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Health Hazards of Farming

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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.

Recent statistics indicate there are 5,355,000 Americans living on 2,214,420 farms.[1] However, the size of the farm work force in the United States is difficult to quantify because of problems of definition and migration.

While it is impossible to judge the number of family members who regularly or occasionally assist the principal farmer with the farm work, it is important to realize that the entire family, rather than a single worker, is exposed to the health hazards of the work environment.

Also difficult to count are seasonal workers, migrant workers and occasional hired hands. According to a report in *Farm Labor*, there were 1,098,000 hired workers on farms in 1987.[2] Migrant workers are not counted separately by most agricultural surveys, and their estimated number in the United States ranges from 300,000 to 1.5 million.[3]

Judging by all figures, the population at risk in the farm work environment numbers at least 6.5 million and consists of farm managers, farm operators and their families, seasonal workers, and migrant workers and their families. Estimates indicate that children under age 16 constitute 25 percent of the farm work force.[4] In addition to this work force, there are people not officially counted as farmers who engage in activities of agronomy or animal husbandry and are therefore exposed to some of the same health hazards.

Farming Activities

Farming encompasses a wide range of tasks, and each task poses health hazards.

Farmers plow, plant and harvest crops and, in the process, use tools, machinery, and chemicals in the form of fertilizers, fumigants and pesticides. Equipment and machinery must be maintained, and in their capacity as mechanics, farmers are exposed to solvents, oils, gasoline and other petroleum products.

Another aspect of farming is the care of various animals, which includes feeding, cleaning, taming, administering treatment for diseases and injuries, and butchering. In addition to handling farm stock, farmers come in contact with wild animals that can bite, scratch and carry disease.

Farmers must also build and maintain various structures, fences and enclosures. Thus, they are exposed to the hazards of carpentry and construction work.

The farm work environment varies from open fields and wooded areas, with a range of climatic conditions, to the enclosed spaces of barns, livestock confinement buildings, silage and grain enclosures, tool and machinery sheds, and garages.

The variety of activities and environments makes farming a complex occupation and farmers potentially complex patients.

Morbidity and Mortality

INJURY RATES AND CAUSES

The U.S. Bureau of Labor Statistics estimates that the 1985 accident rate for agri-

cultural production was 12.7 cases of injury and illness per 100 full-time workers (200,000 employee hours).[5] This rate is based on incidents reportable to the Occupational Safety and Health Administration (OSHA). OSHA data exclude unpaid family workers, some self-employed farmers, and farms with fewer than 11 employees. In spite of these exclusions, the accident rate in farming is second only to that in construction work.

Disabling injuries to farmers totaled 100,000 in 1986, with 90,000 occurring in farm residents and 10,000 in nonfarm residents working on farms.[5] Machinery and animals are the most common causes of accidental farming injuries; each represents about 17 percent of total accidents. About 47 percent of permanent injuries to farmers are caused by accidents involving machinery.

Other agents of farm accidents are trucks or other vehicles (14.3 percent); tractors (7.9 percent); hand tools (7.5 percent); power tools (4.8 percent) and miscellaneous agents, including household items, chemicals and garden equipment (15.6 percent). Accidents with no agent, a category that includes falls, account for 15.4 percent of farm accidents.

Factors that may contribute to farm accidents include temperature extremes, weather conditions, working in poor light, long working hours, long periods without a rest, stress, fatigue, poor health, inexperience, and advanced age.

Farm workers had the highest rates of all industry groups for skin diseases and poisoning in 1985, according to the Bureau of Labor Statistics.[5] The incidence rates for respiratory conditions due to toxic agents and for disorders due to physical agents were exceeded only by those found in manufacturing, while the rate for dust diseases of the lung was second only to that for mining occupations. Agriculture had the highest incidence rate in the category "all other occupational diseases."

WORK-RELATED DEATH RATES

In 1986, there were 1,700 agricultural work deaths—900 among farm residents and 800 among nonfarm residents working on farms or in other industries classified as agricultural.[5] The agricultural death rate was 52 per 100,000 workers. This rate was higher than the death rate in mining and quarrying (50 work deaths per 100,000 workers) and also exceeded the rates in construction, manufacturing, and all other industrial groups.

