoidable.

5. Motor vehicles are listed as the agency of injury most frequently associated with accidents to farm people. Traffic accidents to farm people. Traffic accidents account for many of the serious injuries of farm people while they are off their farms. Farm machinery was the agency most frequently associated with accidents occurring on farmland. Falls were most frequently associated with home accidents.

6. Farm accidents are at their peak in June, July, and August--the most active period of crop production and harvest.

7. The economic cost of farm accidents is unknown, but it is believed that hospitalization and medical treatment account for less than a fourth of the total cost. As yet, little is known about the economic loss of wages or production, which probably accounts for a considerable part of the total cost. According to a generally accepted rule of thumb, the indirect costs of industrial accidents are about 4 times the direct costs.

8. As no uniform method of reporting farm accidents has been developed, it is difficult in many respects to make comparisons or pool data from various "spot" studies. A uniform report form, with standardized definitions, is needed. Such a report form and definitions would permit comparison of basic factors among areas and time periods, promote a better understanding of the farm accident problem, encourage local studies, and perhaps point to more effective ways of reducing these accidents.

1008. Bible BL, Stuckey WE. **Accidents to farm people in Ohio: 22,608th emergency call....** Columbus, Ohio: Agricultural Extension Service, The Ohio State University, 1963; Bulletin 439. 8 p.

AUTHOR ABSTRACT: It was a fact in 1962:

*21,420 farm people on 18,288 farms were involved in 22,608 accidents. *About one of every five families who had an accident, had multiple accident occurrences.

*One-seventh of the farm families in Ohio had an accident.

*96 per cent of these accidents required a doctor's care, while 12 per cent required hospitalization.

*30,996 days' labor was hired to replace labor of injured persons. *72 per cent of the accidents occurred to men and boys.

*22 per cent of the accidents occurred in the home, 47 per cent on the farm outside the home, and 31 per cent while away from the farm.

*26 per cent of the injuries resulted from falls.

*Farm machinery, including the tractor, was involved in 13.9 per cent of the accidents while the auto and truck accounted for 9.6 per cent.

1009. Wardle NJ. **Farm accidents in Iowa: as reported in newspaper clippings - 1953-62.** Ames, Iowa: Cooperative Extension Service, Iowa State University, 1963; A.E. 970. 7 p.

NO ABSTRACT.

1010. Gwinn SM. **Farm safety--our problem.** Proceedings of: The President's conference on occupational safety, June 23-25, 1964, Washington, D.C. Washington, D.C.: U.S. Department of Labor, Bureau of Labor Standards, 1965; Bulletin 263: 342-347.

NO ABSTRACT.

1011. Kleinman GD. **Occupational health of agricultural workers in California.** State of California, Department of Public Health, Bureau of Occupational Health, 1965. 34 p.

AUTHOR ABSTRACT: As used in this report, agriculture includes crop and livestock farming, and such services as cotton ginning, spraying, hatcheries and other horticultural and husbandry services.

Data on occupational injuries and disease are derived from the experience of those workers covered by the California Workman's Compensation Act; this includes all wage and salary workers in agriculture, 70 percent of California's 331,000 agricultural workers. Excluded are self-employed farmers and unpaid family labor.

Agricultural workers have the third highest rate of disabling work injuries, 68.7 per 1,000 workers, exceeded by construction workers with 81.9 disabling work injuries per 1,000 workers and mineral extraction workers with a rate of 70.2.

In 1963, there were 16,747 reports of disabling work injuries in California; ladders were implicated in 8 percent of the cases; tractors in 6 percent; "ground" in 6 percent; and boxes in 6 percent.

Agricultural workers have the highest rate of disabling and nondisabling occupational disease in California, 12.4 reports per 1, 000 workers in 1963; followed by construction, 5.8; and manufacturing, 4.6.

The majority of the 2,982 reports of disabling and nondisabling occupational disease in agriculture was for skin conditions, 76 percent; followed by systemic poisoning, 10 percent; respiratory conditions due to noxious agents, 3 percent; and infectious and parasitic disease, 3 percent.

Agricultural workers appear to have more severe cases of occupational disease than do workers in general. Among the 2,982 agricultural workers with reported occupational disease in 1963, the estimated period of disability for regular work was 40 percent as compared with 27 percent for all workers (18,060) with occupational disease.

Over half the 2,982 workers with reported occupational disease had Spanish surnames; of these 1,644 workers with Spanish surnames, 36 percent were foreign nationals, mainly from Mexico.

The Division of Industrial Safety in the California Department of Industrial Relations is charges with the responsibility for safe working conditions in places of employment. In November 1961, the Division of Industrial Safety put into effect the first safety orders for agricultural operations.

The staff of the Bureau of Occupational Health in the California Department of Public Health is concerned with the prevention and control of occupational disease at places of work and with the correction of disease producing working conditions, when the solution requires special study and investigation. Medical, nursing and engineering staff have cooperated in studies on farms and in studies of agricultural services. Several studies are discussed in the section on Occupational Disease, Prevention and Control.

In the nine-year period, 1955-1963, there have been 15 deaths attributed to sunstroke among agricultural workers; 5 due to infectious disease; and 28 due to toxic materials.

The special characteristics of agriculture and agricultural workers and the problems involved in establishing occupational disease control and safe working conditions are discussed in the section Comments.

1012. Wisconsin State Board of Health. **Fatal farm accidents: Wisconsin, 1960-1964.** Madison, Wisconsin: State Board of Health, [1965?]. 17 p.

AUTHOR ABSTRACT: 1. During the five year period 1960-1964 Wisconsin averaged 81 fatal farm accidents per year.

2. Most (83 percent) of the accident fatalities that occur on farms are among farm residents.

3. A larger proportion of males (73.5 percent) then females (46.4 percent) are accidentally killed on the farm while at work.

4. Thirty-two percent of the fatal accidents are among persons below age 25, forty-three percent are among persons aged 25-64 and the remaining 25 percent are among persons aged 65 and over.

5. Almost 42 percent of Wisconsin's fatal farm accidents are attributable to tractors. Other farm machinery accounts for 15.5 percent and falls 15.8 percent.

6. Among children (below age 15) 29.3 percent of the fatal accidents involve tractors, and 28 percent involve other machinery.

7. June, July and August account for almost 35 percent of the fatal farm accidents. June and July are the worst months, each with 13.5 percent of the fatalities.

8. Fatal accidents are concentrated during the morning and afternoon hours best suited for field work.

9. Nearly two-thirds of the victims die within one hour of the accident.

1013. Donaldson GF. **Farm machinery safety: physical welfare effects of the man-machine interaction on farms; royal commission of farm machinery, study no. 1.** Ottawa, Canada: Queen's Printer and Controller of Stationery, 1968. 137 p.

NO ABSTRACT.

1014. Hofmeister KM, Pfister RG. **Interaction between man and environment as measured by a study of farm accidents.** Proceedings of: 1968 Winter Meeting of the American Society of Agricultural Engineers, December 10-13, 1968, Chicago, Illinois. St. Joseph, Michigan: American Society of Agricultural Engineers, 1968; ASAE Paper No. 68-564. 9 p.

AUTHOR ABSTRACT: A one year study of 2139 Michigan farms indicated that accidents occurred at the rate of 20.6 accidents per million man hours of farm-work exposure. Male accident rates were higher than female and youth under 15 years of age had higher rates than more mature workers. Size of farm and type of accidents when amount of exposure were taken into account in calculating rates.

A more uniform design and procedure for gathering farm accident data is needed. Findings of various statewide farm accident studies should be comparable so that it would be possible to pool available farm accident data.

1015. Hofmeister KM, Pfister RG. **Michigan farm accident study: a report on accidents occurring to farm families and hired labor, 1967-68.** East Lansing, Michigan: Rural Manpower Center, Michigan State University, 1968; Report No. 14. 51 p.

AUTHOR ABSTRACT: The basic objectives of the study were to: 1) Determine the exposure characteristics of farms and farm families; 2) Procure information on the total Michigan accident picture; 3) Provide supplemental information on the nature and incidence of accidents that would come under workmen's compensation; and 4) Collect information for use in safety education.

A random stratified sampling of 2,139 farms was obtained from ten county areas. This represented 2.57 percent of all Michigan farms. The period covered by the study was June 1, 1967 to May 31, 1968 with 224 volunteer interviewers completing the project.

Results show that only 50.7 percent of the accidents occurred to farm people while doing farm-work. The balance of the accidents occurred while doing home-work, other-work, or during periods of leisure. The incidence of farm-work accidents is in direct proportion to the hours exposure to accidents. Leisure accidents are more nearly a reflection of the number of farms or the number of people exposed to accidents.

Information obtained in this study justifies the following conclusions:

1. Accidents do not happen by pure chance. Variations in farm factors and in family characteristics affect the occurrence of accidents.
2. The total annual incidence of accidents was 13.1 per hundred farms or 29.8 per thousand farm family members.
3. Farm-work accidents occurred at the rate of 6.67 per hundred farms or 20.6 per million man hours exposure.
4. The accident rate of hired labor in the sample was significantly higher than that of the farm family.
5. There is no evidence from the study to assume that the accident rate per million man hours exposure differs for those head of households that spend more or less than 50 percent of their time working on the farm.
6. Evidence from the sample indicates that size of farm was not significantly related to the incidence of accidents when varying amounts of exposure were taken into account.
7. The incidence of accidents according to types of farms shows some variance, although there was not statistically significant difference.
8. Farm-work accident frequencies are affected by both age and sex groups. Male accident rates are higher than female rates.

Several likely candidates for an accident prevention program were found. Tractors, ladders and farm wagons had 6.5, 6.1, and 4.7 percent respectively of all accidents. There is a large potential for improvement in safe practices in these three categories. Leaders would do well to consider the overall impact any program would have on the reduction of the accident frequency.

1016. Wisconsin Department of Health and Social Services, Division of Health. **Fatal farm accidents: Wisconsin, 1965-67**. Madison, Wisconsin: Division of Health, [1968?]. 17 p.

AUTHOR ABSTRACT: 1. Forty percent of all work accidents occur on the farm, but agriculture accounts only for about ten percent of the total labor force. (Page 1)

2. During the three year period 1965-1967 Wisconsin averaged 80.4 fatal farm accidents per year. (Page 3)
3. Most (78 percent) of the accident fatalities that occur on farms are among farm residents. (Page 4)
4. A larger proportion of males (68.1 percent) than females (40.9 percent) are accidentally killed on the farm while at work, including the 14 with work status not stated. (Page 5)
5. Thirty-seven percent of the fatal accidents are among persons below age 25, forty-three percent are among persons aged 25-64 and the remaining twenty percent are among persons aged 65 and over. (Page 3 and 6)
6. Almost thirty-five percent of Wisconsin's fatal farm machinery accounts for seventeen percent and falls eleven percent. (Page 7)
7. Among children (below age 15) twenty-seven percent of the fatal accidents involve tractors, and almost eighteen percent involve other machinery. (Page 9)
8. September, October, and November account for almost thirty-five percent of the fatal farm accidents, but June with twenty-seven and October with thirty-eight percent of the fatalities are the worst months. (Page 10)
9. Fatal accidents are concentrated during the morning and afternoon hours best suited for field work. (Page 12)
10. Nearly seventy percent of the victims die within one hour of the accident. (Page 14)

1017. Giberstone H. **Work injuries in New York State agriculture.** New York, New York: New York State Department of Labor, Division of Research and Statistics, 1969. 71 p.

NO ABSTRACT.

1018. Surry J. **III. Agricultural accident research. In: An annotated bibliography for industrial accident research and related fields.** Toronto, Ontario: Labour Safety Council of Ontario, Ontario Department of Labour, 1969:113-116.

NO ABSTRACT.

1019. Hoff PR. **Accidents in agriculture: a survey of their causes and prevention.** Ithaca, New York: Cornell University, 1970; Information Bulletin 1. 11 p.

AUTHOR ABSTRACT: A total of 223 farms or 12 percent of those cooperating in the survey reported 248 accidents. Of these, one farm reported four accidents, two farms reported three accidents, 23 farms reported two accidents each and the remainder reported one accident each.

Employees are more likely to be involved in accidents than are farm family members. The rate for employees was 25.6 accidents for each 100,000 work days; the rate for family members was 15.6 accidents per 100,000 work days.

Employees on dairy farms had the highest accident had the highest accident rate, 35.7 accidents per 100,000 work days. By contrast, the rate for family members on dairy farms was one of the lowest, 14.8 accidents per 100,000 work days.

By age groups, family members under 15 and males employees under 16 had the highest accident rate. No accidents were reported for females employees under 16.

The accident rate for males was higher than for females. For family members, the accident rate for males was 17 accidents per 100,000 work days: for females, 9.5. For male employees, the rate was 28 and for female employees the rate was 23.4 accidents per 100,000 work days.

Fifty percent of the reported accidents occurred between 1:00 p.m. and 7:00 p.m., and 42 percent occurred between 6:00 a.m. and noon. The highest rates per hour were 14.5 percent between 10:00 a.m. and 11:00 a.m. and 11.7 percent between 3:00 p.m. and 4:00 p.m.

The lowest number of accidents on any single day occurred on Tuesday, 8.8 percent of the total, climbing to 18.1 percent on Saturday.

The accident rate on farms where the manager had no outside employment was lower for all workers, 17.6 accidents per 100,000 work days, than it was on farms where the manager worked off the farm 20 hours or more per week. On the farms where the manager had off farm employment, the accident rate was 22.6 accidents per 100,000 work days.

Thirty accidents involved cows, the largest single group of accidents. Tractors were second, with 21 reported accidents.

The accident frequency for tractors was low, 0.8 accidents per 100,000 hours of operation.

Falls accounted for approximately 25 percent of the reported accidents. "Caught in" machinery accounted for another 25 percent.

Haste and poor judgement undoubtedly contributed to many of the accidents. The text contains analyses of several groups of accidents and suggestions for measures that might have prevented at least some of them.

1020. Hanson WH, Olien C. **Accidents that happened to Minnesota farm people in 1970**. [1971?]. 27 p.

AUTHOR ABSTRACT: This study was conducted from January through December 1970. Cluster samples of 2,314 farm families in 17 randomly chosen Minnesota counties were interviewed by 299 trained volunteer interviewers at three month intervals. A cumulative record was made of all accidents of family members, hired help and visitors. An accident was defined as an injury to a person that required professional medical care (doctor, hospital, nurse, x-ray, etc.) and/or resulted in the loss of one half day or more from normal activity of the injured.

The number of accidents of all farm people in Minnesota in 1970 would be 47.7 times the number reported in the sample. There were 633 accidents reported in the sample of 2,314 farm families, multiplying by 47.7 makes 30,200 accidents to farm families in Minnesota in 1970.

For additional details, see Special Report 39 Rural Accidents in Minnesota.

1021. Hanson WH, Olien CN. **Rural accidents in Minnesota**. St. Paul, Minnesota: University of Minnesota Agricultural Extension Service, [1971?]. 9 p.

NO ABSTRACT.

1022. Nashold RD, Wadsack H. **Fatal farm accidents: Wisconsin, 1968-1970**. Madison, Wisconsin: Division of Health, Wisconsin Department of Health and Human Services, [1971?]. 24 p.

AUTHOR ABSTRACT: 1. Forty percent of all work fatalities in Wisconsin occur on farms, although agriculture accounts for only 9.5% of the total labor force. (Page 3)

2. During the three-year period 1968-1970 Wisconsin averaged 82 fatal farm accidents, with an estimate of farm injuries 70-80 times greater. (Page 7)

3. Farm accident fatalities continue to rise during 1968-1970 with a rate of 17.4 per 100,000 rural farm population compared to a rate of 16.5 for 1965-1967. (Page 7)

4. Farm fatality rates increase with age: Age 0-29 has a rate of 10.7, 30-64 a rate of 19.6 and 65 and over a rate of 53.4 per 100,000 estimated rural farm population.

5. Eighty percent of the accident fatalities that occur on farms are among farm residents; whereas, 20 percent are non-farm persons who are visiting or using the land for recreational purposes, etc. (page 10)

6. Two-thirds of the males who are accidentally killed on the farm were at work while only one-third of the female farm fatalities were reported as involved in farm work. (Page 11)

7. For the reporting period over 39 percent of the farm fatalities are attributable to tractor accidents. Other farm machinery accounts for 15.7 percent, and falls for 12 percent. (Page 13)

8. Among children (below age 15) one-third of the fatal accidents involve tractors, and 24 percent involve other machinery. (Page 15)

9. Summer, when most of the field work is done, is the worst season of the year accounting for almost 35 percent of all farm fatalities. October with 38 fatalities is the single worst month of the year. In addition to tractor accidents October is high in accidents from cornpickers and also from hunting. (Page 16)

10. Fatal accidents are concentrated from mid-morning through the afternoon hours, best suited for field work. (Page 18)

11. Seventy-three percent of the victims die within one hour of the accident; only 7 percent survive for more than 7 days after the injury. (Page 20)

12. Regions of the state with more steep slopes have higher fatal farm accident rates than the regions with more level terrain. (Page 22)

1023. Schnieder R, Florell RJ, Baker D, Lorah R. **Nebraska farm accident study: a report on accidents occurring to farm families and hired farm labor in 1970.** Extension Service, University of Nebraska-Lincoln, College of Agriculture, [1971?]. 57 p.

NO ABSTRACT.

1024. United States Department of Transportation. **Agricultural tractor safety on public roads and farms: a report to the Congress from the Secretary of Transportation.** Washington, D.C.: United States Government Printing Office, 1971. n.p.

AUTHOR ABSTRACT: Pursuant to the provisions of section 8 of Public Law 91-265, enacted May 22, 1970, a study was conducted on the extent, causes and means of preventing agricultural tractor accidents on public roads and farms. The report of that study includes an estimate of the number of deaths resulting annually from agricultural tractor accidents, an identification of the primary causes of such accidents with consideration of the hazards most likely to cause death or injury, and recommendations on means for preventing the occurrence of and reducing the severity of injuries resulting from tractor accidents.

