A study of logger fatalities from 1992–2000

D F Scott

See end of article for authors’ affiliations

Correspondence to: Mr Douglas F Scott, National Institute for Occupational Safety and Health, Spokane Research Laboratory, Spokane, WA 99207, USA; dus3@cdc.gov

Objective: To determine if certain loggers are at increased risk of death during logging operations.


Results: The major findings are: (1) treefallers suffer nearly 63% of all fatalities, (2) the region where the fatality occurred and the size of the employer were not significant factors that contributed to a high percentage of treefaller fatalities, and (3) the Northeast and Midwest regions showed a higher percentage of fatalities compared with the South and West regions.

Conclusions: Overall, the logger fatality rate for 1992–2000, compared with 1980–88 has decreased slightly; however, treefallers continue to be the group of loggers who suffer the highest fatality rate.

The objective of this study was to determine if certain loggers are at increased risk of death during logging operations. The Bureau of Labor Statistics Census of Fatal Occupational Injuries (CFOI) 1992–2000 logger fatality data set contained several new variables to describe logger fatalities which were unavailable in earlier data sets analyzed by previous researchers. These variables included the cause of death, the activity of the logger at the time of death, year of death, month of death, day of death, time of day of death, region where fatality occurred, age of victim, gender of victim, victim’s race, the size of the employer victim was employed with, and part of body which was injured and resulted in death were analyzed. The primary question to be answered was, “are certain logging jobs at a greater risk for fatalities?”

Previous Studies

According to Sygnatur, logging was the most dangerous occupation in the United States during the year 1997, with a logger death rate 27 times higher than the national average for all other occupations combined.1 Sygnatur also found that from 1992 through 1997 the death rate for loggers averaged 128 per 100 000 workers, compared with only five per 100 000 workers in all other occupations combined. The National Institute for Occupational Safety and Health (NIOSH) issued “Alerts” about the high fatality rates associated with logging in December 1994 and May 1995.2 3

It was reported in 1994 that logger fatalities accounted for 2% of all occupational deaths.4 Causes of logging related fatalities from 1992–96, only occupational fishing was more dangerous than logging.5 Sygnatur also reported that in 1994 and 1995, 65.5% of all logger deaths were to a combined group of jobs including fellers, limbers, buckers, and choke setters. Logger death rates were calculated for each year and ranged from a low of 127.6 deaths per 100 000 loggers (1981) to 192.1 deaths per 100 000 loggers (1986), with a rate of 168.3 logger deaths per 100 000 loggers in 1988. They examined the regions where the fatalities occurred and found no region suffering more fatalities than other regions. Their most significant finding was that the highest ranked cause of death was from falling objects (50% of the deaths).

In 1976 the NIOSH attempted to reduce the high rate of logging fatalities by recommending a standard for logging activity and evaluated and recorded information from literature searches, meetings with advisory groups, and visits to logging sites to develop best practices for safe logging. NIOSH concluded that, “inadequate training, poor working techniques and safety measures, coupled with the inherent dangers of felling, bucking, yarding and loading logs, are the major reasons why logging is one of the most hazardous occupations in the United States”.6

OSHA set forth a new regulation (29 CFR 1910.266) for logging companies to comply with by 9 February 1995. Logging operations were to provide additional job and first aid training to loggers, expand the uses and types of personal

Abbreviations: CFOI, Census of Fatal Occupational Injuries; CI, confidence interval; FACE, Fatality Assessment and Control Evaluation (program); LMR, logger mortality rate; NIOSH, National Institute for Occupational Safety and Health; OR, odds ratio; OSHA, Office of Safety and Health Administration

