



Assessment of Occupational Health Disparities in North Carolina, 2013, and Eleven-Year Trend (2003-2013) – Part 1

Introduction

Occupational health disparities are defined as differences in disease incidences or risks to health from work exposures that exist across racial and ethnic worker populations¹. These disparities result in part from the high concentration of certain racial/ethnic minorities in high-risk jobs and hazardous industries, and lack of complete safety awareness and interventions among certain worker populations due to social, cultural, or economic barriers²⁻⁶.

As the North Carolina workforce becomes more diverse as more people migrate from outside the state⁷, certain worker populations (e.g. racial/ethnic minorities) will be at high risk for work-related injury or illness for a variety of reasons. For instance, foreign-born immigrant workers may be unaware of local laws, or received poor or very little formal training in their native language regarding worker safety and health protection⁸. Past efforts to describe occupational fatalities in North Carolina have also shown patterns in work-related deaths by race/ethnicity. For example, rates of occupational fatalities among Hispanic workers have been persistently higher than among other racial/ethnic groups⁹.

Describing occupational health disparities in North Carolina is important to help understand and address the risks to workers in the state. This report used employment data and methods developed by Michigan⁸ to describe how different racial/ethnic categories of workers are concentrated in different low and high-risk occupations, and the association between race/ethnicity and rates of work-related fatalities.^a

Methods

Data for occupation, race, ethnicity, and employed population (denominator) counts were obtained from the U.S. Census Current Population Survey (CPS), using the Census online data-mining tool, DataFerrett. CPS is a monthly survey of households conducted by the US Census Bureau for the Bureau of Labor Statistics (BLS). Information provided includes comprehensive data on the labor force, employment, unemployment, persons not in the labor force, workhours, earnings, demographics, and other labor force characteristics¹⁰. All currently employed residents of North Carolina during 2013, aged 16 years or older, were selected for analysis. Data were categorized by occupation, race, and ethnicity.

Analyses were conducted on CPS data in three ways to determine how different racial /ethnic groups of workers were distributed within different occupational groups. These methods were recommend by the study: *Occupational Health Disparities, A State Public Health-Based Approach*⁸:

- 1) within 22 major occupational groups: rank by median hourly wage¹¹ and determine the percentage of employment by race/ethnicity;
- 2) within the four major racial/ethnic groups: classify the ten most common occupations by level of risk, described by three categories determined by the International Labor Organization: manager/professional, clerical/sales/service, trades/operators/manual laborers¹²; and
- 3) within occupation groups national ranked with the highest incidence rates of injury and illness: determine percentage of employment by race/ethnicity.

Fatality (numerator) counts were obtained from the U.S. BLS Census of Fatal Occupational Injuries (CFOI). Since 1992, CFOI has been providing comprehensive annual work-related fatality data for the U.S. Reported fatalities are verified by cross-referencing reported counts from multiple sources (e.g. death certificates, media reports, workers' compensation reports, follow-up questionnaires, and administrative reports from federal and state agencies such as the

^a Part 1 in a three-part series assessment of occupational health disparities in North Carolina.

Occupational Safety and Health Administration)¹³. Information provided includes data on worker characteristics (demographics, data on industry and occupation), and data concerning fatal incidents (e.g. equipment involved and circumstances of the injury event). All work-related fatalities recorded by CFOI were selected for analysis.

Analyses were conducted on CFOI data from calendar years 2003 through 2013 to determine the association between race/ethnicity and work-related injury conditions over time. Occupational fatalities were chosen for this time period for analysis, as the CFOI system in North Carolina is the state's most comprehensive case-based surveillance system for work-related injuries that systematically includes standardized information on race/ethnicity. Rates over time were calculated. Rate ratios with 95% confidence limits and *p*-values were calculated using OpenEpi v.3.03a.

Results

Demographics

In 2013, the estimated North Carolina workforce consisted of 4,294,106 employed persons. 73.2% were non-Hispanic (NH) White, 20.5% were NH Black, 3.1% were NH Asian, and 3.2% were in other or mixed racial groups. An estimated 8.8% of workers were of Hispanic ethnic origin. Hispanic ethnicity may be included within all race categories.

