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Will Risks to Older Workers Change in the 21st Century?

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ABSTRACT

Workers aged 65 and older face different risks than those in younger age groups. The occupational fatality rate for this group (13.6 per 100,000 workers) during 1980–1995 was almost three times greater than the rate for workers aged 16 to 64. This study projects the traumatic occupational fatality experience for the ten occupations with the largest number of occupational fatalities for workers 65 years and older. Although the occupational fatality rate for workers 65 years and older is projected to decrease from 12.5 in 1995 to 11.5 in year 2008, the number of occupational fatalities for this group is projected to increase from 459 in 1995 to 518 in year 2008. The overall proportion of occupational fatalities experienced by workers in the 65 years and older age group is expected to increase from 7% in 1995 to 10% in 2008. To assist in developing the most effective interventions, the five leading external causes of death associated with these fatalities were estimated for year 2008. With the aging of the American workforce, more research is needed in areas concerned with protecting older workers from injury.

Key Words: aging workforce, occupational fatalities, dangerous occupations.

INTRODUCTION

The growth of the older population, combined with the projected increase in their labor force participation rates, will result in an older working population in the near future. Furthermore, research has found that risks faced by older workers are much different than those of other age groups (Kisner and Pratt 1999, 1997). Projecting risks to this older worker population in the next decade will help policymakers set priorities for research and prevention efforts.

The civilian labor force, or the number of available workers, has expanded considerably over the last quarter century. According to the Bureau of Labor

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Statistics (BLS), the number of available workers will increase by 17 million between 1998 and 2008. Furthermore, the share of the civilian labor force that is 65 years and older is also increasing slightly—rising from the 1998 level of 3,847,000 (2.8% of the labor force) to 4,645,000 (3.0% of the labor force) in 2008 (Fullerton 1999a).

BLS expects the civilian labor force participation rate — “a measure of the proportion of a population group in the labor force” — for those aged 65 and older to increase from 12% to 13% between 1998 and 2008. Reasons for this predicted increase for workers 65 years of age and older include increased life expectancies, improved health conditions of aging populations, a switch from defined benefit to defined contribution retirement plans, the scheduled increase in the normal retirement age for Social Security (Fullerton 1999b; Wiatrowski 2001) and the overall strength of the economy (Purcell 2000). The influx of the “Baby Boomer Generation” will contribute to even greater increases in workers aged 65 years and older, starting in year 2011. The period of time between 2011 and 2029 will witness the entrance of the complete range of the “Baby Boomer Generation” into the 65 years and older age group. This trend may reverse after the “Baby Boomer Generation” leaves the workforce and employment levels are dependent on birth rates associated with the next generation.

Data from the National Traumatic Occupational Fatalities (NTOF) surveillance system indicate that during 1980 through 1995, the fatality rate for workers aged 65 and older (13.6 per 100,000 workers) was almost three times greater than the rate for workers aged 16 to 64. Furthermore, workers aged 65 years and older had a disproportionate share of traumatic occupational fatalities. On average, this age group comprised just under 3% of the workforce, while experiencing more than 7% of the occupational fatalities annually.

The aging workforce and changes in occupational fatal injuries present a unique and challenging issue for public health researchers. With steadily increasing employment numbers predicted for workers aged 65 and older — from 3.8 million in 1998 to 4.6 million in 2008 — the fatality experience of workers in this age group will become increasingly significant for the national occupational safety and health experience. This paper highlights the changing age composition of the American workforce and some of the areas of concern related to fatalities.

METHODS

The data were extracted from the National Traumatic Occupational Fatalities (NTOF) surveillance system for 1980 through 1995, which was the entire period available at the time this study was conducted. Maintained by the National Institute for Occupational Safety and Health (NIOSH), NTOF is a census composed of death certificate information obtained annually from vital-statistics-reporting units in the 50 states, New York City, and the District of Columbia. Inclusion criteria for NTOF stipulate that the decedent must have been 16 years of age or older, the external cause of death was an injury according to the International Classification of Diseases-9th Edition (ICD-9), codes E800-E999 (WHO 1977), and the “Injury at Work?” item was marked with a positive response.

