ORIGINAL ARTICLE

Fatal occupational electrocutions in the United States

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Introduction: The highest proportions of fatal occupational electrocutions have occurred among those employed in the electrical trades and in the construction and manufacturing industries.
Methods: Data from 1992 through 1999 were obtained from the Bureau of Labor Statistics Census of Fatal Occupational Injuries.
Results: Occupational electrocution deaths occurred almost entirely among males, with the highest rates among those aged 20–34 and among whites and American Indians. They were highest during the summer months, in the South, and in establishments employing 10 or fewer workers. The highest rates occurred in the construction, mining, and agriculture, forestry, and fishing industries and among trades associated with these industries.
Conclusions: Electrocution continues to be a significant cause of occupational death. Workers need to be provided with safety training and employers, particularly smaller employers, persuaded of the need for safety training.

Electrocution is the fifth leading cause of occupational injury death in the United States,[1] and a particular hazard to those whose work routinely brings them into close proximity to electrical sources. Studies have shown the highest proportion of electrocution deaths occurred among electricians and electrical helpers,[2–4] and among utility workers[3 5] and those employed in the construction and manufacturing industries.[2 6–8] Fatal electrocution injuries tend to occur among white[3 9] males,[3 7 8] and among workers who are younger than the average age of occupational deaths overall.[2 7 9–11] Contact with overhead power lines is reportedly by far the most frequent cause of fatal electrocution injury.[1 7 8 12 13]

The Bureau of Labor Statistics Census of Fatal Occupational Injuries (CFOI) has a greater capture rate for occupational fatalities than other sources of United States occupational fatality data, as multiple data sources are used.[14 15] Also, circumstances surrounding the death are recorded in greater detail. In contrast, existing research on fatal occupational electrocutions has utilized the National Traumatic Occupational Fatalities (NTOF) surveillance system or data from the Occupational Safety and Health Administration (OSHA). NTOF data are derived solely from death certificates, possibly resulting in the undercounting of work related deaths. All employers do not fall under OSHA jurisdiction, and the construction and manufacturing industries tend to be over-represented in OSHA investigations. CFOI data are not subject to these biases and are less likely to undercount occupational electrical deaths. To date no study of fatal occupational electrocutions using CFOI data has been published. Additionally, studies published in the peer reviewed literature describing occupational electrocution deaths for the United States as a whole have been industry or occupation specific. The purpose of the present study is to utilize CFOI data in presenting a more complete picture of occupational electrocution deaths in the United States than has previously been published.

METHODS

Data on fatal occupational electrocution deaths in the United States from 1992 to 1999 were obtained from Bureau of Labor Statistics CFOI. CFOI is a federal-state cooperative program that has been active in all 50 states and the District of Columbia since 1992. CFOI maintains data compiled from multiple state and federal administrative sources, including death certificates, workers' compensation reports, coroner, medical examiner and autopsy records, OSHA fatality reports, the Mine Safety and Health Administration, the Employment Standards Administration, news media, follow up questionnaires, and state motor vehicle crash reports. To determine whether a fatality is work related, state personnel who collect, code, and verify fatality data use a case definition that stipulates that "the decedent must have been employed (that is, working for pay, compensation, or profit or in the family business) at the time of the event and engaged in a legal work activity or present at the site of the incident as a requirement of his or her job". Suicides and homicides meet the case definition if they occur at work. Fatalities that occur while traveling to and from work (commuting) are not considered work related. In general, each death must be verified by two source documents. In those instances where a second source document cannot be located, the fatality is included only if sufficient information exists from the first source to determine that the death was work related.

In the CFOI data files, the event or exposure that produced the injury and the source of injury are coded using the *Occupational Injury and Illness Classification Structures* (OIICS).[16] Occupation is coded according to the *Census Occupation Classification System* (COCS), 1990.[17] Industry is coded according to the *Standard Industrial Classification Manual*, 1987 edition.[18]

Electrocution fatalities were identified according to OIICS Nature of Injury or Illness Code 930, "electrocutions, electric shocks". Nine decedents whose electrocution injuries occurred before 1992, but who died during the study period, were excluded from the analyses.