Wage

Compared to the overall representation for each racial/ethnic group in the overall workforce, NH Blacks (20.5%) were underrepresented in the five of the seven highest-paid (upper tertile) occupation groups, and overrepresented in four of the seven lowest-paid (lower tertile) groups (Table 1A). NH Asians were only underrepresented in two of the seven highest-paying occupations, and over-represented in one of the lowest-paying occupation groups. Subjects in the "Other" category were underrepresented five of the seven highest-paying occupations. Hispanics (8.8%) were underrepresented in the entire upper tertile of highest-paid occupations in North Carolina, and overrepresented in five of the seven lowest-paid occupation groups (Table 1B).

Occupational Classification

Of the ten most common occupations for NH Blacks, nine of the ten occupations were service or manual labor, and all of the top 10 occupations among Hispanics were service or manual labor (Table 2). Only three of the ten most common occupations among NH Asians and seven among NH whites were in service or manual labor.

Injury/Illness Risk Hazard

Of the 13 occupations ranked with the highest work-related injury/illness rates nationally, NH Blacks were overrepresented in eight of the 13 occupation groups (Table 3), the top three being highway maintenance workers (73.5%), nursing assistants (57.7%), and laborers (52.9%). Hispanics were overrepresented in six of the 13 high-risk occupation groups, the top three being construction laborers (46/1%), food preparation workers (33.5%), and truck drivers (22.6%).

Occupational Fatalities

From 2003 through 2013, a total of 1,697 occupational fatalities were reported in North Carolina, an average of 154 (range: 109-183) deaths annually. Although the number of Hispanic work-related deaths accounts for only 12% of all occupational fatalities over time, the rate of work-related fatalities among Hispanics has consistently been higher than in any other racial/ethnic category over the 11-year period (Figure 1). Additionally, Hispanic workers are 1.75 (95% CL 1.04, 2.80; *p*<0.05) times more likely to die on the job as compared to non-Hispanic White workers (Table 4). However, over the eleven-year period, there was a 38% decrease in the rate of fatalities among Hispanic workers.

Public Health Significance

Occupational health disparities in North Carolina exist by race and ethnicity. Non-Hispanic Black and Hispanic workers are employed in more occupations at high risk for injury than non-Hispanic White or non-Hispanic Asian workers. These findings are also largely consistent with national findings^{14,15}. Racial/ethnic minorities have consistently been over-represented in high-risk industries that are usually lower-paid and predominantly manual labor occupations^{3,5}. North Carolina CPS employment data reflects these findings. Both NH Blacks and Hispanics were over-represented in over half of the lowest-paid occupations in the state. It is also concerning that there is an increased risk of work-related injury among Hispanics and NH Blacks, as nine of the ten most common occupations among NH Blacks are hazardous trades or manual labor, and all of the ten most common occupations among Hispanics are trades and manual labor. Furthermore, NH Blacks and Hispanics are also over-represented in occupations with the highest national rates of non-fatal work-related injuries. Finally, although the overall rates of fatal work-related injuries have been decreasing among Hispanic workers, they are still consistently at a significantly higher risk of dying at work as compared to other racial/ethnic groups. Continued surveillance with other data source, in addition to collecting data that explores in-depth the potential causes of work-related injury and death should be the next steps taken to understand occupational health disparities.

Limitations

Employment data alone cannot explain the causes of racial/ethnic occupational health disparities in work-related injuries, but can be useful in identifying the presence of disparities among race/ethnicity. Further data exploration will be necessary to better address this problem in the state. The CPS does not capture data from children less than 15 years of age, institutionalized persons, or persons in the Armed Forces¹⁰. It is a survey of a probability sample of households, and not a comprehensive census counting all employed persons¹⁰.

