The Aging Farm Community:

Using *Current Health*

and *Safety Status*

to *Map Future Action*

March 6-8, 2007

Holiday Inn Select
Indianapolis Airport
Indianapolis, IN

Daily Speakers and Presentations

Audio and Powerpoint Presentations for the speakers are listed below. The title is the link to the audio presentation given at the conference. Powerpoint Presentations are a slide presentations given at the conferencee.

Tuesday, March 6

Chip Petrea: Introduction and Logistics for Conference

Karen Peters, UI-Chicago, Institute for Health Research and Policy (Powerpoint Presentation)
General overview of issues related to physiological aging and its affects on both physical and mental capacities
Implications of the Aging Process: Opportunities for Prevention PDF Paper

Jim Mitchell, University of North Carolina (Powerpoint Presentation)
Rural Aging and the Effect of Migration on the Rural Landscape
Rural Aging Research and Change in Rural Counties: An Emerging Research Agenda PDF Paper

Marc Schenker, UC Davis (Powerpoint Presentation)
Older Farmers in the Western US

John Myers, NIOSH (Powerpoint Presentation)
National Injury and Fatality Data for Aging Farmers
Injuries and Fatalities to U.S. Farmers and Farm Workers 55 Years and Older PDF Paper

James Gregory, Texas Tech University (Powerpoint Presentation)
Impact on Sleep Deprivation on Agricultural Injury Incidents
Impact of Sleep Deprivation on Agricultural Injury Accidents PDF Paper

Glen Blahey, Manotoba Ag, Rural and Food Initiative (Powerpoint Presentation)
Age-Related Physiological Changes: Considerations for Older Farmers' Performance of Agricultural Tasks

Bill Field Purdue University (Powerpoint Presentation)
Agrability/Breaking New Ground Safely Cultivating Independence for Farmers with Disabilities– Young and Old

Wednesday, March 7

Don Voaklander, University of Alberta (Powerpoint Presentation)
Medication Use, Co-morbidity and Injury in Older Farmers
Health, Medication Use and Agricultural Injury: A Review PDF Paper

Michelle Umbarger-Mackey, University of Iowa (Powerpoint Presentation)
Injury/Illness Data from Certified SafeFarm Clinics in Iowa
Older Farmers, What's New With Certified Safe Farm PDF Paper

Mike Rosmann, Agriwellness, Iowa (Powerpoint Presentation)
Behavioral Health Issues of the Aging Agricultural Population
Behavioral Health Issues of the Aging Agricultural Population PDF Paper

Deb Reed, University of Kentucky (Powerpoint Presentation)
Overview of techniques and strategies used for screening and treating aging farmers
Providing Health Services to Aging Farmers: A Practitioner's Perspective PDF Paper

Shannon Lizer, University of Illinois School of Nursing, Rockford (Powerpoint Presentation)
Overview of Agricultural Medicine and Health in Education of Primary Care Providers

Chike Anyaegbunam, University of Kentucky (Powerpoint Presentation)
Safety and Health Education to Aging Farmers and Scarce Resources: What are the Implications?

Social Marketing of Agricultural Safety and Health to Ageing and Limited Resource Farmers: What Are the Implications? PDF Paper

Henry Cole, University of Kentucky
Impacts of Social Marketing Techniques on Agricultural Safety and Health Initiatives

Thursday, March 8, AM

Kevin Rund, Illinois Farm Bureau (Powerpoint Presentation)
Current status of aging populations, particularly farmers, within state policy

Chip Petrea, Summary of Conference

Group Discussion

What To Do Next

Injuries and Fatalities to U.S. Farmers and Farm Workers 55 Years and Older

John R. Myers, Larry A. Layne, and Suzanne M. Marsh

For the proceedings of the Conference on The Aging Farm Community: Using Current Health and Safety Status to Map Future Action, March 6-8, 2007, Indianapolis, IN

The findings and conclusions in this report are those of the authors and do not necessarily represent the views of CDC, NIOSH.

Injuries and Fatalities to U.S. Farmers and Farm Workers 55 Years and Older

Abstract
Farmers and farm workers over the age of 54 years have been identified as a high risk group for farm fatalities since the 1980's. In addition, the severity of non-fatal injuries has been shown to be higher for these older farm workers. Data from two national systems are presented to better define both fatal and non-fatal injuries occurring to these older workers: the Occupational Injury Surveillance of Production Agriculture (OISPA) survey, conducted for the National Institute for Occupational Safety and Health by the U.S. Department of Agriculture, and the Census of Fatal Occupational Injuries (CFOI), maintained by the Bureau of Labor Statistics. OISPA estimates that farmers and farm workers aged 55 years and older averaged 26,573 lost-time injuries annually in 2001 and 2004, with an annual injury rate of 4.5 lost-time injuries per 100 workers compared to an overall injury rate of 4.8 lost-time injuries per 100 workers. "Contact with objects" (35%) and "falls" (30%) were the most common type of injury event. CFOI data show that farm workers aged 55 years and older accounted for over half of all farming deaths between 1992 and 2004 (3,671 of 7,064 deaths), and had a fatality rate of 45.8 deaths per 100,000 workers compared to the overall farming fatality rate of 25.4 deaths per 100,000 workers. Most common sources of fatality were "tractors" (46%), "trucks" (7%), and "animals" (5%). This study and many others indicate that older farmers and farm workers have lower overall injury risk compared to workers less than 55 years of age. However, injuries in this aging farm work force appear to be much more severe, especially for fatalities where rates for older farmers and farm workers were over 2.5 times that of the younger age group. To more effectively encourage and reinforce safe work behaviors among these older workers, prevention programs may need to be communicated through non-traditional venues such as farm magazines and equipment dealers.
Keywords: production agriculture; farmer; older workers; traumatic injury

Introduction

The United States (U.S.) population is aging, driven in large part by the "baby-boom" generation of which the first members will be turning 65 years old in 2012 (Horrigan, 2004). The impact of this phenomenon on the U.S. workforce is quite profound. Based on projections from the Bureau of Labor Statistics (BLS), workers over the age of 54 years will account for 19.1% of the civilian workforce by 2012, up from 11.8% in 1992 and 14.3% in 2000 (Toosi, 2004). This growth in older workers is projected to reach 21.2% of the workforce by 2014, and continue to grow for several more years thereafter (Toosi, 2005).

The agricultural workforce is also aging, with farmers (excluding those in horticulture) being one of the most aged occupations in the U.S. workforce (Dohm, 2000). The average age of farm operators has been increasing steadily since the late 1970's, moving from 50.3 years of age in 1978 to 55.3 years in 2002 (Allen and Harris, 2005). In 2002, half of all farms were operated by farmers over the age of 54 years (NASS, 2004), up from 48% in 1992 (BOC, 1994). Other characteristics of this population, based on the 2002 Census of Agriculture, include the fact that the average age of full-time farmers was 57 years; that farm operators working in "fruits and tree nuts," "sugar cane, hay, and all other crop," and "cattle operations" have the highest average age (57.7 years, 57.5 years, and 56.7 years respectively); and that the average age for farm operators was much higher for farms earning less than $50,000 (Allen and Harris, 2005).