According to previous analysis of inherent limitations in using death certificates to determine work-related fatality information, death certificates identify an average of 80% of all work-related fatalities (Jenkins *et al.* 1992; Russell and Conroy 1991;

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Stout-Weigand 1988). Additionally, a 1994 study indicated that the “reporting of work-relatedness by coroners is poor for female and older workers” (Kraus *et al.* 1995). Therefore, frequencies presented in this study should be considered minimum counts for workers aged 65 years and older.

The industry and occupation recorded on the death certificate are the “usual” industry and occupation of the decedent. Industry was grouped into 11 division-level categories as defined by the 1987 Standard Industrial Classification system (OMB 1987). Occupation was categorized into 11 major divisions according to the 1980 and 1990 Bureau of the Census (BOC) Occupational Classification Systems (BOC 1982; BOC 1992).

Data from the NTOF surveillance system were used to identify the ten occupations that experienced the highest frequency of occupational fatalities for workers aged 65 years and older from 1980 through 1995. This list includes nine occupation categories with the largest number of deaths for the entire period (1980 through 1995) as well as a category (food and lodging managers) that experienced a substantial number of deaths since its introduction as a new coding category in 1992 (Table 1).

The denominators used to compute fatality rates were derived from unpublished data from the Current Population Survey (CPS), conducted by the Bureau of Labor Statistics (BLS 1990 to 1998). These unpublished data, employment levels by detailed occupations, were obtained from BLS by request. Data from this survey are based on annual averages from the civilian population aged 16 years and older. For purposes of this study, military fatalities were excluded from NTOF data to facilitate conformity with BLS unpublished employment data from the CPS program.

For this study, methods from a similar 1999 study were modified to derive the impact of the older worker on the workforce (Biddle and Blanciforti 1999). The projected employment for the ten selected occupations was calculated by applying the percent change in employment between the 1998 and 2008 labor force projec-

Table 1. Occupations with the largest number of traumatic occupational fatal injuries — workers 65 years and older, 1980–95.

| Rank | Occupation | Number of Fatalities |
|------|-------------------------------|----------------------|
| 1 | Non-horticultural farmers | 2126 |
| 2 | Supervisory sales occupations | 487 |
| 3 | Truck drivers | 307 |
| 4 | Non-construction laborers | 145 |
| 5 | Carpenters | 126 |
| 6 | Farm workers | 120 |
| 7 | Food and lodging managers | 27* |
| 8 | Construction laborers | 115 |
| 9 | Janitors and cleaners | 107 |
| 10 | Private guards and police | 86 |

*Food and lodging managers experienced the seventh largest number of deaths since its introduction as a BOC coding category in 1992.

tions (Braddock 1999) to the CPS 1998 counts. The average rate of change within the CPS data for each of the selected occupations over the 9-year period was applied to the projected year 2008 counts by occupation to determine the distribution by age within each selected occupation.

Similarly, the projected year 2008 fatality rates were the average percent change in fatality rates for workers aged 65 years and older in the selected occupations over the years 1980 through 1995. These projected 2008 fatality rates were applied to the projected 2008 employment levels for this age group within each selected occupation to derive the projected fatality counts.

Estimates of the number of fatalities for each external cause of death within the selected occupations for the year 2008 were derived. The proportions of the leading external cause of death for workers aged 65 and older within each occupation were averaged over the 1980 through 1995 period. These averages were applied to the 2008 projected fatality counts for each of these occupations.

There are several limitations to the methodology used in this study, mostly related to assumptions regarding future patterns. For example, the rates of change for employment and fatality were assumed to remain constant. Although a formal sensitivity analysis was not conducted for this study, a rudimentary sensitivity analysis using a 10% change in the projected number of workers 65 years and older and a 10% change in the projected fatality rate for 2008 produced a nearly proportional 17% change in fatality numbers within each of the ten selected occupations. It was also assumed that the external causes of death would remain the same. Furthermore, improvements in health and function for older workers and technological advances that would accommodate the needs of this special population of workers are not incorporated into the methodology.

RESULTS

Although workers aged 65 years and older accounted for just under 3% of the civilian labor force, they experienced more than 7% of the occupational fatalities between 1980 and 1995. Estimates for the year 2008 are that workers aged 65 years and older in the workforce will increase by a small percentage, accounting for just over 3% of the labor force, and occupational fatalities will increase by almost 3% to just under 10% of all fatalities.