Mortality rates were calculated using denominators derived from the Current Population Survey files.[19] As the Current Population Survey does not include persons on active duty in the Armed Force, we excluded subjects whose occupation was listed as "military" (COCS codes 903–905) to ensure

Abbreviations: CFOI, Census of Fatal Occupational Injuries; COCS, Census Occupation Classification System; NIOSH, National Institute for Occupational Safety and Health; NTOF, National Traumatic Occupational Fatalities (surveillance system); OIICS, Occupational Injury and Illness Classification Structures; OSHA, Occupational Safety and Health Administration

Table 1 Fatal occupational electrocutions by sex, age, and race, United States, 1992–99

	No (%)	Rate*
Sex		
Male	2491 (98.6)	0.43
Female	34 (1.4)	0.01
Age group (years)		
<16†	13 (0.5)	–
16–19	90 (3.6)	0.14
20–24	329 (13.0)	0.29
25–34	838 (33.2)	0.29
35–44	655 (25.9)	0.23
45–54	381 (15.1)	0.19
55–64	168 (6.7)	0.16
⩾65	48 (1.9)	0.14
Not reported	3 (0.1)	
Race		
White	2212 (90.9)	0.23
Black	192 (7.9)	0.16
American Indian	16 (0.7)	0.22
Asian	13 (0.5)	0.04
Other/not reported	208 (0.1)	
Ethnicity		
Hispanic	294 (11.6)	0.30
White (not Hispanic)	1738 (68.8)	0.21
Black (not Hispanic)	163 (6.5)	0.14
Other (not reported)	34 (1.4)	0.08
Other/not reported	296 (11.7)	
Region		
Northeast	263 (10.4)	0.12
Midwest	612 (24.2)	0.23
South	1233 (48.8)	0.33
West	417 (16.5)	0.18
Establishment size (number of employees)		
1–10	893 (35.4)	
11–19	207 (8.2)	
20–49	242 (9.6)	
50–99	155 (6.1)	
100+	410 (16.2)	
Not reported	618 (24.5)	
Total	2525	0.23

*Deaths/100000 worker years.
†Rates not calculated. Current Population Survey data unavailable for workers <16 years of age.

comparability of numerators and denominators. Frequency distributions were calculated for age, sex, race, industry, occupation, month, region, establishment size, worker activity at the time of injury, and injurious event.

RESULTS

Although 98.6% of fatal electrocutions were among males, the rate among males was 0.43 per 100 000 workers per year, as compared with 0.01 for females (table 1). The highest death rate by age group was among those aged 20–34, although they were not markedly higher than rates for workers 35–54. The rates of electrocution death were highest among white and American Indian workers, followed closely by black workers. When examined by ethnicity, Hispanic workers had the highest rate, twice that of non-Hispanic black workers. For 2% (296 workers) of electrocution deaths, ethnicity was not recorded, including workers of white, black, and "other" race. The Southern United States had the highest proportion and the highest rate of electrocution deaths. The majority of electrocution deaths occurred in establishments employing one to 10 workers. The highest rates by industry were in construction, mining, and the agriculture, forestry, and fishing group (table 2). When analyzed by subgroup, the largest proportions of deaths in the "farming, forestry, and fishing" industry occurred among agricultural production crops (for example, grain, fruits, vegetables) and landscape and horticultural services. (Results are presented by subgroup for this industry only, because there is greater variation in the rates of electrocution death than were observed in subgroups of the construction and mining industries.) Within agriculture, rates were highest among workers in landscape and horticultural services.

