

# Impact of a Changing U.S. Workforce on the Occupational Injury and Illness Experience

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**KEY WORDS:** *occupational injury/illness; working women; occupational fatality; occupational health and safety; work environment*

## BACKGROUND

Over the past quarter century, the civilian labor force has expanded considerably. The increase in the number of available workers can be attributed to two principal factors—rapid population growth and a sharp increase in participation in the labor force on the part of women. In the early 1970s, just over 40% of women in the civilian noninstitutional population were in the labor force; by 1997, 60% of women were either working or actively looking for work [Bureau of Labor Statistics, 1997; Employment Projections]. This upward trend in women's participation is expected to continue into the next century. The U.S. Department of Labor estimates that over the next 10 years, the number of women in the labor force will increase by 14% or nearly 9 million women.

Looking at the occupational safety and health experience of the American worker, the experience of women in the workforce differs notably from that of men. Historically, the number and rate of women sustaining an occupational injury and illness have been far less than those of men. For example, in 1996, women suffered only one-third of all reported work-related non-fatal injuries and illnesses requiring time off from work [Bureau of Labor Statistics, 1997; Annual Survey of Occup. Injuries and Illnesses] while they represented nearly one-half of the working population [Bureau of Labor Statistics, 1997; Current Population Survey]. Though small, the proportion of fatal incidents suffered by women is increasing, from 7% in 1992 to just over 8% in 1996 [Bureau of Labor Statistics, 1997; Census

of Fatal Occupational Injuries]. Finally, it has been suggested that women have exhibited fewer injuries and deaths because they tend to work in safer or lower risk occupations. However, beginning in the 1970s, the proportion of women employed in more hazardous jobs has been increasing [Ong, et al., 1988].

Not only does the magnitude of the safety and health problem differ for women, but so do the circumstances under which these incidents occur (see Table I). Homicide was the leading cause of fatal occupational injury for women, while highway crashes were the major cause for men [Bureau of Labor Statistics, 1997; Census of Fatal Occupational Injuries]. The leading cause for non-fatal occupational injury and illness for male and female workers is the same. However, the next most frequent cause was falls for females and contact with objects for males [Bureau of Labor Statistics, 1977; Annual Survey of Occupational Injuries and Illnesses].

The experience of women is thus historically distinct from that of men and is expected to change over time. This paper sheds light on the changing nature of the workforce and women's participation in the workforce, along with changes in occupational injury and illness trends to help public health research focus on the unique characteristics of women's exposure in the workplace.

## METHODS

Employment data used for 1992–1996 were annual average employment data from the Bureau of Labor Statistics (BLS) Current Population Survey program (CPS) [Bureau of Labor Statistics, 1997; Current Population Survey]. The projected employment for occupations was derived by applying the change in employment between 1996 and labor force projections for 2006 counts by the BLS labor force participation program [Bureau of Labor Statistics, 1997; Employment Projections] to the CPS

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Accepted 1 May 1999

**TABLE I.** Leading Event or Exposure for Non-Fatal Injuries and Illnesses for Selected Occupations by Sex, 1996, U.S.A.

Occupation	Leading event or exposure (percent)	
	Male	Female
Cashiers	Overexertion in lifting (32)	Overexertion in lifting (24)
	Slip, trip, loss of balance without fall (13)	Fall to floor, walkway or other surface (21)
Cooks	Contact with hot objects or substances (17)	Fall to floor, walkway or other surface (31)
	Struck by swinging or slipping object (17)	Contact with hot objects or substances (18)
Carpenters	Overexertion in lifting (13)	Overexertion in lifting (12)
	Fall to floor, walkway or other surface (7)	Repetitive motion (11)
Truck Drivers (19)	Overexertion in lifting (16)	Collision between vehicles, mobile equipment
	Fall to floor, walkway or other surface (9)	Overexertion in lifting (18)

