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A Review of Farm Accident Data Sources and Research

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A Review of Farm Accident Data Sources and Research. By Jack L. Runyan. Agriculture and Rural Economy Division, Economic Research Service, U.S. Department of Agriculture. Bibliographies and Literature of Agriculture No. 125.

Abstract

Agriculture is one of the most accident-prone industries in the United States. In 1990, the occupational injury incidence rate per 100 full-time workers in production agriculture was 12.3 on farms employing 11 or more workers, compared with 8.3 for all industries in the private sector. The occupational fatality rate for the broad category of firms called agriculture, forestry, and fishing was 23.8 per 100,000 full-time employees, compared with 4.3 for all private sector industries. Other data sources show even higher accident and fatality rates in agriculture. This study examines national sources of farm accident data and reviews selected farm safety studies on the nature and causes of farm injuries and illnesses, health and safety of youth, farm safety education, and methods of data collection.

Keywords: Agricultural accidents, farm accidents, farm safety.

Washington, D.C. October 1993

Contents

Summary

In 1990, injuries struck over 12 out of every 100 full-time workers on farms employing more than 10 people, and almost 24 out of every 100,000 were killed in jobs involving agriculture, farming, and fishing.

These figures leave uncounted all accidents and deaths on the large proportion of farms run with fewer than 10 workers or operated only by the owner and family members. According to the Bureau of Labor Statistics, these casualty rates are 1.5 times higher than the average injury rates and 4.3 times higher than the average fatality rates for all private sector industries.

This bibliographical review traces the causes of such injuries and illnesses, and cites farm safety studies, including some on the health and safety of youth and farm safety education. Among other highlights, this review discusses the following:

- Farming presents unique safety problems not found in most other industries.

- National-level data concerning farm accidents have serious limitations, which raise questions about their accuracy and reliability.

- Case studies provide useful insights into causes and consequences of farm accidents, but generalizations cannot be made beyond the study area.

- Few safety standards exist for farm machinery and workplaces, and most such standards apply only to farms employing 11 or more workers.

- Little emphasis has been placed on researching the chronic effects of long-term exposure to pesticides and other farm chemicals.

- Farm operators and family members are aware of the dangers in farming, but may make decisions that under more ideal conditions would have been considered too dangerous.

- A large number of children are injured on farms each year. The farm is also often the home, and the children play on or near machinery. Sometimes children of migrant workers are injured as well.

- Most traumatic injuries involve machinery, with tractors being involved in most fatal accidents.

- Education, properly planned and executed, holds a great potential for improving farm safety. Farm safety education programs are most effective when operators, family members, farm workers, manufacturers, researchers, and farm safety specialists are all involved in program development.

A Review of Farm Accident Data Sources and Research

Jack L. Runyan

Introduction

This report reviews current data sources and selected research concerning farm safety. The report is not intended to present an exhaustive review of farm safety literature.[1] Instead, its aim is to provide a synopsis of farm safety data and research that will help guide researchers and policymakers in their efforts to reduce injuries and illnesses on farms. More specifically, this report provides background to illustrate the continued need for farm safety research, highlights and evaluates national sources of data applicable to farm safety, and examines research in some of the major problem areas in farm safety.

Background

According to the Bureau of Labor Statistics (BLS), the occupational injury incidence rate per 100 full-time workers on farms employing 11 or more workers in production agriculture was 12.3 in 1990 (fig. 1). This compared with rates of 14.1 in construction and 11.9 in manufacturing industries (U.S. Department of Labor, 1992). In addition, the BLS data report occupational fatality rates for enterprises employing 11 or more workers. Fatalities for the broad category of firms called agriculture, forestry, and fishing were 23.8 per 100,000 full-time employees in 1990 compared with 20.6 in construction and 2.8 in manufacturing (U.S. Department of Labor, 1992). Since most farms either hire fewer than 11 workers or employ only family members, the BLS data probably undercount the actual injury and fatality rates in agriculture.[2]

Farming, by its very nature, creates an environment conducive to accidents and illnesses. The home and worksite are the same location for most farm operators. Farmers do not "leave their work at the office," and they and their family members experience the potential for greater exposure to hazards associated with machinery, tools, and chemicals. Farmers and farmworkers receive little formal safety training; most training is learned on the job (largely by trial and error and through word of mouth). Farmers often work alone and far from assistance should an accident occur. Emergency services in many rural areas are distant from the farm and often not equipped to handle the more severe farm injuries (Congress of the United States, 1990).

Farming is usually not performed in packages of 40-hour weeks but rather in an erratic tempo dictated by weather, season, and climate. Farmers and their laborers frequently work in such environmental conditions as cold, heat, rain, snow, wind, and darkness, which increase the risk of accidents. In addition to such conditions, farmers and farmworkers may face the psychological pressures of uncertain finances, deadlines, changeable weather, and boredom from long hours of repetitive tasks (Hoskin and others, 1988c). The danger is

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[1]Readers seeking additional farm safety research should consult *Agricultural Safety and Health: A Resource Guide* (Zimmerman, 1992), *Abstracts* (Centre for Agricultural Medicine, 1992), and *Papers and Proceedings of the Surgeon General's Conference on Agricultural Safety and Health* (U.S. Department of Health and Human Services, 1991b).

[2]The U.S. Census of Agriculture, the most recent data available on the number of employees per farm, indicates that two-thirds of almost 2 million farms used only family or unpaid labor or hired fewer than 10 workers during the year.

compounded by working with machinery unforgiving to mistakes, chemicals of which the effects are not fully known, and animals that may inadvertently or otherwise cause physical injury. Work in hazardous areas, with confined animals or in grain bins and silos with fumes, molds, and dusts, may also cause chronic illnesses (Dosman and others, 1988; Hurst, 1992; Knudson, 1984; and Zwemer and others, 1992). Finally, many farmers and farm laborers may forgo medical attention or may wait until the accident or illness nearly incapacitates them because of scarce or inconvenient medical services, high costs of medical care (many farm families and hired workers do not have adequate health insurance), fear of loss of job, or other reasons (Congress of the United States, 1990).