The highest rates by occupation were among extractive occupations (2.38 deaths per 100 000 workers per year) and the construction trades (2.10 per 100 000 workers per year), followed by farming, forestry, and fishing (1.16 per 100 000 workers per year for the combined group) (table 3). Separate rates for construction trades are presented in table 4. When occupational group was broken down by subcategory, the highest rates in construction were among electric power installers, earth drillers, supervisors of electricians and power transmission installers, and electrician apprentices. Among agricultural occupations, the highest rates of death were among supervisors of farm workers, marine life cultivation workers (includes freshwater aquaculture), groundskeepers and gardeners (includes most trees surgeons), managers of horticultural specialty farms, and horticultural specialty farmers (some tree surgeons were included in this classification) (table 4). Marine cultivation workers bear separate mention because of their extraordinarily high rate of death, 33.57 per 100 000 workers; however, they were

Table 2 Fatal occupational electrocutions by industry, United States, 1992–99

SIC codes*	Description	No (%)	Rate†
01–09	Agriculture, forestry, and fishing	312 (12.4)	0.94
01	*Agricultural production: crops*	*105 (33.7)*	1.31
02	*Agricultural production: livestock*	*48 (15.4)*	0.48
078	*Landscape and horticultural services*	*110 (35.3)*	2.36
071, 072, 075, 076	*Other agricultural services*	*25 (8.0)*	2.25
	Unknown/other	*16 (5.2)*	
10–14	Mining	69 (2.7)	1.20
15–17	Construction	1144 (45.3)	1.60
24–25, 32–39	Manufacturing: durable goods	172 (6.8)	0.16
20–23, 26–31	Manufacturing: non-durable goods	93 (3.7)	0.13
40–49	Transportation and public utilities	277 (11.0)	0.38
50–59	Wholesale and retail trade	130 (5.2)	0.06
60–67	Finance, insurance, real estate	22 (0.9)	0.03
70–89	Services	247 (9.8)	0.07
91–99	Public administration	45 (1.8)	0.10
	Other	14 (0.6)	
	Total	2525 (100)	

*Standard Industrial Classification (SIC) manual, 1987.
†Deaths/100000 worker years.

Table 3 Fatal occupational electrocutions by occupation, United States, 1992–99

COCS codes*	Occupational description	No (%)	Rate†
001–199	Managerial and professional occupations	113 (4.5)	0.04
200–235	Technical, sales, administrative support	23 (0.9)	0.07
243–389	Sales occupations and administrative support	36 (1.4)	0.01
403–469	Service	79 (3.1)	0.05
473–499	Farming, forestry, fishing	320 (12.7)	1.16
503–549	Precision craft and repair	264 (10.5)	0.69
553–599	Construction trades	988 (39.1)	2.10
613–617	Extractive occupations	31 (1.2)	2.38
628–699	Precision production	45 (1.8)	0.13
703–799	Operators, fabricators, laborers	96 (3.8)	0.14
803–889	Transportation and material moving	517 (20.5)	0.57
	Other/not reported	13 (0.5)	
		2525	

*Census Occupation Classification System, 1990.
†Deaths/100000 worker years.

included in the "other" classification in table 4 due to the small number of deaths. More than half of fatal electrocutions occurred during "constructing, repairing, cleaning, inspecting, or painting activities" (table 5) and the location of the majority of fatal electrocution injuries occurred at "industrial places and premises". Construction sites were the most common location (44.9%) in this category. In 41% of cases, the electrocution was attributed to contact with overhead power lines (table 6).

The proportion of occupational electrocution deaths was the highest during the summer months and the lowest in winter (fig 1).