Overall employment levels for the 65 years and older age group increased from just under 3 million workers in 1980 to 3.8 million in 1998. BLS estimates place this figure at the 4.6 million-worker level in 2008. Applying the 2008 fatality rate for workers 65 years and older, to worker fatalities for this age group produces an expected increase to more than 500 deaths (Table 2).

Linear projections using the 1980 through 1995 rate of change patterns projected into the future for workers aged 65 and older in ten selected occupations show that seven of these occupations are expected to have increased employment between 1998 and 2008 (Figure 1). The occupation category of carpenters is expected to maintain its employment numbers while the non-horticultural farmers and farm workers categories are both expected to decline in numbers.

The ten selected occupations accounted for almost 51% of the fatalities for workers aged 65 years and older during the 1980 through 1995 period. Five of the

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Table 2. Employment level and number and rate of traumatic occupational fatal injuries for workers 65 years and older, base year and 2008.

| | Base Year | Projected 2008 | Percent Increase |
|-------------------|-----------|----------------|------------------|
| Employment Levels | 3,800,000 | 4,500,000 | 18% |
| Fatalities | 459 | 518 | 13% |
| Fatality Rates | 12.5 | 11.5 | (8%) |

Note: Base year for employment is 1998 and fatalities is 1995

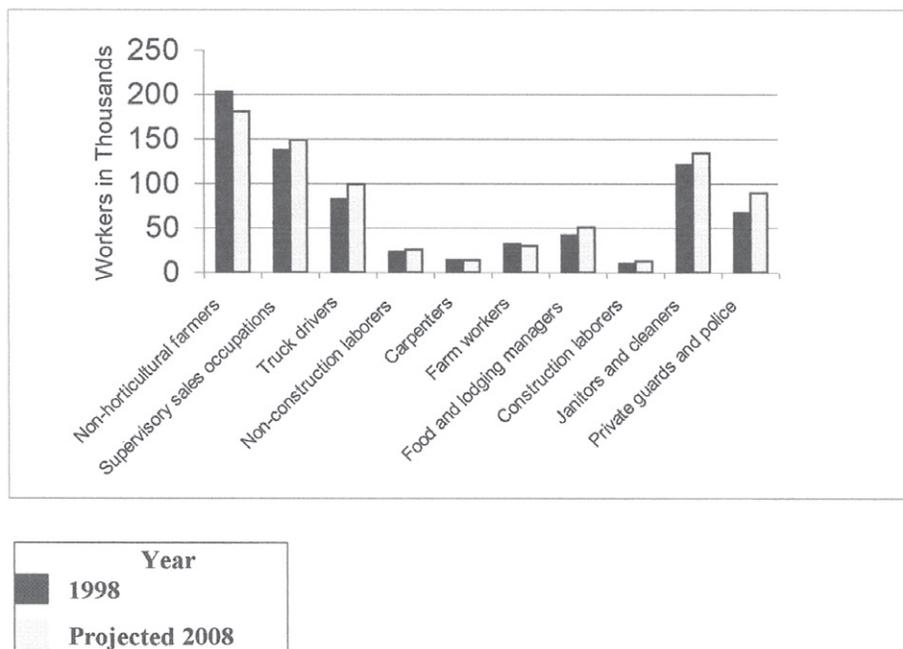


Figure 1. Employment levels of selected occupations for 65 years and older, 1998 and 2008.

ten selected occupations are expected to experience a higher number of fatalities in 2008 compared to 1995 (Table 3). The largest proportional increase in the number of expected fatalities for 2008 is in the occupation category of food and lodging managers, with an expected increase of 110%. The second largest occurs in the truck drivers category with an expected increase of 67%.

Six of the ten selected occupations are expected to experience higher fatality rates in 2008 compared with NTOF 1995 rates (Table 3). The occupation expected to experience the greatest increase in fatality rate is non-construction laborers with a projected increase of 50% in the fatality rate. The food and lodging managers category has the second largest projected fatality rate increase, a 30% rise, as well as experiencing the greatest increase in the number of expected fatalities. Despite the fact that the number of fatalities for farm workers is expected to remain the same, the rate is expected to increase by 25%.

