

# Injuries in Working Populations: Black-White Differences

## ABSTRACT

**Background.** Although "accidents and adverse effects" mortality is higher among Blacks than Whites, annual injury rates reported in the National Health Interview Survey (NHIS) are lower among Blacks. We evaluated the influence of sociodemographic risk factors on injury rates among working adults.

**Methods.** NHIS data from 1983 through 1987 for currently working adults were used. Methods were developed to estimate standard errors using data from different sample frames and sample sizes.

**Results.** Working Blacks had fewer reported injuries requiring medical attention or restriction of usual activities than working Whites (22.0 vs 27.0 per 100 persons per year). The difference was pronounced among younger adults in both sexes and among both poor and nonpoor. However, age, sex, and income could not completely explain racial differentials. "At-work" injury rates (36% of all injury episodes) were similar for Blacks and Whites (9.2 vs 9.9 per 100 persons per year), except low-income Blacks and Blacks in service or blue-collar occupations had nonsignificantly smaller at-work injury rates.

**Conclusions.** Possible reporting biases could not be completely eliminated. However, available evidence does not rule out a true difference in injury rates by race, highlighting the complexity of understanding the etiology of injuries and, hence, developing public health programs to prevent injuries. (*Am J Public Health.* 1991;81:1418-1414)

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## Introduction

Injuries are a major cause of death among young adults and adults in their middle years.<sup>1</sup> More than one third of deaths among adults aged 20 to 34 years are due to accidents and adverse effects.<sup>2</sup> In contrast, 12% of deaths to adults aged 35 to 49 years and only 3% of deaths to adults aged 50 to 64 years are due to accidents and adverse effects. In addition to these deaths, each year there are 33.8 million nonfatal injuries to adults requiring medical attention or restriction in activity.<sup>3,4</sup> This report focuses on episodes of nonfatal injury.

In general, working adults have lower injury rates than other segments of the population.<sup>3</sup> However, injuries do have significant consequences for the working population. Injuries cause the loss of more working years of life than all forms of cancer and heart disease combined.<sup>1</sup> In 1980, injuries and poisonings were the leading category for medical costs among working age individuals in the United States.<sup>5</sup> Further, injury rates among workers are rising. From 1983 to 1989, the work-related injury rates reported by the Bureau of Labor Statistics' Annual Survey of Occupational Injuries and Illnesses steadily increased from 7.5 per 100 full-time workers to 8.2.<sup>6,7</sup> Likewise, yearly work loss due to injuries has increased (from 57.2 days per 100 workers to 74.2). These data are based on reports by employers that are subject to underreporting.<sup>8</sup>

Injuries occur in some population subgroups more than others.<sup>9</sup> Whites report more injuries than Blacks<sup>10</sup> but are far less likely to die of injuries than Blacks.<sup>11-13</sup> Injury rates are higher at younger ages.<sup>3,4</sup> To measure morbidity in working populations, regardless of its association with the workplace or employer-

based reporting systems, and to examine the patterns of injuries in workers related to known important parameters such as race, we examined the incidence of injuries among US workers using data from the National Health Interview Survey (NHIS).

## Methods

The NHIS is a continuing nationwide sample survey using personal household interviews conducted by the National Center for Health Statistics of the Centers for Disease Control.<sup>4</sup> Questionnaire information is collected on demographic and personal characteristics, illnesses, injuries, impairments, chronic conditions, health resource use, and other current health topics. The selection of households is based on a multistage probability sampling plan permitting national estimates for the noninstitutionalized civilian population of the United States. Over the years covered in this report, the response rate for the survey was between 95% and 98%.<sup>4</sup>

For this report, data from the survey years 1983 through 1987 were combined. Only currently employed adults 18 through 64 years of age were included. (Currently employed adults 65 years and over accounted for only 6952 out of a total of 216 528 interviews of all working

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adults.) "Currently employed" included persons reporting that at any time during the 2-week period covered by the interview they either worked at or had a job or business. This included both paid and unpaid work. Those who were temporarily absent from a job or business were considered as currently employed if they expected to work as soon as the particular event causing the absence (e.g., vacation, strike, or illness) no longer existed.