The methodology of the study involved three major phases: 1) a detailed investigation and evaluation of the problem by a multi-disciplinary task group, including a careful review of published articles and other material, field visits to major tractor manufacturing plants and to major test and farm operating facilities, and visits to universities where research is actively conducted on tractor safety problems; 2) solicitation of technical papers on a variety of selected safety topics from acknowledged authorities; and 3) scheduling of a public meeting to obtain a broad range of views and experiences from individuals and organizations concerned with agricultural tractor operations and accidents. Liberal use was made of existing sources of information, of the solicited papers and the proceedings of the public meeting in arriving at findings that are presented in the body of the report, and the papers and proceedings are included in full detail in the appendixes along with a reference list of publications.

1025. Doss HJ, Pfister RG. **Farm machinery use study: nature and extent of use of farm machinery in relation to frequency of accidents.** East Lansing, Michigan: Cooperative Extension Service, Michigan State University, 1972; Report No. 30. n.p.

NO ABSTRACT.

1026. Giberstone H. **Work injuries in New York State agriculture, 1970.** New York, New York: New York State Department of Labor, Division of Research and Statistics, 1972. 47 p.

NO ABSTRACT.

1027. Paterson KW, Novack JA, Bertrand AL. **The distribution and characteristics of farm accidents in Louisiana.** Baton Rouge, Louisiana: Louisiana State University, Agricultural Experiment Station, 1972; Bulletin No. 665. 22 p.

AUTHOR ABSTRACT: The study of farm accidents was inspired by the fact that accidents represent one of the most important problems related to rural life and farming. Information on accidents was obtained from a survey of farms in 25 of Louisiana's 64 parishes. These parishes, chosen at random, reflect the various characteristics of land-type and land-use found throughout the state. A sample of 1,561 farms from 25 parishes were monitored for accidents over a period of one year. Analysis of the data obtained determined that: 1.) One hundred eighty-two accidents occurred in 1970 on the farms in the sample population. This was an average of one accident for every

nine farms. 2.) Seven out of 10 accidents reported involved such injuries as cuts and bruises. Only those instances where the victim lost at least a half-day's work or had to see a doctor were counted as accidents. 3.) The majority of farm accidents reported (59 percent) occurred while the individual involved was performing farm work. 4.) Interestingly, 80 percent of the accidents involved such things as slips, falls, and accidents of a general nature. The high percentage of the latter implies that although farm machinery safety programs are essential, general safety programs are also important and needed.

1028. Stout TT, Darbee BI. **Sixty cases of disabling farm accidents**. Wooster, Ohio: Ohio Agricultural Research and Development Center, 1972; Research Bulletin 1056. 21 p.

AUTHOR ABSTRACT: Sixty farm people participated in the study. They were the cooperating and eligible persons who could be located from a total of 91 names which had been suggested. Forty-three of these were household heads at the time of their injury, nine were dependants, eight were single, and all were injured in farm-related accidents.

Ninety percent of all accidents involved machinery. More than half of all machinery accidents involved cornpickers. The typical machinery accident occurred when the individual was trying to unclog a piece of moving machinery during some harvest phase of farming. Ninety percent of all accidents recorded resulted in amputations. There was almost a perfect relationship between machinery accidents and amputations. Non-machine accidents typically were associated with injuries other than amputations.

About 95 percent of the study participants judged that they had recovered 90 percent or more of their previous daily living skills, i.e., ability to care for themselves without the help of others. More serious injuries did not necessarily result in recovering less of their former skills, but they seemed to recover more slowly.

1029. Doss HJ, Pfister RG. **A study of farm machinery use in Michigan**. East Lansing, Michigan: Michigan State University Agricultural Experiment Station, 1973; Research Report No. 219. 4 p.

NO ABSTRACT.

1030. Schramm CJ. **Workmen's compensation & farm workers in the United States**. In: Barth PS, Berkowitz M, Rosenblum M, Watkins NL. Supplemental studies for the national commission on state workmen's compensation laws, Volume I. Washington, D.C.: 1973:137-159.

AUTHOR ABSTRACT: Farmworkers, engaged in one of the most hazardous industries in the United States, are generally not covered by workmen's compensation insurance. Because of the dangerous nature of agricultural work and because many farmworkers are in marginal income positions, the question of coverage is of great importance. Throughout this paper, migrant workers are considered apart from the non-family wage and salary farmworkers. I refer to the latter as members of the stabilized farm labor force which includes unpaid family members as well. There were approximately 196,000 migrants employed in 1970. Current emphasis on the workmen's compensation system and rising interest in the socio-economic problems of both the stabilized farm labor force and migrant agricultural workers lend added importance to the need for knowledge in this area.

This paper will examine both the legal and economic problems of extending coverage to farmworkers. First, however, the present state of coverage, estimates of work force presently covered, an economic analysis of secular changes in the agricultural labor market, and a description of the occupational hazards peculiar to farming will be explored. The paper also presents cost estimates on extending coverage.

We will show that in the jurisdictions having so-called compulsory coverage, only about one-half of all hired farmworkers are actually covered. Further, we will find the cost of extending coverage to uncovered hired workers to be roughly between $77.4 million and $133.9 million.

Three major considerations will be discussed which are connected to the extension of coverage. Suggestions are made to include family members who work on the farm, new means of insuring the coverage of migrants are proposed, and finally, the problems of policing coverage and the delivery of medical benefits are discussed. In connection with these problems a general disability coverage is proposed for farmers to either incorporate private insurers or to be funded publicly.

1031. Stuckey WE, Pugh AR. **Accidental injuries to Ohio farm people 1957-1972.** Columbus, Ohio: Cooperative Extension Service, The Ohio State University, 1973; Extension Bulletin No. MM338, September 1973. 11 p.

NO ABSTRACT.

1032. Hanford WE, Fletcher WJ. **Accident surveys: a guide to agricultural safety engineering and education.** Proceedings of: 1974 Annual Meeting for the American Society of Agricultural Engineers, June 23-26, 1974, Stillwater, Oklahoma. St. Joseph, Michigan: American Society of Agricultural Engineers, 1974; ASAE Paper No. 74-5001. 9 p.

AUTHOR ABSTRACT: Farm accident surveys are providing, thanks to an improved accident information retrieval system, profiles of the major accident problem areas. An analysis of these facts provides the information for development of guidelines to aid in accident prevention through better engineering design and improved safety education.

1033. Pugh AR, Stuckey WE, Phillips GH. **Accidents to farm and rural nonfarm people in Ohio - 1972.** Wooster, Ohio: Ohio Agricultural Research and Development Center, [1974?]; Extension Bulletin 572. 19 p.

AUTHOR ABSTRACT: In Ohio in 1972:

*One out of six farm families in Ohio had an accident.

*One out of eight rural nonfarm families in Ohio had an accident. *In 100% of the reported accidents involving farm people and 99% of the rural nonfarm accidents, a doctor's care was required.

*In 22% of the reported accidents involving farm people and 20% of the rural nonfarm accidents, hospitalization was required.

*63% of the reported accidents involving farm people and 68% involving rural nonfarm people occurred to men and boys.

*44% of the reported accidents involving farm people occurred on the job, 10% off the job, and 43% during recreation and leisure activities.

*19% of the reported accidents involving rural nonfarm people occurred on the job, 17% off the job, and 45% during recreation and leisure activities.

*26% of the injuries to farm people and 29% of the injuries to rural nonfarm people resulted from a fall.

1034. Hanford WD, Pfister RG, Corwith J. **Combine safety, design and education.** Proceedings of: 1975 Winter Meeting of the American Society of Agricultural Engineers, December 15-18, 1975, Chicago, Illinois. St. Joseph, Michigan: American Society of Agricultural Engineers, 1975; ASAE Paper No. 75-1523. 10 p.

AUTHOR ABSTRACT: The 10-state farm accident surveys are utilized to identify the nature of accidents involving combines. An analysis is made of design, recognizing the influence of legislation on the progress that has been made in the past. Opportunities for operator education programs are presented.

1035. Kennedy W. **Fatal accidents of Iowa farm people, 1947-1971.** Ames, Iowa: Cooperative Extension Service, Iowa State University, 1975. 16 p.

NO ABSTRACT.

1036. LeGarde JC. **An analysis of farm equipment accidents on North Carolina public roads.** Chapel Hill, North Carolina: Highway Safety Research Center, University of North Carolina, 1975. 43 p.

AUTHOR ABSTRACT: This is an exploratory study to determine the patterns of highway accidents in North Carolina involving farm tractors and other farm equipment. A total of 1806 farm equipment accidents occurring in 1966, 1968, 1969, 1970, and 1971 were used in this study (the 1967 accident files were not available), and certain comparisons were made using all North Carolina accidents in 1969. In addition, several other comparisons were made using the 1972 accident and driver license files.

It was found that farm equipment operators in accidents suffer more fatalities and injuries than do other drivers. Farm equipment accidents follow a pattern of seasonal agricultural use and are more likely to occur in clear weather, during daylight hours, in open country, and on straight, level, paved roads. Farm equipment involved in highway accidents is more likely to be lacking proper lighting equipment than are other vehicles involved in farm equipment crashes.

Farm equipment operators involved in accidents are almost exclusively male, while about three-fourths of all accident drivers are male. Above the age of sixteen, operators of farm equipment are older than are drivers of the other vehicles.

Almost one-half of all collisions involving farm equipment and other motor vehicles occur when both vehicles are going straight, and another one-fourth occur when the tractor turns left while being passed by another vehicle.

Adult tractor operators involved in collisions are more likely to be sober than accident drivers in general, but nearly 18 percent of adult tractor drivers involved in single-vehicle non-collision accidents have been drinking.

On the basis of the results, the author makes the following recommendations: 1) A requirement that the slow-moving vehicle emblem be affixed to farm equipment operating on public roads. 2) A requirement that adult farm equipment operators possess a valid driver's license. 3) A requirement such as exists in some other states whereby underage persons may qualify for a special license for agricultural purposes. Such persons could be required to demonstrate competence in handling farm equipment before operating such equipment on public roads. 4) A requirement that directional signals and some type of rear-view mirror be present on farm equipment while on public highways. 5) A requirement that farm equipment being towed by tractors be properly lighted when on public roads during periods of darkness. In addition, existing requirements that farm tractors on public roads be properly lighted should be more strictly enforced. 6) Stronger enforcement of all other existing laws governing the operation of farm equipment on the public highways.

1037. Urben L. **Agricultural accident statistics.** Proceedings of: Conference on Agricultural Health and Safety, September 4-5, 1974, Iowa City, Iowa. 1975; NIOSH Contract No. CDC-99-74-98: 186-190.

AUTHOR ABSTRACT: A national profile of agricultural accidents is necessary if an effective reduction program is to be achieved. To produce the profile, accident statistics are obtained by standardized techniques in a total of 22 states. A priority list of problems is based on severity and frequency of accident, and a search technique is developed using up to 20 variables. Family members account for 87 percent of all accidents, and falls are the most frequent cause of injury. The studies provide information so that evaluation, countermeasures, and education may be achieved.

1038. Bondy MK, Lebow RH, O'Malley M, Reilly T. **Occupational health and safety for agricultural workers.** Cincinnati, Ohio: National Institute for Occupational Safety and Health, 1976; DHEW (NIOSH) Publication No. 77-150. 129 p.

AUTHOR ABSTRACT: This report describes activities undertaken at a rural primary health care facility located in the agricultural center of South-western 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.

1039. Brazelton RW, Fischer D, Knutson GD. **A farm accident study in California.** Berkeley, California: Division of Agricultural Sciences, University of California, 1976; Special Publication No. 3066. 5 p.

NO ABSTRACT.

1040. Farr. **Report on the health and safety of those engaged in agriculture.** Strasbourg, France: Council of Europe, Parliamentary Assembly, 1976; Working Papers Volume III, Document 3806. 22 p.

NO ABSTRACT.

1041. Fritsch CF. **Occupational and nonoccupational fatalities on U.S. farms.** Washington, D.C.: Economic Research Service, United States Department of Agriculture, 1976; Agricultural Economic Report No. 356. 19 p.

AUTHOR ABSTRACT: In 1973, a total of 1,769 accidental deaths occurred on U.S. farms, according to the National Center for Health Statistics. Excluded from this total are vehicular deaths on public roads and deaths occurring in the farm home. Based on occupational fatality rates developed for 1969-1971, from 60 to 70 percent of the 1973 farm fatalities were directly related to the farmwork environment.

Accidents involving machinery were the major cause of the 1969-1971 fatalities, but regional variations were large. Machinery and related factors were involved in almost half of the accidental deaths in the Northern Plains during the period, compared with less than 30 percent in the Southern Plains.

Drownings and firearm deaths accounted for about one-fourth of the accidental deaths on farms. Drownings occurred with greatest frequency in the Southeastern States, and firearm fatalities occurred most often in the Southern Plains.

Accidental fatalities occur with greatest relative frequency to older persons. Accidental fatalities to persons 65 years old and older occurred at almost twice this age group's proportional representation in the farm population and labor force. The incidence of accidental fatalities to persons under 55 was less than their population and work force representation. Drownings occurred with greatest frequency to persons under 25, and machinery-related fatalities were responsible for over half of the accidental deaths of persons 45 and older. Persons 45 to 59 years old--an age group within the actively working age range--experienced more fatalities related to blows than did persons 60 and older. Falls were the second most important cause of accidental death of persons 60 and older, ranking behind machinery-related fatalities.

1042. Piercy LR. **A study of power take-off accidents.** Proceedings of: National Safety Congress Public Employee Sessions. 1976; National Safety Congress Transactions, Volume 8: 66-69.

NO ABSTRACT.

1043. Robbins RD. **Agricultural accidents in North Carolina: a descriptive report.** Greensboro, North Carolina: North Carolina Agricultural & Technical State University, 1976; The Research Bulletin Series, Volume 66, No. 10. 35 p.

AUTHOR ABSTRACT: Very little work has been done on farm accidents in North Carolina. A few studies have been made in other states. Agriculture has been excluded from workmen's compensation in the past, and therefore, few accidents were reported and little information was given about costs. These shortcomings lead to this study on "Farm Accidents in North Carolina". The basic objectives were to determine the size of losses in agriculture, and to determine the risks in agriculture and related industries.

This study was based upon a random sample of five counties selected from across the state by geographic region. One-third of the farmers in the sample counties were surveyed to determine if an accident occurred, when it occurred, how it happened, and the costs involved in the accident.

The results show that just over three percent of the farms in the survey experienced an accident. Most accidents occurred in or near some type of building or structure. The most likely victims of an accident were male, either the husband or the son. The very young (under 20) is especially accident prone.

Costs of agricultural accidents are likely to be higher than non-agricultural accidents. Average costs of agricultural accidents were $300-$400, and likely to be higher. Medical costs averaged $154 and value of time in lieu of compensation, $150-$240. Most injuries did not require hospitalization, only a few required more than five days. Accidents in agriculture and agricultural related industries are more expensive than in non-agricultural industries. The total costs of agricultural and related accidents were $500 and $390 for non-agricultural industries.

As might be expected from the higher costs involved, agriculture experiences more accidents than non-agriculture. The accident rate in agriculture is a best remaining constant while in most other industries, the rates are declining. Only in mining and construction industries are the accident rates higher than in agriculture.

Important implications of this study are as follows: 1) Substantial savings can be made if the accident rate in agriculture could be reduced; 2) Some provisions, public and/or private, may be needed in agriculture to aid accident victims, especially to offset medical costs and compensation; 3) Since agriculture is relatively more dangerous, additional emphasis may need to be placed on safety in agriculture; and 4) Farm owners may wish to insure themselves to protect against loss due to injury.

1044. Silletto TA. **Implications for agricultural safety education programs as identified by Iowa farm accident survey [doctoral dissertation].** Ames, Iowa: Iowa State University, 1976. 171 p.

AUTHOR ABSTRACT: Interviewers in twenty-four counties in Iowa surveyed 3,161 farms to secure information for the study. The data were reported on questionnaires developed by the National Safety Council for use in Standardized Farm Accident Reporting Programs.

The average accident resulted in a loss of 9.68 days from normal activities. There was one accident for every 5.66 farms. About 20 percent of the accidents occurred in leisure activities. About three percent of the accidents resulted in physically handicapped victims. The total estimated loss due to accidents in Iowa in 1975 was $4,036, 989.

Fewer accidents for 0-4 and 5-14 year old youth were observed than expected and more 45-64 year old persons had accidents than expected.

Dairy and hog farms were found to make significant contributions to the overall chi-square when data for accidents by type of farms were analyzed.

Persons living on farms 51-100 acres in size had fewer accidents than expected but farm sizes 501-750 and 751 and over made significant contributions to the overall chi-square value.

The month of December was found to have less accidents than expected while there were more accidents than expected during May and August.

When an analysis of data related to frequency of accidents by exposure was completed, it was found that a significant contribution had been made toward the overall chi-square value by all classes. However, the exposure class, 0-1 hour included nearly three times more observations than were expected. It was found that legs, fingers, feet and head were most often injured.

The frequency of accidents was compared at levels of formal education, however the analysis resulted in a nonsignificant chi-square value. It was not possible to reject Hypothesis "there is no significant difference between the accident rates of persons completing safety training and the accident rates of those not completing safety training".

1045. Baker DE, Fletcher WJ, Zeglen EJ. **Big round bales -- anatomy of a safety problem.** Proceedings of: 1977 Annual Meeting of the American Society of Agricultural Engineers, June 26-29, 1977, Raleigh, North Carolina. St. Joseph, Michigan: American Society of Agricultural Engineers, 1977; ASAE Paper No. 77-5030. 11 p.

AUTHOR ABSTRACT: Elimination of accidents is vital to the interest of rural America and the agricultural community as a whole. This paper will describe the three pronged approach being used to head off a potential problem with big round bales.

1046. Bubolz TA, Kennedy WJ, Hull DO. **Iowa agricultural accident and illness study, 1975.** Ames, Iowa: Cooperative Extension Service, Iowa State University, 1977. 8 p.

NO ABSTRACT.

1047. Burkart JA, Egleston CF. **A comparison of worker's compensation agricultural data and the farm accident survey in California.** Salt Lake City, Utah: University of Utah Research Institute, 1977. 74 p.