Although those employed as private guards and police experienced one of the highest frequencies of fatalities between 1980 and 1995, the number of deaths in 1995 did not meet publication criteria. Therefore, the rates for this occupation were not projected for the year 2008.

External Cause of Death Category

For 1980 to 1995, more than three-fourths of all fatalities among workers aged 65 and older named the following five categories as the external cause of death: machines (27%), motor vehicles (19%), homicides (13%), falls (13%), and struck by falling object (5%). For the ten selected occupations, these top five leading

Table 3. Number and rate per 100,000 workers of traumatic occupational fatalities by selected occupations for workers 65 years and older, 1995 and 2008.

| Occupation | 1995 Frequencies | 1995 Rates | 2008 Projected Frequencies | 2008 Projected Rates |
|-------------------------------|---------------------|---------------|----------------------------------|----------------------------|
| Non-horticultural farmers | 129 | .49 | 85 | .47 |
| Supervisory sales occupations | 48 | .31 | 52 | .35 |
| Truck drivers | 29 | .44 | 47 | .47 |
| Non-construction laborers | 3 | .12 | 4 | .18 |
| Carpenters | 6 | .32 | 4 | .29 |
| Farm workers | 9 | .24 | 9 | .30 |
| Food/lodging managers | 7 | .23 | 15 | .30 |
| Construction laborers | 3 | .25 | 3 | .25 |
| Janitors and cleaners | 4 | .04 | 7 | .05 |
| Private guards and police | * | * | * | * |

*Rates not calculated for cells with fewer than three deaths.

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external cause of death categories accounted for between 71 and 89% of fatalities for workers 65 years of age and older.

Machine-related fatalities were the leading external cause of death for the 65 years and older age group for non-horticultural farmers, (54%), non-construction laborers (23%), and farm workers (39%). Almost two-thirds of truck drivers and one-quarter of construction laborers experienced fatalities as a result of motor vehicle crashes, the leading external cause of death for these occupation categories. Falls were the leading external cause of death for carpenters (42%) and janitors and cleaners (36%). Construction laborers experienced both falls (24%) and motor vehicles (24%) as the leading external causes of death. The leading external cause of death category for supervisory sales occupations (40%), private guards and police (47%), and food and lodging managers (63%) was homicides. Although struck by a falling object was not the leading cause of death for any of the selected occupations, it was among the top five leading external causes of death for workers aged 65 years and older.

For the ten selected occupations, the highest average rates (1990 through 1995) by external cause of death category paralleled the highest frequencies. Non-horticultural farmers (30.9 per 100,000 workers), non-construction laborers (10.5), and farm workers (7.1) experienced the highest fatality rates within the machinery-related external cause of death category. The highest fatality rates for truck drivers (19.5) resulted from motor vehicle crashes. Homicides had the highest rate among the leading external causes of death for food and lodging managers (14.0), supervisory sales occupations (10.3), and private guards and police (4.2). Construction laborers (26.0), carpenters (18.9), and janitors and cleaners (2.3) experienced falls at a higher rate than any other external cause of death category.

The projected number of deaths attributed to the leading external cause of death increased for some occupations and decreased for others. Although the number of machine-related traumatic occupational fatalities in agricultural occupations is projected to decrease from an average of 81 to 51, the number of deaths will be sufficiently high to remain an area of concern. Projections for motor vehicle fatalities within the truck driving occupation are projected to double. Similarly, homicides within the supervisory sales occupation category are expected to increase by 30% and almost quadruple within the food and lodging managers category.

DISCUSSION

This study focused on the occupational fatality effects associated with the 20% increase in labor force participation numbers predicted for the 65 years and older age group, between 1998 and 2008. Because of the significant increase in the U.S. birth rate during the years 1946 and 1964, the generation known as the "Baby Boomer Generation," the increase in older workers will likely continue until year 2029. With the maturation of the "Baby Boomer Generation" and an increasing retirement age, the 65 years and older age group's respective labor force participation numbers are expected to more than double between 1998 and 2025. BLS projects an increase of nearly 40% between 1998 and 2015, the year when the "Baby Boomer Generation" workers will be between the ages of 51 and 69. An additional 25% increase is predicted between 2015 and 2025, the year when this group will be

between the ages of 61 and 79. This constitutes an increase of 2.2% in the share of the civilian labor force that is aged 65 years and older.