Major Occupational Injuries and Illnesses

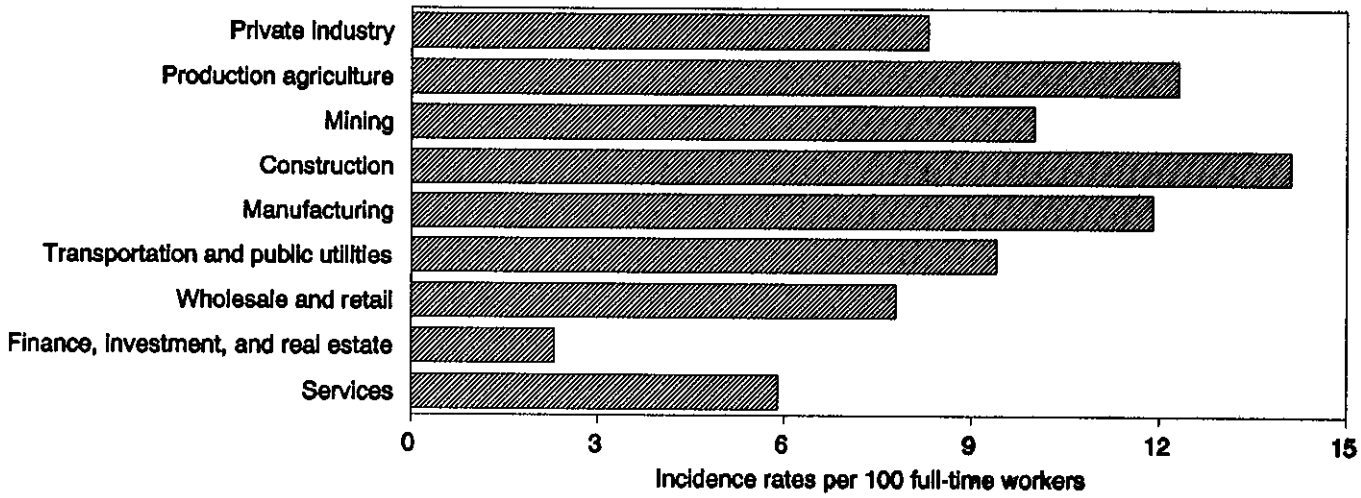
The National Coalition for Agricultural Safety and Health has identified the major occupational injuries and diseases of farmers and farmworkers as traumatic injury and death, acute and chronic disease, respiratory disease, cancer, pesticide toxicity, dermatitis, musculoskeletal syndromes, noise-induced hearing loss, and mental disease (National Coalition for Agricultural Safety and Health, 1988). These are reviewed in more depth later in this report.

Efforts To Improve Farm Safety

Various industry, professional, medical, and research groups are involved in efforts to improve farm safety. Research and medical institutions, including the University of Iowa's Institute of Agricultural Medicine, the National Farm Medicine Center of the Marshfield Medical Research Foundation (Wisconsin), Bassett Hospital (New York), Clemson University, the Medical University of South Carolina, the University of California at Davis, and Colorado State University are collecting data to document the state of agricultural health.[3] In addition to these U.S. institutions, the Centre for Agricultural Medicine at the University of Saskatchewan is also active in farm health and safety research.

Figure 1

Occupational injury incidence rates by industry division, private sector, 1990



Source: U.S. Department of Labor, 1992

[3]These institutions are active in providing health and safety education and service to the farming sector, as well as conducting research.

Other groups, including equipment manufacturers, the American Society of Agricultural Engineers, State farm safety specialists, the National Institute for Farm Safety, and the American Conference for Governmental Industrial Hygienists, call attention to the dangers of farming and educate the public on the need for funding research and education to improve the farm safety record (National Coalition for Agricultural Safety and Health, 1988).

The Federal Government also has been involved in farm safety efforts. The Extension Service (ES) of the U.S. Department of Agriculture, the U.S. Department of Labor (DOL), the Environmental Protection Agency (EPA), the National Institute of Occupational Safety and Health (NIOSH), and the Office of Rural Health Policy (ORHP) of the U.S. Department of Health and Human Services are active in improving farm safety and health. ES supports a variety of health education programs, provides funds to support farm safety education and awareness in all States and Puerto Rico, and provides training and educational programs to pesticide applicators in all 50 States and 4 territories. DOL administers the Occupational Safety and Health Act that provides some workplace protections for farmworkers. EPA, which administers the Federal Insecticide, Fungicide, and Rodenticide Act, recently issued standards that protect farmworkers from pesticide poisoning. NIOSH financially supports surveys of research techniques and conducts as well as supports farm safety research and education. ORHP operates a rural health information service, and it also supports, through grants, the funding of rural health research centers, the establishment and ongoing operation of State offices of rural health, and a rural health outreach program.

The Federal Government has undertaken other initiatives as well. In 1991, the Surgeon General of the U.S. Public Health Service convened a Conference on Agricultural Safety and Health called "Farmsafe 2000: A National Coalition for Local Action" (U.S. Department of Health and Human Services, 1991b). This conference was designed to raise consciousness, build coalitions, disseminate information, and encourage action to prevent injury and disease in agriculture. Congress, in the Food, Agriculture, Conservation, and Trade Act of 1990, authorized the Secretary of Agriculture to make grants to States to establish programs to provide individual and family health education and information and training concerning safety in the workplace to farmworkers, timber harvesters, and farm families.[4] This same act also directed the Secretary of Commerce to include questions relating to agricultural accidents and farm safety in the *1992 Census of Agriculture*.

Review of Data Sources

No comprehensive data system exists to identify the extent of the farm safety problem or the potential risk factors associated with injury and illness on the Nation's farms (Gerberich and others, 1991). Serious limitations in the existing data sources mask the extent of the problem, and little agreement has been reached on the annual estimates of farm injuries, illnesses, and fatalities (Toscano and Windau, 1991). For example, 1989 estimates of fatalities in the agricultural, forestry, and fishing industry ranged from the 110 reported by the Bureau of Labor Statistics (BLS) (U.S. Department of Labor, 1992) to the 1,300 cases reported by the National Safety Council (National Safety Council, 1991a). Farm injury and illness incidence rates also vary. BLS reported an incidence rate of 10.9 per 100 full-time workers in agriculture, forestry, and fishing in 1989, while the National Safety Council reported a rate of 8.8 for the same industry group. Variations are due largely to differences in definitions, the worker populations included, age criteria, methods of case ascertainment, data collection methodology, and types of information collected. Comparisons are further complicated by the lack of standardized reporting categories.

Efforts to monitor farm injuries and illnesses have also been hampered by the lack of adequate data to identify the population at risk. In the broadest sense, this population includes farm operators, domestic hired workers,

[4]Funds for those grants have not been appropriated by Congress, but the mechanism is in place to improve farm safety efforts.

foreign nationals, contract workers, and unpaid family and other workers as well as those who live on farms. No data source identifies the total number of people at risk and the various demographic characteristics of that population at the national level.

Several sources of farm safety data are produced by the U.S. Department of Labor, the U.S. Consumer Product Safety Commission, the U.S. Department of Health and Human Services, and the National Safety Council. Other new data collection efforts by the U.S. Departments of Commerce and Agriculture are underway. Gerberich and others contains an evaluation of most farm safety data sources (Gerberich and others, 1991).

U.S. Department of Labor

Data sources from the U.S. Department of Labor which include farm statistics are considered below.

Annual Survey of Occupational Injuries and Illnesses

The Bureau of Labor Statistics (BLS) in the U.S. Department of Labor publishes annual estimates of occupational injuries and illnesses for industries in the private sector (U.S. Department of Labor, 1992). These estimates are based on a survey of about 280,000 private sector establishments stratified by industry and employment size. Data are collected from records maintained by employers in accordance with the Occupational Safety and Health Act of 1970.[5] Published statistics include the number and incidence rate per 100 full-time employees for workplace injuries, illnesses, and fatalities by two- or three-digit Standard Industrial Classification (SIC) codes and size of establishment. Self-employed individuals are excluded from the survey. Farm injury and illness data are collected only for farms employing 11 or more workers. Information on fatalities for all industries, including agriculture, is collected only for establishments employing 11 or more workers. Farm fatality data are published for the broader category of agriculture, forestry, and fishing.