AUTHOR ABSTRACT: Data obtained from the state of California Worker's Compensation System was compared with data collected during the National Safety Council's Farm Accident Survey conducted in California from February 1973 to January 1974. A comparative analysis of the methodologies of the two data collection systems, and their respective analyses of injury data, illness data, and accident rates are presented. Tables illustrating data collected by the systems are compared, and data collection sheets used by both systems are reproduced. The authors

conclude that problems exist in the comparison of the Farm Accident Survey and the Worker's Compensation system because of differences in purposes, methods of collecting data, coding schemes, amount of information collected, and types of workers covered.

1048. Field WE, Bailey RW. **A summary of the 1976 Indiana farm accident survey with a brief analysis of fatalities on Indiana farms, 1973-1976.** West Lafayette, Indiana: Cooperative Extension Service, Purdue University, [1977?]. 8 p.

NO ABSTRACT.

1049. Lloyd M. **Arizona farm and ranch accident survey, 1976.** Arizona: Cooperative Extension Service, [1977?]. 11 p.

AUTHOR ABSTRACT: The data collected revealed the following: 1) Male full-time employees between the ages of 25-44 years exhibited the highest accident rates. 2) Most accidents occurred during midmorning and midafternoon. 3) Most of the accidents occurred in February, April and May. 4) The largest percentage of injuries and illnesses occurred by being struck against or by object, and slips and falls from different levels. 5) Feet and back were parts of the body most frequently injured. 6) Animal handling accidents category had the highest frequency rate. 7) One accident occurred per 2.7 number of farms interviewed. 8) Farm yards and farm buildings were the locations reporting the most accidents and illnesses. 9) Accidents and illnesses occurred the largest percentage of time during the activity of routine chores.

1050. Murphy D. **A survey of farm accidents and illnesses in Pennsylvania, 1976.** University Park, Pennsylvania: The Pennsylvania State University, Cooperative Extension Service, 1977; Extension Studies 70, June 1977. n.p.

AUTHOR ABSTRACT: The diversity of the types, causes, and conditions surrounding accidents is considerable. Accidents happen to farm people, primarily family members, on all types and sizes of farms.

Data collected in this survey revealed the following:

1. The fall and early winter months are the most hazardous time for people on farms.
2. Accidents occur on all types of farms. Farm accidents occurred by type of farm at a rate that was proportional to the number of people involved in that type of enterprise.
3. Most farm accidents happen between the hours of 9-10 a.m. and around 3 p.m.
4. Animals and farm machinery are the two things most often associated with farm accidents.
5. Farm people are most likely to be involved in an accident while doing routine chores.
6. The average measurable cost of accidents in 1976 was nearly $400.
7. Nearly 50 percent of the victims were struck by an object or involved in a fall.
8. Family members accounted for 87 percent of all accidents.

1051. Stewart LE. **A survey of accidents on Maryland farms 1974.** Maryland: Cooperative Extension Service, University of Maryland, 1977; Bulletin No. 255. 15 p.

AUTHOR ABSTRACT: This bulletin contains the results of a farm accident survey conducted in 22 Maryland counties in 1974. The survey covered 1,231 commercial farms representing all major types of agriculture in the state.

Briefly, in Maryland during 1974:

* One hundred seventy-five accidents reported on 1,231 farms.
* Doctor's care was required in 95 percent of the reported accidents.

* Forty-six percent of the victims were treated in hospital emergency rooms.
* Twelve percent of the victims were admitted to the hospital.
* Twenty-four percent of the accidents were classified as slight; 2.2 percent resulted in permanent injury; 3.4 percent were fatal and 70.4 percent were classified as severe.
* Seventy-two percent of the total accidents were farm work related; 28 percent were non-work or leisure-time accidents.
* Farm owner/operator and members of their families were involved in 78 percent of the accidents; employees in 14.8 percent; visitors and guests in 7.2 percent.
* Accident rate for farm family members was 15.2 per 100,000 days worked; for employees was 19.6 per 100,000 man-days worked.
* Tractors and machinery were involved in 26.2 percent of the work-related accidents; animals in 15.9 percent; hand and power tools in 10.3 percent; other vehicles in 9.5 percent.
* An average of 13 days per accident were lost from usual activities due to the accidents reported (a total of 6.2 man-years lost on the 1, 231 farms).
* Average medical cost per accident reported was $298.65.
* Medical, property damage and replacement labor costs totalled $62, 793. (For Maryland projects to approximately $3-4 million.)
* Of those people having tractor or machinery related accidents: one had one year in the 4-H tractor program; three had some vocational agricultural; and one had hazardous occupations training.

1052. Wills JB. **Tennessee farm accident and illness survey, 1975**. Tennessee: National Safety Council, Tennessee Farm Bureau Women, University of Tennessee Cooperative Extension Service, 1977. 37 p.

AUTHOR ABSTRACT: This report contains the results of the farm accident and illness survey conducted in Tennessee in 1975. Here are some major points.
* 65% of all farm accidents occurred to the farm operator or members of his family.
* Males were involved in over 72% of the accidents reported.
* 53% of the injuries reported involved cuts, sprains, and bruises.
* 15% of all accidents reported required admittance to hospital.
* Slips and falls were the most common accident reported.
* Legs and arms were the most frequently injured part of the body.
* Animals and farm machinery were the objects most often involved in reported accidents.
* Beef and Dairy farms had very high accident rates in comparison to other type farming operations.
* 97% of all accidents reported involved only one person.
* Over 56% of all accidents reported were classified as severe.
* 72% of accidents reported occurred while person involved was working.
* The winter months of November, December, January, and February showed the lowest accident rates.
* An average of 24 days were lost from work for each accident reported.
* An average of 1.5 days per accident were spent in a hospital.
* Medical expenses averaged $171.09 per accident reported.

1053. Wisconsin Department of Health and Social Services, Division of Health. **Fatal farm accidents in Wisconsin, 1971 to 1975**. Madison, Wisconsin: Wisconsin Department of Health and Social Services, Division of Health, 1977. 27 p.

AUTHOR ABSTRACT: 1) Almost forty percent of all work accident fatalities occurred on Wisconsin farms, although only a small proportion of the working population is employed in agriculture (six percent in 1970).

2) During the five-year period 1971-1975 there were an average of 87 farm accidents per year with an estimated 100 disabling injuries for each fatality.

3) The number of Wisconsin farms continually decreased from 1950 (174, 000 farms) to 110,000 in 1970 and 104,000 in 1975. The average acreage per farm increased from 136 to 188 acres in the same period.

4) The farm accident rate rose to 21.5 per 100,000 farm population in 1971-1975; from 19.7 in 1968-1970.

5) Farm accident fatality rates are highest among those over 65 (56.6) with the 15-24 age group second (22.2). Rates are similar for the 25-44 (18.3) and the 45-64 age groups (18.7). The rate for children under 15 is slightly lower at 16.3 per 100,000.

6) Almost 80 percent of the accident fatalities on Wisconsin farms during this period were farm residents.

7) Five out of eight farm accident victims were working at the time of injury.

8) Almost forty percent of the farm accident fatalities were tractor accidents; other machinery caused 18.5 percent and falls 10 percent.

9) Among children under 15, a third of the 100 fatalities in the five-year period were due to tractor accidents and 28 percent involved other machinery.

10) June had the highest number of accidents with 13.8 percent of the total and October next with 12.6 percent. These are the months when hay and corn harvest are at their peak.

11) Almost seventy percent of all fatalities died within an hour of the injury; less than ten percent survived more than one week.

1054. Berry CM. **Chapter Fifteen. Agricultural hazards**. In: Clayton GD, Clayton FE, eds. Patty's industrial hygiene and toxicology. Volume I: general principles, Third Revised Edition. New York: John Wiley & Sons, Inc., 1978:653-664.

NO ABSTRACT.

1055. Burkart JA, Egleston CF, Voss RJ. **The rural health study: a comparison of hospital experience between farmers and nonfarmers in a rural area of Minnesota (1976-1977)**. Cincinnati, Ohio: 1978; DHEW (NIOSH) Publication No. 78-184. n.p.

AUTHOR ABSTRACT: The Rural Health Study used hospital records and brief occupational histories to identify problem health areas for agricultural workers and residents in a selected area of the Midwest. A population-based analysis according to residence in two rural counties and a case-control analysis according to years of agricultural exposure was utilized.

Overall, patients with an agricultural background were healthy and slightly healthier than patients with no agricultural history. The following possible areas were identified: Males and females both showed increased risks for diseases of; blood-forming organs, osteoarthritis, gall bladder, hernia of the abdominal cavity, veins and lymphatics, and eye conditions. Male farm workers showed increased risks for benign prostatic hypertrophy and female farm workers had increased risks of uterovaginal prolapse, acute myocardial infarctions, disease of the skin and subcutaneous tissue, and neoplasms. Females over 65 years of age with 20 or more of agricultural exposure were the only farm group whose overall health was worse than the corresponding nonfarm group.

Data on smoking histories, collected for adjustment purposes, corroborated national findings.

1056. Jester RC. **Delaware farm accident study -- 1977**. Newark, Delaware: Cooperative Extension Service, University of Delaware, 1978. 13 p.

NO ABSTRACT.

1057. Young CW. **Reducing tractor fatalities: two decades of progress**. Ohio: Cooperative Extension Service, The Ohio State University, 1978; Bulletin 640. 8 p.

AUTHOR ABSTRACT: 1. Tractor fatalities have declined over the 22-year-period, 1956 through 1977. This decline has occurred during a period when tractor numbers on Ohio farms have remained relatively constant.

2. Sixty-three percent of the tractor victims were killed in overturns, with the majority of the overturn fatalities (67%) being sideways. Field conditions at the time of the fatalities were not related to overturns.

3. Full-time farmers or family members of full time farmers accounted for 47 percent of all tractor fatalities.

4. The age grouping of 65 and over accounted for 26 percent of all fatalities. The next most affected age grouping was 45-64, accounting for 25 percent of all fatalities. These two age groups are killed in disproportionate numbers when compared to the percentage of rural Ohio population that they occupy.

5. Males were fatality victims of tractor accidents in 94 percent of all cases studied.

6. Extra riders accounted for 13 percent of all fatalities with 43 percent of the extra riders being under 5 years of age. The percentage of extra rider fatalities from full time farm families was greater than for part time farming or non farm victims. Drivers of tractors involved in extra rider fatalities were usually brothers or fathers of the victim. Twenty-four percent of the drivers of the tractors in extra rider fatalities were in the 11-15 age group.

7. More fatalities were recorded for the six hour period following 12: 00 noon than for the six hour period immediately prior to noon. A noticeable drop in fatalities occurred after 6:00 P.M. A greater percentage of part time farmers were killed after 6:00 P.M. than was full time farmers.

8. May was the highest fatality month followed by July, August and June respectively.

9. Almost half of all tractor fatalities occurred in the field. Highway related tractor fatalities accounted for 18 percent of all fatalities. A greater percentage of full time farmers was killed in highway accidents with motor vehicles than was part time farmers. Twenty-three percent of all fatalities occurring in tractor-motor vehicle altercations was represented by victims age 70 and over. A noticeable decline occurred in tractor fatalities related to altercations with motor vehicles in the decade following the required use of the slow moving vehicle (SMV) emblem.

10. All major makes and types of tractors were involved in fatalities during the 22-year-period of the study. No single make, model or type of tractor stands out as being more susceptible to accidents then another. No specific setting of wheels or weighting situations were determined a major cause of upsets or accidents.

11. Equipment being pulled or attached to tractors or mechanical failure were not determined major factors in tractor accidents and fatalities. No one specific piece of equipment can be singled out as a major contributing factor to fatalities.

1058. Aherin RA, Riesenberg L. **1978 Minnesota farm accident survey**. University of Minnesota Agricultural Extension Service, [1979?]. n.p.

NO ABSTRACT.

1059. Donham KJ, Mutel C. **Agricultural medicine: the missing component of the rural health movement**. Oakdale, Iowa: University of Iowa, [1979?]. n.p.

AUTHOR ABSTRACT: In recent years, a great deal of effort has gone into improving the health care of rural populations. In most instances, efforts have been narrow in scope, concentrating on one problem (accessibility of health care), and on a few segments of the rural population (economic, social, and racial minorities). The term "Rural Health Movement" frequently is equated with attempts to improve health care delivery to these subpopulations.

We contend that a true rural health movement must not be narrow in scope, but instead must attempt to deal with the numerous health problems of a broad spectrum of rural subgroups. In particular, we consider the occupational and environmental aspects of health needs of the large agricultural subgroup, defining the clinical,

preventive, and community health aspects of these problems as "agricultural medicine". Members of the agricultural subgroups have been heretofore ignored in organized health efforts unless they happened to be a member of a social, racial, or economic minority group. Members of the agricultural population daily encounter a variety of occupational and environmental health hazards, such as toxic chemicals and zoonotic infectious agents. Many of these hazards are unique to the agricultural population. The health status of the agricultural subgroup is poorer than is commonly believed. If a true improvement in the health of this population is to be realized, then clinical, preventive, and community health aspects of their problems all must be dealt with. We must develop systematic ways of educating health care providers about these problems, as well as develop new types of health care programs for rural areas.

1060. Hanford WD, Hoskin A, Miller T. **Standardized farm/ranch accident survey report: an update.** Proceedings of: 1979 Winter Meeting of the American Society of Agricultural Engineers, December 11-14, 1992, New Orleans, Louisiana. St. Joseph, Michigan: American Society of Agricultural Engineers, 1979; ASAE Paper No. 79-5531. 7 p.

AUTHOR ABSTRACT: This report summarizes the survey procedures and the data obtained from a total of 24 states. A brief discussion of the TREESEARCH method of analysis is also presented. The injury distribution contained in this survey update is similar to that presented in an 18-state report published previously.

1061. Massie CM. **Agriculturally-related accidents in Maryland in 1974 and their relationship to selected variables [doctoral dissertation].** University of Maryland, 1979. 194 p.

AUTHOR ABSTRACT: The purpose of this study was to determine the relationship between selected variables and agriculturally-related accidents in the State of Maryland during 1974.

Information was obtained by using the revised form of the National Safety Council "Form for Reporting Farm Accident Data." The data were recorded according to a standardized coding system. The data in this study were obtained through the cooperation of the Department of Agricultural Engineering, Cooperative Extension Service, Maryland Farm Bureau Women's Committee, Maryland Agricultural Safety and Health Federation and the National Safety Council.

The population of this study included all farms in the 23 counties of Maryland. A 10 percent sample from this population was selected. Farms were included in the sample only if the heads of households agreed to cooperate. Location of the farms in a county was determined by a stratified sampling of areas within the county.

Chi square statistic was used to determine the relationship between certain variables. Actual levels of significance greater than above the .050 level were reported.

There was a chi square significant at .050 when the relationship between number of years on the farm and the person who administered first aid to the injured person were crosstabulated.

When the number of family members at home was crosstabulated with the age of individuals injured, a chi square significant at .020 resulted.

When the number of hours per week devoted to farm work and regions of the body were crosstabulated, a chi square significant at .020 resulted.

When the years attended school was crosstabulated with time of year of accident a chi square significant at .050 resulted.

When the years attended school and age of injured was crosstabulated a chi square significant at .004 resulted.

When the hours per week devoted to farm work and age of injured was crosstabulated a chi square significant at .004 resulted.

When years on farm and age of injured was crosstabulated, a chi square probability of .000 resulted. On the basis of age, the Low-26 year age group was involved in the highest proportion of accidents. The 50-Hi age group was involved in the next highest proportion and the 27-49 year age group had the lowest proportion of accidents.

On the basis of years on the farm, the 32-49 year group were involved in the highest proportion of accidents. The 48-Hi group was involved in the next highest proportion and the Low-31 years on farm group was involved in the lowest proportion of accidents.

A two-sample t-test was used to determine if there was a difference between selected demographic factors of farms that had accidents in the years 1974 and farms that did not have accidents.

Results of the t-test indicated differences at the .050 level of significance or less in the following factors: 1) acreage under cultivation, 2) average hours devoted to farm work, 3) number of male family members who live/work on farm, 4) number of female family members who live/work on farm, 5) number of 8 hour days spent at farm work by males of the family, 6) number of hired males who live/work on farm, 7) number of 8 hour days spent at farm work by hired males.

A regression analysis showed that 18% of the variability in severity of accidents was explained by number of persons involved, time victim was with thing involved, and years in school.

Results of this study suggest the need for further research to identify variables that can be used as a basis in reducing agriculturally-related accidents.

1062. Murphy DJ. **Relationship of attitudes toward farm safety concepts and farm accident involvement**. The Pennsylvania State University, 1979. 109 p.

AUTHOR ABSTRACT: Many safety educators firmly believe that good safety attitudes are a must if people are to avoid accidents in the workplace and elsewhere. This idea has evolved mainly from the industrial safety movement and has been adopted in most fields of safety such as traffic, aviation, agriculture, and the like. However, this fundamental adage has never been tested in some of these fields, particularly agriculture.

There are many differences between industrial safety and agricultural safety. Inclement weather, time, poor crop and livestock prices, and societies expectation of the farmer to be a rugged, tough, independent individual are just a few of the subtle pressures exerted on farmers that are not felt by many other workers. Many of these pressures work directly against the farmer's safety and are suspected to be related to a number of farm accidents.

A random sample of 1500 Pennsylvania farmers were asked their attitudes toward 15 nationally recognized farm safety concepts. Farm Safety Concepts were defined as nationally recognized safe operating or working procedures, rules or practices. The Semantic Differential Attitude Test was used to collect attitude data. The Semantic Differential is a bi-polar adjective scale which allows the respondent to indicate not only his preference but also the intensity of that preference. Other pertinent data about the subjects were obtained through questions at the beginning of the questionnaire.

Four hundred ninety-three respondents indicated they had about the same attitudes towards farm safety concepts regardless of their accident involvement. In other words, those farmers who were involved in farm accidents expoused just as good an attitude toward safety as those farmers who had no accidents. In addition, farmers' expressed attitudes did not differ significantly regarding farm safety when analyzed by size of operation, type of operation, hours spent working on the farm, or level of education. The results of this study suggest that the apparent high priority farm safety educators give to safety attitude promotion should be re-examined. In addition, educators should deal with the subtle pressures exerted on a farmer that often increase his chance of an accident. Farm safety education programs should help farmers recognize these pressures to deal with them. Too, poor safety attitudes should not be used to explain away farm accidents caused by unsafe acts of the farmer.