**TABLE II.** Employment for Selected Occupations by Sex, 1996 and Projected 2006 (Thousands) U.S.A.

Occupation	1996 Employment			2006 Projected Employment		
	Total Number	Male Percent	Female Percent	Total Number	Male Percent	Female Percent
Cashier	2856	22.9	78.1	3342	22.4	77.6
Cooks	2061	57.8	42.2	2350	55.8	44.2
Nursing Aides & Orderlies	1850	11.6	88.4	2313	10.9	89.1
Janitors & Cleaners	2205	65.1	34.9	2293	66.5	33.5
Carpenters	1220	98.7	1.3	1293	98.6	1.4
Assemblers	1271	56.9	43.1	1284	57.7	42.3
Truck Drivers	3019	94.7	5.3	3442	94.1	5.9
Construction Laborers	809	96.2	3.8	874	96.1	3.9
Stock Handlers & Baggers	1106	71.5	28.5	1360	70.9	29.1
Laborers, Non-construction	1334	79.8	20.2	1547	79.7	20.3

**TABLE III.** Percent of Non-Fatal Occupational Injury or Illness for Selected Occupations by Sex, 1996 and Projected 2006 U.S.A.

Occupation	1996				2006			
	Fatal		Non-Fatal		Fatal		Non-Fatal	
	Male	Female	Male	Female	Male	Female	Male	Female
Cashiers	74	26	25	75	75	25	27	73
Cooks	100	0	50	50	81	19	46	54
Nursing Aides & Orderlies	22	78	9	91	30	70	8	92
Janitors & Cleaners	97	3	73	27	92	8	77	23
Carpenters	100	0	98	2	100	0	98	2
Assemblers	75	25	63	37	88	12	64	36
Truck Drivers	98	2	94	6	97	3	93	7
Laborers, Construction	97	3	97	3	97	3	98	2
Stock Handlers & Baggers	82	18	68	32	86	14	68	32
Laborers, Non-construction	95	5	85	15	96	4	85	15

1996 counts. Distribution by sex was determined by calculating the average rate of change over the five year period within the CPS data and applying it to the projected 2006 counts by occupation (see Table II).

Occupational injury and illness data for 1992–1996 are taken from the BLS Annual Survey of Occupational Injury and Illness [Bureau of Labor Statistics, 1997; Annual Survey of Occupational Injuries and Illnesses]. For this analysis, occupations selected were those with the highest number of occupational injuries and illnesses with days away from work (see Table III). The projected counts for selected occupations by sex were derived by applying the

average rate of change between successive years from 1992 to 1996 for these same groups to the projected employment counts. The same process was adopted for occupational fatality counts from the BLS Census of Fatal Occupational Injuries [Bureau of Labor Statistics, 1997; Census of Fatal Occupational Injuries].

## RESULTS

Overall, the occupational injury and illness rates are showing a declining trend, with projected rates for 2006 expected to show a decrease for both women and men.

**TABLE IV.** Number and Rate of Non-Fatal Occupational Injuries and Illnesses for Selected Occupations by Sex, 1996 and Projected 2006 (Rate per 100 Employees) U.S.A.

Occupation	1996 Injuries/Illnesses				Projected 2006 Injuries/Illnesses			
	Male		Female		Male		Female	
	No.	Rate	No.	Rate	No.	Rate	No.	Rate
Cashiers	7794	1.3	22844	1.0	8852	1.2	23792	0.9
Cooks	15240	1.3	15108	1.7	15193	1.2	18114	1.7
Nurse Aides & Orderlies	8293	3.9	84847	5.2	8466	3.4	99525	4.8
Janitors & Cleaners	33837	2.4	12323	1.6	35075	2.3	10571	1.4
Carpenters	32823	2.7	610	3.9	34797	2.7	728	3.9
Assemblers	27725	3.8	16019	2.9	27209	3.7	15148	2.8
Truck Drivers	143161	5.0	9418	5.9	159558	4.9	12786	6.3
Laborers Construction	42362	5.4	1095	3.6	41541	5.0	1052	3.1
Stock Handlers & Baggers	20623	2.6	9843	3.1	22217	2.3	10674	2.7
Laborers, Non-construction	91578	8.6	15800	5.9	95663	7.8	16392	5.2

**TABLE V.** Number and Rate of Occupational Fatal Injuries for Selected Occupations by Sex, 1996 and Projected 2006 (Rate per 100,000 Employees) U.S.A.