The BLS data have three major limitations for farm safety research. First, farm establishments employing fewer than 11 people or only immediate family members are not included in either the injury/illness or fatality data (Gerberich and others, 1991).[6] Thus, these data probably undercount the number of farm accidents by omitting those many farms employing few hired workers or none at all. Second, the data do not isolate farm fatalities from the broader industry category of agriculture, forestry, and fishing. Third, the data do not include injuries or illnesses for the self-employed. However, the BLS data are useful for tracking changes in the number and incidence rates of accidents over time in the agriculture, forestry, and fishing industry and for industry comparisons by size of the workforce.

Census of Fatal Occupational Injuries

In February 1991, the BLS established the Census of Fatal Occupational Injuries (CFOI) as an ongoing data collection program (Toscano and Windau, 1991). CFOI was published for the first time in 1992 and was designed to provide a more systematic, verifiable count of all fatal occupational injuries and to obtain descriptive

[5]OSHA requires all employers who are not exempt to maintain records of occupational injuries and illnesses and lost days. Recordable injuries and illnesses are: (1) occupational deaths, regardless of the time between injury and death or the length of the illness, (2) nonfatal occupational illnesses, or (3) nonfatal occupational injuries that involve one or more of the following: loss of consciousness, restriction of work or motion, transfer to another job, or medical treatment (other than first aid) (U.S. Department of Labor, 1992, p. 71). Lost workday cases involve days away from work or days of restricted work activity or both (U.S. Department of Labor, 1992, p. 71).

[6]Annual appropriation bills have specifically exempted farms employing 10 or fewer workers from coverage under the Occupational Safety and Health Act.

data on the circumstances surrounding these events. The first CFOI reported data from only 33 States, but the coverage will be nationwide in the future. The data are collected by the Federal-State Cooperative System using death certificates, State and Federal workers' compensation reports, motor vehicle traffic fatality reports, coroner or medical examiner reports, work-related fatality reports from the Occupational Safety and Health Administration, Mine Safety and Health Administration data, Employment Standards Administration data, and other sources. Fatalities are counted if two sources indicate work relationship. CFOI includes data on work-related fatalities resulting from both injuries and illness occurring in agricultural establishments with one or more employees, as well as those involving self-employed farmers and their family members.

U.S. Consumer Product Safety Commission

The data from this source involve product-related injuries such as those involving tractors and other farm machinery.

Product Summary Reports

The National Injury Information Clearinghouse of the U.S. Consumer Product Safety Commission publishes estimates of product-associated injuries on an annual basis (U.S. Consumer Product Safety Commission, 1991). These estimates are based on reports of product-associated injuries treated in hospital emergency rooms participating in the National Electronic Injury Surveillance System (NEISS). Product-associated injuries are those related to machinery, chemicals, or other manufactured products, and thus falls and animal-related injuries, for example, are not included. The NEISS estimates are calculated from a sample of hospitals with emergency treatment departments (U.S. Consumer Product Safety Commission, 1991). In addition to estimates of the number of injuries, the *Product Summary Report* also includes data on injuries by age group, and it identifies whether the victim was treated and released or was hospitalized.

These data have several limitations. First, four injury groups are not counted in this data set: those who are treated in a doctor's office; those who either ignore or treat their own injuries; those injured by falls, natural irritants, nonmanufactured products, or animals; and those who die before reaching the hospital. Second, data are reported for product-related injuries only. Third, the sample is small and not representative of U.S. emergency rooms (Gerberich and others, 1991). Fourth, the commission's policy on disseminating national estimates eliminates reporting of some product-associated injuries.[7] However, these data do permit identifying the developing trends as to how the number of injuries that required hospital treatment have changed over time for the most frequently reported products (such as farm tractors and farm wagons).

U.S. Department of Health and Human Services

The U.S. Department of Health and Human Services (HHS) has been attempting to develop methods that will accurately estimate the incidence of accidents in U.S. agriculture. One of the methods developed is discussed below. A second method being developed is discussed later in the report.

National Traumatic Occupational Fatalities System

The National Institute for Occupational Safety and Health (NIOSH) in the U.S. Department of Health and Human Services began a surveillance project in 1985 to quantify the number of U.S. occupational deaths due to trauma

[7]"The Commission policy is to disseminate only national estimates that meet all three of the following criteria: coefficients of variation that are 33 percent or smaller, national estimates that are 1200 or greater, and national estimates that are based on a sample count of 20 or greater" (U.S. Consumer Product Safety Commission, 1991).

(Myers, 1989). This project is known as the National Traumatic Occupational Fatalities (NTOF) System. NTOF is a census of death certificates from all 52 agencies reporting vital statistics in the United States. Each agency provides NIOSH with copies of death certificates that meet the following criteria: the age of the victim is 16 years of age and older, the injury is an immediate underlying or contributing cause of death, and the "injury at work" item on the certificate is marked "yes" (Myers, 1989). The NTOF has both advantages and limitations in detecting agricultural deaths (Myers, 1989). Advantages are: (1) information contained on death certificates, including the coding of the cause of death, is consistent from State to State, (2) all workers (operators, hired, and unpaid family) are included because a death certificate is filed for each U.S. death, (3) the "injury at work" item assists in denoting those agricultural deaths that are occupational, and (4) certificates are easily accessible (Gerberich and others, 1991, and Myers, 1989). Major limitations include: (1) occupational deaths involving juveniles under the age of 16 are not reported in the NTOF, (2) certain manners of death (for example, motor vehicle deaths) and some occupational groups (for example, farmworkers, especially part-time farmers holding other jobs) tend to be underreported by death certificates, (3) the industry and occupation information on the death certificate reflects the victim's usual work history and may not reflect where the person was employed at the time of death (Myers, 1989), and (4) information collected on certificates is frequently misclassified or missing (Gerberich and others, 1991, and Myers, 1989). Studies suggest that death certificates are only between 70 and 80 percent efficient in detecting occupational deaths (Myers, 1989).

National Safety Council

The National Safety Council (NSC) annually releases data that measure levels and rates of injuries and fatalities and identifies pertinent industries by two- and three-digit SIC codes (National Safety Council 1991a and 1991b). Data are based on occupational injury and illness reports of over 6,500 National Safety Council members. Data are collected in accordance with the recordkeeping requirements established by OSHA. Information is presented on occupational injury and illness incidence rates per 100 full-time employees. The council also estimates unintentional deaths by injury (homicides and suicides are excluded) of persons in the civilian work force, 14 years and older, with the exception of private household workers. The NSC estimates are not developed using scientific sampling procedures, and the reliability of the estimates is unclear.