www.injuryprevention.com
database has been initiated to compile all state logger fatality
safety and health professionals. Reports from FACE are
ations designed to control or eliminate identified risks, and to
types of events to identify injury risks, develop recommenda-
Virginia. This program is designed to allow states to identify
Oklahoma, Texas, Washington, Wisconsin, and West
Alaska, California, Iowa, Kentucky, Massachusetts,
''discomfort'' among most chain saw operators.16
monoxide during the short exposure time contributed to
found that during the felling operation, high levels of carbon
the job types estimated.
incidence rate of 104.9 per 100 000, which was the highest of
and estimated that forestry and logging workers had an
ers and farm managers, truck drivers, miscellaneous laborers,
livestock farmers, sportspersons, coaches, and related, farm-
ning strike, other and unknown) were combined
of death (cutting trees, limbing or bucking, skidding, setting
chokers, loading logs, other and unknown) and the activity at the
dead while the victim was cutting (felling) trees,
fatalities was chosen. Fatalities in this paper are defined as
deaths occurring while the victim was cutting (felling) trees,
limbing and bucking trees, skidding trees, or loading trees.
The cause of death (treefall, limbfall, fall from a tree,
struck by log, struck by object other than log, run over by
logging vehicle, skidder or tractor rollover, chainsaw, light-
ing strike, other and unknown) and the activity at the time
of death (cutting trees, limbing or bucking, skidding, setting
chokers, loading logs, other and unknown) were combined into
14 cause-activity variables (table 1).
The cause-activity variable was used to determine the
cause and activity with the highest percentage of fatalities.
The risk of death for various combinations of variables was
done using 2 × 2 tables, resulting in odds ratios and
confidence intervals.

RESULTS
Table 2 and fig 1 show the logger mortality rate (LMR) for
1992–2000. The LMR is the number of loggers employed each
year divided by the number of logger fatalities per year times
1000. The LMR showed a similar trend from 1992–95 (slight
decrease). However, the LMR increased in the years 1996–
2000 to rates above or equal to previous years.
Table 3 is a summary of all characteristics (variables)
described by this study.
The results of combining the variables cause and activity
(cause-activity) showed that treefall/cutting, treefall/limbing,
and treefall/unknown combined as a group accounted for
62.8% of the logger fatalities. Therefore, further analysis of
focused on the risk of death to treefallers compared to the
risk of death to non-treefallers.
Because treefallers suffered a higher percentage of fatal-
ities, several variables were considered as risk factors,
including part of body injured which led to death, the age of the treefallers, the race of the treefallers, the month of the fatality, the time of day of the fatality, the size of the employer, and the region of the United States where the fatality occurred.

It was hypothesized that treefallers might have a higher risk of dying from head injuries (from the act of falling trees) than other loggers, therefore, treefallers and non-treefallers were compared to whether or not a head injury resulted in death while cutting trees (n = 780). The risk of a treefaller dying from a head injury while cutting trees is not more likely than a non-treefaller dying while cutting trees (OR 1.14, 95% CI 0.84 to 1.54).

It was hypothesized that the age of the treefallers might be a risk factor, therefore treefallers and non-treefallers were compared to age (n = 777). The risk of a young treefaller (age 15–44) dying while cutting trees is not more likely than a young non-treefaller of dying from a head injury while cutting trees (OR 1.03, 95% CI 0.79 to 1.33). The risk of an older treefaller (age 45 and older) dying while cutting trees is not more likely than the risk of an older non-treefaller dying while cutting trees (OR 0.96, 95% CI 1.37 to 0.67).

Nearly 80% of all fatalities were suffered by white males. Therefore, black and white treefallers and black and white non-treefallers were compared with respect to race to see if it might be a factor (n = 742). The risk of a black treefaller dying while cutting trees is more likely than white treefallers dying while cutting trees (OR 1.2, 95% CI 0.79 to 1.81).

The month of the fatality was grouped into spring-summer (April through September) and fall-winter (October through March) (n = 780). The risk of a treefaller dying while cutting trees in the spring-summer months is not more likely than a non-treefaller dying while cutting trees during the fall-winter months (OR 1.06, 95% CI 0.78 to 1.42).

The size of the employer was grouped into employers employing from one to 10 workers, and 11 or more employees (n = 780). It was found that the risk of a treefaller dying while cutting trees and employed by an employer employing from one to 10 workers is 1.7 times more likely than a non-treefaller dying while cutting trees and employed by an employer employing 11 or more workers (OR 1.7, 95% CI 1.16 to 2.45).

Finally, the region of the United States where the fatality occurred was examined. About 54% of all fatalities occurred in the South (Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia), followed by about 22% in the West (Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming), about 12% in the Northeast (Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont), and 11% in the Midwest (Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin). Because the South had a high percentage of fatalities, the Midwest, West, and Northeast were grouped.