INJURIES AND DEATH IN FARM CHILDREN

Recent studies indicate that children are a significant part of the farm work force and that children who live on farms face the risk of serious injury. A 1985 review of data sources revealed that 300 children and adolescents die each year of farm injuries; 23,500 suffer nonfatal trauma. More than half of the victims die without reaching a physician; an additional 19 percent die en route to a hospital. The accident rate for 15- to 19-year-old boys is double that of younger children and 26 times higher than that for girls. The most common cause of fatal and nonfatal injuries is farm machinery.[6]

Children of any age may work on the family farm, exempt from child labor laws. Children aged 12 or older may work on other farms with parental permission.

MORTALITY DATA

American farmers appear to be a basically healthy work force. They have a larger proportion of nonsmokers than is seen in the general population,[7,8] and this contributes significantly to their overall health. A study comparing mortality rates among California farmers and other occu-

TABLE 1

Reported Associations Between Cancer and Farm Work in the United States

Type of cancer	*Study location*
Stomach, lymphatic tissue[9]	California
Cervical[9]	California (white females)
Skin, lymphocytic leukemia, Hodgkin's disease[13]	California
Non-Hodgkin's lymphoma[14]	Utah
Testicular[15]	Texas
Leukemia[16]	Wisconsin
Leukemia[17]	Nebraska
Multiple myeloma, lymphocytic leukemia, lip, liver, connective tissue[18]	Washington
Leukemia, non-Hodgkin's lymphoma, multiple myeloma, Hodgkin's disease, lip, stomach, prostate[19]	Iowa
Oral cavity, pancreas[20]	All states
Bladder, prostate[21]	All states (dairy farmers)
Malignant melanoma[21]	All states (crop and livestock farmers)
Malignant melanoma, other skin cancer[22]	North Carolina (white farmers)
Malignant melanoma, brain, leukemia[22]	North Carolina (nonwhite farmers)
Prostate[22]	North Carolina

pations[9] showed fewer deaths due to atherosclerotic heart disease among farm workers, although this group had elevated proportionate mortality rates for motor vehicle accidents, respiratory diseases, and infective and parasitic diseases. An Iowa study[10] found fewer deaths from coronary artery disease among farmers.

A study of mortality among male farmers in South Carolina[11] showed an increased proportionate mortality ratio for cerebrovascular disease and for external causes of death. White and nonwhite farmers had elevated proportionate mortality rates for all external causes. White farmers had considerably increased mortality rates for motor vehicle accidents, fires, drowning, and environmental causes of death, such as heat and cold. Mortality from fires and falls was high among nonwhite farmers.

In a study of Wisconsin farmers,[12] significantly decreased rates were seen for tobacco- and alcohol-related causes of death. This decrease is considered to be a reflection of protective lifestyle habits among farmers. Excessive rates occurred for accidental causes and asthma.

CANCER

Studies of U.S. farmers[9,13-22] have shown associations between various types of cancer and farm work (*Table 1*). Although these studies raise concerns about possible carcinogenic exposures among farmers, most do not attempt to establish an etiology for the cancer but only to associate it with the occupation of farming. However, a recent study[23] implicated farming and certain chemical exposures in the etiology of lung cancer in male patients and their siblings, and the Wisconsin study[12] links cancer rates with exposure to agricultural chemicals. The increased risk of malignant melanoma seen among crop and livestock farmers, but not among dairy farmers, is related to the long work hours the former groups spend in the sun.[21]

Hazards of Farm Equipment

To accomplish their daily chores, farmers routinely use a variety of equipment and machines. Cultivators, plows and listers, manure spreaders, harrows, subsoilers and rollers work the soil. Pneumatic saws and "apes" prune and thin orchards. Sprayers and dusters fumigate and exterminate. Mowers and rakes are used in haying. Crops are harvested with threshers, augers, combines, corn pickers, cotton strippers, potato harvesters and bean pickers. Hay balers, power grinders, crushers, pulverizers, cutters, elevators and blowers facilitate crop storage.

As mentioned earlier, nearly half of all permanent injuries to farmers involve farm machinery.[5] The severity of the trauma inflicted by farm machinery is explained by the purposes of the machines. They are designed to grab, cut, chop and crush, and they do not distinguish between crops and

people who are accidentally in the way.[24] Of the farm machinery injuries studied by Simpson,[25] half resulted from a person being caught in the moving parts of a machine. The power take-off mechanism was implicated in 19 percent of the injuries. Falls from machines also accounted for 19 percent of the accidents, and 14 percent of the victims were struck by a machine part.