U.S. Department of Commerce

The Bureau of the Census in the U.S. Department of Commerce for the first time included questions in the *1992 Census of Agriculture* to measure the number of injuries and deaths incurred by farm operators, family members, and hired workers. Data from the *1992 Census of Agriculture* will be published at both the national and State levels. These data will be available in late 1994.

U.S. Department of Agriculture

The Economic Research Service, U.S. Department of Agriculture, included questions about the number and severity of farm accidents in its 1992 Farm Costs and Returns Survey (FCRS), a national survey of about 13,000 farms. The FCRS data will be available in the spring of 1994.

State Workers' Compensation Systems

State Workers' Compensation systems are also sources of farm accident data. These data provide information on persons covered under respective State compensation programs who incurred a work-related injury or illness. State requirements for worker coverage vary as do types and classifications of data available. Thus, workers' compensation data are not comparable from State to State (Daberkow and Fritsch, 1979, and Gerberich and

others, 1991). For example, agricultural workers are covered by workers' compensation in only 38 States or jurisdictions, and most have special provisions that exempt some farms and are based on size of payroll, number of employees, or number of workdays (Runyan, 1992).

Other

Researchers have used a variety of State and local sources to explore farm safety issues. These sources include newspaper clipping services to help detect fatal events not readily accessible through death certificate data, hospital records, emergency room and urgent care cases, outpatient facilities, primary care practitioners, government records, and a variety of personal interview, mail, and telephone surveys to collect data. (See Gerberich and others, 1991, for an evaluation of some of these sources).

Review of Recently Published and Current Research

Research on farm accidents centers around causes and severity of injuries and illnesses, health and safety of youth, farm safety education, and improved survey techniques. Examples of research from each of these areas are discussed below.

Injuries and Illnesses

Gerberich and others point out the need for continued and improved injury surveillance. "A major barrier to progress in the prevention of agricultural injuries has been not only a lack of knowledge about the magnitude of the problem but also a deficiency in knowledge about the specific causes or risk factors due to the lack of analytical studies" (Gerberich and others, 1991, p. 161). The status of injuries and illnesses on farms is one of the first items of information that should be determined. Status of injury or illness includes information about the victim, the agent that caused the injury or illness, the task being performed when the illness or injury occurred, and other information that will describe the event.

Injuries

Injuries in farming range from cuts and scrapes to total disabilities and fatalities. Most traumatic injuries occur during interactions with machinery, especially tractors (Bean, 1991). Injuries also result from poor building design, electric power, livestock handling, and weather conditions. The activities that victims were most often performing when injured are machinery maintenance, fieldwork, and caring for animals (Hoskin and others, 1988b and 1988c; Pollock, 1990; and Yoder and others, 1989).

Tractors. Tractor accidents have been identified as the leading cause of deaths and disabling injuries on farms (National Coalition for Agricultural Safety and Health, 1988). Tractors are the most frequent cause (one-third to one-half) of injury for fatal farm accidents but account for a much smaller percentage (5 to 10 percent) of nonfatal farm accidents, according to Murphy (Murphy, 1990). Murphy also reports that the types of fatal tractor accidents have not changed over the last 20-plus years, with overturn accounting for about one-half and runover accounting for about one-fourth of such accidents (Murphy, 1990). The results from a study of tractor fatalities in New York between 1985 and 1988 by Pollock support Murphy's findings (Pollock, 1990). Most deaths caused by overturns and runovers could be prevented if tractors were equipped with rollover protective structures (ROPS) and seat belts and if passengers were not allowed on tractors. However, only about one-third of the tractors on U.S. farms are equipped with such protective structures (Heffernan, 1991). According to a study in Pennsylvania, less than 19 percent of the tractors had ROPS (Huizinga and Murphy, 1988). Other types of fatal injuries involving tractors are caused by power takeoff (PTO) entanglements, contact with overhead electrical wires, and road collisions (Madsen, 1991).

Not all injuries involving tractors are fatal. Hoskin and others, in their report on tractor-related injuries, showed that "struck by or against" an object and fall from a different level were the most frequent types of injuries. These generally resulted in bruises or fractures (struck by or against) and fractures or sprains to the foot (fall) (Hoskin and others, 1988b). Most of the struck by or against accidents occurred during fieldwork, but most of the accidents by falls occurred while the tractor was parked or stationary (Hoskin and others, 1988b). In another tractor safety study, Schumacher and others visually inspected tractors to determine whether tractor owners/operators were maintaining and using original equipment manufacturers (OEM) safety devices (Schumacher and others, 1989). This study drew two conclusions. First, "farm tractor owners/operators tend to neglect the maintenance of OEM tractor safety devices as the age of the tractor increases" (Schumacher and others, 1989, p. 5). Second, "in the most general way, a lack of safety consciousness on the parts of tractor owners/operators was apparent" (Schumacher and others, p. 5).

Machinery Other Than Tractors. Hoskin and others in their study of machinery-related injuries showed that most accidents occurred when the victim was struck by or struck against the machine while performing maintenance on combines with grain heads when the machine was not running (Hoskin and others, 1988a). Other types of injuries that happen when working with machinery include entanglements in belts, chains, gears, power takeoffs at the tractor and along the PTO drive, and crop gathering and moving mechanisms (Madsen, 1991). Most machinery is manufactured with protective devices, and warning signs are placed on the machines at spots where workers can become easily entangled.

Nonmachinery. Hoskin and others report the most frequent type of nonmachinery-related injuries is "struck by or against" an object. These injuries generally result in a bruise or fracture to the head and most often happen while performing chores involving animals or treating animals (Hoskin and others, 1988c). A Pennsylvania study supports these findings, showing that the largest percentage of farm injuries occurred in barns (30 percent), fields (16 percent), barnyards (14 percent), and farm buildings (12 percent) (Huizinga and Murphy, 1988).

Illnesses

Farmers and farmworkers have higher rates than other workers of respiratory disease, certain cancers, acute and chronic chemical toxicity, dermatitis, musculoskeletal syndromes, noise-induced hearing loss, and stress-related mental disorders (National Coalition for Agricultural Safety and Health, 1988).

Respiratory Disease. Respiratory diseases are not new to farmers and farmworkers. In 1713, Bernardino Ramazzini wrote that "measurers and sifters of grain were at risk for respiratory problems," and in 1832, Charles Thackrah "described a relationship between asthma and inhalation of corn dust" (Von Essen, 1991). In 1974, a study by a small group of veterinary practitioners showed that respiratory problems appeared in workers exposed to swine confinement areas (Donham, 1992).