The impact of the aging U.S. workforce on occupational injuries is mixed. In general, previous research has shown that the incidence of less severe occupational injury decreases or is unchanged with age (Castillo and Rodriguez, 1997; Jackson, 2001; Layne and Landen, 1997; Layne and Pollack, 2004; Mitchell, 1988; Root, 1981; Salminen, 2004). But injury patterns by age become less clear as severity of the injury increases, with some studies showing a positive relationship between age and severe injury, while other studies dispute such findings. In a literature summary on chronic disability among injured workers, Turner et al. (2000) found that a majority of studies showed older workers at greater risk of losing more work time from injuries than younger workers. A study of construction workers found that older workers over the age of 49 had higher lost workday injury rates than their younger counterparts (Lowery et al., 1998). However, from an incidence perspective, Personick and Windau (1995) found that workers 55 years of age and older had lower risk for days away from work compared to younger workers, while Gluck and Oleinick (1998) found that workers 54-64 years of age had lower incidences of compensable back injuries than their younger counterparts.

In a study of occupational injuries treated in hospital emergency departments (EDs), Layne and Pollack (2004) found that workers 55 years of age and over did not have higher injury rates due to slips, trips, and falls, but did have a higher proportion of slips, trips, and falls that resulted in hospitalization. Similarly, Castillo and Rodriguez (1997), in a study of workers 63 years of age or older who were treated for an occupational injury at a hospital ED, found that the likelihood of one of these injuries resulting in lost work time increased with age. Alexander et al. (1999), using Washington State workers' compensation data, reported that the likelihood of a worker being hospitalized or requiring significant medical care for a compensable injury increased with age.

For permanently disabling or fatal injuries, the effect of aging is much clearer. In an analysis of workers' compensation data from multiple states, Root (1981) and Mitchell (1988) found that the risk of permanent injuries significantly increased with increasing worker age. This same pattern has been reported for occupational fatalities by several researchers using a variety of data sources (Alexander et al., 1999; Castillo and Malit, 1997; Feyer et al., 2001; Kisner and Pratt, 1997; Marsh and Layne, 2001; Loomis et al., 2003; Mitchell, 1988; Personick and Windau, 1995; Pratt et al., 1996; Root, 1981; Rossignol, 1994; Salminen, 2004; Toscano and Windau, 1994).

For the agriculture production industry, surveys of farm operators suggest that farmers and farm workers 65 years or older accounted for between 5% to 14% of the work-related injuries on farms (Hanford et al., 1982; Hoskin et al., 1988; Huizinga and Murphy, 1988; Zhao and Hetzel, 1992). From a risk perspective, a majority of farm operator surveys examining self-reported work-injuries found a pattern of decreasing injury risk with age (Crawford et al., 1998; Hanford et al., 1982; Hoskin et al., 1988; Hwang et al., 2001; Lewis et al., 1998; Sprince et al., 2003; Xiang et al., 1998). In a study of older Colorado male farm operators, Xiang et al. (1999) found this same pattern of decreasing injury risk with age up until the age of 75 years when a dramatic increase in injury rates was observed. Park et al. (2001a), looking at a limited prospective sample of farm operators in Iowa, observed an increasing injury risk of work-related farm injury by age, although this trend was not statistically significant.

Two studies examining work-related farm injuries based on ED records and medical records generally agreed with most farm operator-based injury studies; these record-based studies reported decreasing injury risk with increasing age (Carstensen et al., 1995; Myers, 1990). A third study, however, that detailed medical record surveillance on fall-related work injuries within a cohort of farmers in Wisconsin found a significant increasing risk of injury with increasing age (Nordstrom et al., 1996). Data from this same cohort, looking specifically at farmers 65 years and older, found fall-related injury incidence rates tended to increase with age (Stueland et al., 1996). One additional study looking at ED-treated work injuries to all workers 55 years of age and older found agricultural workers to be at higher risk for injuries than older workers in other industries (Layne and Landen, 1997).

Gelberg et al. (1999), in a study of farm injuries in New York and Kentucky, reported that farmers 60 years old and older were more likely to be hospitalized by their injuries. Layne and Landen (1997) also found that agricultural workers 55 years and older had a higher proportion of hospitalized ED-treated work injuries than older workers in other industries utilizing a national probability sample. In a study of hospitalized injuries to Canadian farmers by Hartling et al. (1997), farmers over the age of 64 years were found to have 27% higher median hospital costs for their work injuries, as well as 75% longer median hospital stays. Two additional studies, using Canadian hospital discharge data, confirmed that older farmers do have a higher risk for hospitalized injuries when compared to younger farmers (Blahey and Alberg, 1993; Pickett et al., 2001). Because farm operations are not typically covered by compensation programs, only one study involving compensable injuries and older farmers was identified. Hartman et al. (2004) studied a cohort of farmers in the Netherlands and found that the risk of filing a sick-leave claim increased with age.

As with older workers in general, the effect of age on permanently disabling or fatal work injury among farmers and farm workers is generally much clearer. In an analysis of large multiple state farm operator surveys, Hanford et al. (1982) and Hoskin et al. (1988) reported an increasing risk of permanent injuries with increasing age. For work-related fatalities, several reports based on a variety of data sources indicated that older workers account for a large proportion of farm work deaths (Campbell and Field, 1986; Field and Purschwitz, 1987; Gelberg et al., 1999; Hayden et al., 1995; Murphy, 1985; Murphy, 1990; Murphy and Ambe, 1996; Murphy and Kassab, 2001; Purschwitz and Field, 1986). Population-based studies for fatal work-related farm injuries consistently show significant increases in fatality rates by age, beginning between the ages of 50 to 60 years (Fiedler et al., 1998; Hanford et al., 1982; Hard et al., 1999; Hard et al., 2002; Hoskin et al., 1988; Kisner and Pratt, 1997; Meyer, 2005; Mitchell et al., 2002; Myers, 1989; Myers, 1990; Myers and Hard, 1995; Pickett et al., 1999; Voaklander et al., 1999).

This work intends to provide an updated view of the older farming population in the U.S. by describing the changing age structure within the production agriculture industry since the early 1990's; reporting occupational injury results from two national farm operator surveys conducted for the National Institute for Occupational Safety and Health (NIOSH) by the National Agricultural Statistics Service (NASS); summarizing fatal work-related farm injuries in the U.S. using the BLS Census of Fatal Occupational Injuries (CFOI) surveillance system; reviewing case-based tractor fatality investigations from the NIOSH Fatality Assessment and Control Evaluation (FACE); and comparing current findings to those reported previously in the literature.