A 1986 study focusing on injuries caused by power take-off mechanisms[26] revealed that accidents occur because the clothes, boots or belt of a farmer or a child became entangled in the coupling devices. Several types of injuries can result: (1) fracture or amputation of an extremity, especially when the clothing does not yield; (2) lesions in extremities or blunt thoracic and abdominal damage with visceral injury, due to being hurled through the air and striking the machine or the ground, and (3) multiple fractures of ribs with pulmonary contusion, vertebral fracture, and injuries of the penis and the scrotum, due to being wedged between the pole of the equipment and the power take-off mechanism.

In a Minnesota study of farm injuries to children,[27] augers and power take-off mechanisms caused the highest incidence of permanently disabling injuries among the children studied.

The latest statistics show that almost 27 percent of all farm fatalities involve tractors.[5] In 1986, an estimated 400 tractor-related farm deaths occurred nationwide. Tractor overturns caused 44 percent of these fatalities. In 23 percent of the deaths, the victim was run over by the tractor. Other tractor mishaps caused 27 percent of the fatalities.

The serious injuries that are most often associated with machinery and tractor accidents include amputations of fingers and limbs, spinal cord injuries, blunt trauma of the chest and abdomen, eye punctures, crush injuries, and compound fractures of the extremities.[25] In addition to these are the less serious cuts, bruises, and tendon and ligament injuries.[25]

Many injuries are unique to farm workers. These include hay balers' fractures (combined fractures of the sternum and T12 vertebrae)[28] and such crushed extremity injuries as corn picker's hand and auger worker injuries.[29,30]

Indications are that farm injuries are often severely contaminated and are more likely to become infected than similar injuries sustained in factory accidents. It has also been noted that morbidity and mortality in many cases are related to delay in treatment, attributed to rural location.[29,30]

VIBRATION AND NOISE

Machinery and power tools subject farmers to extreme amounts of vibration and to noise levels exceeding tolerable or safe levels. Degeneration of the thoracic and lumbar vertebrae was found in 70 percent of tractor drivers in a cross-sectional study.[31] In a ten-year longitudinal study, tractor drivers showed an increase in adverse spinal changes, such as spondylotic, osteochondrotic and arthrotic reactions.[31]

Significant hearing impairment has been discovered in farmers between the ages of 19 and 42 years. Dairy farmers, with the least amount of machine operating time, had the most minimal loss of hearing.[32]

Chemical Hazards

The chemical products used in farming, such as pesticides and fertilizers, were at one time assumed to affect only vegetation, soil, and plant, insect and animal

TABLE 2

Reported Associations Between Pesticides and Health Risks to Farmers

Health risk	*Type of pesticide*	*Study group and/or location*
Parkinson's disease[35]	Organophosphates	Farmers
Systemic poisoning[36,37]	Parathion residues	Orchard workers and crop workers
Dermatitis[38]	Organophosphates, carbamates	13 states
Skin cancer[38]	Organophosphates, carbamates	13 states
Neurologic and behavioral abnormalities, persistent eye problems[39]	Mevinphos, phosphamidon	Farm workers (California)
Inhibition of cholinesterase (plasma and red blood cell)[40,41]	Organophosphates	Corn and peach pickers, cotton field workers (North Carolina)
CNS symptoms[42]	Organophosphates	Farm workers (New Jersey)
CNS symptoms[43]	Organophosphates	Farmers (Nebraska)
Behavioral effects[44]	Organophosphates	Farm workers
Infertility, sterility[45]	Halogenated hydrocarbon: dibromochloropropane (DBCP)	Male field workers
Chromosome aberrations[46]	Variety of pesticides	Agricultural workers
Dysmenorrhea[47]	Organochlorines	Migrant workers (Colorado)
Pulmonary fibrosis (fatal)[48]	Dipyridyl: paraquat	Agricultural workers
Lymphoma[49]	Chlorophenoxy compound: 2,4-D	Wheat farmers (Kansas)
Dermatitis[50]	Organosulphite: Omite-CR	Orange pickers (California)
Liver damage[51]	Organochlorines	Agricultural workers
Eye injuries[52]	Variety of pesticides	Rural communities

life, but they have increasingly come under scrutiny because of harmful effects on humans. Use of agricultural chemicals in farming has increased from an index of 32 in 1960 to an index of 123 in 1985.[33]

PESTICIDES

The term "pesticides" refers to insecticides, rodenticides, fungicides, herbicides, fumigants, defoliants, molluscicides, nematocides, algicides and acaracides. While the 1.2 billion pounds of pesticides used annually in the United States[2] destroy the plant or animal life they are directed against, and are credited with increased agricultural production,[34] they also cause serious health risks to humans.