Table 4 Fatal occupational electrocutions in selected occupational categories, United States, 1992–99

COCS codes*	Occupational description	No (%)	Rate†
Construction trades			
	Supervisors, construction occupations		
555	Supervisors, electricians, power transmission installers	26 (2.6)	7.78
556	Supervisors, painters, paperhangers, and plasterers	5 (0.5)	4.51
557	Supervisors, plumbers, pipefitters, and steamfitters	5 (0.5)	3.37
558	Supervisors, not elsewhere classified	45 (4.6)	0.86
	Construction trades, except supervisors		
563	Brickmasons and stonemasons	9 (0.9)	0.52
567	Carpenters	73 (7.4)	0.63
573	Drywall installers	5 (0.5)	0.31
575	Electricians	377 (38.2)	6.11
576	Electrician apprentices	26 (2.6)	8.25
577	Electrical power installers and repairers	173 (17.5)	15.91
579	Painters, construction, and maintenance	56 (5.7)	1.18
585	Plumbers, pipefitters, and steamfitters	30 (3.0)	0.71
588	Concrete and terrazzo finishers	11 (1.1)	1.46
595	Roofers	45 (4.6)	2.15
596	Sheetmetal duct installers	7 (0.7)	1.64
597	Structural sheetmetal workers	19 (1.9)	2.81
598	Drillers, earth	19 (1.9)	8.75
599	Construction trades, not elsewhere specified	42 (4.3)	2.45
	Other‡	15 (1.5)	
Total		988 (100.0)	2.10
Agricultural occupations			
	Farm operators and managers		
473	Farmers, except horticultural	52 (17.9)	0.65
474	Horticultural specialty farmers	6 (2.1)	1.67
475	Managers, farms, except horticultural	22 (7.6)	1.90
	Farm occupations, except managerial		
477	Supervisors, farm workers	11 (3.8)	3.41
479	Farm workers	92 (31.6)	1.24
	Related agricultural occupations		
485	Supervisors, related agricultural occupations	9 (3.1)	1.09
486	Groundskeepers and gardeners, except farm	91 (31.3)	1.50
	Other‡	8 (5.7)	
Total		291 (100)	1.11

*Census Occupation Classification System, 1990.
†Deaths/100000 worker years.
‡Occupational classification for which there were fewer than five electrocution deaths.

Table 5 Worker activity and location at the time of fatal electrocution, United States, 1992–99

CFOI codes*	Description	No (%)
Worker activity		
100–194	Vehicular and transportation operations	128 (5.1)
200–299	Using or operating tools, machinery	461 (18.3)
300–390	Constructing, repairing, cleaning, inspecting, painting	1443 (57.2)
400–490	Protective service activities	20 (0.8)
500–599	Materials handling operations	200 (7.9)
600	Physical activities, not elsewhere classified	110 (4.4)
	Other	96 (3.8)
	Not reported	67 (2.7)
Total		2525 (100.0)
Location		
10–19	Home	369 (14.6)
20–29	Farm	226 (9.0)
30–39	Mine and quarry	146 (5.8)
40–49	Industrial place and premises	860 (34.1)
40	*Industrial places and premises*	*5 (0.6)*
41	*Industrial places and premises, unspecified*	*89 (10.3)*
42	*Dockyard*	*10 (1.2)*
43	*Industrial yard*	*29 (3.4)*
44	*Loading platform*	*14 (1.6)*
45	*Railway yard, line, or tracks*	*15 (1.7)*
46	*Warehouse (except loading platform)*	*26 (3.0)*
47	*Construction site (includes major renovations)*	*386 (44.9)*
48	*Factory plant*	*98 (11.4)*
49	*Industrial places, repair shops, and premises, not elsewhere classified*	*188 (21.9)*
50–59	Place for recreation and sport	81 (3.2)
60–69	Street and highway	227 (9.0)
70–79	Public building	238 (9.4)
80–89	Residential institution	46 (1.8)
90–98	Other	211 (8.4)
99	Not reported	121 (4.5)
Total		2525 (100.0)

*Census of Fatal Occupational Injuries, CFOI research file user reference, 1999.