An injury or injury condition was any condition classified according to the nature-of-injury codes 800 through 999 in the *International Classification of Diseases*, 9th version (ICD-9), modified for the NHIS.<sup>14</sup> An "episode of injury" was any accidental or nonaccidental violence causing an injury requiring medical attention or at least a half day of restricted activity, including bed days, work-loss days, or cut-down days. The recall period was 2 weeks prior to the interview. A person may have had more than one episode of injury during the recall period. Further, more than one type of injury could result from a single episode of injury. For the purposes of this report, "injury" will refer to injury episodes. The number of injury episodes during the 2-week recall period was multiplied by 26. Therefore, "injury rate" refers to the annual rate of episodes of injury.

For this report, data from 5 survey years were combined to enhance the stability of estimates for demographic subgroups. In 1985 the sampling frame for the NHIS was changed to include, among other features, oversampling in geographic areas with a high density of Blacks. Further, because of lack of funds, the numbers of households in the sample had to be reduced by one quarter in 1985 and by one half in 1986.

The NHIS is a clustered multistage probability sample; therefore, the Statistical Analysis System (SAS) procedure SESUDAAN<sup>15</sup> was used to compute rates, means, and their standard errors and to compute the effect of the complex survey design on the standard error, known as the "design effect".<sup>16</sup> Average annual rates for the 5-year period were estimated by pooling episodes and persons from all 5 years and, hence, both survey designs. The variance was, therefore, the weighted sum of the variance due to the 1983 through 1984 survey design period and the variance due to the latter 1985 through 1987 period. The variance for 1983 through 1984 could be calculated by using SESUDAAN. However, because sample sizes changed during 1985 through

Demographic Group	Estimated Population Size, in Thousands		No. of Interviews
	No.	%	
Total	103 622		209 576
Age (in years)			
18–44	74 963	72.3	149 513
45–64	28 659	27.7	60 063
Sex			
Men	57 715	55.7	114 617
Women	45 907	44.3	94 959
Race			
Whites	90 312	87.2	180 326
Blacks	10 422	10.1	23 704
Other	2 888	2.7	5 546
Family income			
< \$10 000	8 379	8.1	17 126
\$10 000–\$19 999	18 934	18.3	38 926
≥ \$20 000	69 156	66.7	138 924
Missing	7 153	6.9	4 600
Occupation <sup>a</sup>			
White-collar	57 690	55.7	115 936
Blue-collar	28 723	27.7	57 974
Farmer or farm worker	2 933	2.8	6 048
Service	12 458	12.0	25 813
Missing	1 818	1.8	3 805
Education			
< 12 years	57 981	60.0	118 470
Some college	35 076	33.8	69 919
Some postgraduate	9 548	9.2	19 098
Missing	1 017	1.0	2 089

<sup>a</sup>Occupation classes include the following: White-collar: executive, administrative, and managerial; professional specialty; technicians and related support; sales; administrative support, including clerical. Blue-collar: precision production, craft and repair; machine operators, assemblers and inspectors; transportation and material moving; handlers, equipment cleaners, helpers, and laborers (except farm). Farm workers: farming, forestry, and fishing. Services: private household; protective service; service occupations, except protective and household.

1987, the variance for 1985 through 1987 could not be calculated in the usual manner and so was estimated using two approaches. The first approach assumed that the design effect was the same for both time periods and equal to the design effect for the sample collected in 1983 through 1984,  $deff_0$ . The variances for the 1985 through 1987 period were then estimated by multiplying the simple random sampling variance by  $deff_0$ . The second approach assumed that the coefficient of variation was constant over both time periods. Therefore, using the estimates for the rates in each time period and the variance for the first 2 years, the variance for the last 3 years could be estimated.

The design effects for injury-related parameters by demographic subgroups were generally between 0.7 and 1.4, which suggests only a moderate influence of the complex design on the standard errors. Standard errors presented here use the second—coefficient of variation—approach because (1) there was less than a 10% difference in the magnitudes of stan-

dard errors yielded by the two procedures, and (2) the coefficient of variation approach tended to yield larger (and hence more conservative) standard error estimates, especially for smaller subpopulations.

