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# Nonfatal occupational injuries among African American women by industrial group

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**Abstract**

**Objective:** This study examined characteristics of nonfatal work-related injuries treated in emergency departments (EDs) among African American women by industry in the U.S. in 1996. **Method:** Injury data were from the National Electronic Injury Surveillance System (NEISS). Employment data were from the Current Population Survey (CPS). **Results:** In 1996, African American women, age 16 or older, were treated in EDs for an estimated 158,335 nonfatal work-related injuries (2.6/100 full-time equivalents, FTEs). Of these injuries, 39% occurred in healthcare, 14% in retail trade, and 12% in manufacturing. Healthcare experienced the highest injury rate of 5.1/100 FTEs, followed by a rate of 2.6/100 FTEs in retail trade. **Summary:** This study is the first report on work-related injuries treated in EDs among African American women by industry on a national level. Injury patterns varied by industry in terms of source, event, diagnoses, and body part. For example, in healthcare the leading source involved interactions with patients and the leading event was physical exertion; whereas in retail trade the leading source was structures and surfaces, and the leading event was contact with objects. **Impact on Industry:** These findings demonstrate that nonfatal work-related injuries are often concentrated in certain high-risk industries, such as healthcare, manufacturing, and retail trade. To improve occupational safety and health for African American women, future research activities and prevention strategies should address the high-risk industries identified in this analysis. 

*Keywords:* African American women; Occupational injuries; Occupational safety; Surveillance; Emergency departments

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## 1. Background

From 1994 to 2005, the number of female workers and the number of minority workers in the U.S. are projected to increase. By the year 2005, women are expected to represent about 48% and minorities about 28% of the workforce (Fullerton, 1995). Women in general, and especially African American women, have been underserved by the occupational safety and health research community. Important questions remain unanswered about the profile of hazards and the incidence of work-related injuries and illnesses experienced by this population (National Institute for Occupational Safety and Health [NIOSH], 1996). The concerns of racial disparity in public health and difficulties in obtaining scientific data for the study of minority public health led to the Disadvantaged Minority Health Improvement Act of 1990. This act provides for the collection and analysis of health data that are specific to particular ethnic and racial populations, and for specific topics to be addressed such as the incidence of accidental injuries (United States Code, Congressional and Administrative News, 1990). The National Occupational Research Agenda has also identified the occupational safety and health of women and minorities as being among the nation's research priorities for the next decade (NIOSH, 1996).

A study of the National Hospital Ambulatory Medical Care Survey (NHAMCS) suggested that African Americans had a higher rate of nonfatal work-related injuries that were treated in emergency departments (EDs) than Caucasians (4.2/100 workers vs. 3.5/100 workers; McCaig, Burt, & Stussman, 1998). A study of the National Electronic Injury Surveillance System (NEISS) data (Chen & Layne, 1999) also reported that African American women had a higher rate of these types of injuries than Caucasian women (2.4/100 full-time equivalents [FTEs] vs. 1.7/100 FTEs). Further, the U.S. Bureau of Labor Statistics (BLS) Survey of Occupational Injuries and Illnesses estimates 70,112 cases of nonfatal injuries involving African American women requiring days away from work for the survey year of 1996 (U.S. BLS, 2000). This study was conducted to examine characteristics of nonfatal work-related injuries that were treated in EDs among African American women by industrial group.

## 2. Methods

National estimates of nonfatal work-related injuries were computed using data from NEISS for 1996. In 1980, NEISS was developed by the Consumer Product Safety Commission (CPSC) to nationally monitor injuries involving consumer products through a stratified probability sample of all hospital EDs in the U.S. and its territories. At that time, CPSC selected 65 hospitals to participate in the collection of NEISS data (McDonald, 1994). The sampling frame was established by first stratifying all hospitals into four strata by hospital size (determined by the annual number of ED visits) and geographic region. The final sample was then selected from the four sampling strata. In 1990, the sample was expanded to

include 91 hospitals; however, the "core" sample (i.e., the original 65 hospitals) was retained.

In 1996, through an interagency agreement with NIOSH, CPSC collected work-related injury data from the 65 hospital EDs from the original "core" single-stage sample (CDC, 1998). Work-related data were not obtained from all 91 hospitals in the CPSC sample due to financial limitations. The work-related data collected for NIOSH include all work-related cases regardless of the involvement of a consumer product in the injury event. A work-related case was defined as any injury sustained while: (a) performing work for compensation; (b) performing volunteer work for an organized group; or (c) performing work on a farm. These guidelines were based on the "Operational Guidelines for Determination of Injury at Work" (Jenkins et al., 1993).