### Table 3 - Selected characteristics of all fatalities between 1992 and 2000 (%)

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Month</td>
<td>Day</td>
<td>Time</td>
<td>Part of body</td>
</tr>
<tr>
<td>January</td>
<td>8.3</td>
<td>6.6</td>
<td>Abdominal</td>
</tr>
<tr>
<td>February</td>
<td>8.4</td>
<td>9.0</td>
<td>Back</td>
</tr>
<tr>
<td>March</td>
<td>8.2</td>
<td>10.0</td>
<td>Chest</td>
</tr>
<tr>
<td>April</td>
<td>6.9</td>
<td>11.0</td>
<td>Head</td>
</tr>
<tr>
<td>May</td>
<td>7.3</td>
<td>Noon</td>
<td>Leg</td>
</tr>
<tr>
<td>June</td>
<td>8.2</td>
<td>1.0</td>
<td>Multiple injuries</td>
</tr>
<tr>
<td>July</td>
<td>7.1</td>
<td>2.0</td>
<td>Neck</td>
</tr>
<tr>
<td>August</td>
<td>10.4</td>
<td>3.0</td>
<td>Unclassified</td>
</tr>
<tr>
<td>September</td>
<td>11.0</td>
<td>4.0</td>
<td></td>
</tr>
<tr>
<td>October</td>
<td>8.7</td>
<td>92.2</td>
<td></td>
</tr>
<tr>
<td>November</td>
<td>9.1</td>
<td>Age</td>
<td></td>
</tr>
<tr>
<td>December</td>
<td>8.3</td>
<td>&lt;15</td>
<td>1-19</td>
</tr>
<tr>
<td></td>
<td>100.0</td>
<td>16-19</td>
<td>11-19</td>
</tr>
<tr>
<td></td>
<td>20-24</td>
<td>20.2</td>
<td>20-49</td>
</tr>
<tr>
<td></td>
<td>25-34</td>
<td>27.2</td>
<td>50-99</td>
</tr>
<tr>
<td></td>
<td>35-44</td>
<td>27.2</td>
<td>&gt;100</td>
</tr>
<tr>
<td></td>
<td>45-54</td>
<td>20.5</td>
<td>Not reported</td>
</tr>
<tr>
<td></td>
<td>55-64</td>
<td>16.4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>65 &amp; &gt;</td>
<td>5.8</td>
<td>Region</td>
</tr>
<tr>
<td></td>
<td>99.8</td>
<td></td>
<td>Northeast</td>
</tr>
<tr>
<td></td>
<td>2.2</td>
<td>Race</td>
<td>Midwest</td>
</tr>
<tr>
<td></td>
<td>100.6</td>
<td>American-Indian</td>
<td>South</td>
</tr>
<tr>
<td></td>
<td>1.9</td>
<td></td>
<td>West</td>
</tr>
<tr>
<td>Gender</td>
<td>Male</td>
<td>99.7</td>
<td>Black</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>0.2</td>
<td>White</td>
</tr>
<tr>
<td></td>
<td></td>
<td>99.9</td>
<td>Other</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Unknown</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>100.1</td>
</tr>
<tr>
<td>Employer size</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1-10</td>
<td>60.8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>11-19</td>
<td>5.8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>20-49</td>
<td>2.7</td>
<td></td>
</tr>
<tr>
<td></td>
<td>50-99</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt;100</td>
<td>1.7</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Not reported</td>
<td>27.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>99.7</td>
<td></td>
</tr>
<tr>
<td>Region</td>
<td>Northeast</td>
<td>12.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Midwest</td>
<td>11.3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>South</td>
<td>54.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>West</td>
<td>22.1</td>
<td></td>
</tr>
</tbody>
</table>

Figure 1 Logger mortality rate (LMR) 1992–2000.
together and compared to the South (n = 780). The risk of a treefaller dying while cutting trees in the South is 1.2 times more likely than a non-treefaller cutting trees in the rest of the United States (OR 1.2; 95% CI 0.90 to 1.59).