## Results

For the following analyses, the population included currently employed adults, aged 18 through 64 years. Table 1 gives the estimated population sizes and numbers of people interviewed by several demographic characteristics. Among the Black population, slightly more working adults were in the younger group (75%) or were women (50%).

Although the number of interviews was quite large (209 576), only 2016 working individuals reported an injury requiring medical attention or restricted activity in the previous 2 weeks, an annual weighted estimate of 27 382 000 injuries in the US working population. Table 2 gives the weighted numbers of injuries and rates

**TABLE 2—Annual Number and Rate of Episodes of Injury among Currently Employed Persons, Aged 18–64 Years, by Selected Demographic Characteristics: National Health Interview Survey, 1983–1987**

Demographic Group	Number of Episodes of Persons Injured (in thousands)	Rate (per 100 persons/yr)	Standard Error (per 100 persons/yr)
Total	27 382	26.42	0.47
Age (in years)			
18–44	22 128	29.52	0.61
45–64	5254	18.33	0.61
Men	16 708	28.95	0.70
Women	10 674	23.25	0.62
Whites	24 569	27.20	0.49
Blacks	2287	21.95	1.01
Other	526	18.20	0.82
Income			
< \$10 000	3427	40.90	2.41
\$10 000–\$19 999	5736	30.30	1.04
≥ \$20 000	16 858	24.38	0.48
Occupation <sup>a</sup>			
White-collar	12 433	21.62	0.50
Blue-collar	10 398	36.20	1.11
Farmer or farm worker	961	32.75	3.80
Service	3210	25.58	1.35
Education			
≤ 12 years	16 070	27.72	0.61
1–4 years of college	9044	25.89	0.75
Postgraduate	2039	21.84	1.20

<sup>a</sup>Occupation classes include the following: White-collar: executive, administrative, and managerial; professional specialty; technicians and related support; sales; administrative support, including clerical. Blue-collar: precision production, craft and repair; machine operators, assemblers, and inspectors; transportation and material moving; handlers, equipment cleaners, helpers, and laborers (except farm). Farm workers: farming, forestry, and fishing. Services: private household; protective service; service occupations, except protective and household.

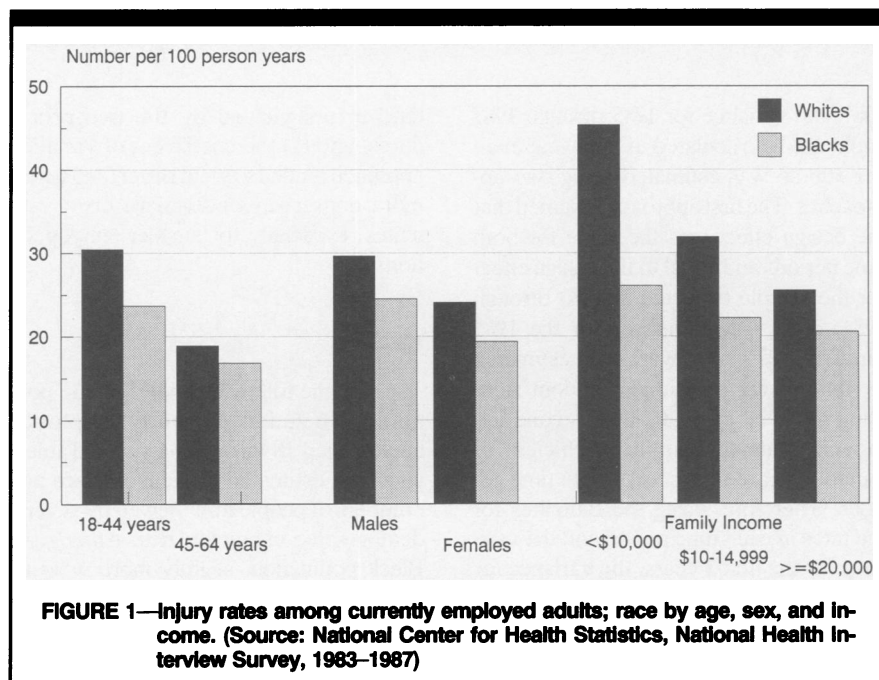
jury requiring medical attention or restricted activity. Approximately 89% of all injuries were medically attended (89% of injuries among Whites and 87% among Blacks), and 55% were associated with at least a half day of restricted activity (55% among Whites and 61% among Blacks). Injury rates were higher among the younger male, lower income, and White populations. Blue-collar and farm-related occupations had higher injury rates.