Methods

In general, there is not one single definition for an older worker (Wegman, 1999). Some studies define older workers with a minimum age 50 or 55 years, while others define older workers as 65 years or older. For this study, an older worker is defined as anyone aged 55 years and older.

Population data were extracted from the BLS Current Population Survey (CPS) (BLS, 2007). CPS, a monthly household survey, provides information on the U.S. civilian, non-institutionalized population aged 15 years old or older and includes wage and salary workers, self-employed, part-time workers, and unpaid workers in family-oriented enterprises (e.g., farms and small businesses). For this study, labor force estimates are reported only for those 16 years and older.

Non-fatal farming injury estimates for adults were derived from the NIOSH Occupational Injury Surveillance of Production Agriculture (OISPA) surveys for calendar years 2001 and 2004. Conducted for NIOSH by the U.S. Department of Agriculture, NASS, the OISPA is a Computer Assisted Telephone Interview (CATI) survey of a random sample of U.S. farming operations. For the 2001 and 2004 surveys, a farm was defined as any operation with $1,000 or more of gross agricultural production within a calendar year. The NASS sampling frame covered all agricultural production operations, including both crop and livestock operations with the exception of large swine confinement operations, which were excluded. Participation in OISPA surveys was voluntary.

OISPA collected information on work-related farming injuries occurring to adults (defined as any person 20 years or older). An agricultural work-related injury was defined as an injury that

(1) occurred while performing work on or for the farm business, and (2) resulted in four or more hours of restricted activity (e.g., the individual could not perform work or other normal duties, missed work, etc.) or required professional medical treatment. While the total number of work-related farm injuries was requested for the calendar years 2001 and 2004, descriptive information was collected only for the two most recent injury events in each of these two years. The survey excluded injuries to contractors working for the farm operation. The categorical injury variables for "source of injury" and "event or exposure" were coded from narrative injury descriptions using the BLS-developed Occupational Injury and Illness Classification System (OIICS) (BLS, 1992).

Response rates for the 2001 and 2004 surveys were similar, 61% and 65% respectively. Sampling weights were calculated based on the number of farms responding by geographical region within three broad "value of sales" categories (<$10,000; $10,000-$99,999; >$99,999). The nine geographical regions were those defined by the U.S. Bureau of the Census (BOC) (BOC, 1975). Farm counts within the 27 strata were obtained from farm numbers published by the NASS (2002, 2005). For this study, the data for 2001 and 2004 were combined and reported as an annual average.

Occupational fatality data were extracted from research files obtained from the BLS CFOI for the years 1992 through 2004. Collected from various federal, state, and local sources, the CFOI data include fatal work injuries from all 50 states and the District of Columbia. The files used for this study, however, exclude all fatalities from New York City. BLS normally corroborates each workplace fatality using multiple source documents – including death certificates, workers' compensation reports, medical examiner reports, and police reports. A fatality is included if the decedent was employed at the time of the event and engaged in a legal work activity or present at a site as a job requirement. Data are collected for all public and private sector workers regardless of the size of the operation or worker age.

Detailed industry information in the CFOI data is coded based on the Standard Industrial Classification (SIC) Manual (Office of Management and Budget, 1987) for data years 1992 through 2002 and the North American Industrial Classification System (NAICS) (Office of Management and Budget, 2002) for data years 2003 through 2004. Fatalities occurring in the agriculture production industry subsector were identified using the SIC major groups '01' and '02' ("Agricultural production – crops"; "Agricultural production – livestock and animal specialties") and the NAICS major groups '111' and '112' ("Crop production"; "Animal production"). The event or exposure and the source that directly precipitated the fatality are coded based on the BLS-developed OIICS.

Tractor-specific data were derived from the NIOSH Fatality Assessment and Control Evaluation (FACE) program (NIOSH, 2003). The FACE program involves the investigation of fatalities from specific causes of death including agricultural machines. Since 1982, NIOSH researchers have used worksite investigations to identify factors that contributed to fatal occupational injuries; the information collected during the investigations is used to explore factors that may be difficult to obtain through passive surveillance systems. These findings are then used to formulate strategies to prevent similar incidents from occurring in the future. In 1989, NIOSH expanded this program through the creation of State FACE. Since that time, 22 states have

conducted FACE investigations through this program for variable time periods. Internal and state FACE reports involving agricultural operations were manually screened to identify tractor-related cases. Information on the age of the victim and information on the tractor involved in the event were abstracted from the reports. Copies of these reports can be obtained on the FACE website (www.cdc.gov/niosh/injury/ traumaagface.html). Although the information collected for each case through FACE is thought to be comprehensive, FACE is not a national census. Thus, the data presented from FACE are a summary of the detailed investigations that provide in-depth information about the fatal incident not available elsewhere. Because the FACE investigations were not selected based on a sample, these data should not be considered generalizable.

Both non-fatal and fatal rates for this study were calculated using the estimates of employed civilian workers from the BLS CPS data. Non-fatal injury incidence rates were calculated as the estimated number of injuries at the regional or national level divided by the estimated annual average working population in agricultural production. Non-fatal rates are expressed as the number of injured per 100 workers. Fatal injury rates were calculated as the number of fatalities divided by the estimated annual average working population; the rates are expressed as the number of fatal work injuries per 100,000 workers. Numbers of fatal injuries are reported for all ages; fatality rates are reported for workers aged 16 years and older.

Results

Employment Demographics

Older workers (55 years and older) accounted for about 13% of the total U.S. workforce from 2003 through 2004. Although only 3.5% of this older workforce was employed in agriculture production, older workers accounted for 29% of the total agriculture production workforce. During the 13-year period, the proportion of older workers in agriculture production increased from 27% in 1992 to 33% in 2004.

Non-fatal Injuries in Agriculture Production

In 2001 and 2004, there were an estimated 83,940 non-fatal injuries per year among adults 20 years and older in agriculture production. The corresponding injury rate for the two years combined was 4.8 per 100 workers. Workers 55 years and older accounted for 32% (26,573) of the total injuries. Injury rates for the younger (4.6 per 100 workers) and older (4.5) adult age groups were similar. The South and Midwest regions accounted for the largest number of injuries and highest injury rates for both the younger and older farmers (Table 1).

By nature of injury, older workers experienced fractures (21%), sprains/strains (18%), multiple diagnoses (17%), cuts (16%), and bruises (10%). Injured older workers were farm family household members (83%), hired adult workers (8%), and relatives (5%) (4% were other or unknown). By type of farm, older workers on livestock operations accounted for 64% of the injuries with a rate of 5.3 per 100 workers; 34% of the injuries to older workers occurred on crop operations with a rate of 3.3.

In 2001 and 2004, approximately 35% of the non-fatal injuries to older workers resulted from contact with objects and 30% from falls. Contacts with objects were primarily struck by swinging or slipping objects (10% of the total) and struck by falling objects (5% of the total). Falls on the same level accounted for 15% of the total and falls from elevation accounted for

14%. Other categories with high numbers of non-fatal injuries were assaults by animals (10%), off-road non-collisions (7%), and overexertion (5%).