According to Von Essen, at least six disorders are associated with exposure to airborne dusts in farming: hypersensitivity pneumonitis (HP), organic dust toxic syndrome (ODTS), chronic bronchitis (CB), acute pulmonary symptoms (APS), asthma, and mucous membrane irritation (MMI) (Von Essen, 1991). HP is caused by exposure to antigens found in silage and in spoiled hay and grain. HP is commonly seen on dairy farms but has also been found on farms where grain is stored in drying bins and is found in poultry houses and mushroom houses (Von Essen, 1991). ODTS occurs after exposure to large amounts of organic dust (Von Essen, 1991). Workers affected by ODTS include those uncapping silos on dairy farms, cleaning grain bins, moving moldy grain, and working in swine confinement facilities (Von Essen, 1991). The precise cause of CB, other than airborne dust, has not been isolated; nor have the individuals who are at high risk been identified. However, workers in swine confinement areas, poultry farmers, and handlers of grain appear to have risks of suffering from CB (Von Essen, 1991). The occurrence of APS has been studied in grain farmers and swine confinement workers, and both groups have exhibited symptoms (Von Essen, 1991). Asthma can be triggered by many farm antigens. Also, many farm antigens cause MMI.

In addition to airborne dusts, some gases can cause acute toxicity. The primary locations of these gases are silos, manure pits, and modern semienclosed animal production buildings (Hurst, 1992; Popendorf, 1991; and Zwemer and others, 1992). Soon after corn is ensiled, nitrogen oxide levels begin increasing and continue to increase for about 7 days. Anyone entering silos during the first 2 weeks after filling may experience difficult or labored breathing (dyspnea) or, in the extreme case, death (Popendorf, 1991; and Zwemer and others, 1992). Hydrogen sulphide, methane, ammonia, carbon dioxide, and carbon monoxide are some of the toxic gases emanating from manure pits, especially when the manure is being agitated (Hurst, 1992). Even when the levels of these gases are not high enough to be fatal, unconsciousness may cause drowning or near drowning in manure liquids (Hurst, 1992). High levels of ammonia have been documented in poultry and swine confinement facilities, especially in winter (Popendorf, 1991). Concentrations of ammonia in these facilities would ordinarily be only a strong irritant to the eyes, nose, and throat but when combined with organic dusts could cause pulmonary damage (Popendorf, 1991).

Cancers. Leukemia, Hodgkin's disease, non-Hodgkin's lymphoma, multiple myeloma, and cancers of the lip, skin, stomach, prostate, and brain have excessive occurrences in farmers (Novello, 1991). The marked frequency of these cancers in farmers have not been conclusively identified (Blair and Zahm, 1992; McDuffie and others, 1988; McDuffie and others, 1990; and Novello, 1991). However, "cancers of the skin and lip are linked to increased exposure to the sun's ultraviolet radiation," and exposures to nitrates, pesticides, viruses, antigenic stimulants, and various fuels, oils, and solvents are suspected causes of many cancers (Novello, 1991; and U.S. Department of Health and Human Services, 1991a). Some evidence indicates women on farms have higher incident rates of multiple myeloma than do farm men (Zahm and others, 1992a).

Pesticide Toxicity. Exposure to pesticides can produce acute and chronic toxic reactions. Acute reactions develop immediately after moderate or high exposures to pesticides. Symptoms of acute reactions include dizziness, vomiting, headache, fatigue, drowsiness, and skin rashes. Although this area of toxicity is not yet fully scientifically documented, some of the suspected chronic effects are central nervous system damage, lung diseases, soft tissue sarcoma, Hodgkin's disease, non-Hodgkin's lymphoma, leukemia, and lung cancer (Blair, 1991; National Coalition for Agricultural Safety and Health, 1988, and Zahm and others, 1992b). More research on the chronic effects of pesticide exposures is required.

Dermatitis. Occupational dermatitis is very common among workers on U.S. farms (National Coalition for Agricultural Safety and Health, 1988). Among the agents causing dermatitis and related skin conditions are ammonia fertilizers, animal feed additives, pesticides, plants, sunlight, cattle, swine, sheep, moist and hot environments, and chiggers, bees, and wasps (Blair, 1991; Susitaival and others, 1992; Zwemer and others, 1992).

Musculoskeletal Syndromes. Degenerative musculoskeletal syndromes are widespread among farmers and farmworkers (National Coalition for Agricultural Safety and Health, 1988; and Novello, 1991). Low back pain, hip arthrosis, and degenerative arthritis of the knee and upper extremities are the syndromes most often reported (National Coalition for Agricultural Safety and Health, 1988; and Novello, 1991). Chronic vibration from tractors and farm machinery and repetitive trauma associated with farm work can lead to musculoskeletal syndromes (Barbieri and others, 1992; Holness and Nethercott, 1992; National Coalition for Agricultural Safety and Health, 1988; and Novello, 1991).

Noise-Induced Hearing Loss. Another occupational hazard for farmers and farmworkers is hearing loss caused by exposure to farm machinery, especially tractors. Hearing losses affect about a quarter of younger farmers and one-half of older farmers (May and Dennis, 1992; National Coalition for Agricultural Safety and Health, 1988; Novello, 1991; and Reesal and others, 1992). "Significant numbers of those affected have been found to develop a communication handicap by age 30" (National Coalition for Agricultural Safety and Health, 1988, p. 21).

Stress-Related Mental Disorders. Farmers, farmworkers, and farm family members have high rates of stress-related mental disorders, especially depression (Heffernan, 1991). "Some of these disorders appear to be related to isolation, and others result from agricultural stressors such as economic hardship and weather conditions" (National Coalition for Agricultural Safety and Health, 1988, p. 21). Factors beyond a farmer's control, such as reduced revenue, increased workload, weather, and management problems, were found to cause significant mental stress (Crevier and Brun, 1992).

Health and Safety of Youth

Youth present a special problem in the area of farm safety. The Fair Labor Standards Act limits the employment of minors according to age and occupational activity (Runyan, 1992).[8] Some children as young as 10 years old may work on farms with parental consent. Children of farm operators may work for their parents on their own farms at any age. In addition, many children are at risk by living on farms. A study of 169 Iowa farm families highlights some of the safety issues related to youth: (1) more than 40 percent of the children who operated equipment were not supervised; (2) about 30 percent of children more than 3 years old played alone in work areas and 80 percent of them played near machinery in operation; and (3) children began operating equipment at an average age of 12, even though parents believed their children were not capable of operating equipment until age 15 (Hawk and others, 1991).

An earlier study of injuries to farm youth (less than 20 years of age) in 1979, 1980, and 1981 used national statistics (Reesal and others, 1992). According to this study, (1) about 300 youth die each year from farm injuries and 23,500 suffer nonfatal injuries; (2) rates of fatal and nonfatal injuries increase with the age of the victim; (3) fatal and nonfatal injury rates are much higher for males than for females; (4) more than one-half of the victims of fatal farm injuries die before reaching a physician, nearly one-fifth die in transit to a hospital, and about one-tenth live long enough to receive inpatient care; (5) nearly 90 percent of the nonfatal injuries were treated in an emergency room and released; and (6) accidents involving farm machinery accounted for most of the fatal and nonfatal injuries, with tractors being involved in more accidents than other machinery. Other farm machinery involved in such accidents were wagons and combines. However, these findings may be somewhat misleading because the data include deaths due to drowning and firearms and do not distinguish between recreation and farm-related activities as agents of death (Rivara, 1985).