DISCUSSION

Ninety one percent of all fatalities occurred in 14 cause-activity groups. Of these groups, treefall/cutting, treefall/unknown, and treefall/limbing accounted for nearly 63% of all fatalities. Two risk comparisons (treefaller-employer size and treefaller-region) actually had slightly higher risks. The risk of death for a treefaller working for an employer employing one to 10 workers was 1.7 times more likely than for a non-treefaller. However, according to the United States Census Bureau, nearly 83% of all logging employers employed from one to 10 workers. Therefore, the risk of death for a treefaller working for an employer employing from one to 10 workers is not significant when compared with the fact that 83% of the employers employ only one to 10 workers. The second comparison compared treefallers to the region of the United States where the fatality occurred. Again, according to the United States Census Bureau, 52.3% of the loggers were employed in the South, 31.4% were employed in the West, 8.9% were employed in the Northeast, and 7.4% were employed in the Midwest. Comparing the percentage of fatalities in the regions, the South accounted for 54%, the West accounted for 22%, the Northeast accounted for 12%, and the Midwest accounted for 11%. Therefore, there is no disparity in the number of fatalities in the South, even though the percentage of fatalities is higher. There seems to be a disparity in the percentage of fatalities in the West, Northeast, and Midwest. There are a higher percentage of fatalities in the Northeast and the Midwest compared with the percentage of loggers employed in each region, while the West appears to have a smaller percentage of fatalities compared with the percentage of loggers employed.

A comparison was made with results from this study and the Myers and Fosbroke study (1994). Two different data sets were used. The Myers and Fosbroke data used the NTOF data set and involved 1278 logger fatalities over a nine year period (1980–88) while this study used the Bureau of Labor Statistics CFOI data, it was found that region of fatality and the size of the employer were not factors contributing to the high percentage of treefaller fatalities. Third, it was identified that there are a higher percentage of fatalities in the Northeast and the Midwest.

63% of all logger fatalities (1992–2000) were from the cause-activity groupings of treefall/cutting, treefall/unknown, and treefall/limbing.

The risk of death for a treefaller working for an employer employing from one to 10 workers was 1.7 times more likely than for a non-treefaller; however, 83% of all logging companies employ from one to 10 workers.

There is a disparity in the percentage of logger fatalities in the West, Northeast, and Midwest.


Treefallers continue to be the group of loggers who suffer the highest fatality rate.
compared with the percentage of loggers employed in each region, while the West appears to have a smaller percentage of fatalities compared with the percentage of loggers employed. Finally, the rate of logger deaths has actually increased since 1995 and has not decreased from 1996 to 2000 (rate of 1.2/1000 logger fatalities). However, the logger fatality rates for the nine year period of this study compared with the logger fatality rates from the Myers and Fosbroke nine year period are all lower, which show an improvement.

REFERENCES
1 Sygnatur EF. Logging is perilous work. Compensation and Working Conditions 1988 [winter]; 7.

LACUNAE

Couple survives nine storey fall after “lover’s spat”
A couple survived a nine storey fall from the top floor of a Bangkok apartment block onto the roof of a car after a lover’s spat. Witnesses said the pair’s plunge was broken by trees before they struck the roof of a Honda sedan which crumpled beneath them. Neighbours said the couple had been arguing heatedly before the fall yesterday but there were no details on exactly how they tumbled from their top floor apartment. The husband was treated in a Philadelphia area. “It’s the best thing for the environment, and it’s the best thing for public safety to get rid of these things”, Carney said (from River Revival Bulletin; submitted by Peter Jacobson).

Quiet crusade against deadly dams
It has been nearly four years since Frederick J House and his 14 year old son, Paul, drowned in a May afternoon while canoeing on the Perkiomen Creek. Rescuers said the pair apparently paddled too close to an unmarked “low-head” dam, a relatively harmless looking structure of a type that spans rivers and creeks all over Pennsylvania. But these dams, built to serve mills, factories, and canals in the 19th and 20th centuries, are not harmless. They have claimed the lives of so many swimmers, boaters, fishermen, and children that water safety experts call them “drowning machines”. For the last decade, the Pennsylvania Fish and Boat Commission, the state Department of Environmental Protection, and American Rivers, an organization that promotes free flowing waterways, have been working to remove abandoned and unstable dams. More than 100 in Pennsylvania have been demolished. Two thirds of the removals have been financed with state and federal funds and private grants. The average demolition cost is surprisingly low: $50 000. Often, the work can be done with a backhoe. Scott Carney, a biologist with the Fish and Boat Commission who coordinates dam removals, said about 50 more dams in Pennsylvania are slated for removal, 15 of them in the Philadelphia area. “It’s the best thing for the environment, and it’s the best thing for public safety to get rid of these things”, Carney said (from River Revival Bulletin; submitted by Peter Jacobson).