In addition to demographic information such as age, race, and sex, each case record contains the patient's industry and occupation information in a narrative format, physician's diagnoses, and injury sources and events. The injury sources and events were coded according to the Occupational Injury and Illness Coding Scheme developed by the U.S. BLS (1994). For this study, the narrative industry information was coded for African American women, using a computer algorithm, according to the 1990 Census Classification System (U.S. Bureau of the Census, 1992). This computer algorithm coded about 70% of the data, with the remainder being coded manually. The classification of industrial groups used in this study corresponds to the classification of industrial divisions in the 1990 Census Classification System, with the exception of the professional/related service division (industrial codes from 812 to 893), which has been divided into two industrial groups: healthcare (industrial codes from 812 to 840) and other professional services (industrial codes from 841 to 893).

Each injury case in NEISS is assigned a statistical weight on the basis of the hospital's probability of selection in the sample. NIOSH calculates an adjusted weight to account for the use of the core sample of 65 hospitals. National estimates are obtained by extrapolating these adjusted statistical weights. National estimates were computed for African American women aged 16 years and older. Variances and 95% confidence intervals (95% CI) were calculated using methods that accounted for the complex sample design of NEISS (CPSC, 1994a, 1994b). In accordance with CPSC recommendations, any weighted estimate less than 1200 is not considered reliable, and therefore not reported due to high standard errors.

The estimates of employment used for the calculation of injury rates were derived from the Current Population Survey (CPS), which is a national population-based household survey that includes approximately 60,000 households each month (U.S. BLS, 1997a). The CPS monthly microdata files were used to generate employment estimates. The estimates of FTEs were calculated by dividing the actual hours worked per week, as reported by survey respondents, by 40 h and then multiplying by the weighted estimate of the number of working individuals. The rates are presented as number of injuries per 100 FTEs.

## 3. Results

In 1996, there were 2133 injuries among African American women aged 16 years or older treated in the 65 hospital EDs participating in this NEISS effort (information for race was missing for 13% of all injuries). Of these injuries, 276 (12%) had missing industry information and were placed in an unknown group (Table 1); seven cases were coded as volunteers and could not be placed in an industrial group.

An estimated 158,335 (95% CI = 96,539–220,130) African American women, aged 16 and older, were treated for work-related injuries in EDs in the United States during 1996, yielding an annual work-related injury rate of 2.6 injuries/100 FTEs. Healthcare was the industry with the highest frequency ($n = 62{,}114$) and the highest rate of work-related injuries among African American women (5.1/100 FTEs). The industry sectors with the next highest frequencies of work-related injuries were retail trade, manufacturing, and other professional services (Table 1). The next highest injury rates occurred in retail trade, transportation/communications/public utilities, and manufacturing (Table 1).

Tables 2–5 compare injury distributions by source, event, diagnosis, and injured body part for the four industrial groups of healthcare, retail trade, manufacturing, and transportation/communications/public utilities. The leading injury events were: bodily reactions and exertions in healthcare, and contact with objects (most were struck by or against objects) in manufacturing, retail trade, and transportation/communications/public utilities (Table 2). The leading

Table 1
Estimated number, CI, and rate of nonfatal work-related injuries among African American women treated in EDs by industrial group in the U.S. (NEISS,[a] 1996)

| Industrial group | Estimated number of injuries | 95% CI's | | Rate per 100 FTEs[b] |
|---|---|---|---|---|
| Healthcare | 62,114 | 33,184 | 91,043 | 5.1 |
| Retail trade | 21,413 | 12,778 | 30,047 | 2.6 |
| Transportation/communication/ public utilities | 9,067 | 718 | 17,415 | 2.4 |
| Manufacturing | 19,083 | 3,300 | 34,865 | 2.4 |
| Other professional services | 12,018 | 6,683 | 17,353 | 1.0 |
| Public administration | 5,184 | 2,205 | 8,163 | 1.0 |
| Personal services | 3,153 | 1,145 | 5,160 | 0.9 |
| Other[c] | 6,153 | 2,974 | 9,332 | 0.7 |
| Unknown | 19,653 | 9,845 | 29,462 | – |
| Total | 158,335 | 96,539 | 220,130 | 2.6 |

[a] National Electronic Injury Surveillance System. In 1996, this system had 65 hospital EDs collecting nonfatal work-related injuries.

[b] Full-time equivalents.

[c] Industry groups with an estimated number of injuries less than 1200 were grouped to "other" group, which include construction, entertainment service, agriculture/forestry/fishing, wholesale, business/repair service, finance/insurance/real estate, and mining industry.