DISCUSSION

Occupational electrocution deaths occurred almost entirely among males. The highest rates were found among those aged 20–34 and among white and American Indian workers, followed by black workers. The proportions of occupational electrocution deaths were highest in the summer months, in the South, and in establishments employing 10 or fewer workers. The highest rates by industry were in construction, mining, and agriculture, forestry, and fishing. The highest occupation specific rates were among trades associated with these industries.

The present study found nearly 99% of electrocution deaths to have occurred among males, similar to the findings of the National Institute for Occupational Safety and Health (NIOSH).[3] This is likely in part due to the prevalence of males in trades with greater exposure to electrical sources. This study showed the highest rates of death among those aged 20–34; whereas, the highest occupational injury death rates overall in the United States occurred among those aged 45 and over.[20] Similarly, other studies have reported that workers who perish from electrocution tend to be younger than occupational injury fatalities generally.[2 7 9–11] As younger workers tend to be

Table 6 Events to which fatal occupational electrocutions were attributed, United States, 1992–99

CFOI codes*	Description	No (%)
3100	Contact with electric current, unspecified	165 (6.6)
3110	Contact with electric current of machine tool, appliance or light fixture	408 (16.2)
3120	Contact with wiring, transformers, or other electrical components	648 (25.7)
3130	Contact with overhead power lines	1046 (41.4)
3140	Contact with underground, buried cables	40 (1.6)
3150	Struck by lightning	128 (5.1)
3190	Contact with electric current, not elsewhere classified	69 (2.7)
	Other†	21 (0.8)
Total		2525 (100.0)

*Census of Fatal Occupational Injuries, CFOI research file user reference, 1999.
†Includes event code groups containing five or fewer subjects.

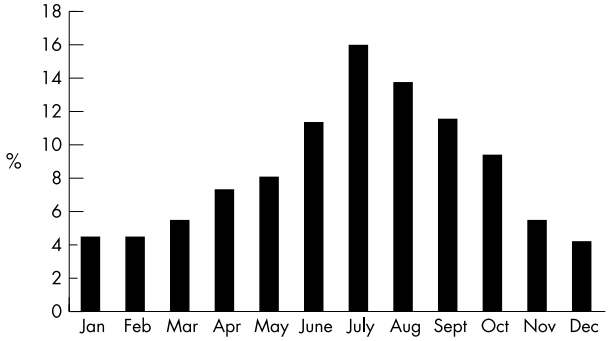

Figure 1 Proportion of fatal occupational electrocutions in the United States 1992–99 by month.

disproportionately affected, interventions should be geared toward these individuals in high risk occupations, industries, and activities. Rates of occupational electrocution death did not differ substantially by race in the present study, and the proportions were similar to those reported by NIOSH. When compared with other regions, the South generally had the highest rates of electrocution death across all industries. The "South" includes Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia. Other studies have not presented rates by region; however, CFOI data show the South to have the greatest proportion of fatal occupational electrocutions in the United States.[21] Reasons for the higher rate in the South are not clear. Whether they may be in some way tied to the duration of warm weather or placement of power lines is not known. Duration of warm weather may affect duration of exposure to outdoor electrical hazards and should correspondingly be reflected in rates; however, denominator data are annual numbers of employed and not reflective of seasonal variations in employment resulting from cold or inclement weather.

The highest proportion of electrocution fatalities occurred in establishments employing 10 or fewer workers, followed by establishments employing 100 or more. These proportions are consistent with CFOI data presented elsewhere for all worker injury fatalities.[20] Although establishments with 100 or more employees had the second highest proportion of injury deaths, they demonstrated the lowest rate of injury death.[20] Smaller employers may have fewer formal safety procedures in place and provide less structured safety training. Given their disproportionate number of electrocution deaths, safety programs specifically geared toward these smaller employers may be warranted.