Occupation	1996 Fatalities				Projected 2006 Fatalities			
	Male		Female		Male		Female	
	No.	Rate	No.	Rate	No.	Rate	No.	Rate
Cashiers	70	11.2	24	1.1	123	16.4	41	1.6
Cooks	11	0.9	0	0.0	21	1.6	5	0.5
Nursing aides & Orderlies	5	2.3	18	1.1	10	3.9	23	1.1
Janitors & Cleaners	61	4.2	2	0.2	94	6.2	8	1.1
Carpenters	87	7.2	0	0.0	116	9.1	0	2.2
Assemblers	6	0.8	2	0.3	12	1.6	2	0.3
Truck Drivers	770	26.9	16	9.9	1095	34.8	39	19.3
Laborers Construction	283	36.3	8	26.0	365	43.4	10	28.1
Stock Handlers & Baggers	18	2.3	4	1.3	28	2.9	5	1.2
Laborers, Non-Construction	203	19.1	10	3.7	301	24.4	12	3.7

However, the projected increased employment over this period will result in an overall increased frequency of lost-workday incidents. It is notable that within selected occupations both high numbers and rates of injuries and illness are reported and projected to increase; the lost work-time incidents involving women truck drivers are expected to increase from 9,418 in 1996 to 12,786 in 2006, with rates per 100 employees increasing from 5.9 to 6.3 (see Table IV). Fatal occupational injury rates per 100,000 employees for women truck drivers are expected to increase from 9.9 in 1996 to 19.3 in 2006 (see Table V). Women carpenters will continue to show climbing frequencies of non-fatal illness and injury, increasing from 610 to 728, with virtually no change in rates. Fatal injury rates for female construction laborers are projected to remain high, increasing from 26.0 per 100,000 employees in 1996 to 28.1 per 100,000 employees in 2006. The high rate of non-fatal injury and illness for women will also remain high, but will decline from 3.6 per 100 employees to 3.1 per 100 employees.

## CONCLUSIONS

The changing nature of the workforce through the beginning of the 21<sup>st</sup> century will produce changes in the nation's experience of occupational injury and illness. These changes, particularly the increase in women's entry into nontraditional occupations, will require that public health research be focused on the unique characteristics of women's exposure in the workplace. Obstacles in this research include the imprecision in matching numerator and

denominator data to calculate rates, and the fact that employment projections are job-demand driven, rather than an extrapolation of an existing occupation-participation trend.

Additionally, research will be needed to design, implement, and evaluate intervention strategies specific to the injuries and illnesses suffered by working women. Currently, standards are developed and implemented by using male capacities with little consideration to the significantly different physical and physiological differences in women [Headapohl, 1993]. Research should assess the plausibility of redesigning jobs and work stations, as well as focus on establishing standards and regulations to accommodate this increasing diversity among workers.

## REFERENCES

- Bureau of Labor Statistics. 1997. Employment projections, U.S. Department of Labor.
- Bureau of Labor Statistics. 1997. Annual survey of occupational injuries and illnesses, 1992-1996, U.S. Department of Labor.
- Bureau of Labor Statistics. 1997. Current population survey, 1992-1996, U.S. Department of Labor.
- Bureau of Labor Statistics. 1997. Census of fatal occupational injuries, 1992-1996, U.S. Department of Labor.
- Headapohl D. 1993. Sex, gender, biology, and work. Occupational medicine: State of the art reviews Vol 8, No. 4, 685-707.
- Ong CN, Koh D, Phoon WO, Low A. 1988. Anthropometrics and display station preferences of VDU operators. Ergonomics 31: 337-347.