Pesticide exposure carries a risk of the neurologic and behavioral problems associated with reduced cholinesterase activity, dermatitis, reproductive disorders, pulmonary problems, liver damage, eye damage and various types of cancer. *Table 2* summarizes reported associations between pesticides and health risks to farm workers.

Organophosphates and carbamates are the chemical compounds most often used in pesticides. Both are cholinesterase inhibitors. Overexposure to these compounds causes abdominal pain, ataxia, nausea, dizziness, vomiting, headache and malaise—symptoms similar to those of influenza. A serum cholinesterase determination is important to accurately diagnose an illness as pesticide poisoning. In addition to poisoning, the literature reports an increased

risk of accidents to workers at the time of chemical exposure.[38]

Migrant workers are often at increased risk of pesticide poisoning, especially if they live and eat in or near the areas where pesticides are being used (*Figure 1*). Their exposure time is increased, and the water they use for drinking, cooking and washing may be contaminated. Evidence shows that poor nutritional status and dehydration increase the likelihood of cholinesterase inhibition.[53] Nutrition and hydration are often marginal for migrants, making pesticide poisoning both more likely and more severe. Children are also more susceptible to pesticide poisoning, and the children of migrants and other farm workers are at high risk.

FIGURE 1. Cooking and eating area for migrant workers.

FERTILIZERS

Fertilizers pose a serious risk to agricultural workers during handling, storage and application. Anhydrous ammonia is a widely used nitrogenous fertilizer. Liquid ammonia is sold in pressurized tanks and is applied directly to the soil. Since ammonia in this form is highly caustic and freezes on vaporization, it can easily cause first- and second-degree burns on contact with the skin. Eye damage occurs in the form of conjunctivitis or corneal ulceration.[54]

A Nebraska study[55] shows that anhydrous ammonia is the chemical most frequently implicated in emergency room visits or hospitalizations connected with exposure to agricultural chemicals. The most common reasons for exposure are spray drift, equipment failure and accidental spill.

PETROLEUM PRODUCTS

Agricultural use of solvents and fuels introduces risks through skin contact and vapor inhalation. Solvents affect the central and peripheral nervous systems, causing psychomotor and neurobehavioral functional disturbances.[56] As dermal irritants, solvents cause extreme dryness and cracking of the skin. All of these products carry the risk of fire, especially when they are used in small enclosures such as sheds or garages.

Confinement Hazards

ANIMAL CONFINEMENT

Large numbers of animals of one species can be raised in confinement in a small in-

door space. Swine, for example, are often born indoors and may spend their entire lives until time for market within one building. This method of livestock raising is an efficient, labor-saving method of increasing production and saving field space for other uses. Feeding and watering systems, waste handling and ventilation systems are all part of the confinement structure.

Livestock confinement buildings produce hazards related to toxic gases, bacteria and particulate matter emanating from accumulated animal wastes. The waste drops through slats in the floor and is sometimes pumped from that location into outside storage tanks.

In swine confinement environments, ammonia, carbon dioxide, carbon monoxide, hydrogen sulfide and aerosolized particles may exceed threshold limit values or short-term exposure limit values for these substances.[57] Methane build-up creates a risk of asphyxiation and can also cause explosions.[58]

Studies of U.S. workers in swine confinement environments show a high incidence of chronic respiratory disorders, ranging from bronchitis in 70 percent of the workers to asthma in 10 to 15 percent and episodes of hypersensitivity pneumonitis syndrome in another 10 to 15 percent.[59]

Incidents of fatal or near-fatal asphyxiation from gases in swine confinement buildings have been reported. Toxic situations result from gas build-up in tightly closed buildings and from agitation of the stored waste during the pumping process. Life-threatening situations occur when the building is entered at times of high gas build-up, when the manure storage pit must be entered to unclog a blocked sewage line or when a recently emptied tank is entered. Workers overcome by gases have fallen into full tanks, as have children who have eluded supervision.[60]

Hydrogen sulfide, a product of anaerobic activity in animal wastes, appears to be the substance most likely to cause accidental death.[60] Death in these instances occurs very suddenly. Autopsy reports of persons who died in this manner indicate extensive pulmonary edema.[60] The rescuer in these cases often becomes a second victim.[60,61] Rescue attempts should not be made without an oxygen supply and breathing apparatus.[60] Accidents could be prevented if farm workers in confinement buildings wore self-contained breathing devices and carried safety lines.[60,61]