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Appendix

Table 1A. Percent Employed Major Occupational Groups by Non-Hispanic Racial Groups, Ranked by Median Hourly Compensation Wage for Each Occupational Group, NC, 2013

Occupational Groups*	Median Hourly Wage**	NC Number Employed	White	Black	Asian	Other^{&}
All Occupations	\$15.46	4,294,106	73.2	20.5	3.1	3.2
Management Occupations	\$47.41	438,570	81.4	11.3	5.0	2.2
Computer and Mathematical Occupations	\$36.89	117,575	74.7	12.5	12.1	0.7
Architecture and Engineering Occupations	\$32.23	56,172	82.6	7.2	6.1	4.1
Business and Financial Operations Occupations	\$29.35	169,424	81.4	15.1	2.6	0.8
Life, Physical, and Social Science Occupations	\$27.68	59,819	58.8	24.0	14.5	2.6
Healthcare Practitioners and Technical Occupations	\$26.87	255,012	75.7	15.6	4.6	4.0
Legal Occupations	\$26.81	26,400	78.2	21.8	0.0	0.0
Community and Social Service Occupations	\$19.48	96,115	74.9	21.2	1.1	2.9
Education, Training, and Library Occupations	\$19.31	264,569	74.9	17.5	1.7	5.9
Arts, Design, Entertainment, Sports, and Media Occupations	\$18.90	84,833	89.8	8.4	0.0	1.8
Installation, Maintenance, and Repair Occupations	\$18.81	170,955	84.2	12.2	0.8	2.8
Construction and Extraction Occupations	\$16.06	215,465	84.0	11.7	0.5	3.8
Protective Service Occupations	\$15.44	88,123	69.5	23.0	0.0	7.5
Office and Administrative Support Occupations	\$14.81	533,721	69.4	23.7	2.4	4.5
Production Occupations	\$14.06	274,336	64.0	30.3	4.4	1.3
Transportation and Material Moving Occupations	\$12.97	267,164	62.1	33.7	2.3	2.0
Sales and Related Occupations	\$11.52	455,654	71.6	22.6	2.6	3.2
Farming, Fishing, and Forestry Occupations	\$11.43	32,278	79.4	19.7	0.0	0.8
Healthcare Support Occupations	\$10.89	126,176	46.2	50.1	1.0	2.7
Building and Grounds Cleaning and Maintenance Occupations	\$10.14	169,888	78.4	18.7	0.5	2.4
Personal Care and	\$9.41	142,950	64.5	24.1	8.1	3.3

Service Occupations						
Food Preparation and Serving Related Occupations	\$8.87	248,908	74.4	19.9	1.7	4.0
<p>*Source: 2013 Current Population Survey, US Census Bureau. **Source: 2013 National Occupational Employment and Wage Estimates, United States Bureau of Labor Statistics. & "Other" category includes American Indians, Alaskan Natives, Hawaiian/Pacific Islanders, and subjects identified as mixed-race with two or more racial groups (e.g. White-Black, White-Black-Asian, etc.).</p>						

Table 1B. Percent Employed Major Occupational Groups by Hispanic Ethnicity, Ranked by Median Hourly Compensation Wage for Each Occupational Group, NC, 2013