1063. West Virginia University Center for Extension & Continuing Education, Cooperative Extension Service. **West Virginia farm accident survey**. Morgantown, West Virginia, [1979?]. 9 p.

AUTHOR ABSTRACT: *Most farm accident victims are males above the age of 30.

*The majority of farm accidents are severe, resulting in lacerations or fractures.

*The months of February, May and September are especially hazardous.

*Most farm accidents occur on Monday or Tuesday between the hours of 8 to 10 a.m. and 1 to 5 p.m.

*Most farm accidents occur while the victim is performing field work on routine chores occurring in the barnyard or the field.

*Most victims are hospitalized or treated in emergency rooms.

The diversity of the types, causes and conditions surrounding accidents is considerable. Accidents happen to farm people, primarily family members, on all types and sizes of farms.

You are encouraged to use this information to help prevent farm accidents. After all, you have your safety and maybe your life at stake.

1064. Erisman G. **Farm work accidents in Florida**. Gainesville, Florida: Florida Cooperative Extension Service, University of Florida, 1980. n.p.

NO ABSTRACT.

1065. Fritsch CF, Zimmer JM. **U.S. farm accident fatalities, 1970-76**. Washington, D.C.: Economics, Statistics, and Cooperatives Service, United States Department of Agriculture, 1980; Agricultural Information Bulletin No. 434. 32 p.

AUTHOR ABSTRACT: Farm accidents caused 1,438 deaths in 1976 (14.5 victims per 100,000 exposed persons), 20 percent below 1970 and the lowest rate since 1962. Persons 35 to 44 years old had the fewest farm accident fatalities, while those 55 and older had the most. Farm-machinery accidents, crushing accidents, and accidental blows accounted for nearly two-thirds of all deaths and were responsible for most of the year-to-year variations. Improved safety features on farm machinery and educational efforts by manufacturers may have contributed to the decline in farm fatalities.

1066. Riesenberg LE. **An investigation of the agricultural education background for accident involved and non-involved farm tractor and machinery operators in Minnesota [doctoral dissertation]**. University of Minnesota, 1980. 142 p.

AUTHOR ABSTRACT: Statement of the Problem. The study was concerned with answering three basic questions.

1. Was the distribution of work injuries of the 1978 Minnesota Farm Accident Survey significantly different from the distribution of work injuries compiled by the National Safety Council?
2. What was the participation of farm tractor and machinery operators in the ongoing agricultural education programs?
3. Was there a difference in the participation in these ongoing agricultural education programs between accident involved and non-involved operators?

Method of Research. Using the procedures of the Standardized Farm Accident Reporting Program, a stratified random sample of farms grouped in clusters in 19 counties of Minnesota were surveyed four times during 1978 by volunteer interviewers. The survey in each county was coordinated by the county extension staff with the training of the interviewers done by the state staff.

Findings. There was a significant difference in the distribution of work injuries between those of the 1978 Minnesota Accident Survey and the "national norm" as compiled by the National Safety Council in respect to:

1. Age of victim
2. Residency of the victim
3. Type of farm
4. Location on the farm
5. Agent involved
6. Victims activity

7. Type of injury
8. Part of body injured

No significant difference was found in respect to severity of injury. It was found that the majority of farm tractor and machinery operators in Minnesota did not participate in vocational agriculture, the 4-H power program and the Tractor and Machinery Safety Training Program. Amount of experience and vocational agriculture completed were found to be slightly associated with accident involvement.

1067. Agricultural Safety and Health Center. **Fatal agricultural accidents in Kansas, 1976-1980**. Manhattan, Kansas: Cooperative Extension Service, Kansas State University, 1981. n.p.

NO ABSTRACT.

1068. Bilbao SC. **1980 Utah farm accident survey**. Utah: Cooperative Extension Service, Utah State University, 1981. 15 p.

AUTHOR ABSTRACT: *Most farm accident victims are husbands between the age of 25-44.

*The majority of farm accidents are severe, resulting in sprains, fractures or lacerations to the foot and leg.

*The month of July is especially hazardous.

*The greatest number of farm accidents occur while the injured victim is treating livestock, usually cows, most often in the barnyard.

*The accident rate per 100 farms in Utah during 1980 totaled 34.3, the illness rate 11.1.

1069. Wisconsin Department of Health and Social Services, Division of Health. **Fatal farm accidents. In: Death from accidents, poisoning and violence: Wisconsin 1976-1980**. Madison, Wisconsin: Wisconsin Department of Health and Social Services, Division of Health, [1981?]:21-40.

AUTHOR ABSTRACT: Wisconsin averaged 77 fatal accidents per year, down from an average of 87 per year of 1971 through 1975. The number of Wisconsin farms continually decreased from 1950 (174,000 farms), to 110,000 in 1970, and 93,000 in 1980. The average acreage per farm increased from 136 to 183 to 200 in the same period (pages 24, 36).

Farm accident fatality rates are highest among those 65+ (66.7), with the 45 through 64 age group, second (25.0). Rates are similar for the 0 through 14 (20.0) and the 25 through 44 age groups (20.6). The rate for young adults 15 through 24 is slightly lower at 18.3 per 100,000. (page 24).

October had the highest number of fatal accidents, with 14.3 percent of the total farm fatalities. November was next with 12.2 percent. (These are the months when corn harvesting is done.) (page 30).

Twenty-three percent of accidents occurred during the period 9:00 AM to 11:59 AM. An equal percent occurred between 3:00 PM to 5:59 PM. (page 31).

In 54 percent of the accidents, the physician or coroner indicated the interval between onset and death was immediate/sudden/or instant. For an additional 22 percent, death was within 24 hours. (page 32).

Almost 48 percent of all those dying from farm accidents were never married, of which 65 percent were under the age of 20. An almost equal percentage were married (46 percent) at the time of death. Six percent were widowed or divorced. (page 26).

Fifty-three percent of those dying from farm accidents during this five-year period were working at the time of the accident. (page 38-39).

Three cause-of-death groups account for over one fourth of the farm fatalities: Natural and environmental factors with 8.9 percent, being struck accidentally by a falling object with 8.6 percent, and striking against or struck accidentally by objects or persons with 8.1 percent. Accidental falls was the next highest category with 28 deaths or 7.3 percent of the total. (page 33).

Ten counties reported no fatal farm accidents during the 1976 through 1980 period. Only four counties reported no fatal farm accidents during the previous five-year period ("Fatal Farm Accidents in Wisconsin, 1971 through 1975"). An additional 48 counties (66.7 percent) averaged less than two deaths per year. (pages 34-35).

1070. Hanford WD, Burke JW, Fletcher WJ. **1982 farm accident survey report**. Chicago, Illinois: National Safety Council, 1982. 45 p.

NO ABSTRACT.

1071. Miettinen U, Rytkonen E, Husman K. **Farmers' exposure to noise**. Helsinki, Finland: Institute of Occupational Health, 1982; [Translation from Maanviljelijan melualtistus]. 38 p.

AUTHOR ABSTRACT: The investigation concerned farmers' total exposure to noise as a result of the work. The farms investigated and the farmers represented three branches of production: dairy cattle (2 farms), a poultry farm and a pig farm. The noise exposure was followed during a whole working year.

The exposure was measured by a noise dose meter which the farmer himself used. The results measured for each operation or working day were converted by calculation into equivalent continuous A-weighted sound levels corresponding to a 40 hour working week. On the basis of 51 weekly levels, the equivalent continuous A-weighted sound level was calculated for a whole working year.

On the farms studied, the farmer's exposure to noise exceeded the sound level of 85 dB(A) regarded as the hearing damage limit, and was roughly of the same order irrespective of the branch of production. The farmers also had slight hearing damage of the type associated with noise.

A tractor was the cause of less than half of the noise exposure on all four farms. Substantial peaks in the exposure, daily and weekly, were caused by a circular saw, chain saw or power grinder and also a combine harvester, dryer or mower chopper. No clear seasonal variations were observed in the exposure to noise.

1072. Davies JE. **Chapter 5. Pesticide poisonings--who gets poisoned and why?** In: Davies JE, Freed VH, Whittemore FW, eds. An agromedical approach to pesticide management: some health and environment considerations. Miami, Florida: University of Miami Printing, 1983:75-90.

AUTHOR ABSTRACT: Pesticide poisonings are under-reported in all parts of the world but are assuredly higher in the developing countries. Incomplete data suggests that the number of cases and deaths are higher than expected and have increased considerably with the introduction of the organophosphate and carbamate insecticides to the different areas of the Third World.

This Chapter reviews pesticide poisonings, a problem which is of equal concern to agriculture and public health and one which constitutes a major agromedical problem. Mechanisms of poisonings and potentially hazardous situations are discussed.

1073. Hanford WD, Fletcher WJ. **Farm accident experience from multi-state surveys**. Proceedings of: 1983 Summer Meeting for American Society of Agricultural Engineers, June 26-29, 1983, Bozeman, Montana. St. Joseph, Michigan: American Society of Agricultural Engineers, 1983; ASAE Paper No. 83-5043. 24 p.

AUTHOR ABSTRACT: Prior to 1968, national statistics on farm and ranch accidental injuries and fatalities were drawn from death certificates and local studies without uniformity or correlation. A system of state accident surveys now offers comparable information that is representative and has the validity to use in formulating logical accident countermeasures.

1074. Mutel CF, Donham KJ. **Chapter 4. Occupational health problems of the rural work force.** In: Mutel CF, Donham KJ. Medical practice in rural communities. New York, New York: Springer-Verlag, 1983:77-115.

AUTHOR ABSTRACT: Certain rural occupations affect the health of employees in a distinctive manner. Agricultural workers and other persons who work in the farm environment or with raw farm products (such as farm family members and employees of agricultural support businesses) are exposed to threats from farm machinery, excessive sunlight and heat, particulates and vapors that may be irritating, toxic, or allergenic, farm structures (including silos and animal confinement buildings) with abnormal air constituents, livestock, and pesticides. Resulting health problems include accidents, heat stress, neurovascular degeneration of the hands resulting from vibration, hearing loss, numerous respiratory problems (such as asthma, farmer's lung, silo filler's disease, and asphyxiation), infectious diseases transmitted from animals, a variety of skin problems (including irritation, sensitization, and infection), certain cancers, and pesticide poisonings and injuries.

Loggers are exposed to the hazards of working with large, heavy objects and noisy, dangerous machinery in an outdoor environment. Major health problems include numerous accidents, hearing loss, and vibrational injury. Other health concerns include exposure to toxic chemicals, cancer, infectious diseases transmitted from the woods environment, and plant-induced skin and respiratory systems reactions.

Underground miners also suffer high accident rates resulting from falling rock, electrical hazards, and mining machinery. Dust hazards have been substantially reduced by wet drilling, but a number of generalized respiratory responses to dusts and reactions to specific mined materials (such as asbestos, mercury, and uranium) still threaten miners. Gases and vapors may pose direct problems because of their toxicity or, secondarily, may cause fires and explosions. Other health concerns include noise, heat, and carcinogenic substances.

Rural physicians may be the de facto occupational health physicians for these rural employees, as well as for employees of the growing number of rural industries. This is but one of the challenging roles available to the rural physician who remains open to the health care needs of the total community. The demands and rewards of such an extended role are described in the next and last chapter.

1075. Williams DL. **Iowa agricultural accident and illness study, 1981.** Ames, Iowa: Cooperative Extension Office, Iowa State University, 1983. 8 p.

NO ABSTRACT.

1076. Williams DL. **Iowa farm and people characteristics and agricultural accident occurrence [doctoral dissertation].** Ames, Iowa: Iowa State University, 1983. 82 p.

AUTHOR ABSTRACT: The findings in this study can be summarized as follows:

1. Agricultural accident frequencies were significantly related to the size of the farming operation. Larger farms are more likely to have an agricultural accident than smaller farms.
2. Agricultural accident frequencies were significantly related to farm type, as defined in this study. Beef and dairy farms are more likely to have an agricultural accident than corn, soybean, hog or general livestock farms.
3. Agricultural accident frequencies were significantly related to annual farm exposure to agricultural work. Farms reporting more than 4,500 hours of exposure annually had a higher accident frequency than with less exposure.
4. Agricultural accident frequencies were significantly related to age. Persons between 25 and 64 years of age were found to have more accidents than other age groups.
5. Agricultural accident frequencies were significantly related to sex. Males were found to have relatively more accidents than females. The difference between sexes could not be entirely explained by differences in exposure levels between males and females.

6. Agricultural accident frequencies were significantly related to an individual's annual exposure to agricultural work. Persons who performed agricultural work more than 1,500 hours per year were found to have higher accident frequencies than persons who had fewer hours of exposure.

7. No significant relationship was found between tractor and machinery operators' level of formal education and tractor or machine accident frequencies.

8. No significant relationship was found between tractor and machinery operators' completion of 4-H or Vocational Agriculture Hazardous Occupations Order tractor and/or machinery safety training program and tractor or machine accident frequencies.

The most significant finding in this study is the strong correlation between the level of annual exposure and agricultural accident occurrence. Of the variables measured in this study, including formal education and safety education, the level of annual exposure to agricultural work best accounts for the differences in agricultural accident occurrence among groups of workers and groups of farms.

1077. Baker SP, O'Neill B, Karpf RS. **Chapter 9. Machinery**. In: Baker SP, O'Neill B, Karpf RS. The injury fact book. Lexington, Massachusetts: D.C. Heath and Company, 1984:107-111.

NO ABSTRACT.

1078. McKnight RH. **U.S. agricultural equipment fatalities, 1975-1981: implications for injury control and health education [doctoral dissertation]**. Baltimore, Maryland: The Johns Hopkins University, 1984. 301 p.

AUTHOR ABSTRACT: National data obtained from the Consumer Product Safety Commission were analyzed to determine the extent and characteristics of farm equipment fatalities during 1975-1981. Of 3, 229 such deaths on farms, three-fourths were associated with farm tractors; one-half of these occurred when the tractor overturned. Besides tractors, 800 deaths were linked to 30 other farm machines, including auger-elevators, cornpickers, manure spreaders, and power take-offs. Clinical features of fatal injuries were especially alarming, including massive thoracic crushing, decapitation, and dismemberment. For all forms of fatal injury, the death rate peaked in 1975. After declining for the next two years, the rate began an upward trend that has not yet abated. Compared to other age groups, farm children aged 14 and under were at higher risk for almost half of the study's 21 types of fatal injury episodes, including being entrapped in grain augers and being run over by farm mowers and tractors. An estimated one-third of all deaths to adults could have been prevented if three available, yet under-utilized injury control devices had been installed: tractor rollover protective structures, guarding on auger intake ports, and power take-off shielding. The study implications emphasize the necessity for new federal standards for farm tractor occupant protection as well as the need to rescind farming's current exemptions from OSHA oversight. This study, which is the first to describe the characteristics of these fatal injuries on a national basis, concludes with numerous implications for injury control and agricultural health policy.

1079. Sell WE. **The nature of power take-off accidents [master's thesis]**. West Lafayette, Indiana: Purdue University, 1984. 178 p.

AUTHOR ABSTRACT: The primary goal of this project was to investigate present hazards associated with power take-off components and to make recommendations for reducing power take-off related injuries and deaths.

The following objectives were established to help insure that this primary goal was met:

1. Collect and summarize recent power take-off accident data.
2. Identify the principle factors contributing to power take-off related accidents.
3. Develop practical recommendations which could be readily implemented by farm safety leaders to promote the safe use of power take-off operated agricultural equipment.

The population studied consisted of 64 people who had power take-off accidents from 1975-1984.

In addition to the accident investigation 578 John Deere tractors manufactured from 1952 to 1983 were examined to determine the operator usage and condition of power take-off master shields.

Also included in the study were the results of a power take-off pictorial warning decal survey. Five hundred and eleven people were surveyed to determine which of five pictorial warning decals would be the most effective warning if used on power take-off agricultural equipment.

Four common factors were present in the majority of accidents investigated. These included:

1. The equipment was in a stationary position with the power take-off engaged.
2. There was an absence of shielding in the area of entanglement.
3. A protrusion such as a pin or bolt was present.
4. The victim put himself in a position where bodily contact with the revolving power take-off occurred.

Of the types of master shields evaluated, the flip-up shield was the most likely to be left in place. The quick-attach shield was the most likely to be removed.

1080. Aherin RA. **Illinois farm work accidental deaths, 1985.** Illinois: Cooperative Extension Service, University of Illinois, 1985. n.p.

NO ABSTRACT.

1081. Canadian Centre for Occupational Health and Safety. **Health and safety in Ontario agriculture: hazards and strategies. Brief to the Ontario Task Force on Health and Safety in Agriculture.** Hamilton, Ontario: Canadian Centre for Occupational Health and Safety, 1985. 25 p.

AUTHOR ABSTRACT: This brief highlights the changing face of Ontario Agriculture. The past 25 years have seen dramatic shifts in population, increasing reliance on mechanization, use of chemicals, and the emergence of farm employment as a major contributor to farm productivity. These developments have added new hazards and increased the risks associated with old hazards.

The legal framework in which occupational health and safety operates in Ontario agriculture is presently characterized by exemption. These exemptions have limited the application of occupational health and safety strategies which have been developed to protect other Ontario workers.

The brief argues that progress in agricultural occupational health and safety requires a broadly-based mixture of strategies. Legislation, employee participation, education, information, and engineering are important and inter-related strategies which need to be developed or strengthened in a mix of strategies appropriate to the hazards of agricultural work. The brief makes few recommendations concerning the mechanisms by which these strategies should be implemented, but points out that mechanisms developed in a cooperative and consultative manner are likely to be more sensitive to the needs of the total agricultural community and thus more productive.

1082. Chong J. **Health of persons engaged in farm work. A background literature review.** Hamilton, Ontario: The Occupational Health Program, McMaster University, 1985. 408 p.

AUTHOR ABSTRACT: The objective of this literature search on the health of persons engaged in agricultural work with an analysis relating to the findings to Ontario is in accordance with the request for proposals published by the Ontario Task Force on Health and Safety in Agriculture in July, 1984. The tasks to be completed by the Occupational Health Program, McMaster University were:

1. To assemble and review relevant literature concerning farm work-related injuries and illnesses.
2. To relate the findings to agricultural conditions in Ontario.
3. To identify priorities requiring further detailed study and analysis.