Survey results indicate that non-fatal injuries to older workers were more severe (or disabling) than those for younger workers. Among older workers, nearly half (47%) of the injuries resulted in 14 or more restricted work days compared to 32% for younger workers (Table 1). About 20% of the injuries to older workers resulted in hospitalization compared to 16% for younger workers. For those who were hospitalized, nearly one quarter (24%) of older workers were hospitalized 8 or more days for injuries compared to 8% of workers 54 years and less (Table 1).

Fatal Injuries in All Industries
A total of 75,327 work-related fatal injuries occurred in the U.S. from 1992 through 2004 for all age groups in all industries. The corresponding fatality rate was 3.9 per 100,000 workers. Workers 55 years and older accounted for 23% of the total and had a fatality rate of 7.7.

Fatal Injuries in Agriculture Production
In the agriculture production industry subsector for the same period, there were 7,064 deaths to farmers and farm workers. The fatality rate was 25.4 per 100,000 workers. Decedents in agriculture production were older than those in all industries (Figure 1). Farmers and farm workers 55 years and older accounted for 52% (3,671) of the deaths in agriculture compared to only 23% of all deaths occurring among workers 55 years and older in all industries. As previously mentioned in the *Employment Demographics* section however, older workers comprised about 33% of the agricultural workforce compared to 13% of the total employment. In all industries, the majority of deaths were incurred by those 25-54 years of age (68%). In agriculture, 38% of the total deaths were incurred by farmers and farm workers 25-54 years of age.

From 1992 to 2004, older farmers and farm workers (55 years and older) had a fatality rate of 45.8 per 100,000 workers, which was 1.8 times the overall agriculture production rate of 25.4 and 2.6 times greater than the rate for farmers and farm workers 54 years and younger (Figure 2). Although rates fluctuated from year to year, the risk over time for workers of all ages has not changed from 1992 through 2004. The largest number of deaths to farmers 55 years and older was in the Midwest and South (Figure 3). The highest fatality rate occurred in the Northeast (66.0 per 100,000 workers), closely followed by the Midwest (57.7 per 100,000 workers). Most (67% or 2,467) of the fatalities to farmers 55 years and older occurred on crop farms, and 28% (1,009) occurred on livestock farms (type of farm was unknown for 5% of the cases). The fatality rate for older farmers was 3 times higher on crop farms (70.3 per 100,000 workers) than on livestock farms (22.7).

Tractor-related incidents accounted for almost half (46%, 1,702) of the fatal work-related injuries to older farmers. Also common incidents for farmers 55 years and older were trucks (7%, 272), animals (5%, 201), agriculture harvesters (3%, 121), and agriculture mowers (3%, 117). Tractor overturns comprised 44% of the 1,702 tractor-related deaths. Fall from and struck-by incidents accounted for an additional 13% of the tractor incidents. Similarly, overturns and fall from and struck-by were the leading causes of fatal occupational injury (56% of the 117 deaths) involving

Table 1. Average annual non-fatal injuries and injury rates in agriculture production in the U.S., 2001 and 2004.

	20-54 Years Old		55+ Years Old		Age Unknown
	Number	Rate*	Number	Rate*	Number
Total	52,715	4.6	26,573	4.5	4,652
U.S. Regions	Number	Rate*	Number	Rate*	Number
Northeast	2,667	2.9	1,070	2.7	467
Midwest	18,678	5.3	9,516	4.3	1,119
South	20,220	5.7	11,766	5.5	874
West	11,152	3.2	4,222	3.8	2,192
Nature of Injury	Number	%	Number	%	Number
Fracture	9,222	17.5	5,449	20.5	87
Sprain/Strain	11,928	22.6	4,715	17.7	450
Multiple	4,980	9.5	4,556	17.2	195
Cut	8,220	15.6	4,277	16.1	286
Bruise	6,485	12.3	2,770	10.4	33
Other	11,880	22.5	4,806	18.1	3,601
Days of Restricted Work Activity	Number	%	Number	%	Number
None	6,529	12.4	3,722	14.0	184
<1 day	7,731	14.7	3,111	11.7	50
1 – 6 days	16,952	32.2	5,205	19.6	257
7 – 13 days	3,977	7.5	1,651	6.2	0
14 – 27 days	2,786	5.3	1,952	7.4	39
1 – 3 months	7,626	14.5	5,447	20.5	41
> 3 months	6,601	12.5	5,161	19.4	165
Unknown	513	1.0	323	1.2	3,916
Number of Days Hospitalized	Number	%	Number	%	Number
1 – 7 days	7,477	89.4	3,593	68.3	76
8 – 14 days	544	6.5	539	10.3	20
15 – 21 days	109	1.3	545	10.4	0
> 21 days	0	0	164	3.1	0
Unknown	230	2.8	416	7.9	70

* Rate per 100 workers

Source: NIOSH Occupational Injury Surveillance of Production Agriculture

agricultural mowers. Truck-related deaths were most often highway collisions (52%), and deaths involving agriculture harvesters occurred most often as a result of being caught-in the equipment (40%).

Tractor-related incidents investigated through the NIOSH FACE program were reviewed to obtain additional information not otherwise available through OISPA or CFOI. Between 1992 and 2001, 44 deaths to farmers 55 years and older involving tractor rollovers were investigated. Of these 44 deaths, 40 of the tractors did not have a rollover protective structure (ROPS), two

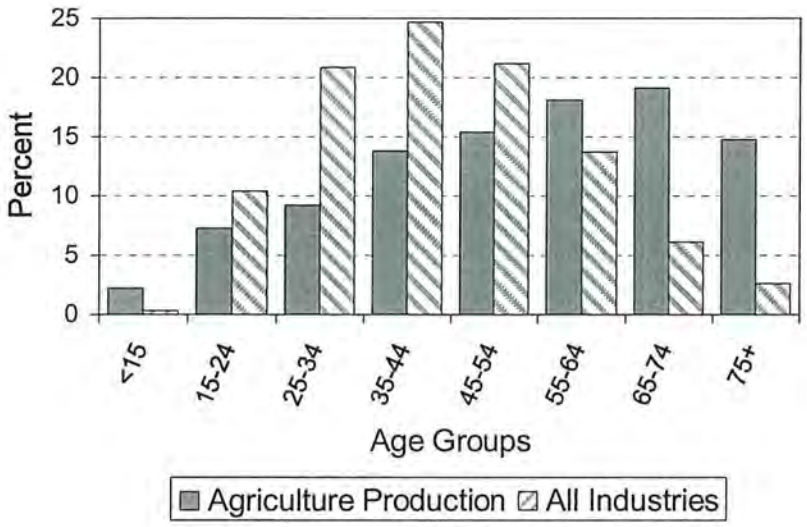

Figure 1. Occupational deaths by age group for agriculture production and all industries, U.S. 1992-2004.
Source: BLS Census of Fatal Occupational Injuries (data excludes N.Y. City)