Figure 1 shows the injury rates for age, gender, and family income groups separately for Whites and for Blacks. In all comparisons except workers aged 45 through 64 years, working Blacks had fewer injuries per person per year.

Within age groups, differences between injury rates also were observed by gender. Among workers aged 45 through 64 years, there was no difference between men and women (18.7 per 100 persons per year vs 17.8), whereas, in the younger age group 18 to 44 years, men had a significantly higher reported injury rate (33.0) than women (25.3). When racial groups were compared separately for men and for women by age group, Black men in the younger age group had lower injury rates than White men (26.5 vs 33.9), but there was little difference by race among older men (18.8 vs 19.1). Among women, Blacks had lower rates in both age groups (20.9 vs 26.1 among women aged 18 to 44 years and 14.8 vs 18.4 among women aged 45 through 64 years).

Because the distribution of jobs differs between Whites and Blacks, Table 3 shows the injury rates by four major occupational classes and by race. There was no difference between Whites and Blacks among white-collar workers. There were too few Black workers in farm or farm-related occupations to reliably estimate the annual injury rate. Blacks had significantly lower injury rates among blue-collar workers and service workers. Within these occupational classes, there were racial differences in the types of jobs. Among service workers, 5% of Whites and 10% of Blacks worked in private households. Among the blue-collar workers, 12% of Whites and 19% of Blacks were handlers or equipment cleaners.

To determine whether the overall higher injury rates among blue-collar workers and service workers were found disproportionately among individuals with lower family incomes, the injury rates were further classified by family income (see Table 3). Low-income Blacks were more often working in service occupations (30%) than low-income Whites



per 100 persons per year for the various demographic subpopulations listed in Table 1. For all characteristics, the rates were significantly different between pairs of subpopulations. (For race, “Whites”

was used as the reference population; for income, “≥ \$20,000”; for occupation, “white-collar”; and for education, “postgraduate.”) Overall, approximately one in four working adults each year had an in-

(18%). There was little racial difference in the proportions employed in blue-collar occupations (33% of low-income Blacks and 36% of Whites). The injury rates among Blacks were smaller than among Whites for all occupation-income groups, except white-collar workers.

In the NHIS, injuries are grouped in four general classes: moving-motor-vehicles injuries, with traffic accidents as a subclass; accidents occurring while at work; accidents occurring in or adjacent to the home; and other accidents. These classes are not mutually exclusive. In the currently employed adult population, the distribution among classes of accidents was 12%, 36%, 25%, and 34%, respectively. Approximately 13% of the moving-motor-vehicle accidents occurred at work.

Because "at-work" injuries were the largest class of injuries and because all persons in this study population were currently employed, the at-work injury rates were calculated for the demographic subgroups (Table 4). In general, the at-work injury rate pattern was similar to all-injury rates. That is, rates were higher among the younger, male, and lower-income groups. However, in contrast to the all-injury rates, there was little difference between racial groups in at-work injury rates. Figure 2 shows these rates by racial groups for age, sex, and family income separately. Only among the low-income population was the Black at-work injury rate appreciably, though not significantly, lower than the White at-work injury rate. Approximately 93% of the at-work injuries were medically attended (93% among Whites and 94% among Blacks), and 54% were associated with at least a half day of restricted activity (54% among Whites and 59% among Blacks).

The rates for at-work injuries were calculated for the four major occupational groups by race (Figure 3). None of the comparisons by race were statistically significant. In general, the differences in rates of at-work injuries between racial groups were smaller than racial differences in rates of all injuries.