Not surprisingly, and in accordance with previous studies,[2–6] the highest rates of electrocution death by occupation occurred among the electrical trades (electricians, apprentices) and utility workers. The high rate of electrocution death among earth drillers is an unexpected finding. Decedents listed as earth drillers were primarily engaged in drilling water wells. All 17 were fatally electrocuted when either a truck boom or a drilling derrick contacted overhead power lines. As truck boom contact with power lines is a particularly common cause of fatal electrocution and the number of earth drillers is small, safety messages and other interventions might be more appropriately directed toward all workers whose work involves boomed vehicles.

In this study, 41% of the fatalities examined resulted from contact with overhead power lines. Most published studies addressing electrocution deaths have found the highest proportion to involve power line contact.[7 8 12 13] Contact with overhead power lines by cranes,[22 23] as well as boomed vehicles, is a common mechanism responsible for electrocution death and present opportunities for targeted prevention efforts.

As in the present study, NIOSH reported the highest rates of electrocution death to occur in the construction, mining, and agriculture, forestry and fishing industries, respectively.[3] NIOSH found rates by occupation to be highest among craftsmen, laborers, and farmers. Although this differs from the findings of the present study, the occupational groupings may not be comparable, including individuals performing dissimilar work tasks.

Studies have consistently reported the greatest numbers of occupational electrocution deaths during the months of June, July, and August and the lowest numbers during the winter months.[3 6 7] A recent study reported that among fatal occupational injuries overall, fewer occur during the summer months. Although data are not presented, frequency distributions were calculated by occupation and industry according to month of injury. The purpose of these analyses were to determine whether the high rates of electrocution deaths during the summer months were attributable to certain occupations or industries, particularly weather dependent construction trades. The highest numbers of electrocution deaths occurred during July and August for all industries except for "finance, insurance and real estate", which had its highest numbers in June and July. These elevated numbers during the summer months occurred in "wholesale and retail trade", "public administration", as well as in the construction industry and "transportation and public utilities". A plausible explanation presented by one author for this widely reported drop in electrocution deaths during the winter months is that there is reduced outdoor activity and use of heavier clothing, gloves and boots.[24] Workers are also more susceptible to electrocution during the summer, because during hot, humid weather the skin is more likely to be moist, offering less resistance to electric current.[25]

NIOSH reported a gradual decline (23% overall) in electrocution deaths between 1980 and 1992. The present study does not suggest that there has been a continuing decline in occupational electrocution deaths between 1992 and 1999 (data by year not presented); however, the study period may be of insufficient length to demonstrate such a pattern. Additionally, because Current Population Survey data are not comparable across all years from 1992–99, it is not possible reach conclusions with respect to a trend in rates.

Limitations

A limitation of the study is that the data utilized do not allow calculation of true exposure based rates. The opportunity for exposure is not uniform across occupations, those not directly involved in electrical work having only very brief periods of exposure, whereas individuals employed in the electrical trades may have nearly continuous exposure. The rates presented therefore do not give a true picture of the electrocution hazard attached to particular occupations. The rates may fairly accurately illustrate the hazard for those occupations, such as electric utility workers, with almost continuous exposure to electrical current. Occupations with minimal or intermittent exposure may demonstrate high rates when the likelihood of electrocution death is, in fact, relatively low.

Strengths

A strength of this study over previous studies of occupational electrocutions in the United States is its reliance on CFOI data. CFOI has since 1992 compiled data from diverse state and federal source documents, including death certificates, workers' compensation reports, OSHA reports, and medical examiner reports. It is widely regarded as more complete than other sources of data on occupational injury fatalities. Work relatedness is recorded with questionable accuracy and consistency on death certificates,[26] resulting in under-reporting of occupational injury deaths by 24 to 33%.[27] For the purposes of CFOI, work relatedness is verified by two independent source documents, whereas NIOSH's NTOF surveillance system is based

Key points

- Electrocution is the fifth leading cause of occupational injury death in the United States.
- The highest rates of death occurred in males, those aged 20–34, and among whites and American Indians.
- Rates of death were highest during the summer months, in the South, and in smaller businesses.
- Rates by industry were highest in construction, in mining, and in agriculture, forestry, and fishing.

solely on death certificates. Additionally, in the NTOF data used by the NIOSH monograph, 83% of cases, circumstances of the electrocutions were not characterized.[3] Worker activity at the time of injury was reported in all but 67 (2.65%) of cases in the present study utilizing CFOI.