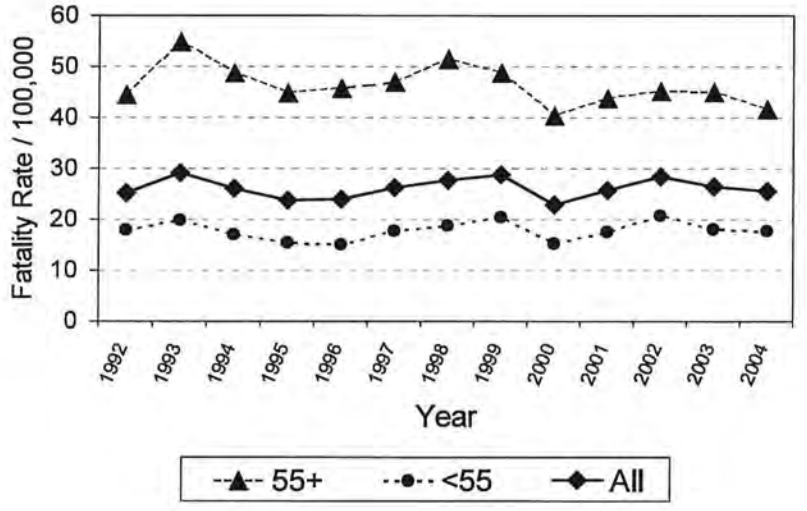

Figure 2. Agriculture production fatality rates by age and year, U.S. 1992-2004.
Source: BLS Census of Fatal Occupational Injuries (Data excludes N.Y. City. Rates calculated by NIOSH and may differ from those published by BLS.)

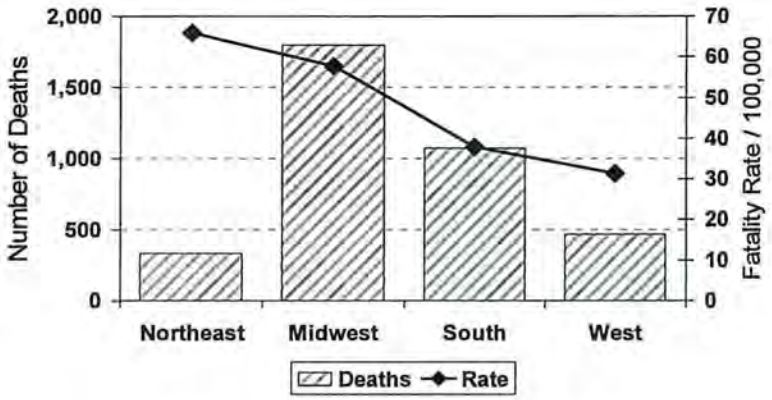

Figure 3. Number of deaths and fatality rates for farmers and farm workers 55+ years of age by region of the country, U.S. 1992-2004.
Source: BLS Census of Fatal Occupational Injuries (Data excludes N.Y. City. Rates calculated by NIOSH and may differ from those published by BLS.)

had a ROPS, and information was unavailable for the remaining two incidents. Of the rollover fatalities on tractors without ROPS, 15% of the tractors were manufactured in the 1940s or earlier; 50% in the 1950s and 1960s; 30% in the 1970s; and 5% in the 1980s. Of the two deaths that occurred on tractors with ROPS, one tractor had a cab but the farmer was not wearing a seatbelt; on the other tractor, the ROPS was folded over and not in the upright position. One of these ROPS-equipped tractors was manufactured in the 1960s and the second in the 1980s.

Discussion

Data Summary and Comparison to Other Studies

Based on a review of previous studies, a major finding was the lack of consistency in how older workers are defined, how an injury is defined, and the degree to which comparisons have been made within older worker populations and between older workers and younger worker populations. Previous work defined older workers as anyone as young as 50 years, but generally start at or around 60 years of age. The data sources for non-fatal injuries in these studies varied, including farm operator surveys, workers' compensation claims, emergency department records, and hospital discharge records. Sources of data for fatal work injuries were also variable, including death certificates, newspaper clippings, and medical examiner reports. Despite these differences in definitions and data sources, strong associations between age and work injuries emerged. In general, the risk for all occupational injuries decreases with age; however, this pattern levels out, then gradually reverses as the severity of the injury increases, culminating in a clear positive association between fatal work injury risk and age.

The findings presented here agree well with the overall view of the association between age and occupational injury risk. The results of the OISPA survey confirm previous studies of non-fatal

injuries, showing that older workers overall are at somewhat lower or equal risk of non-fatal injuries, but have an increasing risk as the severity of the injury increases (Alexander et al., 1999; Blahey and Alberg, 1993; Castillo and Rodriguez, 1997; Gelberg et al., 1999; Hanford et al., 1982; Hartling et al., 1997; Hartman et al., 2004; Hoskin et al., 1988; Layne and Landen, 1997; Layne and Pollack, 2004; Mitchell, 1988; Pickett et al., 2001; Root, 1981; Turner et al., 2000). Major types of injury causes for older farmers and farm workers identified in the current study also agree with previously published literature, with falls and animals being common issues for older workers (Browning et al., 1998; Gelberg et al., 1999; Hanford et al., 1982; Hartman et al., 2004; Hwang et al., 2001; Layne and Landen, 1997; Lewis et al., 1998; Nordstrom et al., 1996; Park et al., 2001a; Pickett et al., 2001; Sprince et al., 2003; Xiang et al., 1999).

For fatal injuries, the results presented here reaffirm the findings of previous researchers that report a clear increase in the risk of fatal injury with age for all workers (Alexander et al., 1999; Castillo and Malit, 1997; Feyer et al., 2001; Kisner and Pratt, 1997; Marsh and Layne, 2001; Loomis et al., 2003; Mitchell, 1988; Personick and Windau, 1995; Pratt et al., 1996; Root, 1981; Rossignol, 1994; Salminen, 2004; Toscano and Windau, 1994), a pattern that is even more pronounced in the agricultural production industry (Fiedler et al., 1998; Hanford et al., 1982; Hard et al., 1999; Hard et al., 2002; Hoskin et al., 1988; Kisner and Pratt, 1997; Meyer, 2005; Mitchell et al., 2002; Myers, 1989; Myers, 1990; Myers and Hard, 1995; Pickett et al., 1999; Voaklander et al., 1999). In addition, the identification of farm tractor overturns as the single most common cause of fatal occupational injury for farmers and farm workers 55 years and older agrees with most prior studies of work-related farm deaths (Fiedler et al., 1998; Field and Purschwitz, 1987; Gelberg et al., 1999; Hard et al., 1999; Hard et al., 2002; Hayden et al., 1995; Kisner and Pratt, 1997; Meyer, 2005; Mitchell et al., 2002; Murphy, 1985; Murphy, 1990; Murphy and Ambe, 1996; Murphy and Kassab, 2001; Myers, 1989; Myers and Hard, 1995; Pickett et al., 1999; Purschwitz and Field, 1986; Voaklander et al., 1999).