**Discussion**

This study confirmed some previous findings in the injury epidemiology literature, but also generated some intriguing results. Injuries to US working adults are common, affecting a quarter of US workers every year. Reported injuries occur more frequently among the poor, among young men, and among the White popu-

**TABLE 3—Injury Rates in Major Occupation<sup>a</sup> Classes, Ages 18–64 years, by Race and Family Income: National Health Interview Survey, 1983–1987**

Income and Race	White-Collar	Blue-Collar	Farm	Services
All income levels				
All races	21.62	36.20	32.75	25.58
Whites	21.84	37.95	30.24	28.27
Blacks	21.70	25.57	64.06 <sup>b</sup>	14.77
Less than \$20 000				
All races	26.60	39.83	39.22 <sup>b</sup>	28.72
Whites	27.19	43.38	36.25 <sup>b</sup>	31.82
Blacks	29.01	20.64	75.66 <sup>b</sup>	19.19
At least \$20 000				
All races	21.31	34.93	23.77 <sup>b</sup>	19.13
Whites	21.62	36.05	23.86 <sup>b</sup>	19.24
Blacks	23.47	27.64	35.97 <sup>b</sup>	13.22

<sup>a</sup>Occupation classes include the following: White-collar: executive, administrative, and managerial; professional specialty; technicians and related support; sales; administrative support, including clerical. Blue-collar: precision production, craft and repair; machine operators, assemblers, and inspectors; transportation and material moving; handlers, equipment cleaners, helpers, and laborers (except farm). Farm workers: farming, forestry, and fishing. Services: private household; protective service; service occupations, except protective and household.  
<sup>b</sup>Relative standard error greater than 30%.

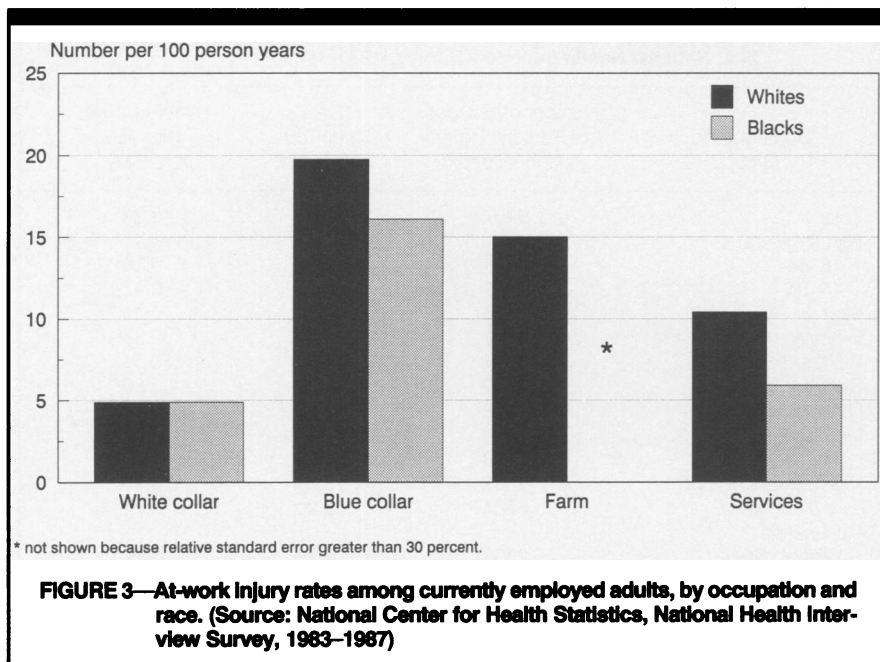
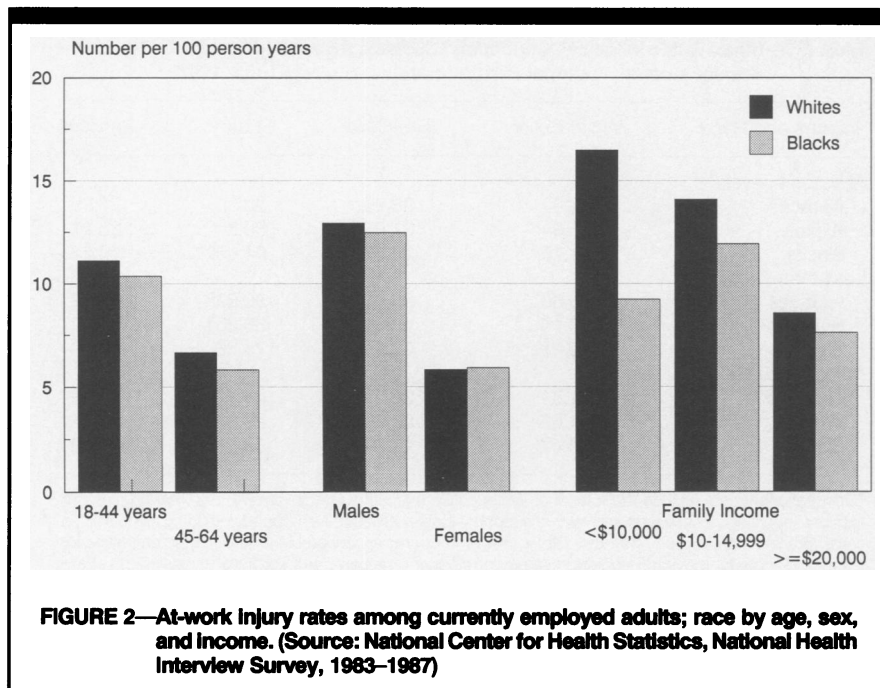
**TABLE 4—Annual Number and Rate of Episodes of Injury at Work among Currently Employed Persons, Aged 18–64, by Selected Demographic Characteristics: National Health Interview Survey, 1983–1987**