Occupational Groups*	Median Hourly Wage**	NC Number Employed	Hispanic	Non-Hispanic
All Occupations	\$15.46	4,294,106	8.8	91.2
Management Occupations	\$47.41	438,570	3.2	96.8
Computer and Mathematical Occupations	\$36.89	117,575	0.8	99.2
Architecture and Engineering Occupations	\$32.23	56,172	6.0	94.0
Business and Financial Operations Occupations	\$29.35	169,424	2.7	97.3
Life, Physical, and Social Science Occupations	\$27.68	59,819	4.1	95.9
Healthcare Practitioners and Technical Occupations	\$26.87	255,012	1.8	98.2
Legal Occupations	\$26.81	26,400	3.8	96.2
Community and Social Service Occupations	\$19.48	96,115	2.8	97.2
Education, Training, and Library Occupations	\$19.31	264,569	1.1	98.9
Arts, Design, Entertainment, Sports, and Media Occupations	\$18.90	84,833	5.5	94.5
Installation, Maintenance, and Repair Occupations	\$18.81	170,955	5.7	94.3
Construction and Extraction Occupations	\$16.06	215,465	33.8	66.2
Protective Service Occupations	\$15.44	88,123	6.7	93.3
Office and Administrative Support Occupations	\$14.81	533,721	3.8	96.2
Production Occupations	\$14.06	274,336	11.8	88.2
Transportation and Material Moving Occupations	\$12.97	267,164	11.7	88.3
Sales and Related Occupations	\$11.52	455,654	6.8	93.2
Farming, Fishing, and Forestry Occupations	\$11.43	32,278	33.4	66.6
Healthcare Support Occupations	\$10.89	126,176	1.0	99.0
Building and Grounds Cleaning, and Maintenance Occupations	\$10.14	169,888	26.3	73.7
Personal Care and Service Occupations	\$9.41	142,950	10.0	90.0
Food Preparation and Serving Related Occupations	\$8.87	248,908	24.8	75.2
*Source: 2013 Current Population Survey, US Census Bureau.				
**Source: 2013 National Occupational Employment and Wage Estimates, United States Bureau of Labor Statistics.				

Table 2. Ten Most Common Occupations for Major Racial/Ethnic Groups, Stratified by Major Occupation Types, North Carolina, 2013