A study of fatal farm-related injuries to children 9 years of age and under in Wisconsin and Illinois from 1979 to 1985 that used death certificate data showed the average annual death rates in the study population were 3.2 per 100,000 in Wisconsin and 1.5 per 100,000 in Illinois (Salmi and others, 1989). The study found that the death rate was substantially higher for boys than for girls, that most fatalities occurred in July, and that machinery was the source of more than one-half of the injuries in Wisconsin and Illinois during the period of the study (Salmi and others, 1989).

Farm Safety Education

The most successful education efforts to improve farm safety will involve farmers, farm family members, farmworkers, educators (both extension and institutional), researchers, farm equipment design engineers, and political policy leaders. All of these groups have a stake in farm safety. A brief review of some literature on farm safety education follows.

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[8]See appendix for summary of the minimum age requirements of the Fair Labor Standards Act.

Farmers' Perceptions of Health and Safety Issues

One of the first questions to ask when planning an education program is whether or not the participants realize a problem exists. Research studies in New York and in Iowa focused on farmers' perceptions of health and safety issues, accident causes, and methods of accident prevention (Kendall and others, 1990; and Pollock, 1990). Both studies showed farm families to be aware that farming is a hazardous occupation and that safety is important even when this factor is ranked alongside such matters as prices and the environment. Findings also indicated that farm families were receptive to receiving constant reminders and literature about safe working practices, especially when these practices could be put to use by all ages. Farm magazines, the Cooperative Extension Service, and local equipment dealers (in the Iowa study) were found to be the most frequently used sources of safety information. Farm families participating in the New York study had reservations that safety meetings might not be the best way to communicate safety information (Pollock, 1990).

Farm operators and family members are aware of farming hazards, but in times of stress, such people may make decisions that under more ideal conditions would have been considered dangerous and unwise. For example, a farmer may throw aside a bent power takeoff shield so that grain unloading can go forward, rather than wait until the shield can be repaired. In this example, the operator is unconsciously making the economic decision that the value of the time required to repair the shield is greater than the potential loss that might result from an injury. But, under identical conditions, this same operator would probably not forget to check the tractor's oil level or to lubricate the moving parts as required.

Suggested Methods for Educating About Farm Safety

Individuals concerned with occupational and farm safety issues frequently ask, "If nonagricultural industries can reduce their death and injury rates, why can't agriculture?" Aherin and others suggest that the answer to this question lies in the lack of engineering research and research funding for agricultural safety. However, these authors argue that "it is equally important to recognize that we should not stop trying to do a better job with education methods" (Aherin and others, 1990, p. 19). The authors suggest that behavioral psychology may help in providing solutions for this continuing problem (Aherin, 1991; and Aherin and others, 1990).

Variables of Effective Safety Communication. Aherin and others identify several variables of effective safety communication: source characteristics, social support/conformity, personal involvement, and characteristics of the message itself. They argue that the most effective message will be conveyed by one who is an expert in agricultural issues, is trusted and liked by farmers, and is as similar as possible to farmers (source characteristics). Furthermore, they suggest that people comply more often with persuasive arguments when with others who have complied also and that attitudes change more when the message presented is extremely different from the one already believed by the receiver (social support/conformity). Also, "any program that requires the direct participation of the farmers could potentially increase persuasion and safety behavior" (personal involvement) (Aherin and others, 1990, p. 16).

Elements for Safety Communications. Aherin and his colleagues also note the importance of the characteristics of the message. They identify four elements that should be included in any safety communication: "(1) the nature of the hazard; (2) the level of seriousness of the hazard; (3) how to practically avoid the hazard; and (4) the potential consequences of not avoiding the hazard" (Aherin and others, 1990, p. 16). These authors use warning signs and labels, a major form of safety communication by machinery manufacturers, to demonstrate these four elements. To be effective, labeling of hazardous machinery parts requires that (1) the users must perceive that a dangerous situation exists, (2) the explanation of the consequences of disregarding the warning must be memorable to the hearers, (3) the cost of complying with the warning in terms of time or inconvenience should not exceed the users' willingness to comply, and (4) the example of those who profit by the warning can inspire others to do the same. In brief, the warning text that accompanies the label must be explicit and must answer the question, "Why should I obey?" (Aherin and others, 1990, p. 18).

An Example of a Safety Education Effort

One example of an effort to educate people about farm safety is a farm safety audit called "Farm Safety Walkabout," which could be used either as an individual or as a community activity, and which was developed at the University of Iowa (Hawk and others, 1992). The audit has six one-page sections: people, house, farmyard, farm and livestock buildings, machinery, and evaluation (of the audit). The handbook provides all the materials necessary to carry out a community activity as well as the safety audit, a farm family health and safety community survey, a pre-test to gather information on safety practices, a post-test to evaluate the effect of the program, a resource list, an accident emergency information sheet, and a basic list of supplies for a well-equipped emergency first-aid kit for a rural home. Gogerty's report gives an evaluation of the usefulness of this audit (Gogerty, 1991).

Survey Methods

Much of the research published during the past few years concerning farm safety has either focused on survey methods or devoted a section to survey methods. Two survey methods are used most frequently to collect farm accident data: surveys of farm households and surveys of death certificates.

Farm Household Surveys

The following discussion includes a survey that was methodologically sound but had implementation problems and a survey that is being tested.

Standard Farm Accident Survey Program. In the late 1960's, extension safety leaders at Ohio State and Michigan State Universities developed a standardized method of collecting agricultural accident data (Baker and others, 1990). Using the Ohio State-Michigan State research as a basis, the National Safety Council, in cooperation with the U.S. Department of Agriculture, developed and implemented the Standard Farm Accident Survey Program (Baker and others, 1990). Although the Standard Farm Accident Survey Program was methodologically sound, consistent implementation from State to State was difficult because the survey relied heavily on volunteers to collect the data and because selecting and maintaining a stratified sample proved to be difficult (Baker and others, 1990). Also, some States did not participate in the study, which limited its usefulness as a national data source. For these and other reasons, this survey was not conducted after 1984 (Murphy and Huizinga, 1989).

Modified Total Design Method. In 1988, a new method for collecting farm accident data was tested in Pennsylvania through a cooperative effort involving Pennsylvania State University, the National Safety Council's Agriculture Division, and the National Institute for Occupational Safety and Health. This new survey used a modified Total Design Method (TDM) of a personalized mail survey (Baker and others, 1990; Murphy and Huizinga, 1989; and Pollock, 1990).[9] The survey was based on a random stratified sample from the most up-to-date mailing list of farm operators in the State; stratification variables were type, size, and geographic location of the farm. Although mail surveys frequently have low response rates of 25-30 percent, the Pennsylvania survey had a response rate of 76 percent (Baker and others, 1990; Huizinga and Murphy, 1988; and Murphy and Huizinga, 1989).