Demographic Group	Number of Episodes of Persons Injured (in thousands)	Rate (per 100 persons/yr)	Standard Error (per 100 persons/yr)
Total	9967	9.62	0.29
Age (in years)			
18–44	8114	10.82	0.36
45–64	1852	6.46	0.37
Men	7335	12.71	0.44
Women	2631	5.73	0.37
Whites	8897	9.85	0.31
Blacks	959	9.20	0.86
Other	112	3.87	
Income			
< \$10 000	1236	14.75	1.42
\$10 000–\$19 999	2587	13.66	0.75
≥ \$20 000	5664	8.20	0.24
Occupation <sup>a</sup>			
White-collar	2759	4.78	0.26
Blue-collar	5494	19.13	0.78
Farmer or farm worker	481	16.40	2.19
Service	1177	9.45	1.03
Education			
≤ 12 years	6873	11.85	0.42
1–4 years of college	2508	7.15	0.40
Postgraduate	503	5.26	0.68

<sup>a</sup>Occupation classes include the following: White-collar: executive, administrative, and managerial; professional specialty; technicians and related support; sales; administrative support, including clerical. Blue-collar: precision production, craft and repair; machine operators, assemblers, and inspectors; transportation and material moving; handlers, equipment cleaners, helpers, and laborers (except farm). Farm workers: farming, forestry, and fishing. Services: private household; protective service; service occupations, except protective and household.

lation. Total reported-injury rates for working Whites exceeded those for working Blacks (27 vs 22 per 100 persons per year, respectively), but injuries occurring at work were not different between races (9.9 and 9.2, respectively).

In contrast to these findings for non-fatal injuries, injury death rates are about 18% higher in Blacks for injuries occurring at work<sup>12,13</sup> and for many specific causes of injury death regardless of whether the injury occurred at work.<sup>11</sup> Specific types



of injuries (including nonfatal injuries) show different racial patterns. Hospital- and clinic-based studies have reported more Whites among motor vehicle injury or spinal cord injury victims,<sup>17,18</sup> and more non-Whites among penetrating injury or ocular trauma victims.<sup>17,19</sup> The demographic distributions of these patients, however, may reflect the populations served and not necessarily the rates of injuries in the population subgroups.