The high fatality rate experienced by workers aged 65 years and older (13.6 per 100,000 workers) and the predicted increase in the share of the civilian workforce associated with workers 65 years of age and older will likely lead to a larger proportion of overall occupational fatalities within this age group. Because of the potential for a significant rise in occupational mortality rates of workers in this age group, increased efforts should be directed toward applied research aimed at lowering the number of fatalities for workers aged 65 years and older. Efforts should include researching interventions directed at the leading causes of death for workers in those selected occupations that are projected to experience increases in occupational fatalities or rates.

Agricultural occupations are projected to continue experiencing the largest number of fatalities for workers aged 65 years and older. Given that the leading external cause of occupational fatalities for workers in this age group is projected to remain machine-related incidents, intervention efforts should focus on machine-related agricultural incidents. A 1991 study indicated that 69% of all agricultural machine-related fatalities involved tractors and more than half of these were rollover incidents (Etherton *et al.* 1991). This study suggested that greater use of tractor rollover protection structures (ROPS) could have prevented many of these fatalities. Additional efforts should concentrate on educating farmers about the safeguards that are available on modern farm equipment and the hazards of using older farm equipment, which may be improperly guarded.

Motor vehicle crashes, the leading cause of accidental death in the United States, is also the leading cause of occupational fatalities for truck drivers and construction laborers in the 65 years and older age group. The National Highway Traffic Safety Administration's (NHTSA) research and development department is working to advance the capabilities, user acceptance, and benefits of collision avoidance systems. Areas of collision avoidance interventions addressed by research at NHTSA (2001) include intersection, rear-end, road departure, lane change and drowsy driver (NHTSA, on-line). Another area of concern with older truck drivers and construction laborers is that their physical capabilities are generally decreasing while their work requirements remain constant (Ringebach and Jacobs 1995).

The majority of occupational fatalities reported for older workers employed as sales managers, food and lodging managers, and private guards and police resulted from homicides. Adopting interventions such as bullet-proof shields, silent alarms, surveillance cameras, brighter external lighting, maintaining only small amounts of cash on site and scheduling workers in pairs may help prevent homicides to workers of any age, including older workers (Jenkins *et al.* 1992).

During this study period, falls were the leading external cause of death for carpenters, construction laborers and janitors and cleaners. A 1993 study cited deteriorating control of postural stability, psychomotor slowing, prolongation of visual reaction time, fatigue and reduced strength as factors that increase the likelihood of an older worker falling (Agnew and Suruda 1993). Identifying these physical limitations or impediments provides insight into developing and employing engineering controls to decrease the risk of fatalities to this group. As an example, a 1997 study identified falls on or from stairs as having a higher risk for workers aged

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65 years and older (Kisner and Pratt 1997). The study stated that engineering controls such as adequate lighting, non-slip surfaces, and handrails could prevent many of these fatal falls on or from stairs.

Although it is one of the top five causes of death for workers aged 65 years and older, struck by a falling object is not the leading cause of death for any of the ten selected occupations. Workplace interventions related to struck by falling objects, should allow for the reduced reaction times, limited visual fields, and hearing impairments common among older workers (Zwerling *et al.* 1998).

While the number and proportion of workers aged 65 and older is increasing, the occupation mix is changing and hence the characteristics of fatalities will change. Projections from this study have shown both increases and decreases in external causes of death within a given occupation. These five leading external causes will undoubtedly remain problematic but efforts to identify additional causal factors should be undertaken. Further research should examine all occupations, particularly those listed as the fastest growing by BLS, to better understand the fatality experience that older workers will face.

CONCLUSIONS

The need to protect older workers from workplace hazards is becoming increasingly important with the aging of the American workforce. By projecting the leading external causes of death for each of the ten most dangerous occupations for workers aged 65 years and older, this study has identified areas of concern for researchers regarding probable future occupational fatalities among workers in this age group. Because the number of workers 65 years of age and older is projected to increase dramatically over the next 25 years, current implementation of intervention strategies that accommodate the needs of older workers may prevent many future fatalities. Evidence from this study suggests that the risk of fatal occupational injury to workers 65 and older will undoubtedly change in the 21st century.