Dust in livestock confinement buildings can carry viral and bacterial agents as well as toxic gases and, when inhaled, may reach the deeper portions of the lungs. Respiratory infections and allergic reactions are frequent health problems for workers in these areas.[59]

SILO FILLER'S DISEASE

Chopped green forage plants and hay are stored in silos and allowed to ferment. The mixture becomes silage, or fodder, and is used to feed calves and other livestock. When farmers enter the silo, usually in late summer or autumn, they can be exposed to silo gas build-up in this small, confined space. Silo gases are a mixture of nitrogen dioxide, nitric oxide and carbon dioxide derived from anaerobic fermentation of the green silage. Overexposure to the gases can result in a flu-like syndrome of chills, cough, fever, dyspnea and chest pain.[62] Chronic pulmonary insufficiency and pulmonary edema can result.[63] Methemoglobinemia has also been reported among silo fillers.[64]

Zoonoses

Farmers are at increased risk for zoonoses because they regularly come into contact with animals that carry these dis-

eases. *Table 3* summarizes the zoonoses for which farmers are most at risk.

Over 150 zoonoses have been identified worldwide, with 40 of significance as agricultural occupational diseases.[65] The zoonoses that occur most often in the United States are tularemia and Rocky Mountain spotted fever. In 1987, there were 188 cases of tularemia and 592 cases of Rocky Mountain spotted fever. The largest concentration of tularemia occurred in the west north-central and west south-central states. Rocky Mountain spotted fever occurred chiefly in the south Atlantic states.[66]

In addition to the zoonoses cited in *Table 3*, viral infections resulting from contact with infected animals can occur on the skin of farmers. Cowpox lesions occur on the hands of milkers, with possible swelling of the lymph nodes. Pseudocowpox (or milkers' nodes) is a similar affliction with hard nodules instead of inflamed lesions.[67] Orf (sheep pox) can be contracted from sheep and goats or from their infected carcasses. The orf virus causes vesicles around the mouth and eyes of the animals; it is then transmitted to humans and produces an itching, vesicular or pustular lesion on the fingers, hands or arms. Fever is sometimes present.

Fungal Diseases

Ringworm is transmitted to humans by direct contact with infected animals. On farms, calves are often the infected animals, but ringworm is also transmitted by cats, dogs, goats, sheep and mice. Ring-shaped pigmented patches on the skin mark the presence of the infection.

Sporotrichosis, transmitted by contact with infected soil, causes skin nodules and ulcers. A pulmonary form of sporotrichosis results from the inhalation of spores and causes a systemic disease.

Histoplasmosis is endemic in the Ohio and Mississippi river valleys. Inhalation of dust contaminated with *Histoplasma capsulatum* results in an illness resembling influenza or in a chronic pulmonary or disseminated disease. Exposure often occurs on chicken farms.

Coccidioidomycosis (cocci, valley fever or San Joachim Valley fever) results from inhalation of the arthrospores of *Coccidioides immitis*. Endemic in the southwestern United States, principally California and Arizona, the malady is characterized by fever, respiratory infection and erythema nodosum. It is often seen in connection with dusty occupations, and its association with farm employment has been recognized since the 1920s.[68]

Sensitizers

Extrinsic allergic alveolitis (hypersensitivity pneumonitis) denotes diseases characterized by a response of the lungs to specific antigens contained in organic dusts that penetrate lung parenchyma. Dry animal or vegetable matter creates dusts and mold from hay, straw, compost, barley, wheat, wood, animal hairs and droppings, or animal protein.

The many types of hypersensitivity pneumonitis related to farming include bagassosis, cheese washer's lung, dog house disease, farmer's lung, furrier's lung, mushroom worker's lung, paprika splitter's lung, silo filler's lung, suberosis and wheat weevil disease. Farmer's lung is the form most common among hay and grain growers and represents an allergic sensitization following exposure to moldy grain or hay. The peak incidence is in late winter or early spring, since hay used at those times has reached optimal moisture and temperature conditions for spore formation. The resultant allergic reaction is a response to thermophilic actinomycetes and fungal spores.