The first objective was achieved by a comprehensive review of relevant scientific literature concerning disease and injury of farm workers published in the scientific literature. Additional information was obtained from

agricultural research centers and government sources. From information already obtained concerning the pattern of farming in Ontario it was possible to indicate areas likely to require detailed study. By identifying the most serious potential problems and also those which are most likely to respond to preventive measures, specific recommendations are proposed.

These recommendations are as follows:

RECOMMENDATION 1: A detailed survey regarding exposure to pesticides and organic chemicals in farm work be carried out across Ontario to identify populations at risk of adverse health effects.

RECOMMENDATION 2: A health data collection system for agricultural health and safety be established to detect potential adverse health effects of farm work in Ontario.

RECOMMENDATION 3: An agricultural health and safety research program be organized within Ontario University to carry out descriptive and analytical epidemiological studies of the health of persons engaged in farm work.

RECOMMENDATION 4: An intensive educational program for family physicians, medical officers of health, physicians in postgraduate training, and medical and nursing students concerning occupational health and safety in agriculture be initiated in Ontario.

RECOMMENDATION 5: Preventive interventions including legislation and community-based worker education pertaining to the protection of the health of persons engaged in farm work in Ontario be brought into effect.

1083. Krantz F. **Fatal farm accidents: Wisconsin, 1981-1983.** Madison, Wisconsin: Wisconsin Department of Health and Social Services, Division of Health, Center for Health Statistics, 1985. 17 p.

AUTHOR ABSTRACT: 1. The number of Wisconsin farms continually decreased from 174,000 in 1950 to 110,000 in 1970 to 100,000 in 1975 and an estimated 88,000 in 1983. The average acreage per farm increased from 136 to 207 acres in the same period. In recent years, the number of tractors per farm has remained nearly constant. (Table 1)

2. After a slow but steady rise in fatal farm accident rates for two decades, the data for 1981-1983 show a small decrease in the rate. During the three-year period 1981-1983 there were an average of 60 fatal farm accidents per year. (Table 2)

3. Fatality rates continue to be highest among those age 65 and over. The rate being more than twice the state rate. (Table 3)

4. Forty-seven percent of the farm fatalities were from machinery related injuries. Tractors account for a large proportion of these deaths. Falls accounted for eight percent of the deaths and motor vehicle injuries another eight percent. (Table 4)

5. Among children under age 15 a third of the 31 fatalities in the three-year period were due to tractor accidents and a quarter involved other machinery. (Table 5)

6. The highest number of injury fatalities occurred in July with 16.9 percent of the total. October is next with 12.4 percent. Hay and grain are harvested in July and the peak of corn harvest is usually in October. (Table 9)

7. Almost 73 percent of injury victims die within an hour of injury; less than seven percent survived more than a week. (Table 11)

8. Eighty-three percent of the fatal farm accidents occurred among residents of the 1,268 civil towns in Wisconsin. (Table 12)

9. Among farmers and farm laborers, 73 percent were "at work" at the time of the accident. (Table 13)

10. Eighteen counties reported no fatal farm accidents during the period 1981-1983. Twenty-three counties averaged less then one death per year. Eight counties had 32 percent (57 or 180) of the deaths during this period. These were Clark, Dane, Green, LaCrosse, Monroe, Richland, Rock and Wood counties. (Table 14)

1084. Murphy DJ. **Pennsylvania farm fatalities during 1980-84.** University Park, Pennsylvania: The Pennsylvania State University, College of Agriculture, Cooperative Extension Service, 1985; Special Circular 319. n.p.

NO ABSTRACT.

1085. Napier TL, Goe WR, Pugh AR. **Incidence and predictive factors associated with farm accidents in Ohio.** Wooster, Ohio: Ohio Agricultural Research and Development Center, The Ohio State University, 1985; Research Circular 287. 15 p.

AUTHOR ABSTRACT: The descriptive data revealed that slightly less than one-third of the study sample had experienced at least one farm-related accident in the previous 3 years (1980-1982). More than half the farmers who had experienced an accident indicated the accident resulted in sutures, hospitalization, loss of sight, loss of hearing, loss of limbs, or death, all of which were defined as serious injuries. Farmers who had experienced accidents reported an average of 16.1 work days lost per farm-related accident, which is much higher than the number reported in earlier research (30). The large number of lost work days supports the observation made in this study that more than half of all farm accidents resulted in serious injury. The study findings demonstrated that the major causes of farm accidents are machinery, falls and farm animals. Data collected to assess adoption of ROPS revealed an increase in use from a previously conducted study, but the percentage of farmers using ROPS was quite small, indicating slow adoption. Farm safety equipment has also increased in use since 1977, with the greatest increases in squeeze bottles filled with water for anhydrous ammonia spills and smoke detectors in farm homes. Several types of protection devices were shown not to be widely used. Throughout the presentation of the descriptive findings, comparisons were made between full-time and part-time farmers. These analyses revealed that farming status was a very poor predictor of all the safety variables examined.

1086. National Institute for Occupational Safety and Health, Division of Safety Research. **Fatal accident circumstances and epidemiology (FACE) report: three electrocuted on farm in Georgia.** Morgantown, West Virginia: National Institute for Occupational Safety and Health, Division of Safety Research, 1985; FACE-86-6-I. n.p.

AUTHOR ABSTRACT: A fatal accident circumstances and epidemiology (FACE) report on an accident involving an electrocution in Georgia was presented. The report was part of the NIOSH FACE project to collect data on electricity or confined workers, 21 and 41 year old males, and the owners, a 61 year old male, were moving a portable grain auger. They were positioned around the rear of the auger, pushing it. As the workmen pushed the auger forward, it contacted a 7,200 Volt power line located 25 feet above the ground. All three workers were electrocuted. The farm had no written safety policy. The sheriff requested that no investigation at the site be conducted for reasons that were not explained. The author recommends that a survey of the farm should be conducted that identifies hazards. These hazards should be discussed with all workmen. Necessary precautions should be stressed to all farm personnel. All equipment (augers) should be lowered to a safe transporting position before being moved from one location to another.

1087. National Institute of Occupational Safety and Health, Division of Safety Research. **Fatal accident circumstances and epidemiology (FACE) report: two electrocuted on farm in Georgia.** Morgantown, West Virginia: National Institute of Occupational Safety and Health, 1985. 5 p.

AUTHOR ABSTRACT: A fatal accident circumstances and epidemiology (FACE) report describing an accident involving electrocutions in Georgia was presented. The report was part of the NIOSH FACE project to collect data on electricity or confined space/related accidents involving fatalities. On October 14, 1985, five farm workers were in the process of moving a portable grain auger when it contacted a 7,200 Volt power line. Two workmen, 30 and

39 years old, were electrocuted and the other three were injured. The three workers who survived the incident were wearing new rubber sole shoes. The two workmen who were killed were wearing leather shoes in poor condition. No autopsies were performed. The cause of death of both victims was listed as electrocution. The farm operator had no written safety policy. Safety was left up to the common sense of the farm workers. The author recommends that employers identify safety hazards that may be encountered on the farm and emphasize safe movement of farm equipment, especially when moving it under power lines.

1088. Ontario Task Force on Health and Safety in Agriculture. **Report of the Ontario task force on health and safety in agriculture**. Toronto, Ontario: Ministries of Agriculture and Food and Labour, 1985. n.p.

NO ABSTRACT.

1089. Pollack JG. **Memorandum to agricultural program leaders**. Ithaca, New York: Cooperative Extension, Cornell University, 1985. n.p.

NO ABSTRACT.

1090. Pugh AR. **Accidental deaths of Ohio farm people**. Ohio: Ohio Cooperative Extension Service, The Ohio State University, 1985; Bulletin 625. n.p.

NO ABSTRACT.

1091. Health and Safety Executive. **Agricultural black spot: a study of fatal accidents**. London: Health and Safety Executive, 1986. 40 p.

NO ABSTRACT.

1092. Jennings B. **Arkansas farm accident study**. Little Rock, Arkansas: Cooperative Extension Service, University of Arkansas, 1986. 11 p.

AUTHOR ABSTRACT: - Two hundred eighteen (218) injuries were reported on 738 farms.

- One accident was reported for every 3.4 farms, or there were 29.5 accidents per 100 farms in the study.
- Injuries to all Arkansas farm residents would project to almost 15, 000 during the survey period.
- A majority (64.2 percent) of all injuries reported were considered severe, 34.9 percent were classified as slight, and .9 percent permanent.
- Almost 70 percent of all injuries reported were from work-related accidents with 30 percent being nonwork injuries.
- Farm families were involved in 79.1 percent of all accidents, employees in 19.2 percent, and visitors in 1.5 percent.
- Males suffered 80 percent of the total injuries reported.
- A majority of the victims (63.8 percent) were between the ages of 25 and 64. The 15-24 age group accounted for 16.9 percent of the injuries.
- Tractors and farm machinery were involved in 37.7 percent of all reported accidents.
- Livestock treatment or handling was the cause of another 22.3 percent of the injuries reported.
- The accidents reported occurred on all types and sizes of farms.

1093. MacCubbin PA, Herzfeld PM, Therriault GD. **Mortality in New York State, 1980-1982: a report by occupation and industry**. Albany, New York: Bureau of Biostatistics, New York State Department of Health, 1986; New York State Department of Health Monograph No. 21. 95 p.

NO ABSTRACT.

1094. National Institute for Occupational Safety and Health. **Preventing fatalities due to fires and explosions in oxygen-limiting silos**. Cincinnati, Ohio: National Institute for Occupational Safety and Health, 1986; DHHS Publication No. 86-118. 6 p.

AUTHOR ABSTRACT: This Alert requests the assistance of fire department personnel, farm owners and workers, and silo manufacturers in the prevention of fatalities due to fires and explosions occurring in oxygen-limiting silos.

Several recent incidents occurred while fighting oxygen-limiting silo fires which resulted in the death of fire fighters. Other fire fighters lost their lives as a result of similar explosions in the late 1960's. The problems associated with burning silos appeared to have abated during recent years, but these incidents demonstrate the need to renew efforts to minimize their recurrence. A concerted effort should be made to prevent silo fires from occurring and to provide training programs on controlling this type of fire.

1095. National Institute of Occupational Safety and Health. **Preventing grain auger electrocutions**. Cincinnati, Ohio: National Institute for Occupational Safety and Health, 1986; DHHS Publication No. 86-119. 4 p.

AUTHOR ABSTRACT: This Alert requests the assistance of farm owners/ managers, farm/agricultural workers, and farm equipment manufacturers in the prevention of electrocutions which may occur while moving metal grain augers. The grain auger is an essential piece of farm equipment which is used to move grain from one location to another. However, every year accidents occur when this piece of equipment is improperly moved in the elevated position and it comes into contact with high voltage power lines. This has resulted in one or more fatalities per incident. This Alert describes two separate incidents that resulted in five fatalities, and occurred within the same week (150 miles apart). Neither of the incidents fell under OSHA jurisdiction because both farms were family operations employing fewer than 10 workers.

1096. Purschwitz MA, Field WE. **Farm-related fatalities involving persons 60 years of age and older**. Proceedings of: 1986 Summer Meeting of the National Institute for Farm Safety, Inc., June 15-19, 1986, Orlando, Florida. National Institute for Farm Safety, 1986; NIFS Paper No. 86-6. 16 p.

AUTHOR ABSTRACT: Individuals 60 or more years of age account for one-third of all Indiana farm-related fatalities, and 20% or more in numerous other states. Two hundred fifty such fatalities are examined, and characteristics and contributing factors discussed.

1097. Schnieder RD. **Farm accidents in Nebraska - a new look**. Proceedings of: 1986 Winter Meeting of the American Society of Agricultural Engineers, December 16-19, 1986, Chicago, IL. St. Joseph, Michigan: American Society of Agricultural Engineers, 1986; ASAE Paper No. 86-5512. 15 p.

AUTHOR ABSTRACT: The computer has been a valuable tool in the retrieval of farm accident statistics. The data has been available in the past; however, the retrieval was cumbersome. Computerizing allows us to get quick replies out to our constituents regarding questions they ask.

1098. Tormoehlen R. **Fatal farm accidents occurring to Wisconsin children, 1970-1984.** Proceedings of: 1986 Winter Meeting of the American Society of Agricultural Engineers, December 16-19, 1986, Chicago, Illinois. St. Joseph, Michigan: American Society of Agricultural Engineers, 1986; ASAE Paper No. 86-5514. 13 p.

AUTHOR ABSTRACT: Two hundred forty-seven Wisconsin children were fatally injury in farm-related accidents from 1970-1984. The 247 cases are analyzed to determine the nature and characteristics of fatal farm accidents occurring to children.

1099. Wilk VA. **XIV. Accidents.** In: Wilk VA. The occupational health of migrant and seasonal farmworkers in the United States, Second Edition. Washington, D.C.: Farmworker Justice Fund, Inc., 1986:84-88.

AUTHOR ABSTRACT: Agriculture is the second most dangerous occupation in the United States today. Migrant and seasonal farmworkers are susceptible to accidents from a variety of sources, although actual documentation of farmworker accidents in not easy. National and state accident data do not identify migrant and seasonal farmworkers in the agricultural categories. Generally, cause of accident and exact occupation of the worker are not specified. Worker's compensation does not cover agricultural workers in 20 states and, thus, agricultural injury and illness data may not even be compiled.

Worker fatigue increases the risk of accidents. Sources of fatigue among farmworkers include the heat and sun, long workdays with few rest periods, excessive noise, vibration, and poor posture caused by prolonged stooping, forward bending, etc.

Children work or play in the fields and thus are exposed to the same occupational hazards as adults. They also are more susceptible to pesticide poisoning accidents.

Prevention of farm accidents depends on engineering controls such as improved equipment design, monitoring the workplace for hazards and eliminating them or reducing their risk, farmworker safety training, and protective gear.

1100. **The occupational environment in agriculture and market gardening.** Proceedings of: Nordic Research Conference, March 4-6, 1987, Jaravallen, Sweden. Stockholm, Sweden: The Swedish Work Environment Fund, 1987; No. 9919185. 75 p.

NO ABSTRACT.

1101. Burke J. **Historical overview of the agricultural safety movement.** Proceedings of: 1987 International Winter Meeting of the American Society of Agricultural Engineers, December 15-18, 1987, Chicago, Illinois. St. Joseph, Michigan: American Society of Agricultural Engineers, 1987; ASAE Paper No. 87-5512. 20 p.

AUTHOR ABSTRACT: The history of organized safety began in earnest in 1912 with the First Cooperative Safety Congress in Milwaukee. 25 years later, some farm leaders met to organize a national farm safety program. The history and achievements of these efforts are highlighted. Still, agriculture remains a hazardous industry, and total resources available for farm safety programs have fallen from past levels rather than increased to meet needs.

1102. Campbell WP. **The condition of agricultural driveline system shielding and its impact on injuries and fatalities [master's thesis].** West Lafayette, Indiana: Purdue University, 1987. 211 p.

AUTHOR ABSTRACT: The primary goal of this project was to investigate the current hazards associated with power take-off components and to develop recommendations to help reduce power take-off related injuries and deaths.

In order to achieve this goal, the following activities were conducted:

1. Data from power take-off accidents was collected and summarized to determine factors associated with power take-off accidents.
2. A review of literature related to the power take-off was conducted to document the progress made toward improving the safety of power take-off components.
3. An investigation of the hazards of the power take-off driveline was conducted by surveying the condition of driveline shielding components on used agricultural implements.
4. The condition of the power take-off related safety signs on used implements was investigated to determine their durability.
5. An audio-visual presentation was produced that was aimed at agricultural equipment operators and dealt with the safe use and maintenance of power take-off drivelines.
6. Recommendations for farmers, safety leaders and equipment manufacturers were developed to help prevent power take-off accidents.

Accident investigations summarized in this study include 100 non-fatal power take-off accidents, and 25 fatal power take-off accidents. Absence of shielding at the area of entanglement, the presence of a protrusion on the driveline, and the actions of the victim were all factors contributing to the majority of the accidents investigated.

The condition of the safety signs and shielding components for the power take-off driveline for 1309 machines was investigated for this study. There were no readable power take-off related safety signs on 45 percent of the implements surveyed. Damaged or missing shielding was found on 40.1 percent of the implement input drivelines, 37.5 percent of the implement input connections, and 23.8 percent of the pedestals on the implements in the sample.

1103. Minnesota Extension Service. **Minnesota farm work-related accidental deaths, 1986.** St. Paul, Minnesota: Agricultural Engineering Department, University of Minnesota, [1987?]. n.p.

NO ABSTRACT.

1104. National Institute for Occupational Safety and Health, Division of Safety Research. **Fatal accident circumstances and epidemiology (FACE) report: Farm worker asphyxiated in grain silo in Indiana.** Morgantown, West Virginia: National Institute for Occupational Safety and Health, 1987; FACE-87-39. 5 p.

AUTHOR ABSTRACT: A 52 year old farm worker entered an oxygen limiting silo through the top opening and was asphyxiated. He was employed on a privately owned farm with one full time and one part time worker. The farm had no written safety program with safety matters being left up to the individual workers. The owner of the farm and his full time employee were filling an 80 foot high silo with alfalfa silage. In the afternoon the owner told his worker that he was leaving for a while but would return later. When the owner was gone, the victim was to clean up the silage around the silo being filled and put away the equipment. The part time employee arrived an hour later, but could not find anyone around. He went to get help, and on returning noticed a 10 foot ladder located under the ladder permanently attached to a silo filled the day before. The father of the part time employee found the victim in the silo, lying about 10 feet from the opening. According to the coroner's report, the victim was probably overcome by nitrous-oxide (10102439) fumes, fell into the silo, and suffocated as a result of aspiration of plant material. There was a significant degree of conflict between the coroner's report and the probable sequence of events and it was recommended that personnel evaluating this accident should rethink their conclusions. It was also recommended that comprehensive policies and procedures be developed by the employer for confirmed space entry.

1105. National Institute for Occupational Safety and Health, Division of Safety Research. **Fatal accident circumstances and epidemiology (FACE) report: farmer dies in Indiana.** Morgantown, West Virginia: National Institute for Occupational Safety and Health, Division of Safety Research, U.S. Department of Health & Human Services, 1987; FACE-87-49. 4 p.