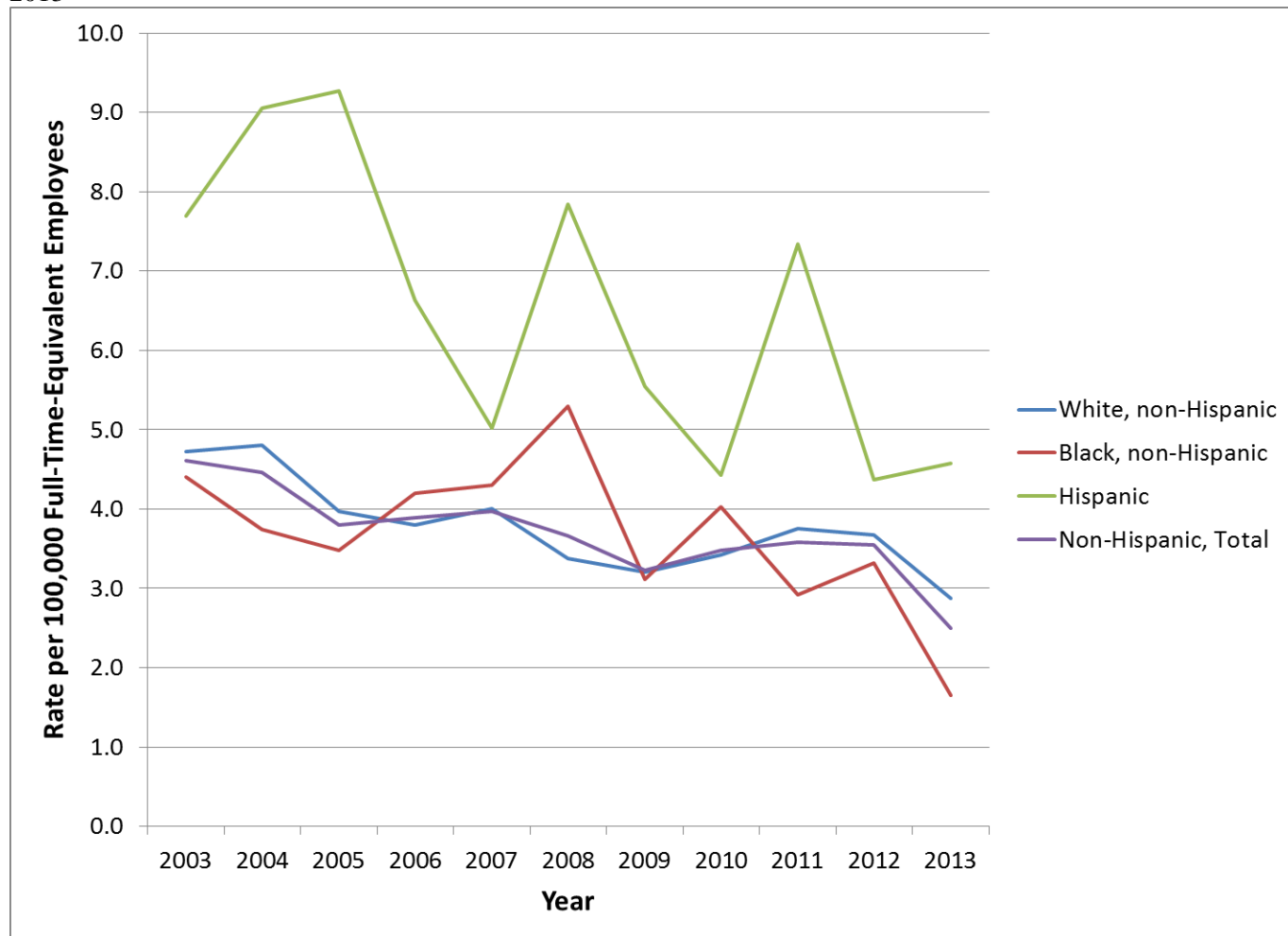
Select Race/Ethnicity*; Major** and Minor* Occupational Groups	Number Employed	(%)
WHITE	3,143,291	
<i>Managers/Professionals</i>		
Managers, all other	76,355	2.4
Elementary and middle school teachers	73,425	2.3
Registered nurses	73,102	2.3
<i>Clerical/Sales/Service</i>		
Retail salespersons	76,283	2.4
First-line supervisors/managers of retail sales workers	62,789	2.0
Cooks	56,329	1.8
Waiters and waitresses	55,220	1.8
Secretaries and administrative assistants	54,641	1.7
Cashiers	54,276	1.7
<i>Trades/Operators/Manual Laborers</i>		
Driver/sales workers and truck drivers	77,033	2.5
BLACK	881,807	
<i>Managers/Professionals</i>		
Managers, all other	16,128	1.8
<i>Clerical/Sales/Service</i>		
Nursing, psychiatric, and home health aides	51,109	5.8
Cashiers	48,979	5.6
Retail salespersons	26,437	3.0
Stock clerks and order fillers	23,374	2.7
Personal and home care aides	16,660	1.9
Customer service representatives	15,067	1.7
<i>Trades/Operators/Manual Laborers</i>		
Driver/sales workers and truck drivers	27,510	3.1
Laborers and freight, stock, and material movers, hand	22,548	2.6
Janitors and building cleaners	19,197	2.2
ASIAN	133,370	
<i>Managers/Professionals</i>		
Food service managers	10,801	8.1
Physicians and surgeons	7,120	5.3
Software developers, applications and systems software	5,370	4.0
Managers, all other	4,659	3.5
Chemists and materials scientists	3,603	2.7
Computer programmers	2,701	2.0
Computer and information systems managers	2,463	1.8
<i>Clerical/Sales/Service</i>		
First-line supervisors/managers of retail sales workers	8,791	6.6
Miscellaneous personal appearance workers	5,982	4.5
Customer service representatives	4,406	3.3
HISPANIC ^{&}	377,264	

<i>Clerical/Sales/Service</i>		
Cooks	32,125	8.5
Cashiers	13,754	3.6
Maids and housekeeping cleaners	9,360	2.5
Waiters and waitresses	8,788	2.3
<i>Trades/Operators/Manual Laborers</i>		
Construction laborers	26,633	7.1
Grounds maintenance workers	20,958	5.6
Janitors and building cleaners	12,048	3.2
Carpenters	11,857	3.1
Painters, construction and maintenance and paperhangers	9,258	2.5
Miscellaneous agricultural workers, including animal breeders	8,870	2.4
*Source: 2013 Current Population Survey, US Census Bureau. **Categories from International Labor Organization, 2012. *Hispanic ethnicity is not mutually exclusive of race categories.		