[9]Total Design Method, developed by Don A. Dillman (Dillman, 1978), consists of two parts. First, the researcher must identify each aspect of the survey that may affect quantity and quality of the survey. This includes personalizing all aspects of the survey such as cover letters, survey instruments, and envelopes. Second, the survey should be organized so that design intentions are carried out in complete detail. There should be no monetary cost to the respondent, the survey instrument must be attractively designed, and the relevance of questions should be obvious to the participants (Baker and others, 1990, p. 4).

During 1989, four more States (Illinois, Missouri, Oregon, and West Virginia) joined the cooperative effort to test the TDM survey technique (Pollock, 1990). Researchers in four other States (Delaware, Indiana, New York, and Ohio) independently used the TDM survey technique. The States conducting the survey in 1989 and the respective response rates were Illinois (85 percent), Missouri (57 percent), New York (56 percent), Oregon (82 percent), West Virginia (57 percent) (Baker and others, 1990; and Pollock, 1990).[10] Based on the surveys in 1988 and 1989, the survey was economical, averaging about $7.50 per response (Baker and others, 1990). The goal now is to pool the data from the various States and to evaluate TDM as a national data collection technique.

Baker and others indicate two shortcomings of the survey: it does not allow for indepth analysis of all accidents, and it does not discover many fatal accidents (Baker and others, 1990). Two changes that may help are Dillman's adaptation of the TDM for telephone surveys, which would gather more detailed national accident data, and the improvements suggested by Murphy, which rely on death certificate data (Murphy, 1989). The telephone survey will allow for indepth analysis but will increase the cost of the survey. Suggested improvements to make death certificates a more accurate and useful method for obtaining farm fatality data (as discussed below) will require some institutional changes that may come about slowly.

Surveys of Death Certificates

In a paper presented in 1989, Murphy made the point that "quantifying agricultural occupational fatalities is anything but an exact science" (Murphy, 1989, p. 1). The death certificate, the primary resource used for documenting these fatalities, contains inaccurate and incomplete occupation and industry information (Gerberich and others, 1991; and Murphy, 1989). To help improve occupation and industry data, Murphy suggests that officials use *The Standard Industrial Classification Manual* (SIC code) and the guidelines provided by the National Center for Health Statistics to help complete the industry and occupation spaces on death certificates (Murphy, 1989). In addition to these resources, he also suggests obtaining relevant information from a family member of the victim (Murphy, 1989). This information, once properly collected, can be presented by industry sector group as well as by industry total and also compared with fatality data from other major industries (Murphy, 1989).

Other Suggestions To Improve Surveys

As the following discussion indicates, more than survey methodology is required to accurately capture farm accident data.

Classifying Farm Accidents. Farm safety research has been inconsistent in identifying accidents that are work-related as distinct from those that are not. Purschwitz and Field discuss the need for consistency in the definition of a farm accident and present in a report of 1989 a set of decision rules for classifying farm accidents as work-related, recreational, home-related, or other (Purschwitz and Field, 1989).

Standardized Categories. Research on tractor accidents highlights problems of classifying data (Murphy, 1990). Murphy notes that most of the tractor accident data collected over the past 20 years have not "progressed beyond simple descriptors" (Murphy, 1990, p. 3).[11] These descriptors give few clues as to how to hasten reduction of tractor accidents. Murphy argues for standardized categories for analysis and consistent presentation of general descriptive data (for example, are farm children persons under 20 years of age, 14 years and under, or some other age?) and exposure data (hours of tractor use) (Murphy, 1990). He expands this line of thinking to include many aspects of farm safety in a subsequent paper (Murphy, 1991).

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[10]Data were not available from Delaware, Indiana, and Ohio.

[11]Descriptors refer to variables such as the age and sex of the victim, the time of year of the accident, severity of the accident, and the general use of the tractor at the time of the accident.

Research in Progress

Studies of farm accidents are being conducted using the new survey techniques mentioned earlier in this report. Two of these are discussed below. In addition, papers presented at the Third International Symposium: Issues in Health, Safety and Agriculture and the Surgeon General's Conference on Agricultural Safety and Health discuss research in progress on a broad range of topics (Centre for Agricultural Medicine, 1992; and U.S. Department of Health and Human Services, 1991b).

Eight-State Study. A NIOSH-sponsored study by John Myers analyzed data on farm injuries in Delaware, Illinois, Indiana, Missouri, New York, Ohio, Oregon, and West Virginia. A paper summarizing the farm injuries in these States has been submitted to the *American Journal of Public Health*. The paper includes injury incident rates and a discussion of the data-gathering technique. A second paper is being prepared from the tractor exposure data gathered during the study.

University of Minnesota Study. In 1991, a study of farm accidents in Minnesota, Nebraska, North Dakota, South Dakota, and Wisconsin was conducted by the University of Minnesota under a grant from the Centers for Disease Control (Gerberich and others, 1991). Data for this study were obtained through two telephone interviews per sample unit. The interviews were 6 months apart, and each resulted in about 4,000 completed interviews. Results of this study are not yet available.

Research Directions for the Future

As this report indicates, additional research is needed on questions of farm safety. Some of the more readily apparent needs are discussed below.

National data sources do not sufficiently identify the number of farm accidents or describe their sources, causes, severity, and effects. Some of the reasons given for the shortcomings of national data are lack of scientific sampling techniques, focus on farms employing 11 or more people, and the limited amount of information provided by many of the methods of data collection.

Efforts are now underway to improve sampling techniques. The Modified Total Design Method will improve survey methodology. However, a scientifically selected sample population at risk will be required before meaningful data can be obtained. Multimethod approaches like the ones being done to prepare the *Census of Fatal Occupational Injuries* make up another attempt to improve the quality of national data. Finally, the *Census of Agriculture* will present accident data based on a national sample of farms.

Accurately assessing farm safety issues will require data on more than descriptive variables. First, the population at risk must be accurately identified. Little is known about the size of the U.S. farm workforce. Second, injury surveillance must provide "time of event, place of occurrence, demographic characteristics of the injured person, characteristics of the injury, agent causing the event, source of the event, mechanism of the event, circumstances surrounding the injury event, medical/health care provided to the injured person, and health outcome of the event" (Gerberich and others, 1991, p. 165). Third, in addition to the above information about the victim and event, information on the characteristics of the farm, including the size, type, and location of the farm and the number of people who work there is required.

Finally, researchers are beginning to evaluate the chronic effects of long-term exposure to pesticides and other farm chemicals. Additional research in this area is needed. Other areas of neglected research concerning chemical, biological, physical, and environmental hazards are specifically identified in the comprehensive reports by the Public Health Service in this country and by the University of Saskatchewan (Centre for Agricultural Medicine, 1992; and U.S. Department of Health and Human Services, 1991b).

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Appendix: A Summary of Minimum Age Requirements of the Fair Labor Standards Act

Minimum age standards for employment in nonagricultural occupations:

1. At 16 years of age in any occupation, other than a nonagricultural occupation declared hazardous by the Secretary of Labor.
2. Employment of 14- and 15-year-old minors is limited to certain occupations under conditions which do not interfere with their schooling, health, or well-being.