Risk Perception and Safety Beliefs

Despite the increased risk of fatal and severe non-fatal injuries identified for older farmers, risk perceptions and safety beliefs of older farmers are usually similar to their younger counterparts. Perceptions of risk, however, are not always concordant with safety beliefs, self-reported preventive health behaviors, safe work practices, or the results reported in the injury/fatality literature.

Wadud et al. (1998) examined beliefs and preventive practices among farmers for hearing loss, respiratory disease, and skin cancer. Overall, farmers most likely to take preventive actions (1) were personally concerned with these three health problems; (2) believed they were preventable; and (3) identified fewer obstacles to using precautions (Wadud et al., 1998). Older age (60 years and older) was a significant predictor of non-use for both hearing and breathing protection, but not skin protection as shown in a multivariate analysis when adjusting for age and education (Wadud et al., 1998). Other studies have also reported lower appreciation for personal protective health equipment such as respirators or hearing protection among older farmers (Hwang et al., 2000).

Another study compared farmers' risk assessment to their safety beliefs and self-reported work practices (Whitman and Field, 1995). Overall, older farmers scored higher on perceptions of risk than their younger counterparts. Examining the farmers' perceptions of risk, farmers of all ages rated stepping over power take-offs (PTOs), moving equipment around power lines, allowing child riders, and entering confined spaces as being more dangerous than operating a tractor without a ROPS (Whitman and Field, 1995). Compared to younger farmers, the largest difference in scores for older farmers was due to higher rating of perceived risk for tractor activities, including children riders, operating a tractor without a ROPS, and working near ponds and ditches (Whitman and Field, 1995).

Among older farmers, discordance becomes apparent when risk perceptions are compared to safety beliefs and actual work practices. While 83% of older farmers reported that tractor-related injuries are severe and 88% agreed that ROPS are effective in tractor overturns, only 26% said the cost of installing a ROPS outweighed the safety benefits. Additionally, older farmers had a high level of confidence in their ability to operate tractors, with 56% reporting that their personal knowledge compensated for loss of physical ability due to age, 69% maintaining that they have the ability to prevent serious tractor injuries, and 33% disagreeing that they were at greater risk when operating a tractor compared to people 20 years their junior (Whitman and Field, 1995). Despite believing ROPS to be effective, self-reported work practices indicated that older farmers are more likely than their younger counterparts to operate non-ROPS tractors, the cause of the largest proportion of work-related deaths among older farmers. Other studies have noted discordance between the perceived risk of particular work tasks or machines and the proportion of fatalities attributable to each (Fiedler et al., 1998;), and that older workers are less likely to make safety-related changes to their work routines (e.g., use of different chemicals or changes to equipment for safety purposes) (Hwang, et al., 2000). Zwerling et al. (2001) reported that middle-aged (45-64 years) and older (65 years and older) male farmers were less likely to report using a seatbelt than non-farmers, but reported no difference for female farmers.

Smaller Farms, Partial Retirement and Older Equipment

There is a general belief that as farmers age, the farm responsibilities are handed down to the next generation with younger family members becoming co-principal operators. But "succession farming" may now be an exception as the majority of older farmers start scaling back prior to retirement (Gale, 1994). The farmer's life cycle model states that capital accumulation, investments, and farm size increase through growth and survival stages of farming, but decrease among older farmers as they approach the exit stage of farming. The average size of a farm for a 20-year old is half that of a farmer 45 years old. Farm growth stops at about age 50, and the average farm size for a 65-year old is about two-thirds that of a 45-year old (Gale, 1994). Data from the 2002 Census of Agriculture also demonstrated that by acreage, the largest farms were operated by middle-aged farmers, while older farmers had mid-sized operations (Allen and Harris, 2005). These data also showed that older farmers have lower farm income, with the value of agricultural products sold usually less than $50,000 compared to greater than $100,000 for their middle-aged counterparts (this relationship also held when government payments were combined with sales).

This scaling back prior to retirement, also referred to as the "disinvestment" stage, implies that older farmers are no longer expanding the farm's base resources such as purchasing new tractors

and machinery (Gale, 1994). This would help explain observations in the literature that suggest older farmers are more likely to operate older tractors (Gelberg et al., 1999; Sanderson et al., 2006; Voaklander et al., 1999). Myers and Snyder (1995) reported that three-quarters of tractors 20-29 years old lacked ROPS, and ROPS were virtually nonexistent on tractors 30 years and older. Tractor rollovers account for the largest majority of older farmer deaths (Hard et al., 1999; Meyer, 2005; Mitchell et al., 2002; Murphy and Ambe, 1996; Murphy and Kassab, 2001; Myers, 1989; Myers et al., 1998; Vaoklander et al., 1999). The second most common type of tractor related death is falling from the tractor and being run over (Hard et al., 1999; Murphy, 1985; Murphy and Ambe, 1996; Murphy and Kassab, 2001; Myers et al., 1998). In this study, 46% (1,702) of all work-related deaths to older farmers involved a tractor. Overturns comprised 44% of the total tractor-related incidents and fall from and struck-by incidents accounted for an additional 13%. Clearly, ROPS protection used in conjunction with a seatbelt would eliminate nearly all of these incidents.

Tractor longevity suggests that many older farmers will continue operating tractors without ROPS for decades into the future because older farmers are more likely to operate older tractors rather than purchasing newer equipment. The average age of tractors in 1993 was 23 years, with 13% of the tractors being 40 years or older (Myers and Snyder, 1995). In 2001, the average age of a tractor had increased to 26 years (Myers, 2003). Although older tractors without ROPS are used less as they age, the tractors are not taken completely out of service as they average 120 to 140 hours of use per year (Myers and Snyder, 1995). Myers and Snyder (1995) previously estimated that the cost per life saved for retrofitting tractors was estimated at $825,000 (Myers and Snyder, 1995). New cost-effective rollover protective structure (CROPS) designs are currently being developed that are as effective as existing ROPS retrofits, and can be installed for half the cost of standard ROPS retrofits. It has been estimated that the installation of CROPS retrofits instead of the standard ROPS would reduce the net cost of preventing an injury by nearly 75% (Owusu-Edusei and Biddle, 2007a and 2007b).

Only one exception was found in the literature reporting that older farmers were not more likely to operate older tractors. Whitman and Field (1995) found no difference in the age of the primary tractor among older farmers (60+ years old) and their younger counterparts. They reported that about 25% of primary tractors used by older farmers were manufactured in 1986 or later, compared to about 28% for farmers younger than 60 years of age. It is unknown why these findings differ from the general literature, but it could be related to their sample from a national magazine, the use of categorical analysis for tractor age, or possibly the examination of the primary tractor rather than the entire tractor fleet. Their findings, however, were consistent with previous studies that showed tractors of older farmers were more likely not to have ROPS. Only 42% of primary and 32% of secondary tractors for older farmers had ROPS compared to about 55% and 42% for primary and secondary tractors among younger farmers (Whitman and Field, 1995).