Major national surveillance systems that include nonfatal injury information, such as the Bureau of Labor Statistics'

Annual Survey of Occupational Injuries and Illnesses and the Consumer Product Safety Commission's National Electronic Injury Surveillance System, either do not collect race or ethnicity data or do not routinely tabulate data by race. The NHIS is a source of national nonfatal injury information that provides both racial and ethnic information. This report and an analysis of data from the National Health Surveys from June 1959 through June 1961<sup>9</sup> (predecessors to the NHIS) show higher nonfatal injury rates for Whites, except for injuries occurring at work. In both

analyses, the reported injury rates for Whites were about 23% higher than for Blacks (in this report) or for non-Whites (in the earlier report), although the rates have doubled over the time period. Reported injuries occurring at work have also doubled, but the racial difference has remained only about 5%. The authors of the earlier report hypothesized that racial differences in all-injury rates could be due to socioeconomic status, "culture" (including patterns of use of medical facilities), and nature of the work performed.<sup>9</sup> Some of these factors are evaluated in the present report.

Young (ages 18 to 44), working White men had the highest reported injury rates, significantly higher than their Black counterparts. Injury rates were highest among blue-collar workers. Among blue-collar and service workers, White rates exceeded those for Blacks, and this remained true when these occupational groups were further subdivided into income categories. Injuries occurring at work account for more than one third of all injuries occurring to working persons. The pattern of at-work injuries showed little of the racial differences observed for injuries in general, with the exception that, among the poor, at-work injury rates for Whites exceed those for Blacks.

In the NHIS, an event cannot be classified as an injury episode unless medical treatment was sought or there was at least one half day of restricted activity. The higher reported rate of injuries among Whites could be due to a truly higher rate, better access to medical care for Whites compared with Blacks, a greater opportunity for Whites to cut down on routine activities because of illness, or a higher probability that Whites will report an injury episode in this interview survey format.

A conclusion that Whites have higher rates of injuries than Blacks would be strengthened if it could be shown that other factors associated with race and the occurrence of injuries did not account for the findings. All of the factors we examined that were associated with greater injury reporting—lower income, lower education, and young age—were inversely associated with being White, suggesting that confounding could not account for the results.

Assessing access to medical care is complex. Other data from the NHIS<sup>10</sup> suggest that reported rates for Whites exceed those for Blacks for some health indicators that reflect contact with the medical care system: the incidence of acute

conditions (defined in part by contact with a medical care provider) and physician contacts per year. In this report, the percentage of episodes associated with medical care visits did not differ between Whites and Blacks, providing some indication that access to care was not responsible for our findings.

Family income<sup>20</sup> and health insurance coverage<sup>21,22</sup> are two important indicators of access to medical care. Blacks are more likely than Whites to be uninsured, potentially limiting access to medical care.<sup>21,22</sup> Insurance coverage data were unavailable for most of the survey years covered in this report, but income data were collected in all 5 survey years. Individuals with low family incomes might be expected to have less access to medical care and be less able to take time off from their activities, such as work. Therefore, it might be hypothesized that injury reporting would be lower in the poorer group even if their true rates were equal to or higher than those in other income groups. However, workers with family incomes of less than \$20 000 had higher reported injury rates than higher income workers, and those with family incomes under \$10 000 had injury rates higher still. Even among the poorest—where, regardless of race, income might severely influence taking time off or getting medical care—White rates exceeded rates for Blacks. Moreover, 88% of the injuries to low-income individuals were medically attended, nearly equal to the 90% rate for higher income individuals. Equal proportions of doctor visits in both income groups, however, does not necessarily indicate similarities in access to care. Data were not available to determine whether injuries considered severe enough to seek medical attention by one group were medically attended by individuals in another group.

Racial differences in the opportunities to cut down on routine activities or to stay in bed could explain the higher reported injury rates among Whites. Blacks may be more likely to have jobs in which staying away from work for reasons of illness carries greater financial consequences, although family income did not account for the racial differences reported here. Alternatively, family and nonwork responsibilities may make routine activity restriction difficult. A greater percentage of Blacks are in single-parent households<sup>23</sup> where opportunities for restricting activity may be limited.

If Whites have a higher probability of reporting health problems in an interview

format, then this may account for the findings. Greater reporting by Whites probably would lead to Blacks having reported more severe conditions on average, but this could not be evaluated with these data. The National Center for Health Statistics is conducting a study of the reliability of reporting of health conditions using the NHIS interview and medical record data that may help evaluate racial differences in health event reporting.