Minimum age requirements for employment in agriculture:

1. At 16 years of age during school hours in any agricultural occupation not declared hazardous by the Secretary of Labor.
2. At 14 years of age outside of school hours in any occupation not declared hazardous by the Secretary of Labor.
3. Twelve- and 13-year-olds may be employed with written parental consent or on a farm where the minor's parent or person standing in place of the parent is also employed.
4. Minors under age 12 may be employed with written parental consent on farms where employees are exempt from the Federal minimum wage requirements.
5. Local minors (permanent residents) 10 and 11 years old may be employed outside school hours under prescribed conditions to hand harvest short-season crops for no more than 8 weeks between June 1 and October in any calendar year, upon approval by the Secretary of Labor of an employer's application for a waiver from the child labor provisions for such employment.
6. Children of farm owners or operators may be employed by their parents at any time and in any occupation on a farm owned or operated by their parents.[12]

[12]Sources: U.S. Department of Labor, 1984 and 1990.

U.S. Department of Agriculture
Economic Research Service

SUMMARY OF REPORT

Detailed Data on Farm Operating and Financial Characteristics Available for 1990

Number 31, August 1993

Contact: Susan E. Bentley, 202/219-0931

An estimated 1.8 million farm operations represented by the 1990 Farm Costs and Returns Survey (FCRS) operated about 1 billion acres of land in 1990 (see table). Almost half of them rented or leased land from others (excluding public grazing lands), primarily through cash rent agreements. A new report, *Farm Operating and Financial Characteristics, 1990*, just released from the USDA's Economic Research Service, presents these and other detailed farm economic data and reliability measures for calendar year 1990. It includes data on the number of farms, land in farms, crop acreages and production, farm labor and wages, capital investments and improvements, farm business income and expenses, and farm business assets and liabilities. These data are summarized by sales class, region, production specialty, farm organization, acreage class, tenure, and operator age and major occupation.

Over one-quarter of farm operations reported removing some land from production in 1990 for summer fallow or government programs, which resulted in an estimated 56 million acres of cropland being removed from production.

Approximately 310,000 farms had gross sales of at least $100,000 in 1990. Farms of this size accounted for 18 percent of all farms, 49 percent of land owned, and 57 percent of land operated. Almost a quarter of all farms reported sales between $20,000 and $99,999 in 1990. Farms with sales of $40,000 to $99,999 reported operating, on average, nearly twice the acreage of farms with sales of $20,000 to $39,999. Farms with sales of less than $10,000 accounted for almost half of all farm operations, and they operated the smallest farms, averaging 123 acres.

Almost half of all farm operations were located in three regions: the Corn Belt, the Appalachian region, and the Southern Plains. However, only about 26 percent of all acres operated were in those regions, reflecting variation in farm size as the types of agricultural activities vary. Average acres operated ranged from 174 acres in the Appalachian region to 3,223 acres in the Mountain region.

Farms and land in farms, all classes, 1990
Nearly half of all farm operations rented or leased land from others.

Item	Total	Farms reporting	Average per reporting farm[1]
	1,000 acres	*Number*	*Acres*
Farms	1,752,125[2]	na	na
Land rented or leased from others[3]	342,011	797,474	429
Cropland removed from production	56,080	480,937	117
Total acres operated[4]	1,030,490	1,751,795	588

na=Not applicable.

[1]Average per reporting farm is defined as the mean per farm reporting a nonzero for the item in the sample. [2]Represents number of farms. [3]Excludes land rented or leased on an animal-unit-month (AUM) basis. [4]Defined as owned land plus land rented or leased from others (including AUM land) less land rented out.

To Order This Report...

The information presented here is excerpted from ***Farm Operating and Financial Characteristics, 1990,*** SB-860, by Susan E. Bentley. The cost is $15.00.

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Economic Research Service

SUMMARY OF REPORT #RDRR-86

Nonmetro elderly report poorer health, but use fewer health care services

September 1993

Contact: Carolyn Rogers, 202/219-0536

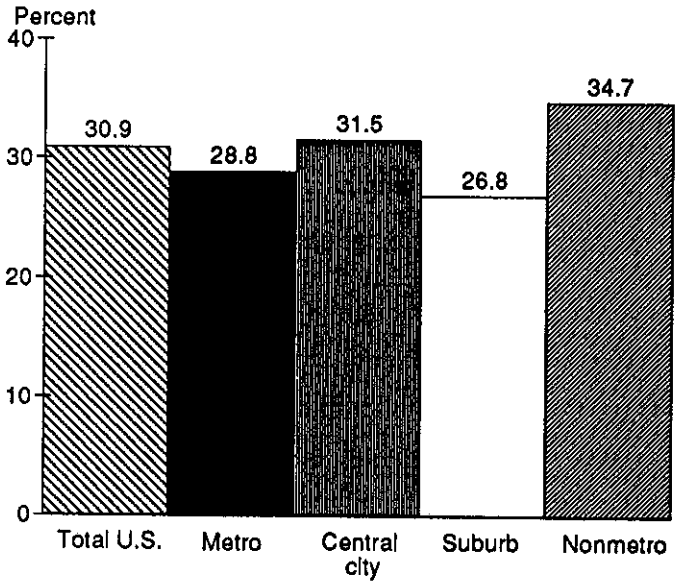
The majority of Americans aged 60 years and older are, and perceive themselves to be, in good health. Health status differs by place of residence, with a higher proportion of nonmetro elders reporting their health as fair or poor (35 percent) than metro elders (29 percent). The nonmetro elderly are also more likely to have certain chronic conditions, such as arthritis, that are clearly associated with poorer physical functioning. Differences in elders' self-assessments of health and physical functioning remain evident by residence when other factors, such as age, race, social support networks, income, and education are held constant.

Health Status and Use of Health Care Services by the Older Population: A Residential Comparison, from USDA's Economic Research Service, uses data from the 1984 Supplement on Aging to the National Health Interview Survey by the National Center for Health Statistics. This data set is the latest available and the most appropriate because it provides a large enough sample size to study differences in the elderly's health and other characteristics separately by residence. The report describes the nature and magnitude of differences in health status and use of health care services by the elderly, by place of residence.

Socioeconomic status, as measured by education and income, is important to the health status of the elderly, with higher socioeconomic status associated with better health. This effect is magnified in nonmetro areas, where the elderly are generally less educated and more financially disadvantaged. Social support networks are strong in nonmetro areas, but their beneficial effect on health status is not enough to overcome the effects of the nonmetro elderly's lower socioeconomic status.

The nonmetro elderly are less likely to use formal health care services, defined as physician visits, hospital stays, and nursing home care. The nonmetro elderly's poorer health and lower socioeconomic status, combined with lower use of services, suggests that a gap exists between the nonmetro elderly's need for care and the availability of services to meet this need.

Elderly persons reporting fair or poor health



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The information presented here is excerpted from ***Health Status and Use of Health Care Services by the Older Population: A Residential Comparison,*** RDRR-86, by Carolyn Rogers. The cost is $9.00.

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