Table 2
Estimated number of work-related injuries among African American women by injury event and industrial group (NEISS,[a] 1996)

| | Injury event [injuries (%)] | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Industrial group[b] | Contact objects | Falls | Bodily reaction | Exposure to HSE[c] | Transportation | Fire/ explosions | Assaults | Other |
| Healthcare | 14,091 (23) | 9,352 (15) | 22,427 (37) | 7,610 (12) | –d | –d | 5,683 (9) | 2,522 (4) |
| Manufacturing | 8,852 (47) | 2,441 (13) | 4,757 (24) | –d | –d | –d | –d | –d |
| Retail trade | 8,623 (42) | 5,638 (27) | 3,869 (19) | 1,746 (8) | –d | –d | –d | –d |
| Transportation/ communication/ public utilities | 2,684 (30) | 1,870 (21) | 2,554 (28) | –d | 1,309 (14) | –d | –d | –d |

[a] National Electronic Injury Surveillance System. In 1996, this system had 65 hospital EDs collecting nonfatal work-related injuries.

[b] Industrial groups listed here had an injury rate higher than 2/100 FTEs and actual injury numbers greater than 100.

[c] Harmful substances or environments.

[d] In accordance with CPSC recommendations, any weighted estimate less than 1200 is not considered reliable, and therefore not reported due to high standard errors.

injury sources were: interactions with persons in healthcare (i.e., lifting/ moving patients); structures and surfaces (86% were falls to the floor) in retail trade; machinery in manufacturing; and vehicles in transportation/ communications/public utilities (Table 3). The body parts most commonly

Table 3
Estimated number of work-related injuries among African American women by injury source and industrial group (NEISS,[a] 1996)

| | Injury source [injuries (%)] | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Industrial group[b] | Containers | Machinery | Parts/ materials | Persons/ animals | Structures/ surface | Tools/ instruments | Vehicles | Other |
| Healthcare | 2,960 (5) | 2,472 (4) | –c | 24,008 (39) | 11,157 (18) | 6,905 (11) | 1,875 (3) | 12,149 (20) |
| Manufacturing | 2,818 (15) | 3,103 (16) | 1,441 (7) | 2,404 (13) | 2,190 (12) | 1,812 (10) | –c | 4,628 (24) |
| Retail trade | 3,424 (17) | 2,361 (11) | –c | 2,724 (13) | 5,023 (24) | 2,589 (13) | –c | 4,428 (21) |
| Transportation/ communication/ public utilities | –c | –c | –c | –c | 1,818 (20) | –c | 2,803 (31) | 1,244 (14) |

[a] National Electronic Injury Surveillance System. In 1996, this system had 65 hospital EDs collecting nonfatal work-related injuries.

[b] Industrial groups listed here had an injury rate higher than 2/100 FTEs and actual injury numbers greater than 100.

[c] In accordance with CPSC recommendations, any weighted estimate less than 1200 is not considered reliable, and therefore not reported due to high standard errors.

Table 4
Estimated number of work-related injuries among African American women by injured body part and industrial group (NEISS,[a] 1996)

| | Injured body part [injuries (%)] | | | | | |
|---|---|---|---|---|---|---|
| Industrial group[b] | Hand/ finger | Head/face/ neck | Leg/knee/ ankle | Trunk/ groin | Shoulder/arm/ wrist | Others |
| Healthcare | 10,458 (17) | 8,142 (13) | 7,358 (12) | 20,054 (32) | 11,912 (19) | 4,191 (8) |
| Manufacturing | 5,494 (28) | 2,828 (15) | 2,868 (15) | 2,905 (15) | 3,602 (19) | 1,385 (7) |
| Retail trade | 6,737 (31) | 2,243 (10) | 3,281 (15) | 4,693 (22) | 3,231 (15) | 1,228 (6) |
| transportation/ communication/ public utilities | –c | 1,372 (15) | 2,201 (24) | 2,721 (30) | 1,442 (16) | –c |

[a] National Electronic Injury Surveillance System. In 1996, this system had 65 hospital EDs collecting nonfatal work-related injuries.

[b] Industrial groups listed here had an injury rate higher than 2/100 FTEs and actual injury numbers greater than 100.

[c] In accordance with CPSC recommendations, any weighted estimate less than 1200 is not considered reliable, and therefore not reported due to high standard errors.

injured were: hand/finger in manufacturing and retail trade; trunk and groin in healthcare and transportation/communications/public utilities (Table 4). The most common diagnosis was sprain and strain in all four industry groups (Table 5).

Table 5
Estimated number of work-related injuries among African American women by diagnosis and industrial group (NEISS,[a] 1996)

| | Diagnosis group [injuries (%)] | | | | | |
|---|---|---|---|---|---|---|
| Industrial group[b] | Burn | Contusion/abrasion/ hematoma | Dislocation/ fracture | Lacerations | Sprain/strain | Others |
| Healthcare | 2,328 (4) | 15,823 (25) | 1,293 (2) | 3,474 (6) | 28,221 (45) | 10,977 (18) |
| Manufacturing | –c | 4,460 (23) | –c | 2,926 (15) | 5,627 (29) | 4,956 (26) |
| Retail trade | 1,508 (7) | 4,438 (21) | –c | 5,109 (24) | 7,062 (33) | 2,231 (10) |
| Transportation/ communication/ public utilities | –c | 1,631 (18) | –c | –c | 5,358 (59) | –c |

[a] National Electronic Injury Surveillance System. In 1996, this system had 65 hospital EDs collecting nonfatal work-related injuries.