AUTHOR ABSTRACT: The owner of a 100 acre grain farm was engulfed in shelled corn inside a 12,000 bushel capacity grain storage bin and suffocated. He was well acquainted with the proper safety procedures to be used when entering a storage bin. The farmer was a diabetic and had been having dizzy spells. His purpose at the bin that day was to remove part of the 8,000 bushels of shelled corn inside onto a truck and to stir the remaining corn with an auger to help lower the temperature and prevent spoilage. It was assumed that he climbed the ladder to the top and entered the door of the bin. His son arrived some time later, noted the auger running and finished loading the truck, assuming his father was visiting neighbors. After loading, the son closed the chute but left the auger running and left the site. Two hours later he returned looking for his father. The bin was opened and holes were cut in the base to remove the corn, which took about 2 hours by hand before the farmer was found. The cause of death was listed as suffocation. It is recommended that a standby person always be used when working in a confined space arrangement, and that harnesses and life lines be used when the confined space contains unstable materials.

1106. Paulson JO, Indian RW. **Fatal accidents in the Ohio farm population, 1984.** Columbus, Ohio: Chronic Disease and Special Studies Unit, Division of Epidemiology, Ohio Department of Health, 1987. n.p.

NO ABSTRACT.

1107. Paulson JO, Indian RW. **Fatal occupational injuries in Ohio, 1984--update report no. 1.** Columbus, Ohio: Ohio Department of Health, 1987. 7 p.

NO ABSTRACT.

1108. Purschwitz MA, Field WE. **Federal funding for farm safety relative to other safety programs.** Proceedings of: National Institute for Farm Safety 1987 Summer Meeting, June 14-18, 1987, Lancaster, Pennsylvania. 1987. 13 p.

AUTHOR ABSTRACT: Federal funding for farm safety compared with other federal spending for occupational spending. Farm safety receives less than 0.3% of annual federal occupational safety spending. Additional federal safety funding is outlined.

1109. Purschwitz MA, Field WE. **Overview of agricultural accident data sources and collection systems.** Proceedings of: 1987 Summer Meeting of the American Society of Agricultural Engineers, June 28 - July 1, 1987, Baltimore, Maryland. St. Joseph, Michigan: American Society of Agricultural Engineers, 1987; ASAE Paper No. 87-5003. 16 p.

AUTHOR ABSTRACT: An overview is given of the various data sources and collection systems for agricultural accident data. Content, limitations, and other factors are discussed. A summary is presented of the types of accident information being obtained by Extension agricultural safety specialists.

1110. Purschwitz MA, Field WE. **Scope and magnitude of injuries in the agricultural workplace.** Proceedings of: 1987 International Winter Meeting of the American Society of Agricultural Engineers, December 15-18, 1987, Chicago, Illinois. St. Joseph, Michigan: American Society of Agricultural Engineers, 1987; ASAE Paper No. 87-5514. 12 p.

AUTHOR ABSTRACT: Agricultural workplace injuries occur in a variety of ways to a variety of people. A summary of the present work-related injury problem in agriculture is presented, based on published data. Historic comparisons with other industries are made.

1111. Springfeldt B, Thorson J. **Mitigation of personal injuries caused by overturning of farming tractors.** Proceedings of: 31st Annual Proceedings of American Association for Automotive Medicine, September 28-30, 1987, New Orleans, Louisiana. Sweden: The Swedish Foundation for Occupational Health and Safety for State Employees, The Department of Environmental Medicine, [1987?]:229-236.

AUTHOR ABSTRACT: Farm tractor overturnings caused an increasing and soon alarming number of serious injuries to farmers in Sweden after 1945. The annual fatality rate for farm tractor overturning was 12 per 100,000 farmers in 1961 and 1 in 1981. The total injury rates were 20 and 7 per 100,000 for the same two years. "Farmers" included males running their own businesses and their males relatives according to censuses.

Mandatory rules prescribing a protective frame or a crushproof cab on new tractors were effective in 1959 and 1970 resp. Supplementary rules for old tractors became effective in 1965 and 1983. At present all farm tractors which are occupationally used should be equipped with a crushproof cab.

Injuries were registered within the National Board of Occupational Safety and Health. A few non-farming cases might have been included before 1972. However, the risk of a fatal overturning was reduced by about 90% and the risk of any reported injury by about 65%

1112. Coye MJ, Fenske R. **Chapter 33. Agricultural workers.** In: Levy BS, Wegman DH, eds. Occupational health: recognizing and preventing work-related disease, Second Edition. Boston: Little, Brown and Company, 1988:511-521.

NO ABSTRACT.

1113. De Bock A. **Chapter 16. Surveillance for accidents at work.** In: Eylenbosch WJ, Noah ND, eds. Surveillance in health and disease. Oxford: Oxford University Press, 1988:191-201.

NO ABSTRACT.

1114. Donham KJ, Horvath EP. **Chapter 59. Agricultural occupational medicine.** In: Zenz C, ed. Occupational medicine: principles and practical applications, Second Edition. Chicago, Illinois: Year Book Medical Publishers, Inc., 1988:933-957.

NO ABSTRACT.

1115. Farm Safety Association, Inc. **Ontario farm fatalities: 1977-1986**. Guelph, Ontario: Farm Safety Association, Inc., [1988?]. n.p.

AUTHOR ABSTRACT: The Farm Safety association will continue to use this type of information to develop educational programs that target major hazards on the farm. The marked decline in fatality numbers during the final two years of the survey suggests that safety education efforts of the past 10 to 15 years have played a role in reducing the number of accidental farming deaths.

1116. Hammer W. **Crucial points and risk factors in farm accidents -their determination by statistical methods**. Proceedings of: 1988 Summer Meeting of the National Institute for Farm Safety. 1988; Paper No. 88-9. 9 p.

AUTHOR ABSTRACT: As a rule accident data are analysed to find cumulations of accidents, to gain information on possible causes and to find genuine starting points for further-leading and purposive risk analyses. Until now only two-dimensional frequency counts have been used. As an alternative two modern statistical methods were applied to analyse accidents: a) log-linear analysis of multiway frequency tables and b) logistic regression. They supply criteria to distinguish between significant and non-significant components. Thus, they furnish decision aids for definite measures to prevent accidents.

Mathematical models are formed to quantify the impact of main effects and interactions on the number and severity of accidents.

1117. Hanford WD. **Agricultural safety related references**. 1988. 10 p.

NO ABSTRACT.

1118. Huizinga MA, Murphy DJ. **A personalized mail survey for collecting agricultural data**. Proceedings of: Summer Meeting of the National Institute for Farm Safety, June 18-23, 1988, Alberta, Canada. 1988. 15 p.

AUTHOR ABSTRACT: Newspaper clippings and personal interview surveys have been the primary methods for collecting agricultural accident data dating to the early 1940's. Accident data forms and survey procedures were standardized during the late 1960's and many statewide surveys were conducted throughout the 1970's. In recent years the implementation of the standardized survey procedure has become difficult and appears to no longer be viable. A personalized mail survey approach was recently tested in Pennsylvania with excellent results. The procedures of personalized mail survey research may serve as a cornerstone to an efficient, long term method of agricultural accident data collection.

1119. Jansson B, Svanstrom L. **Agriculture and injuries: a system for injury surveillance in swedish emergency care as a basis of injury control. Studies on epidemiology of injuries in agriculture**. Sundbyberg, Sweden: Karolinska Institute, 1988. n.p.

AUTHOR ABSTRACT: There are several problems associated with registries; the expense of operating, organizing and staffing a registry and the quality of data. Injury control in agriculture is limited by a lack of comprehensive data on all categories of injuries.

The objectives of this study were to evaluate registry completeness, measurement errors, trend analysis and calculation of risk, to describe the yield of farm injury surveillance and to test the applicability of a model for safety education and training. The study comprised all patients treated by the outpatient medical services for injuries on 2,454 Swedish farms during a one-year period.

The registration system permitted the analysis of system coverage and could be used as a basis for periodic surveys and trend analysis, but further development is needed concerning the organization and staffing problems. Because of the major taxonomic deficiencies of the E-code, a specific questionnaire was developed for collection of data on the circumstances during the accident. Limitations applied to calculation of accident frequency rates per million hours of work. The study showed that farm-work-related accidents in the study area were greatly under-represented in official occupational injury statistics. The importance of registry inclusion criteria when one is comparing different injury surveillance systems was noted.

Collection and analysis of data showed that the methods used could yield information on medical consequences, sequence of events and contributing and background factors. The evaluation of the safety education and training programme demonstrated that the most important factors were the location of the courses, the recruitment procedure and realistic exercises with demonstration of major risks and safe methods of working.

The results may serve as a basis for increased information on the nature and scope of farm injuries. They also provide a basis for planning measures aimed at changing farmers' safety attitudes, e.g. increasing the use of personal protective equipment. A third potential use is selection of priority groups for safety education, training and supervision. It is recommended that an active safety programme should comprise five headings; mass-communication, education, job safety analysis, training and supervision. The health services can provide a basis for health planning for farm injury control.

1120. Lehtola CJ. **An annotated bibliography of theses and dissertations relating to agricultural safety [master's thesis]**. Ames, Iowa: Iowa State University, 1988. 60 p.

NO ABSTRACT.

1121. National Highway Traffic Safety Administration. **Fatal accident reporting system 1987**. Cambridge, Massachusetts: U.S. Department of Transportation, Transportations Systems Center, 1988. n.p.

NO ABSTRACT.

1122. Purschwitz MA, Field WE. **Problems in surveillance and investigation of agricultural fatalities**. Proceedings of: NIOSH Fatal Accident Circumstances and Epidemiology Workshop, November 8-10, 1988, Beckley, West Virginia. 1988. 14 p.

AUTHOR ABSTRACT: The surveillance and investigation of agricultural fatalities is not a straightforward exercise. In order to accurately assess the hazards, surveillance must begin with careful consideration of accident selection criteria and of the unique characteristics of production agriculture. The limitations of existing sources of surveillance information must be understood. Investigation is important in overcoming these limitations, but must be carried out carefully with knowledge that circumstances may not always be conducive to getting the necessary etiologic details. And finally, creative solutions must continue to be investigated to improve our accident surveillance and investigation procedures.

1123. Ross C, Adrian LS. **Grant County 1987 farm injury statistics**. Wisconsin: Grant County Nurses Office, 1988. n.p.

NO ABSTRACT.

1124. Schnieder RD, Morgan DL. **Nebraska farm injury study**. Proceedings of: American Society of Agricultural Engineers, April 8-9, 1988, Columbia, Missouri. 1988; Paper No. MCR 88-103. n.p.

AUTHOR ABSTRACT: A number of studies have been done on farm accident fatalities. However, very little has been done regarding the types of injuries and extent of the injuries. This study covered injuries to persons that were admitted to an emergency room of some hospitals in Nebraska. This study will be continued in Nebraska. If funding can be obtained, we will expand our study to South Dakota and Wyoming.

1125. Schuler RT. **Fatal farm accidents in Wisconsin - 1987**. Madison, Wisconsin: University of Wisconsin-Madison, [1988?]. n.p.

NO ABSTRACT.

1126. Skromme AB. **The first annual U.S. farm accident report - 1986**. Moline, Illinois: 1988. 42 p.

AUTHOR ABSTRACT: Assembled from the Farm Accident Reports from 25 states, representing 68.5% of the farm workers in the U.S. in 1986. All data shown herein has previously been published, but not in a National Report such as this one. All data shown herein has previously been published, but not in a National Report such as this one.

1127. Bowen V. **Agricultural injuries to the upper extremity**. In: Dosman JA, Cockcroft DW, eds. Principles of health and safety in agriculture. Boca Raton, Florida: CRC Press, Inc., 1989:352-354.

NO ABSTRACT.

1128. Cavaletto RA. **Oregon agricultural injury survey**. Proceedings of: 1989 Summer Meeting of the National Institute for Farm Safety, Inc., June 18-21, 1989, Monterey, California. Columbia, Missouri: National Institute for Farm Safety, 1989; NIFS Paper No. 89-5. 10 p.

AUTHOR ABSTRACT: A personalized mail survey was sent to 1500 Oregon farmers and ranchers. The subjects were selected by the Oregon Agricultural Statistic Service. A response rate of 81.8% was obtained. Injury rates for the subjects are two to three times higher than the rates published by the National Safety Council in 1982. It is unclear if this difference reflects an increase in injuries or is an artifact to the survey procedure.

1129. Cohen ML, Moll MB, Linn HI. **Statistical description of agricultural injuries in the U.S.**. In: Dosman JA, Cockcroft DW, eds. Principles of health and safety in agriculture. Boca Raton, Florida: CRC Press, Inc., 1989:311-315.

NO ABSTRACT.

1130. Crapo RO. **Toxic gases from manure pits**. In: Dosman JA, Cockcroft DW, eds. Principles of health and safety in agriculture. Boca Raton, Florida: CRC Press, Inc., 1989:55-57.

NO ABSTRACT.

1131. Dervin K. **A model program for occupational pesticide illness prevention: the 'SENSOR' project in Fresno County.** Proceedings of: 1989 Summer Meeting of the National Institute for Farm Safety, Inc., June 18-21, 1989, Monterey, California. Columbia, Missouri: National Institute for Farm Safety, 1989; NIFS Paper No. 89-6. n.p.

AUTHOR ABSTRACT: In cooperation with the National Institute for Occupational Safety and Health (NIOSH), the California Department of Health Services is conducting a model surveillance program for occupational pesticide illnesses. The program will follow illness cases back to the workplace, evaluate risks and make recommendations for preventive actions.

1132. Elliott GF. **Compensation programs for farmers.** In: Dosman JA, Cockroft DW, eds. Principles of health and safety in agriculture. Boca Raton, Florida: CRC Press, Inc., 1989:345-347.

NO ABSTRACT.

1133. Etherton J, Myers J, Jensen R, Russell J, Braddee R. **Agricultural machine safety research: fatality prevention targeting.** Proceedings of: Annual Meeting of the American Public Health Association, October 26, 1989. [1989?]. 9 p.

AUTHOR ABSTRACT: This report presents data developed to target occupational safety research concerning agricultural machines. NIOSH uses death certificate data to describe occupational fatalities in the U.S. The Agriculture, Forestry, and Fishing industry's fatality rate of 20.7 per 100,000 workers is 2.6 times higher than the national average for all industries of 7.9 deaths per 100,000 workers. Thirty-two percent of these deaths involve agricultural machinery, making machines the leading source of death in agriculture. Agricultural machines are also the most frequent type of machine involved in machine-related fatal injury across industry groups. Thirty-six percent of these agricultural machine incidents involved tractors operating under conditions in which the tractor became unstable, overturned, and crushed the driver. Forty-four percent of agricultural machine fatalities occurred to workers over 60 years of age. Targeting research toward specific machines is expected to maximize benefits in terms of providing new fatality prevention information to farm workers, employers, and equipment designers.

1134. Freta P. **Injuries from farm animals.** In: Dosman JA, Cockcroft DW, eds. Principles of health and safety in agriculture. Boca Raton, Florida: CRC Press, Inc., 1989:365-366.

NO ABSTRACT.

1135. Hansson R, Broberg E, Johansson A, Jorner U, Selander R, Karlberg-Nilsson B. **Study of accidents in farming and forestry in 1987.** Stockholm, Sweden: Lantbrukshalsan AB (The Swedish Farmers' Safety and Preventive Health Association), 1989. n.p.

AUTHOR ABSTRACT: In order to gain an idea of the accident situation and also to obtain information as a basis for the planning of preventive measures in agriculture, the Swedish Farmers' Safety and Preventive Health Association, Lantbrukshalsan, together with the Swedish Board of Occupational Safety and Health and the Central Bureau of Statistics, sent out 20,000 questionnaires to farms and forest companies concerning accidents that occurred in 1987.

In 1987, there were about 227,700 farms with forestry and agricultural operation in Sweden.

A total of 7,500 accidents occurred in agriculture and 2,700 in forestry.

In all, agricultural accidents occurred on about 7% of farms with agriculture and about 2% of the combined agriculture/forestry farms and pure forestry farms. The relative incidence of accidents, i.e. number of accidents per 1 million working hours, is about 50 in agriculture, while the figure for forestry accidents is 120. However, these figures are uncertain due to uncertainty regarding the number of working hours.

Agriculture:

* There is a higher incidence of accidents per 1 million working hours on small farms.
* If the proprietor runs the farm on his own, the relative incidence of accidents per 1 million hours worked is lower than if several people work on the farm.
* 40% of all accidents occur during work with farm animals, of which 6% during mucking-out, stable cleaning and concentrate handling. Dairy cows account for 22% and other animals 18%.
* 30% of all accidents occur during work with crops (including storage). 8% of these occur during storage and distribution of roughage.
* 15% of the accidents occur during construction work and work with equipment.
* 75% of the accidents lead to absence and 50% to sick leave.
* The average absence per accident is about 29 days.
* Accidents in conjunction with tractor operation and work with animals account for the highest number of sick leave days. 28% of the injured persons did not seek any form of treatment.
* The risk percentage is the same for men as for women. However, on average, women have a higher number of sick days.
* Men suffer 80% of all accidents. Women suffer more accidents caused by animals and falling than men.
* The most common injuries are sprains, twists and strains with an average of 36 days absence per accident.
* The main cause of the accidents is kicks from animals (26%), falls to a lower level (14%) and falls on the same level (9%).
* In 22% of the cases, the accidents lead to injuries to hips, legs and knees.

Factors common to both agriculture and forestry:

* Compared to other trades the incidence of accident is high, particularly in the case of forestry work.
* The relative agreement with the official statistics (ISA) is usually good for different variables but not so good for the total numbers of accidents.
* According to official statistics, there were about 5,000 registered accidents while this study found roughly 10,000. There is a lot of explanations for this discrepancy. The data collection for the official statistics is based on the work injury insurance. Even if all economically active persons - employees, employers and self-employed persons - are compulsorily insured for occupational injuries, the farmers don't use the work injury insurance for themselves and their family in the same way as the employees. Probably there is also missing in the data collection.

1136. Huizinga MA, Murphy DJ. **Farm work injuries in Pennsylvania.** [1989?]. 7 p.

NO ABSTRACT.