TABLE 3

Zoonotic Diseases Posing Risk to Farmers in the United States

Disease	*Organism*	*Animal source*	*Contact*	*Symptoms and signs*
Anthrax (woolsorter's disease)	*Bacillus anthracis*	Cows, goats, horses, pigs, sheep	Skin contact or inhalation of spores; bones, hide, hair of animal dead or dying of anthrax; ingestion of undercooked meat	Cutaneous anthrax: malignant pustule Pulmonary anthrax: pneumonia Gastrointestinal anthrax: gastroenteritis
Brucellosis (undulant fever)	*Brucella abortus* or *B. suis*	Cows, pigs	Infected animal parts	Fever, headache, malaise, arthralgia
Viral encephalitis, arthropod-borne	Arbovirus	Horses, rats, dogs, birds	Mosquito bite	CNS involvement; fever, convulsions, coma, meningeal signs
Leptospirosis	*Leptospira interrogans*	Cows, pigs, sheep, horses, rats, dogs	Infected animals or infected urine	Fever, myalgia, jaundice; possible kidney and liver involvement
Psittacosis (ornithosis)	*Chlamydia psittaci*	Turkeys, ducks, chickens, exotic birds, pigeons	Skin or inhalation	Fever, headache, cough, pneumonia
Q fever	*Coxiella burnetii*	Cows, sheep	Inhalation	Flu-like symptoms, gastroenteritis, pneumonia
Rabies	Rhabdoviridae	Dogs, skunks, squirrels, foxes, other wild animals	Virus-laden saliva of rabid animal	Malaise, depression, lymphatic swelling, hydrophobia, muscle spasms, fever, encephalomyelitis
Rocky Mountain spotted fever	*Rickettsia rickettsii*	Rabbits, field mice, dogs	Bites of infected ticks	Fever, headache, conjunctival injection, maculopapular rash, petechiae
Tularemia	*Francisella tularensis*	Sheep, hares, rabbits, other animals	Inhalation, ingestion, infection of wounds or eyes, tick and animal bites	Ulcerated skin lesions, pneumonitis, enlarged and painful lymph nodes

Clinical manifestations of hypersensitivity pneumonitis vary, depending on the degree of exposure. A small but continuous exposure to the antigen results in cough, dyspnea, fever, malaise, myalgia, arthralgia and weight loss.[67] Precipitating antibodies to actinomycetes can be found in the blood, and chest radiographs show widespread nodular shadowing.[69] The illness can become disabling if exposure to the antigen continues. Continued exposure can lead to asthma and pulmonary fibrosis.[67]

Factors Underlying Farm Health

The problems of accidents and illnesses for farmers are frequently compounded by remote work sites and consequent distance from medical care. The outcome of an accident or sudden illness can be worsened by delayed medical attention. Fewer physicians are available in rural areas. In addition, farmers often work alone, and a solitary worker has no witness to accidents or other medical emergencies. Help is often delayed until a worker is missed by others, perhaps hours later.

Injuries and illnesses are exacerbated when it is impractical to cease work to allow time for an injury to heal or an illness to abate. Lack of health insurance makes farmers reluctant to seek medical aid in all but emergency situations, and lack of disability insurance keeps workers on the job when they should rest. At present, workers' compensation for farmers exists in only half the states.

Training for farm tasks is often nonexistent, and inexperience with a machine,

a tool or a chemical can lead to accidents or hazardous exposures. Young people with inadequate experience and elderly people, who may have slowed reflexes or hearing and vision impairments, can easily become accident victims. These people often help out on the farm when the workload is at its peak or when the principal farmer becomes ill or disabled.

Isolation and economic hardship can cause mental stress for the farmer and other family members. Frequently, income depends on weather or varies according to economic indicators outside of individual control. However, isolation and economic uncertainty are balanced against other factors. Farmers are usually highly motivated, independent people who have chosen self-employment to preserve their autonomy. Rural life can be more healthful, with clean air, a self-determined pace, and absence of the stresses of city life.

An accurate perception of the overall health status of farmers is hampered by lack of recent studies, and it is impossible to count accurately the number of accidents or illnesses due to farm work when reporting is not required for all farms and when some farming endeavors are not counted as farms. Because of the scattered nature of the farm work force, prevention programs are lacking and would be difficult to initiate. Preventive measures are suggested in the literature, but ways to disseminate the information and apply preventive principles are left unclear.

Final Comment

Family physicians must be knowledgeable about the health hazards of farming and possible preventive measures, not only in rural areas but in all areas where patients take part in plant or animal tending. Physicians also must be aware that the family's principal worker is not the only family member exposed to the hazards of farming; the entire family shares the duties and risks of farming.

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