However, to fully understand these changes, additional risk analysis and risk factor research will be necessary. To determine the overall safety and health risk to older workers, the number and type of incidents for all occupations should be projected into the future. These projections should include not only workers aged 65 and older, but also an additional category of workers aged 55 to 64. Developing estimates of the external causes associated with these incidents will help guide necessary intervention research for preventing injury and fatality to older workers. Furthermore, this intervention research should address the unique physiological and psychological characteristics of older workers. Finally, similar research should be conducted with occupational injury and illness as the health outcome measure.

REFERENCES

- Agnew J and Suruda AJ. 1993. Age and fatal work-related falls. *Human Factors* 35:31-6
- Biddle EA and Blanciforti LA. 1999. Impact of a changing U.S. workforce on the occupational injury and illness experience. *Am J Ind Med (Supp 00)*:1-4
- BLS (Bureau of Labor Statistics). 1990–1998. Current Population Survey. Unpublished Age Group Data 1990 – 1998. Department of Labor, Washington, DC, USA

- BOC (Bureau of the Census). 1982. 1980 Census of Population: Alphabetical Index of Industries and Occupations. Publication PHC-R-3. U.S. Government Printing Office, Washington, DC, USA
- BOC (Bureau of the Census). 1992. 1990 Census of Population: Alphabetical Index of Industries and Occupations. Publication PHC-R-3. U.S. Government Printing Office, Washington, DC, USA
- Braddock D. 1999. Occupational employment projections to 2008. *Monthly Labor Rev* 122:51-76
- etherton JR, Myers JR, Jensen RC, *et al.* 1991. Agricultural machine-related deaths. *Am J Public Health* 81:766-8
- Fullerton HN. 1999a. Labor force projections to 2008: Steady growth and changing composition. *Monthly Labor Rev*; November:19-32
- Fullerton HN. 1999b. Labor force participation: 75 years of change, 1950–98 and 1998–2025. *Monthly Labor Rev*; December:3-12
- Jenkins EL, Layne LA, and Kisner SM. 1992. Homicide in the workplace: the U.S. experience, 1980–1988. *Am Assoc Health Nurses J* 40:215-8
- Kisner SM and Pratt SG. 1997. Occupational fatalities among older workers in the United States: 1980–1991. *J Occup Environ Med* 39:715-21
- Kisner SM and Pratt SG. 1999. Occupational injury fatalities among older workers in the United States, 1980–1994. *Am J Ind Med (suppl.1)*:24-5
- Krause JF, Peek C, Silberman T, *et al.* 1995. The accuracy of death certificates in identifying work-related fatal injuries. *Am J Epidemiology* 104:973-9
- NHTSA (National Highway Transportation Safety Administration). 2001. Research and Development Project Summaries. Available at <http://www-nrd.nhtsa.dot.gov/include/summaries>
- NIOSH (National Institute for Occupational Safety and Health). 1993. Fatal Injuries to Workers in the United States, 1980–1989: A Decade of Surveillance. Number 93-108S. DHHS (NIOSH), Cincinnati, OH, USA
- OMB (U.S. Office of Management and Budget). 1987. Standard Industrial Classification Manual 1987. U.S. Government Printing Office, Washington, DC, USA
- Purcell P. 2000. Older workers: Employment and retirement trends. *Monthly Labor Rev*; October:19-30
- Ringenbach KL and Jacobs RR. 1995. Injuries and aging workers. *J Safety Res* 26:169-76
- Russell J and Conroy C. 1991. Representativeness of deaths identified through the injury-at-work item on the death certificate: Implications for surveillance. *Am J Public Health* 81:1613-8
- Stout-Weingand N. 1988. Fatal occupational injuries in the United States in 1980–1984: Results of the first national census of traumatic occupational fatalities. *Scand J Work Environ Health* 14 (suppl 1):90-2
- WHO (World Health Organization). 1977. International Classification of Diseases: Manual on the International Statistical Classification of Disease, Injury, and Causes of Death, 9th Rev. Geneva, Switzerland
- Wiatrowski W. 2001. Changing retirement age: Ups and downs. *Monthly Labor Rev*; April:3-12
- Zweling C, Whitten PS, Davis CS, *et al.* 1998. Occupational injuries among older workers with visual, auditory and other impairments. *Occup Environ Med* 40:720-3