1137. Johnston GHF. **High-pressure injection injuries in farmers.** In: Dosman JA, Cockcroft DW, eds. Principles of health and safety in agriculture. Boca Raton, Florida: CRC Press, Inc., 1989:375-376.

NO ABSTRACT.

1138. Khan M. **Spinal cord injuries in agricultural workers.** In: Dosman JA, Cockcroft DW, eds. Principles of health and safety in agriculture. Boca Raton, Florida: CRC Press, Inc., 1989:373-374.

NO ABSTRACT.

1139. Kinley JR. **Safety risks of Ontario farmers.** In: Dosman JA, Cockcroft DW, eds. Principles of health and safety in agriculture. Boca Raton, Florida: CRC Press, Inc., 1989:320-322.

NO ABSTRACT.

1140. Letts RM. **Farm machinery accidents in children.** In: Dosman JA, Cockcroft DW, eds. Principles of health and safety in agriculture. Boca Raton, Florida: CRC Press, Inc., 1989:357-361.

NO ABSTRACT.

1141. Marchant R. **The practitioner's role in safety on the farm.** In: Dosman JA, Cockroft DW, eds. Principles of health and safety in agriculture. Boca Raton, Florida: CRC Press, Inc., 1989:340-341.

NO ABSTRACT.

1142. Mills EM, Shapiro M, Doss H. **Farm injury surveillance in Michigan: the 1987 Sanilac-Tuscola project.** Lansing, Michigan: Cooperative Extension Service, Agricultural Engineering Department Michigan State University and Michigan Department of Public Health, 1989. 112 p.

AUTHOR ABSTRACT: The Michigan Department of Public Health, in cooperation with the Department of Agricultural Engineering at Michigan State University, designed and conducted a farm injury surveillance project in order to determine the factors surrounding agricultural work-related injuries in Michigan. This mail survey was conducted in Sanilac and Tuscola Counties, two representative agricultural counties in the State, and collected information on farm operations, farm workers, and details on injuries which occurred during calendar 1987.

Of the 785 farms in the sample, 114 injuries were reported on 98 farms, establishing an injury rate at 14.5 per 100 farms in 1987. At this rate, it can be projected that over 8,400 injuries are suffered on Michigan farms each year. There were no fatalities reported in this survey; however, 4.4% of the injuries resulted in permanent disability.

There was a direct relationship between exposure and risk: a larger number of work hours, a greater work force size, and larger farm size were directly related to an increased risk of injury on the farm.

Dairy farms in the sample were found to differ from the other types of agricultural operations; the factor more predictive of injury on dairy farms is fewer years of farming experience rather than an increased level of exposure to the hazards of the farm tasks and environment.

Males and hired laborers were found to have higher rates of injury. More severe injuries were suffered by family members. The majority of injuries occurred in summer and fall, except on dairy farms, which exhibited relatively stable rates of injuries year-round.

Farm machinery, animals, and tractors were the most frequently implicated agents involved in the injuries. Machinery repair and routine chores were most often identified as the activities taking place when the injuries occurred. Injuries suffered during the conduct of routine chores were most severe.

The majority of the injuries resulted in a restriction of activities, with over 40% necessitating a restriction of activities for one week or longer or resulting in a permanent disability. Hospital emergency rooms were the most frequently identified source of medical treatment for injuries sustained on the farm.

Based on prior research conducted in this area combined with the findings from this study, recommendations for farm injury prevention efforts in Michigan were formulated.

1143. Morrison HI, Mao Y, Ritter L, Wigle DT. **A census-based record linkage study of Canadian farmers.** In: Dosman JA, Cockcroft DW, eds. Principles of health and safety in agriculture. Boca Raton, Florida: CRC Press, Inc., 1989:280-282.

NO ABSTRACT.

1144. Murphy DJ. **Quantifying agriculturally related accidental fatalities.** Proceedings of: 1989 International Winter Meeting sponsored by the American Society of Agricultural Engineers, December 12-15, 1989, New Orleans, Louisiana. St. Joseph, Michigan: American Society of Agricultural Engineers, 1989; Paper No. 89-5532. 8 p.

AUTHOR ABSTRACT: The death certificate is inadequate for counting and classifying agricultural occupational fatalities. Agricultural occupational fatality cases can be uniformly determined by using standard definitions and terminology from the Standard Industrial Classification Manual and the National Center for Health Statistics, and by obtaining relevant information from a family member of the victim.

1145. Myers JR. **The national traumatic occupational fatalities: a surveillance tool for agricultural work-related deaths.** Proceedings of: 1989 Summer Meeting of the National Institute for Farm Safety, Inc., June 18-22, 1989, Monterey, California. Columbia, Missouri: National Institute for Farm Safety, 1989; NIFS Paper No. 89-9. n.p.

AUTHOR ABSTRACT: The National Institute for Occupational Safety and Health (NIOSH) monitors work-related deaths in the United States. The NIOSH system shows agriculture to a high-risk industry for occupational mortality. Information on risk by geographic region, race, age, and major cause of death are presented for the agriculture industry.

1146. National Institute for Occupational Safety and Health, Division of Safety Research. **National traumatic occupational fatalities: 1980-1985.** Morgantown, West Virginia: National Institute for Occupational Safety and Health, 1989; DHHS (NIOSH) Publication No. 89-116. 28 p.

AUTHOR ABSTRACT: This report describes U.S. traumatic occupational fatalities for the 6-year period from 1980 through 1985. The Division of Safety Research (DSR) of the National Institute for Occupational Safety and Health (NIOSH) has constructed a database as part of its National Traumatic Occupational Facility (NTOF) project. This database contains information from death certificates for work-related deaths recorded in the U.S. since the beginning of 1980. NIOSH plans to continue collecting information on work-related deaths and assembling such deaths in the NTOF database at least until 1990.

This report describes traumatic occupational deaths occurring during the first 6-years of the project and provides information on these deaths at the national and state levels, as well as by occupation and industry. Characteristics of fatally injured workers are also described. Tables indicate which industries in each state have a high risk of fatal injury at work. While this report does not present tests of hypotheses about why specific states or industries have greater numbers of higher rates of traumatic occupational fatalities, it does provide the descriptive background required by injury prevention professionals to direct additional research. Furthermore, the data presented suggests where intervention activities need to be directed. This information also provides a basis for justifying occupational injury prevention programs and measuring their successes or failures.

1147. National Institute for Occupational Safety and Health, Division of Safety Research. **Fatal accident circumstances and epidemiology (FACE) report: two farm laborers die in oxygen-deficient manure pit.** Morgantown, West Virginia: National Institute for Occupational Safety and Health, 1989; FACE-89-44. 6 p.

NO ABSTRACT.

1148. Pratt DS, Stallones L, Darrow D, May JJ. **Injuries on dairy farms in Otsego County, NY: results of active surveillance for 1 year in an established cohort.** In: Dosman JA, Cockcroft DW, eds. Principles of health and safety in agriculture. Boca Raton, Florida: CRC Press, Inc., 1989:349-351.

NO ABSTRACT.

1149. Purschwitz MA. **Development of a data collection system for farm-related accidents resulting in injury [doctoral dissertation].** West Lafayette, Indiana: Purdue University, 1989. 352 p.

AUTHOR ABSTRACT: Farm accidents, and the injuries they cause, are a serious problem in the United States; agriculture has the highest work death rate of all industries. However, because of the lack of reporting requirements for such accidents, there is no primary, up-to-date source of farm accident data to guide prevention efforts. The purpose of this research was to identify, summarize, and evaluate existing accident data systems and sources, to identify the essential farm accident data elements to be collected, to identify potential sources of such data, and to develop a procedure for collecting and managing such data.

Existing sources of farm accident data, as well as numerous occupational and non-occupational accident data systems, were investigated. Death certificates and newspaper clippings were found to be important existing sources, but were not without deficiencies. Other data systems collect farm accident data in various forms, but selection criteria such as age, relationship of farm work to the person's occupation, or number of employees on the farm result in limitations in the data collected.

Extension agricultural safety specialists and other working in farm safety were surveyed on data collection and management. The type of accident, and agent involved, were the most highly desired data elements. A method for obtaining specific farm accident reports from coroners and law enforcement agencies was developed, to supplement death certificate data. A volunteer newspaper clipping service was organized to provide newspaper clippings. Hospital emergency department reporting was investigated and a simple post card reporting system proposed.

A personal computer database application program for farm accident data was developed which requires no knowledge of the database software by the user. The program was designed to allow flexibility in future modifications, and to allow further development by applications programmers to maximize user reporting options.

1150. Purschwitz MA, Field WE. **Consistent classification of farm accidents as farm work-related, recreational, home-related or other.** Proceedings of: 1989 International Winter Meeting sponsored by The American Society of Agricultural Engineers, December 12-15, 1989, New Orleans, Louisiana. 1989; ASAE Paper No. 89-5534. 7 p.

AUTHOR ABSTRACT: The need for consistency in the definition of a farm accident is discussed. A set of decision rules for classifying farm accidents as work-related, recreational, home-related, or other is proposed for consideration.

1151. Schuler RT. **Fatal farm accidents in Wisconsin - 1988.** Madison, Wisconsin: University of Wisconsin-Madison, [1989?]. n.p.

NO ABSTRACT.

1152. Spinelli JJ, Gallagher RP, Band PR, Threlfall WJ. **Mortality from accidents in farmers and farm laborers in British Columbia.** In: Dosman JA, Cockcroft DW, eds. Principles of health and safety in agriculture. Boca Raton, Florida: CRC Press, Inc., 1989:316-319.

NO ABSTRACT.

1153. Stallones L. **Fatal injuries among the Kentucky farm population.**. Proceedings of: Annual Meeting of the American Public Health Association. 1989. n.p.

NO ABSTRACT.

1154. Stueland DT, Lee BC. **Agents associated with agricultural injuries in Central Wisconsin: an initial evaluation.** Proceedings of: 1989 Summer Meeting of the National Institute for Farm Safety, Inc., June 18-21, 1989, Monterey, California. Columbia, Missouri: National Institute for Farm Safety, 1989; NIFS Paper No. 89-001. 13 p.

AUTHOR ABSTRACT: This Emergency Room based farm injury surveillance system identified 913 victims of agricultural trauma in central Wisconsin during a two year period. This report focuses on characteristics of the victims and specific agents associated with the trauma, fall or exposure. Surveillance of farm injuries from the medical perspective can complement information obtained from other systems. An interdisciplinary approach to understanding the complexity of agricultural trauma is warranted in the search for a resolution to this ongoing national concern.

1155. Welsch A, Gerberich S, Gunderson P. **A unique approach to surveillance of severe and catastrophic injuries: an agricultural case study.** In: National Center for Health Statistics. Proceedings of the 1989 Public Health Conference on Records and Statistics. Washington, D.C.: Centers for Disease Control, Public Health Service, U.S. Department of Health and Human Services, 1989:474-480. DHHS Publication No. (PHS) 90-1214.

NO ABSTRACT.

1156. Yoder C, Gartin SA, Bean TL, Lawrence LD, Odell KS. **Analysis of farm worker injuries in West Virginia in 1988 as reported by agricultural producers.** Proceedings of: 1989 Summer Meeting of the National Institute for Farm Safety, Inc., June 18-21, 1989, Monterey, California. Columbia, Missouri: National Institute for Farm Safety, 1989; NIFS Paper No. 89-7. 15 p.

AUTHOR ABSTRACT: Agricultural injuries are currently higher than injuries in any other industry. Data collected and reported in this study concerning farm accidents may explain the phenomena of agricultural accidents and enable agricultural safety professionals and educators to plan programs and procedures to reduce not only the number but also the severity of farm injuries. This study describes farm injuries occurring in West Virginia in 1988.

1157. Aherin RA, Murphy DJ, Westaby JD. **Changing farm worker behavior: a literature review of injury control strategies.** Proceedings of: 1990 International Winter Meeting of the American Society of Agricultural Engineers, December 18-21, 1990, Chicago, Illinois. St. Joseph, Michigan: American Society of Agricultural Engineers, 1990; ASAE Paper No. 901620. 26 p.

AUTHOR ABSTRACT: Extensive research information has been derived from a variety of safety and health fields. Contemporary and emerging theories within behavioral psychology have potential application in farm safety. This is a brief literature review of these areas.

1158. California Occupational Health Program. **Launching SENSOR: a new model for occupational disease surveillance and prevention.** Berkeley, California: California Department of Health Services, 1990; Number 1, Winter 1990. 8 p.

NO ABSTRACT.

1159. Currier R, Muldoon J, Jones SK, Anthony D, Schaufler J. **Surveillance of agricultural related injury in Iowa: quarterly report - April 1990.** Des Moines, Iowa: Iowa Department of Public Health, Division of Disease Prevention, 1990. 63 p.

NO ABSTRACT.

1160. Elkington JM. **A case-control study of farmwork-related injuries in Olmsted County, Minnesota [doctoral dissertation].** Minneapolis, Minnesota: University of Minnesota, 1990. n.p.

AUTHOR ABSTRACT: There were many variables included in the analyses of this study and interpretation of the statistical significance assigned to them needs to be considered in light of the potential for making a Type I error, or concluding that the difference is real when in fact the difference occurred by chance. Since the significance level, which is the margin of error associated with a Type I error, was pre-set at 0.05, for every 20 statistical tests performed, the probability of at least one being statistically significant has been calculated to be 0.64 (Rothman 1990). As indicated below, three of the six significant findings relevant to the secondary hypotheses, and three of the five significant findings relevant to the secondary hypotheses would have remained significant if a significance level of less than or equal to 0.02 had been selected. The cost of increasing the P value, however, increases the chance for making incorrect conclusions of no differences (Rothman 1990). In addition, since all analyses were based on a prior hypotheses and the resulting significant findings were consistent with previous reported studies or findings that fit with nature, less concern can be given to these findings reflecting Type I errors instead of true differences.

The following relevant findings were identified through matched analyses of the data from the current study.

Primary hypotheses:

1. A higher proportion of cases than controls reported the pre-existence of arthritis ($p=0.02$).
2. A borderline significant finding was that a higher proportion of cases, than controls reported the pre-existence of stress, depression or other psychological problems ($p=0.051$).
3. A higher proportion of cases than controls reported regular use of prescription pain medicine ($p=0.046$).
4. A significant trend was indicated such than an increase in the number of farm hours worked was associated with an increase risk of injury ($p=0.002$).
5. The association between lifetime involvement in farming on the basis of the four levels of exposure, "full-time year round", "full-time seasonal", "part-time year round", and "part-time seasonal", was significant ($p=0.008$), indicating the greater the amount of exposure, the greater the risk of injury.

Secondary hypotheses:

6. Cases, compared with controls, had a higher index of injury history for farmwork related injuries that ever restricted their usual activities for any length of time ($p<0.0001$).

7. Cases, compared with controls, had a higher index of injury history for farmwork related injuries for which they ever sought medical care ($p<0.0001$).

8. A nearly significant finding indicated that cases reported more serious injuries in their lifetime than controls ($p=0.053$).

9. Unmatched analysis indicated that there was a significant trend for an increasing number of acres in active production being associated with an increased risk of injury ($p=0.018$). Matched analysis, however, resulted in a non-significant finding except when examined by type of enterprise. The number of acres was significantly associated with the risk of injury for crop farmers ($p=0.017$) but not for livestock farmers ($p=0.29$).

Other findings:

10. Female cases were significantly more likely than males cases to incur a farmwork related injury to the back or spine ($p=0.001$).

11. Female cases were significantly more likely than female controls to report one pre-existing medical condition compared to those respondents reporting zero pre-existing medical conditions ($p=0.03$). 12. When farm variables were considered simultaneously in multivariate modeling, the only factor which remained significantly associated with the risk of injury was the number of hours spent farming per week. 13. When select pre-existing medical conditions and medications were considered simultaneously with the number of hours spent farming per week, arthritis and the number of farm hours contributed separately and significantly to the risk of injury.

1161. National Institute for Occupational Safety and Health. **Alert -request for assistance in preventing deaths of farm workers in manure pits.** Cincinnati, Ohio: National Institute for Occupational Safety and Health, 1990; DHHS (NIOSH) Publication No. 90-103. 7 p.

AUTHOR ABSTRACT: The National Institute for Occupational Safety and Health (NIOSH) requests assistance in preventing deaths of farm workers in manure pits. An urgent need exists to inform farm owners and workers about the dangers of entering such pits, where oxygen-deficient, toxic, and/or explosive atmospheres often result from fermentation of the wastes in confined areas. These hazards have been known for several years. However, recent NIOSH investigations conducted under the NIOSH Fatal Accident Circumstances and Epidemiology (FACE) Program suggest that farm workers are unaware of the danger, and many deaths continue to occur as a result of entry into manure pits.

This Alert describes seven deaths from asphyxiation (suffocation) that occurred during two incidents involving entry into manure pits. The recommendations included in the Alert should be followed by all farm owners and operators who have manure pits on their property. Editors of appropriate trade journals, agriculture extension agents, farm owners and operators, and those in the agricultural trades are requested to bring the recommendations in this Alert to the attention of all workers who are at risk.

1162. Pollock JG. **Perspectives of New York farm safety: workplace injuries and worker opinions [master's thesis].** Ithaca, New York: Cornell University, 1990. 68 p.

AUTHOR ABSTRACT: The Dillman Total Design Method technique for conducting a mail survey was able to produce an acceptable percentage of usable survey instruments. The data can be considered reliable and representative of the agricultural related injury situation here in New York State. The sample size of 1400 farms was large enough to generate data to obtain accident rates and to provide some insight into selected characteristics of accidents and injuries. However, the 115 injuries was too small a number to result in significant distribution of results in all areas of interest. The 1984-86 Workers Compensation study of over 2900 reports did prove to be acceptable when categories were cross-checked with the 1988 accident study.

It is difficult to know if the injury rate on farms in New York is changing. A 1969 study was conducted using the National Safety Council data collection technique but does not report injury rates (Hoff, 1970). Some changes in accident/injury statistics are noteworthy between the 1969 and 1988 studies.