Of existing studies on fatal occupational electrocutions published in the peer reviewed literature, most have utilized data collected by the NIOSH and/or are industry or occupation specific.[7 8 23 28–30] Of the nationwide studies, two are specific to the construction industry,[7 28] which reportedly has a higher percentage of electrocution deaths than other industries.[3] A third study is specific to electrocution deaths involving power tools.[8] Additionally, NIOSH has published a monograph summarizing surveillance findings on occupational electrocution deaths occurring between 1980 and 1992[3] and its Division of Safety Research has published two reports. The NTOF surveillance system is based upon death certificate data, which are often incomplete as to occupational classification and whether the injury occurred at work.[31] Integrated Management Information Systems, also maintained by NIOSH, are based upon OSHA fatality investigations, which selectively capture cases, as not all workers fall under OSHA jurisdiction (for example, public sector and self employed workers).[26] Also, OSHA investigations tend to be concentrated in the construction and manufacturing industries.[32]

IMPLICATIONS FOR PREVENTION

Although, according to NIOSH, fatal occupational electrocutions decreased between 1980 and 1992,[3] electrocution remains the fifth leading cause of occupational injury death. NIOSH has also reported that worker and supervisor training in electrical safety continue to be inadequate and compliance with OSHA regulations and other safe work practices often does not occur.[3]

NIOSH reported that among 224 fatal electrocution incidents evaluated by the Fatal Assessment and Control Evaluation program, at least one of five factors was present. Established safe work procedures were either not implemented or not followed, adequate or required personal protective equipment was not provided or worn, lockout/tagout procedures were either not implemented or not followed, compliance with existing OSHA, National Electrical Code, and National Electrical Safety Code regulations were not implemented, or worker and supervisor training in electrical safety was not adequate.[3] Most of the 224 incidents also involved failures to comply with OSHA, National Electrical Code, and National Electrical Safety Code regulations. The author concluded that all workers should receive hazard awareness training, enabling them to identify potential and existing hazards in the workplace and relate them to potential serious injury and employers should attempt to control any hazards identified.[3]

The authors of a 1998 review article on the effectiveness of safety training published by NIOSH,[33] concluded that among the demonstrated benefits of worker safety training are increased hazard awareness among worker groups at risk and knowledge of and adoption of safe work practices.

Continued vigilance with respect to safety training is needed, particularly in small businesses, in order to increase workers' conscious understanding of the lethal potential of electricity. More diligent enforcement of existing safety regulations is needed, as is stricter adherence to these regulations by employers.

The majority of electrocution deaths result either from direct or indirect contact with power lines. Having the power company de-energize lines in close proximity to construction sites and other settings where there is potential for power line contact reduces this hazard. Where not possible or practical to de-energize lines, adequate clearance must be maintained or lines encased in insulated sleeves.

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LACUNAE

More children's poems

Walk to school every day,
It keeps you fit along the way.
If you learn your Green Cross Code
It will help you safely across the road.
No sitting in a very long queue,
So that's got to be good for you.

Scott, Kings Norton Primary School, Birmingham, UK

One, two, three, four, five,
If you want to stay alive
You have to use the Green Cross Code
To get safely across the road.

Georgia, Four Oaks Infant School, Sutton Coldfield, UK

Me and Mum walk to school each day,
We have such fun we chat away,
I tell her all the things I'll do.
It's nice because there's just us two.
We watch the traffic all rush by,
We stroll along and wonder why
If people took the time to walk
They'd have more time to laugh and talk.

Natalie, St Andrew's Junior and Infant School, Birmingham, UK