Lastly, in addition to succession farming as an exception to the farmer's life cycle model, some older farmers do not enter farming until advanced ages. Many of these older entrants in farming are working part-time or as "retirement" farmers. These farms differ from general agricultural patterns in that they grow in value at a slower rate than those belonging to younger farmers (Gale, 1994). Several studies have cited older farmers continuing to work into retirement years

and the lack of a mandatory retirement age in the farming industry as possible sources of increased morbidity and mortality (Browning et al., 1998; Mitchell et al., 2002; Stueland et al., 1996; Voaklander et al., 1999).

Large Animals and Falls

A previous study found that older farmers were more likely to be found in beef cattle, orchard, and "other crop" (e.g., hay) operations (Allen and Harris, 2005). The higher proportion of older farmers remaining in beef cattle operations appears consistent with the high non-fatal injury incidents related to large animals (Browning et al., 1998; Carstensen et al., 1995; Hartman et al., 2004; Murphy and Ambe, 1996; Pickett et al., 2001; Sprince et al., 2003; Xiang et al., 1999). In the current study, animal related incidents accounted for 10% of the non-fatal injuries and 5% of the fatalities. The non-fatal injury rate among older farmers on livestock operations (5.3 per 100 workers) was higher than the injury rate for crop operations (3.3).

Several studies have reported that older workers are not at increased risk for fall related incidents, but that they are at an increased risk for more severe injury from the falls (Gelberg et al., 1999; Hanford et al., 1982; Layne and Pollack, 2004), and are more likely to result in a fracture, hospitalization, and increased lost work days (Browning et al., 1998; Castillo and Rodriguez, 1997; Hanford et al., 1982; Layne and Landen, 1997). Other studies have reported older workers to be at increased risk of falls (Nordstrom et al., 1996; Root, 1981). Previous studies have found that falls among older farmers are typically from equipment (e.g., from tractors) and in or from buildings, such as when hanging tobacco (Browning et al., 1998; Murphy and Ambe, 1996; Pickett et al., 2001). In the current study, 30% of non-fatal injuries to older farmers were falls, with 15% of the total classified as falls to the same level and 14% as falls from height.

Medical-related Issues

Although data sources included in this study were not extensive enough to allow in-depth exploration of risk factors that contributed to an incident, the literature addresses a number of psychological and physical factors that are often associated with injuries among older workers in general and older farmers in particular. Factors cited in the literature include stress and depression, physical changes related to the normal aging process, and the use of medications to treat pre-existing diseases and conditions.

A perceived notion exists that stress is of particular concern for older farmers. While certain studies agree that farming is a particularly stressful occupation (Olson and Schellenberg, 1986) and that the presence of stress and depression are likely to increase the risk of injury (Elliott et al., 1995; Park et al., 2001b; Xiang et al., 1998; Zwerling et al., 1995), studies that considered age have found stress is a much more critical issue among younger farmers (Elliott et al., 1995; Schulman and Armstrong, 1989; Stallones et al., 1995; Xiang et al., 1998; as cited in Walker and Walker, 1987). Whereas older farmers are more likely to be impacted by major life changes (e.g., retirement, loss of spouse) (Murphy, 1985; Walker and Walker, 1987), their younger counterparts are more likely to have increased stress due to the financial uncertainties, and the uncontrollable and unpredictable nature of farming (Elliott et al., 1995; Simkin et al., 1998; Stallones et al., 1995). The literature also suggests that there is a strong association between depression and back pain among farmers (Huiyn et al., 1999; Park et al., 2001b); however, back

pain episodes appear to decrease with increasing age (Huiyn et al., 1999; Park et al., 2001b), further suggesting a potential disassociation between stress and older farmers. Stallones et al. (1995) suggested that depressive symptoms (often caused by stress) were lower in the farm population than in the general population, further dispelling the notion that stress is a particular concern among older farmers.

Although the true impact of aging on occupational capacity is unclear (Wegman, 1999), studies have shown that injury outcomes become more severe, that the ability to recover from an injury is greatly reduced as age increases (Personick and Windau, 1995; Pickett et al., 1999; Pransky et al., 2005; Purschwitz and Field, 1986; Voaklander et al., 1999), and that prior injuries may increase the risk of future injuries (Browning et al., 1998; Voaklander et al., 2006). Likely risk factors include physical changes such as decreased vision, hearing, and musculoskeletal functioning that occur as a result of an injury or as part of the natural aging process (Karlovich et al., 1988; Rossignol, 1994). Both agricultural and non-agricultural studies have suggested that these physical changes may slow reaction time and negatively impact dexterity, crucial characteristics in most farm settings (Murphy, 1985; Zwerling et al., 1995). Furthermore, researchers have shown that the risk of farming-related injury increases for those with existing physical or musculoskeletal impairment, disease, or other health problems (Hwang et al., 2001; Lewis et al., 1998; Purschwitz and Field, 1986; Sprince et al., 2003; Voaklander et al., 1999; Xiang et al., 1999; Zwerling et al., 1995; Zwerling et al., 1996; Zwerling et al., 1997). Unless these problems are brought on quickly by disease or injury, most of these changes occur slowly and may be ignored until they progress to a disabling state (Murphy, 1985; Wadud et al., 1998). These factors could be offset, or at least minimized, by the use of personal protective devices, but as suggested earlier, studies agree that older farmers are not likely to use safety equipment such as hearing and breathing protection (Hwang et al., 2000; Wadud et al., 1998). In fact, one study found that over half of the senior farmers believed that their knowledge and experience compensated for any age-related physical disabilities (Whitman and Field, 1995).

The use of medications may also adversely affect reaction times and dexterity, thus increasing the risk of injury. Studies confirm a significant association between injury and the use of medication (Sprince et al., 2003; Voaklander et al., 1999; Voaklander et al., 2006; Xiang et al., 1999). Farmers experiencing limited mobility as a result of injury or joint pain (Sprince et al., 2003; Voaklander et al., 2006) may use medication to alleviate or reduce symptoms; however, these medicines have been shown to reduce attention to the surrounding environment, thus elevating the risk of injury (Voaklander et al., 2006). The fact that people in rural areas often do not have access to comprehensive rehabilitation services may lead to an increased number of persons being prescribed pain medications, which could further exacerbate this problem (Voaklander et al., 2006).

In a few studies, age was actually found to be a protective factor against back pain and injuries (Huiyn et al., 1999; Park et al., 2001a; Park et al., 2001b; Xiang et al., 1998; Zwerling et al., 1997). Huiyn et al. (1999) and Park et al. (2001b) suggest that the difference in outcomes by age may have been due to the "healthy worker effect." In other words, older farmers included in these studies may be among those who did not experience injury or pain when they were younger and were therefore more likely to remain in farming.