Table 3. Number and Percent Employed by Race and Hispanic Ethnicity 13 Highest Risk Occupations Nationally, North Carolina, 2013

Occupation Categories*	National Incidence Rate Per 10,000*	Total Employed, NC	% Non-Hispanic (NH) White	% NH Black	% Other	% Hispanic^{&}	% Non-Hispanic^{&}
All occupations	109	4,294,106	73.2	20.5	6.3	8.8	91.2
Transit and intercity bus drivers	677	21909	47.4	48.1	4.5	10.2	89.8
Police and sheriff's patrol officers	491	26947	70.4	20.1	9.5	0	100
Firefighters	457	4856	100	0	0	0	100
Correctional officers and jailers	421	12455	48.5	39.4	12.0	0	100
Nursing assistants	393	88557	38.4	57.7	3.9	1.1	98.9
Telecommunications line installers	387	9703	83.9	13.0	3.1	12.1	87.9
Highway maintenance workers	374	1057	26.4	73.5	0.1	0	100
Heating, a/c and refrigeration mechanics and installers	330	15485	92.0	7.9	0	16.2	83.8
Heavy and tractor-trailer truck drivers	328	19494	52.7	47.3	0	22.6	77.4
Light truck or delivery services drivers	328	111113	69.3	24.8	5.9	5.8	94.2
Food preparation workers	321	20723	67.8	32.2	0	33.5	66.5
Laborers and freight, stock, and material movers	304	42604	47.1	52.9	0	9.7	90.3
Construction laborers	302	57809	92.8	6.2	0.9	46.1	53.9
Source: 2013 Current Population Survey, US Census Bureau							
*Occupation categories and incidence rates for non-fatal injuries and illnesses in 2013 from Bureau of Labor Statistics [2015]							
^{&} Hispanic ethnicity is not mutually exclusive of race categories.							

Figure 1. Rate of fatal work-related injuries by select* racial groups and Hispanic ethnicity¹, North Carolina, 2003-2013



Sources: BLS Census of Fatal Occupational Injuries (CFOI). Workforce estimates from the US BLS Current Population Survey (CPS).

*Selected rate categories had 5 or more reported fatal work injuries in the year of interest.

¹ Persons identified as Hispanic or Latino may be of any race. Race categories shown exclude data for Hispanics and Latinos except where indicated.

NOTE: Includes workers employed by governmental organizations regardless of industry, volunteers, and workers receiving other types of compensation. Also includes self-employed workers, owners of unincorporated businesses and farms, paid and unpaid family workers, and may include some owners of incorporated businesses or members of partnerships. CFOI fatality counts exclude illness-related deaths unless precipitated by an injury event. Workers under the age of 16 years, volunteer workers, and members of the resident military are not included in rate calculations to maintain consistency with the CPS employment.

Table 4. Disparities by Race/Ethnicity for Work-Related Fatalities, North Carolina, 2003-2013

Race/Ethnicity	Average Rate per 100,000 FTE*	Rate Ratio	95%CL	p-value
Non-Hispanic (NH) White (Referent group)	3.8	1.00	---	---
NH Black	3.7	0.96	0.62, 1.44	0.8474
NH Asian	3.1	1.20	0.38, 2.98	0.6754
NH American Indian/Alaskan Native	0.8	1.26	0.32, 3.51	0.649
Other	5.3	1.35	0.22, 4.54	0.6296
Hispanic	6.5	1.75	1.04, 2.80	<0.05

Sources: US BLS Census of Fatal Occupational Injuries (CFOI). Workforce estimates from the 2013 US BLS Current Population Survey (CPS).

*FTE: full-time equivalent

NOTE: rates were calculated as number of fatal occupational injuries per 100,000 FTE worker hours in a given population, and are calculated as $N/EH \times 200,000,000$, where:

N = number of fatal work injuries in a given population,

EH = total hours worked by all employees in a given population during the calendar year, and

200,000,000 = base for 100,000 FTEs in a population (working 40 hours per week, 50 weeks per year).



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