[b] Industrial groups listed here had an injury rate higher than 2/100 FTEs and actual injury numbers greater than 100.

[c] In accordance with CPSC recommendations, any weighted estimate less than 1200 is not considered reliable, and therefore not reported due to high standard errors.

## 4. Discussion

This study finds that healthcare had both the largest number of nonfatal work-related injuries that were treated in EDs and the highest injury rate with 5.1 injuries/100 FTEs. These results are consistent with the results of other studies of healthcare workers (Stout, 1992; U.S. BLS, 1997b). The largest proportion (19.2%) of working African American women was employed in the healthcare industry (U.S. BLS, 1997a). Therefore, in order to reduce the overall number of work-related injuries among African American women, the prevention of work-related injuries in the healthcare industry is essential.

Work-related injuries can be reduced once safety hazards have been identified and prevention strategies developed and implemented. The patterns of injury sources, events, diagnoses, and body parts across various industries found in this study will be helpful for the identification of safety hazards in specific industries. With the identification of these patterns, it will be possible to develop prevention strategies targeted at specific tasks within industries that are found to be high risk.

### *4.1. Strengths and limitations*

There are two national surveillance systems that collect information on nonfatal work-related injury ED visits in the U.S.: NHAMCS and NEISS. In 1996, NHAMCS collected nearly 1000 work-related injury ED visits (McCaig & Stussman, 1998). In contrast, NEISS collected about 41,000 work-related injury ED visits, of which 2133 were African American women aged 16 years or older. The larger sample size in NEISS provides the opportunity to examine characteristics of nonfatal work-related injuries among minority groups. Although NEISS has collected more injuries, it has a smaller sample size of hospitals than NHAMCS (each NHAMCS hospital was asked to collect data only for a 4-week reporting period a year; McCaig et al., 1998). In addition, for each record, NEISS contains information on patients' occupation and industry, which is not included in NHAMCS.

The limitations of using ED records for studying occupational injuries have been reviewed by many studies (CDC, 1998; Layne & Landen, 1997; McCaig et al., 1998). Injuries captured by ED records are only a subset of all work-related injuries. A NIOSH study suggested that approximately 34% of all nonfatal work-related injuries is treated in hospital EDs. Other sources of "first medical treatment" for work-related injuries include doctors' offices (34%), worksite health clinics (14%), and walk-in clinics (9%; Geidenberger, Jackson, & Walker, 1997). The most serious nonfatal work-related injuries will probably be present at hospital EDs, which are often the initial contact for medical care (Fingar, Hopkins, & Nelson, 1992; McCaig et al., 1998). Overall, NEISS covers all industries and occupations and represents the most serious portion of nonfatal work-related injuries (Layne, Castillo, & Stout,

1994). Other national surveillance systems for nonfatal work-related injuries include the Annual Survey of Occupational Injuries and Illnesses maintained by U.S. BLS (which covers the private sector and identifies work-related injuries requiring days off; U.S. BLS, 1998) and the National Health Interview Survey Occupational Health Supplement (which covers all civilians in the workforce and represents self-reported work-related injuries; Geidenberger et al., 1997).

The estimates for transportation/communication/public utilities and manufacturing have large confidence intervals (Table 1). Upon review of the data, the majority of cases from these two industry groups were collected from only a few hospitals; this may be due to the geographic distribution of the industry, geographic distribution of the minority group, or for some other unknown reasons. Therefore, in Tables 2–4, some of the estimates ($\leq 2000$) in these industries are from just a few cases ($\leq 20$) and should be interpreted with caution.

The ED records may be influenced by the population that EDs serve. As a result of this limitation, some worker populations may be overrepresented and others may be underrepresented. Examples of this include: (a) African Americans may be more likely to visit EDs for treatment of work-related injuries, which results in African Americans being overrepresented in ED-based surveillance; (b) hospital workers may be overrepresented, whereas workers in agriculture may be underrepresented (Layne & Landen, 1997). Another limitation in this study is the quantity of missing data. In the 1996 NEISS data, 13% of the injuries were missing data on race and 12% were missing information on industry.

## 5. Conclusions

This study reviewed ED visits for nonfatal work-related injuries to African American women; it is the first report providing a national profile of nonfatal work-related injuries that were treated in EDs among African American women by industry. These findings demonstrate that occupational injuries are often concentrated in certain high-risk industries and suggest the need for targeted research and prevention efforts. Focusing future research activities and prevention strategies on the industry-specific injuries identified in this analysis will help to improve occupational safety and health for African American women.

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