Education and Prevention

Although the results of this study support the longstanding need to focus prevention efforts on machine safety, fall prevention, and safe animal handling strategies, studies suggest that older farmers are not as likely as their younger counterparts to use protective devices and are often unwilling to make changes to improve the safety of farm operations (Hwang et al., 2000; Wadud et al., 1998). Also, Witte et al. (1992-1993) reported that although farmers recognize the potential severity of equipment-related incidents, they believe themselves to be invulnerable (Witte et al., 1992-1993). Furthermore, older farmers often resist change and outside interventions (Pickett et al., 1999). This suggests that creating effective safety and health programs for older farmers requires a more thorough understanding of their beliefs and values and that injury prevention programs must creatively encourage and reinforce voluntary adoption of safe work behaviors and practices (Whitman and Field, 1995). It has previously been reported however, that farmers' motivation for attending adult education programs was for economic reasons, such as learning the latest technology to increase profitability (Dollisso and Martin, 1999).

Studies suggest the use of non-traditional venues such as farm magazines and equipment dealers to communicate and convey safety information to farmers (Ambe and Murphy, 1995; Wadud et al., 1998; Whitman and Field, 1995). Ambe and Murphy (1995) suggest that a more effective training program for tractor operators specifically include input from aged operators, their families, and the institutions that serve them from initial planning stages to program delivery. These revised prevention practices could be broadly applied to all older farmers, not just tractor operators.

Study Limitations

The information presented here is not without certain limitations. There are several limitations to the results presented from the OISPA surveys. A major limitation is that the injuries reported came directly from the farm operator, and the recall period for an injury in these surveys could be up to 15 months. While the injury definition was for more severe cases, which may be easier to recall, there is still the possibility that a reportable injury was not remembered by a respondent. Because of these two issues, there is some degree of undercounting associated with the OISPA due to the farm operator not reporting an injury event. Reluctance to report an injury, not recognizing that an injury event met the survey reporting criteria, or not remembering an injury event may be reasons for non-reporting. Second, the fact that the accuracy or completeness of the survey responses could not be verified may have introduced some response bias into the overall results. Third, this survey did not include injuries that occurred to contract farm workers. A final limitation is the possibility of a non-response bias. Due to the survey design, however, it was not possible to make a second contact to farm operators who refused to participate in the survey. This design feature did not allow for a follow-back questionnaire to assess the non-responses.

For the fatality data presented here, the CFOI is the most complete census of fatal work-related injuries conducted in the U.S. Most limitations related to CFOI deal more with how an occupational injury is defined, or in instances where no official records exist to document a fatality or that it was occupational in nature. First, less than 5% of CFOI cases could not be verified by a second source; however, because initial source documents provided sufficient job-

related information, the cases were included perhaps leading to a slight overestimation. Conversely, the exclusion of unsubstantiated or misidentified cases might have resulted in an underestimation. FACE data also have several limitations. The case-based surveillance approach of FACE does not lend itself to the investigation of all occupational deaths. As such, it represents a convenience sample of occupational deaths that meet priorities set by NIOSH or the states conducting investigations of these deaths. Still, these investigations are valuable in providing a depth of detail not available through other surveillance approaches. Here, much of the FACE conclusions are supported by other data sources, suggesting these results are valid, if somewhat incomplete.

Finally, the denominator used in this study is not perfect. The CPS relies on data provided directly by the person responding to the survey, which does add some degree of subjectivity on how the industry and occupation data are reported. In addition, because the data used here are based on the primary industry of the employed person, individuals that do farm work as a second job are likely to be undercounted. Third, because the CPS is administered by telephone, it undercounts farm workers that do not have a telephone, or are transient in nature. Finally, while possible, this study did not use hours of work as a denominator, which previous studies have shown is associated with the age of the worker. The impacts of these limitations likely lead to an underestimate of the number of workers under the age of 55, as well as overstate the exposure of farmers and farm workers 55 years and older.

Conclusion

Workers 55 years old and older represent a significant and increasing proportion of the agricultural production industry's labor force. This demographic shift in the labor force may result in a decrease in the overall number and incidence rate of occupational injuries reported within this industry. The evidence from this study and many others find that older farmers and farm workers have lower overall injury risk compared to workers less than 55 years of age. Yet the findings from this study, which are strongly supported by the work of others, show that injuries in this aging farm work force appear to be much more severe. This is especially true for occupational fatalities, where the fatality rate for farmers and farm workers 55 years and older was found to be 2.6 times higher than that for those under the age of 55.

Addressing this requires intervention programs that target the primary causes of injury for these older workers. These data point to programs to prevent non-fatal injuries associated with falls (both from an elevation and on the same level), struck by incidents associated with hand tools, and assaults by animals, especially cattle. For fatal injuries, intervention programs must address deaths associated with farm tractors, especially overturn-related events. These causes of fatal and non-fatal injury are repeatedly identified in the literature as major issues for older workers.

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ASH NET
Agricultural Safety & Health Network

Mission:

Catalyzing the development, implementation, and evaluation of grass-roots community-based programs for agricultural health and safety.

The Aging Farm Community:
Using Current Health and Safety Status to Map Future Action

Proceedings (pdf)

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Using History and Accomplishments to Plan for the Future:
A Summary of 15 Years in Agricultural Safety and Health and Action Steps for Future Directions

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In the early 1990's, the W.K. Kellogg Foundation began funding a group of projects to address the unacceptable levels of agricultural injuries and illnesses. Today, eleven projects continue to disseminate both their individual project information and the collective lessons learned. This group is known as ASH-NET.

The organizations participating in ASH-NET represent a myriad of innovative educational and community-based programs, which address various agricultural safety and health issues. By sharing information about these programs, the group hopes to encourage further program development and research benefiting farmers, farmworkers, and their families.

>>Goals of ASH-NET

1.Advocate for policy that improves agricultural safety and health.

2.Bolster national focus on community-based agricultural safety and health issues.

3.Disseminate lessons learned form community-based interventions that target diverse agricultural populations.

4.Promote information exchange and linkages among individuals, agencies, organizations, and academic institutions.

5.Encourage further program development and research benefiting farmers, farm families, and farmworkers.

>>Areas of Focus

Facilitating community-based participation in identifying and addressing rural and agricultural health and safety issues.

Develop educational and training materials and implement programs in English and Second Languages on rural and agricultural health and safety topics for all those working in agricultural production. These include owner-operators, women, the disabled, the young and elderly, farmworkers and their families.

Utilize culturally sensitive methods that foster active participation in assessing health service needs and training seasonal and migrant farmworkers as health and safety trainers.

Advocate for policy change/implementation on behalf of the agricultural community.

Compile and present appropriate health and safety education to health professionals.

Provide rural and agricultural populations with assessment and management techniques for physical and emotional disabilities.

Enhance the role of farm women and farmworker women as safety and health advocates.

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