Evaluation of potential biases is difficult. However, from the discussion above, it appears that the higher rate of injuries among Whites cannot be explained by sociodemographic correlates of race. Available indicators of access to care (e.g., percentage of injuries medically attended) and analyses by income level suggest that availability of health care did not account for the findings. No data were available to address whether racial differences in opportunities for activity restriction or willingness to report injuries had an impact on these results.

This study highlights the importance of analyzing separately injury patterns by the setting of the injury episode because the incidence of injuries at work did not show the same large differences by race for total injuries. Perhaps differences in access to care or opportunities for cutting down on routine activities generally are “leveled” by the workplace. Individuals working in the service occupations (e.g., personal service workers) are less likely to be provided health insurance packages<sup>22</sup> or may be offered less workplace health care, sick leave, or work-hour flexibility. This may explain the lower at-work injury rates among service workers compared with blue-collar workers. Further, our data show that Blacks are more likely to be in these occupations.

Despite their limitations, interviews with the victims of injuries would seem to offer the best opportunity for studying racial differences in nonfatal injury occurrence. These data are less dependent on access to care compared with reporting systems based on emergency room, compensation data, or physician records. However, this focused examination of racial differences in injury reporting suggests that methodological research be conducted on approaches to collect injury data via questionnaires. It will be important to reexamine existing definitions of injuries used in interview surveys to determine the extent to which these capture the injuries of greatest public health importance. Improved assessments of access to care and of barriers to reporting are

needed in epidemiologic studies. Measuring severity of injuries should provide better insight into the public health aspects of injury and disability.

Injury epidemiology is an important public health concern, as evidenced by its inclusion as an emphasis area in the national health objectives for the years 1990 and 2000.<sup>7,24</sup> The workplace is an effective arena for health promotion programs. Therefore, understanding injury patterns within sociodemographic subgroups of the US working population is important. However, it is also important to have better information on injury patterns within sociodemographic subgroups of the entire US population. □

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## Health and Population Data for Developing Countries Available through USAID Project

The Demographic and Health Survey (DHS) Program, funded by the US Agency for International Development (USAID), is contributing unique data to the global database on population and health. To date, over 35 surveys have been conducted in developing countries, including Botswana, Kenya, Nigeria, Senegal, Zimbabwe, Indonesia, Sri Lanka, Peru, Bolivia, Ecuador, Egypt, and Morocco.

The DHS Program, administered by the Institute for Resource Development, Columbia, Md, began in 1984. The primary objectives of the program are to assist developing countries in building the technical skills and resources necessary for conducting demographic and health surveys and to provide developing nations with information for informed health and population policy choices. The data are gathered through a core questionnaire that is adapted to local needs and cultures.

The DHS core questionnaire has two parts: a household schedule for information on all household members and on household amenities and a woman's questionnaire for information on the woman and her children.

The DHS health data are used to estimate levels of neonatal, infant and child mortality; assess treatment practices for major childhood diseases; estimate coverage rates for maternal care and immunization; determine incidence of high-risk

births; and assess regional variation in nutritional status.

The data can also be used to examine the relationships between various sociodemographic variables and health variables to better understand the health picture of developing countries.

The DHS survey data, which are maintained in a computerized archive, are available for 28 countries. Usually, several datasets are available for each country. These include women's data, household data, and service availability data.

In general, DHS datasets are available to researchers after the publication of the country survey report. For a few surveys, written permission is necessary from the in-country survey organization. The data files are accompanied by questionnaires, machine-readable descriptions and associated documentation. Currently, the cost of a DHS dataset is \$200 (\$50 for researchers in developing countries).

To order a DHS dataset, send a completed request form and description of your analysis project to the DHS Data Archive. Request forms are available from the archive. The address is DHS Data Archive, Institute for Resource Development, 8850 Sanford Boulevard, Columbia, MD 21045, USA. Tel: 301/290-2977; Telex: 87775; Fax: 301/290-2999.