Characteristics of the dairy industry's accident situation are significantly different from the non-dairy group. A statewide safety program must take into account the unique needs of the commodity groups. The safe handling of animals is a prevention program area identified in the dairy industry. Prevention programs applicable to accidents occurring during the harvest months of August to October are important in the non-dairy group. Woods-working injuries are sufficiently high to warrant attention by the farm community. Youthful workers must be a target audience for safety and health programs if the strong desire to keep them in the work force is to be achieved.

Fatality information provides a different picture of the safety problem than does the accident studies. Tractor safety and driver training programs, especially for youth and workers 55 years of age or older, need to receive renewed attention. Prevention of tractor overturns and/or the deaths that result from overturns would reduce the fatality rate in New York by about one-half.

The farm community recognizes the need for safety and health intervention programs but does not seem to be willing to make them a priority. Farmers for the most part do not attend safety meetings but prefer to obtain safety information through general farm magazines. Cooperative Extension is the current agency of choice by the farm community to make request to for safety and health materials. Safety professionals need to utilize the Cooperative Extension network but must develop alternatives to the traditional meeting or seminar format if the farm audience is to be effectively reached.

1163. Purschwitz MA. **Fatal farm injuries in children**. Marshfield, Wisconsin: Wisconsin Rural Health Research Center, Marshfield Medical Research Foundation, a Division of Marshfield Clinic, 1990. 17 p.

AUTHOR ABSTRACT: Too many farm parents and children learn the hard way that farming has many dangers for growing children. Between 175 and 300 children die in farm accidents each year, and thousands more are seriously injured. Many of these fatal accidents and injuries could and should be prevented. This article summarizes present knowledge on fatal farm injuries to children. Recommendations and policy implications for prevention will also be presented. It is hoped that this research can catalyze a national effort to prevent the needless deaths of hundreds of farm children each year.

1164. Rust G. **Bibliography [on] health status of migrant farmworkers**. Groveland, Florida: South Lake Family Health Center, 1990. n.p.

NO ABSTRACT.

1165. Stueland DT, Layde PM, Purschwitz MA. **Further evaluation of agricultural injury patterns and agents in Central Wisconsin**. Proceedings of: National Institute for Farm Safety, June 17-21, 1990, Waterloo, Ontario. Columbia, Missouri: National Institute for Farm Safety, 1990; NIFS Paper No. 90-3. 17 p.

AUTHOR ABSTRACT: Emergency room based farm injury surveillance identified 1,478 victims of agricultural trauma in central Wisconsin during a three-year period. This preliminary report focuses on factors related to the number and patterns of injuries observed. Since the period of observation included a year with intense drought, the effect of climate is explored. In addition, a preliminary effort is made to compare injury pattern to the agent of injury. In an ideal interdisciplinary approach to reducing farm injuries, information from medical surveillance of farm injuries can be used by those disciplines involved in farm injury prevention in their efforts to develop effective approaches to reduce the toil of farm injuries. Areas with surveillance systems are ideal sites to evaluate the actual impact of different farm injury interventions.

1166. Sweeney MA, Ciesielski S. **Where work is hazardous to your health: a survey of occupational injuries and field sanitation among North Carolina farmworkers.** 1990. n.p.

AUTHOR ABSTRACT: Although farmwork has an extremely high rate of on-the-job injuries and is the most dangerous occupation in the country, no adequate system exists in North Carolina to ensure that farmworkers who have suffered occupational injuries receive the medical care that they need or any form of compensation that would allow them to take the necessary period of recuperation for a full recovery from their injuries.

Responses to this survey indicate that less than half of the workers who had been injured and felt that they needed to see a doctor were able to do so within the first 24 hours, and nearly one fourth never received any medical attention for their injury. Furthermore, the promptness of medical care appeared to be important. Seventy-five percent of those who saw a doctor within 24 hours reported a full recovery, while only 53% of others (those who saw one more than 24 hours after their injury and those who never received medical care for their injury) did.

There were also significant problems with medical follow-up. Forty-two percent of those who actually received medical care report not being able to keep follow-up appointments, and more than one third returned to work before the release date given by their doctor. Thirty-nine percent of those who had been injured reported that they had still not fully recovered from their injuries.

Seventy-one percent of those who reported injuries missed at least one day of work because of the injury, but of those, only 21% reported receiving even partial compensation for work time lost. No worker interviewed who had been injured in North Carolina received any compensation for lost workdays.

1167. Wilkinson CF. **Introduction and overview.** In: Baker SR, Wilkinson CF, eds. The effect of pesticides on human health. Princeton, New Jersey: Princeton Scientific Publishing Co., Inc., 1990:5-33. (Mehlman MA, Series Editor; Advances in modern environmental toxicology; Volume XVIII).

NO ABSTRACT.

1168. Wisconsin Department of Health and Social Services, Division of Health, Center for Health Statistics. **Fatal farm injuries, 1985-1989.** Madison, Wisconsin: Wisconsin Department of Health and Social Services, Division of Health, Center for Health Statistics, [1990?]. n.p.

NO ABSTRACT.

1169. World Health Organization. **Public health impact of pesticides used in agriculture.** Geneva, Switzerland: World Health Organization, 1990.

NO ABSTRACT.

1170. Bureau of Labor Statistics. **BLS reports on survey of occupational injuries and illnesses in 1990.** Washington, D.C.: United States Department of Labor, 1991; USDL-91-600. 10 p.

NO ABSTRACT.

1171. Collins JG. **Impairments due to injuries: United States, 1985-87.** Hyattsville, Maryland: National Center for Health Statistics, 1991; Vital and Health Statistics, Series 10, No. 177. 55 p.

NO ABSTRACT.

1172. Currier R, Jones SK, Anthony D, Weiser D. **Surveillance of agricultural related injury in Iowa: annual data 1990.** Des Moines, Iowa: Iowa Department of Public Health, [1991?]. n.p.

NO ABSTRACT.

1173. Gerberich SG, Gibson RW, Gunderson PD, French R, Melton LJ III., Erdman A, Smith P, True JA, Carr P, Elkington J, Renier CM, Andreassen LR. **The Olmsted agricultural trauma study (OATS): a population-based effort.** Minneapolis, Minnesota: University of Minnesota, 1991. 270 p.

NO ABSTRACT.

1174. Gerberich SG, Gibson RW, Gunderson PD, Melton LJ III., French LR, Renier CM, True JA, Carr WP. **Surveillance of injuries in agriculture.** Proceedings of: Surgeon General's Conference: Agricultural Safety and Health, April 30 - May 3, 1991, Des Moines, Iowa. 1991. n.p.

AUTHOR ABSTRACT: There has been no comprehensive data system to identify the magnitude of the injury problem in the rural farming community or the potential risk factors that may be associated with this problem. Serious discrepancies among the existing data sources, pertinent to occupational morbidity and mortality, limit identification of the true magnitude of the problem. Based on a recent National Academy of Sciences report, it has been documented that fatal as well as non-fatal occupationally-related injuries have been greatly undercounted. In part, these discrepancies in mortality and morbidity data are due to variations in definitions, the worker populations included, methods of case ascertainment, and the data sources utilized.

Fatality rates, identified for agriculture, have ranked among the highest for many years. However, given the overall discrepancies among the data systems and the reporting limitations for agriculture, these would appear to be extremely conservative estimates. A major barrier to progress in the prevention of agricultural injuries has not only been a lack of knowledge about the magnitude of the problem but also a lack of knowledge about specific causes or risk factors due to the lack of analytical studies. This paper includes an historical perspective of surveillance and its importance to the problem of injuries in the agricultural community. Special emphasis is placed upon the data sources and methodological approaches that have been used in agricultural surveillance, including advantages and limitations.

Among the agricultural injury surveillance efforts that will be discussed, are two major population-based efforts, conducted by a multidisciplinary team, using a methodology that can also serve as a model for long term surveillance efforts at the state, regional and national levels. These efforts are the Olmsted Agricultural Trauma Study (OATS) and the Regional Rural Injury Study (RRIS):

1) The overall purpose of the Olmsted Agricultural Trauma Study (OATS) was to identify the magnitude and characteristics of the injury problem among all farms in Olmsted County, Minnesota, using a telephone interview methodology, validated through medical records. Data pertinent to the household members, characteristics of the farm operation, and injury events (farming and non-farming related; intentional and unintentional) were collected. In concert with this effort, a case-control study to facilitate identification of risk factors as well as an inter-/intra-rater reliability study of E-coding and a follow-up pilot investigation of machinery-related injury events were also conducted. Specific findings, including injury rates, characteristics of the injuries and injury events, and risk factors are presented with regard to implications for surveillance.

2) The OATS provided the basis for the Regional Rural Injury Study (RRIS), currently being conducted in a five state region: Minnesota, Wisconsin, North Dakota, South Dakota, and Nebraska. Data collection covers a twelve month period of time for over 4000 rural households, utilizing computer assisted telephone interviews (CATI). This effort will enable the identification of injury rates for each state and the region as well as multiple analytic substudies, including tractor-rollovers and animal-human injuries. The project also includes application of the results to the development of intervention strategies, to be achieved by convening nationally recognized experts and the regional participants in the Rural/Agricultural Injury Prevention and Control Workshop.

1175. Merchant JA. **Research for Agricultural Safety and Health.**. Proceedings of: Surgeon General's Conference: Agricultural Safety and Health, April 30 - May 3, 1991, Des Moines, Iowa. 1991. 20 p.

AUTHOR ABSTRACT: In identifying research priorities for agricultural health and safety, one must first define the populations at risk. In agriculture, those at risk greatly exceed the number of farmers who report sole or primary employment from agriculture. Agricultural production is now changing dynamically resulting in a substantial increase in farmers with non-farm jobs, greater involvement of women and seasonal workers, and involvement of children and recreational farmers in agricultural operations. All are exposed to some degree to multiple farm hazards--farm machinery, livestock, chemical, organic dusts, and a wide variety of biological hazards. Priorities for research in agricultural safety and health include disease and injury surveillance, epidemiological investigations of morbidity, mortality and risk factors, studies of toxicological effects and mechanisms of disease, and the opportunity for meaningful intervention for disease and injury prevention. Those engaged in this research must also recognize the influence of poverty, limited access to health care and limited insurance coverage among many living and working in rural areas. As the result of the national initiative in agricultural and environmental health, federal, state and foundation funding is now available to address these several research priorities. The challenge is to maintain and cultivate these research opportunities through targeted research designed to advance our understanding and prevention of diseases and injuries among those with agricultural exposures.

1176. Minnesota Advisory Task Force on Farm Safety. **State action for safe farms: final report of the Minnesota Advisory Task Force on Farm Safety, January 1, 1991**. St. Paul, Minnesota: Minnesota Department of Agriculture, 1991. 9 p.

NO ABSTRACT.

1177. National Institute for Occupational Safety and Health. **NIOSH agriculture bibliography**. Cincinnati, Ohio: National Institute for Occupational Safety and Health, Division of Standards Development and Technology Transfer, 1991. 35 p.

NO ABSTRACT.

1178. National Safety Council. **Farm resident accidents, 1990**. In: Accident facts 1991 edition. Chicago, Illinois: National Safety Council, 1991:100-102.

NO ABSTRACT.

1179. Popendorf W, Donham KJ. **Chapter 20. Agricultural hygiene**. In: Clayton GD, Clayton FE, eds. Patty's industrial hygiene and toxicology, Fourth Edition, Volume I, Part A, General principles. New York: John Wiley & Sons, Inc., 1991:721-761.

NO ABSTRACT.

1180. Skjolaas CA, Schuler RT, Wilkinson TL. **1990 Wisconsin farm-related fatalities**. Madison, Wisconsin: Agricultural Engineering Department, University of Wisconsin-Madison, [1991?]. n.p.

NO ABSTRACT.

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## GLOSSARY OF TERMS

Acute care - diagnosis and treatment by emergency medical service, hospital, or medical personnel.

Age - age of injured individuals for whom data or comments are presented.

Agent of injury - a factor whose presence or excessive presence is essential for the occurrence of an injury. Same as vector or vehicle. Examples include farm machinery, animals, motor vehicles, trees, and tools.

Bibliography - lists of readings on farm injury, either annotated or unannotated. Excludes reviews.

Body part affected - arm, hand, eye, and the rest.

Case control study - a study that starts with the identification of persons with the injury or disease of interest and a suitable control (comparison, referent) group of persons without the disease. Also called case comparison study, case compeer study, case history study, case referent study, case-exposure study, or retrospective study.

Case report - report of an observation by a clinician of the occurrence of an injury or disease in five or fewer persons. No comparison or control group.

Case series - similar to above but including six or more cases. Again, no comparison or control group.

Circumstances of injury - information on how the injury incident actually occurred. For example, the farmer slipped on some engine oil on the garage floor as he was leaving to do the milking.

Cohort study - a method of epidemiologic study in which subsets of a defined population are identified based on their exposure status with respect to a factor or factors hypothesized to influence the probability of occurrence of a given disease or other outcome. Also called follow-up, incidence, longitudinal, or prospective study.

Condition(s) other than injury - report discusses disease or condition other than injury, for example, cancer.

County, ZIP, HSA, or Other - one or more of these four terms as appropriate. If county, list name of county. HSA refers to Health Service Area or Health Planning Area, which is a group of counties.

Descriptive epidemiology - a population study concerned with and designed only to describe the existing distribution of variables, without testing causal or other hypotheses. An example is a community health survey used to determine the health status of the people in a community. Unlike a case series, a descriptive study must have denominator data.

Diurnal pattern - contains information on injury occurrence at the different times of the day.

Ecologic study - a study in which the units of analysis are populations or groups of people rather than individuals. An example is study of temporal or geographic associations between median income and cancer mortality rates in administrative jurisdictions such as states or counties.

Economics - cost of injuries, including any of the following aspects: prevention, surveillance, diagnosis, treatment, rehabilitation, insurance, liability, property damage, or other. Also includes cost-effectiveness and cost-benefit analyses of injury control interventions.

Editorial - a commentary or opinion article by a journal's editor or guest writer. Almost always labelled as an Opinion, Editorial, or similar term.

Epidemiology - the study of the distribution and determinants of health-related states or events in specified populations, and the application of this study to control of health problems.

Ethnic group - a people sharing a common and distinctive culture, religion, language, or the like. Examples are Hispanic American, Scandinavian American, and German American.

Evaluation - study of the effectiveness of injury control interventions, such as rollover protection structures on tractors, power-take-off shields, or safety education instruction.

Females - information about injury frequency or type in females can be derived from the article.

Foreign - all countries mentioned and, if Canada, all provinces mentioned.

Injury - the unintentional, harmful outcome resulting from the rapid transfer of any type of energy, including kinetic or mechanical, thermal, chemical, electrical, or radiant.

Letter to Editor - self-explanatory.

Location of injury - the specific area of the farm or environs where the injury incident happened, such as barn, feed lot, highway, or pasture.

Males - information about injury frequency or type in males can be derived from the article.

Morbidity - refers to injury or illness without death.

Mortality - refers to death or fatality.

Occupations - mention of specific occupations, such as farm operator, farm worker, logger, or pesticide applicator. Also includes comparisons of farming to other occupations. Excludes comparisons by industry, such as construction, mining, or transportation.

Original research - the report contain results of an investigation conducted by the author(s). Excludes most editorials and letters to the editor.

Other infection - infectious agent other than tetanus, for example, brucellosis.

Race - an arbitrary classification of modern humans based on various physical characteristics, as skin color, facial form, or eye shape. Examples are White, Black, Indian, and Asian-Pacific.

Review - includes academic, classical or exhaustive reviews; tutorial, didactic or subject reviews; multicase or epidemiologic reviews; consensus conferences; reviews of reported, known or published cases; and state-of-the-art reviews. Materials with the following characteristics are not considered as review: case reports or original research articles containing a review of the literature as an adjunct; statistical and epidemiological surveys; bibliographies which comprise only a list of references; historical articles; monthly summaries of a subject area which appear as a regular feature in journals; and graduate student theses.

Seasonality - contains information on injury occurrence in the different months or seasons of the year.

Severity of injury - article classifies or analyzes injury data by severity in quantitative or qualitative manner. Includes classification by medical follow-up and extent or duration of disability.

Size of farm - refers to land area, usually in acres, but also includes size by value expressed in financial terms such as assets, expenses, or revenue.

State name(s) - postal abbreviation for all states mentioned in the article, for example, WI for Wisconsin.

Tetanus - an acute disease induced by an exotoxin of the tetanus bacillus, which grows anaerobically at the site of an injury.

Type of energy exchange - injury is a result of excessive exposure to physical energy of five types, including mechanical, thermal, chemical, electrical, and radiant.

Type of farm - by primary product such as dairy, beef, pork, sheep, or cranberry.

Type of injury - clinical definition such as fracture, laceration, amputation, or degloving.

United States - self-explanatory.

Year(s) of data - the year(s) to which data cited in the article refer.

*U.S. GOVERNMENT PRINTING OFFICE: 1992-648-179/60017

Author_____ Year_____ No._____

**CODING FORM**

Bibliography on Farm Injury:
List of Descriptors and Subject Headings for Index

Coded by _____

Date _____

Coded by _____

Date _____

Entered by _____

Date _____

Study Design (check all that apply):
- Case report
- Case series
- Descriptive epidemiology
- Cohort study
- Case control study
- Ecologic study
- Acute care
- Economics
- Evaluation (effectiveness of intervention)

Year(s) of data _____

Age:
- Infants (aged 1-23 months)
- Children (aged 2-18 years)
- Adults (aged 19-64 years)
- Elderly (aged 65+ years)

Occupation(s)
Race
Ethnic group
Female(s)
Male(s)
Type of farm
Size of farm
Type of injury
Agent of injury
Circumstances of injury
Seasonal information
Diurnal information
Location of injury

Enter abstract (check one)
____ yes, as is
____ yes, modify
____ no abstract

Type of document (check one)
____ journal article
____ book or book chapter
____ doctoral dissertation
____ master's thesis
____ conference proceeding
____ manuscript
____ bibliography
____ report

Type of energy exchange (check all that apply): kinetic, thermal, chemical, electric, radiant

Body part affected
Severity of injury
Tetanus
Other infection
Condition(s) other than injury or infection
Original research
Bibliography
Review
Editorial
Letter to editor
Mortality
Morbidity

United States
State name(s)_____
_____
County, ZIP, HSA, or other_____ ___
Foreign_____
_____



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