Examining National Trends in Worker Health With the National Health Interview Survey

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Objective: To describe data from the National Health Interview Survey (NHIS), both the annual core survey and periodic occupational health supplements (OHSs), available for examining national trends in worker health. **Methods:** The NHIS is an annual in-person household survey with a cross-sectional multistage clustered sample design to produce nationally representative health data. The 2010 NHIS included an OHS. **Results:** Prevalence rates of various health conditions and health behaviors among workers based on multiple years of NHIS core data are available. In addition, the 2010 NHIS-OHS data provide prevalence rates of selected health conditions, work organization factors, and occupational exposures among US workers by industry and occupation. **Conclusions:** The publicly available NHIS data can be used to identify areas of concern for various industries and for benchmarking data from specific worker groups against national averages.

The magnitude and correlates of work-related health conditions and potentially hazardous working conditions need to be more-fully understood before we can mitigate them, and this understanding requires collection and interpretation of data followed by the dissemination of these data to stimulate public health action (public health surveillance). The data sources that are traditionally used for surveillance of occupational injuries and illnesses include case reports to state public health agencies, the Bureau of Labor Statistics Survey of Occupational Illness and Injury, workers' compensation records, and the National Institute for Occupational Safety and Health (NIOSH) National Electronic Injury Surveillance System Work-Related Injury and Illness Supplement. These data sources provide important information, especially regarding the causes of occupational injuries, but they have many limitations such as incomplete coverage (eg, exclusion of self-employed workers, workers on small farms, and some government employees in the Bureau of Labor Statistics Survey of Occupational Illness and Injury), and most sources only capture occupational injuries and illnesses that are reported to employers or health care professionals.

Many of these limitations can be addressed by using a periodic household-based survey that is representative of the entire civilian noninstitutionalized US population, to examine national trends in worker health. The National Health Interview Survey (NHIS) fits this description and has been used to examine national trends in worker health. One of the most important features of the NHIS is that the data are publicly available on-line.

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Data about workers from the NHIS can be used to track the burden of morbidity, disability, and specific health conditions among all US workers; compare these burdens among worker subgroups to prioritize limited public resources for occupational health; and provide industry-specific estimates to industry stakeholders to prioritize industry-wide interventions and to employers to benchmark the health of their workers against industry averages to prioritize organization-level interventions.

METHODS

The National Health Interview Survey

The NHIS is an annual in-person household survey that has been conducted by the National Center for Health Statistics (NCHS) since 1957. It uses a cross-sectional multistage clustered sample design to produce nationally representative health data. Approximately 35,000 to 40,000 households are surveyed annually. The NHIS consists of a core set of questions that remain relatively unchanged from year to year and supplemental questions that vary from year to year. The National Institute for Occupational Safety and Health sponsored occupational health supplements (OHSs) in 1980, 1988, and 2010. It plans to sponsor another NHIS-OHS in 2015.

Some basic demographic and health information is collected about each family member in each household. Detailed demographic and health questions are asked about 1 sample adult (and 1 sample child, if applicable) from each family. More information about the NHIS can be found at http://www.cdc.gov/nchs/nhis.htm.

Data Available From Core Sample Adult Questionnaire

The core Sample Adult Questionnaire collects sociodemographic information, such as the respondent's sex, age, education, race/ethnicity, and household income. Respondents are asked about several specific health conditions, including injuries/poisonings (3-month recall period), acute conditions (eg, head/chest cold in past 2 weeks), and chronic conditions (eg, hypertension, diabetes, and low back pain). The health status section includes questions about days spent in bed and activity limitations. Health behaviors addressed include tobacco and alcohol use, physical activity, and influenza vaccination, while the health care utilization section addresses issues such as insurance coverage and whether the respondent has a usual place to go for health care.

The NHIS's utility for examining national trends in worker health comes from the fact that the core Sample Adult and Family Questionnaires include questions about the respondent's employment status and several other factors related to his or her current job (or longest-held job in the case of retired workers), such as industry and occupation, class of worker (eg, self-employed, government, and private), the average number of hours worked per week, duration of employment, the number of workers employed at the respondent's workplace, wage/salary, and the availability of certain benefits (eg, employer-sponsored health insurance and paid sick leave). Workers are also asked about the number of days of work they missed because of illness or injury during the past 12 months.

Data Available From the 2010 OHS

The National Institute for Occupational Safety and Health sponsored an OHS to the 2010 NHIS to provide current, national estimates on the prevalence of common workplace exposures and health conditions that are often work-related. The supplement was designed to collect information relevant to worker health beyond what is available from the core NHIS questions.

Information was collected on workers' longest-held jobs to supplement the information about workers' current jobs already available through the core NHIS Sample Adult Questionnaire. Because many occupational hazards have long latent periods or the effects are greatest with cumulative exposure, it is important to know about a person's longest-held job.

Data were also collected on employment arrangements and work schedules and on several key hazardous occupational psychosocial and physical exposures for which recent data were not previously available at a national level. All exposures were assessed with regard to the respondent's current/most-recent job, except for exposure to vapors, gas, dust, or fumes, which was assessed for the respondent's longest-held job.

Finally, information was collected on three health conditions that are commonly related to work (asthma, skin conditions, and carpal tunnel syndrome) to estimate the burden of work-related illness. For these conditions, occupational origin was assessed by asking survey respondents specific questions about their clinicians' opinions of the work-relatedness of the conditions and whether they filed for workers' compensation for these conditions. These were similar to questions included in the 1988 NHIS-OHS.

RESULTS

Using recent NHIS data, NIOSH staff have published analyses of the prevalence of several targeted health conditions and health behaviors by industry and occupation categories, including hearing difficulty attributable to employment,[1] short sleep duration,[2] asthma,[3] and chronic obstructive pulmonary disease.[4]

New Set of NIOSH Documents Based on Core NHIS Data, 1997–2007

The National Institute for Occupational Safety and Health has also partnered with researchers from the Occupational Research Group at the University of Miami (see http://www.umiamiorg.com/index.htm) to produce several reports about worker health on the basis of NHIS core data, including a recently released series of reports developed to describe the prevalence of disability and morbidity among current workers within eight National Occupational Research Agenda (NORA) sectors (Table 1).

Each sector report includes charts and tables for 27 outcomes, showing the prevalence of the outcomes by NORA sector and the prevalence of the outcomes by demographic subgroup within the specific NORA sector. Demographic subgroups include sex, race, ethnicity, age group, education, and insurance status. The outcomes described in these documents, which are all based on self-report, fall into 5 categories: health status, physical activity limitations, chronic conditions, health care utilization, and health risk factors or behaviors.

Figure 1 is an example of the type of results included in these documents. Among workers in all NORA sectors, 5.3% rated their health fair or poor. The highest prevalence rates of fair/poor self-rated health by sector were in mining (6.5%); agriculture, forestry, and fishing (6.2%); and health care and social assistance (5.8%).

Results Based on the 2010 NHIS-OHS

Although data from the 2010 NHIS-OHS have been available only since July 2011, these have already been extensively used in several articles. Six reports describing the prevalence of the key workplace exposures and work-related health conditions covered in the 2010 NHIS-OHS have been published.[5–10]

Data from the 2010 NHIS-OHS were also the basis for a *Morbidity and Mortality Weekly Report* article about short sleep duration among workers that attracted much national media attention because it provided the first national estimates of the magnitude of the problem of short sleep duration among workers working alternative (eg, night) shifts.[11] *Morbidity and Mortality Weekly Report* also published two QuickStats features based on 2010 NHIS-OHS data in December 2011.[12,13] We used 2010 NHIS-OHS data to perform an updated assessment of the relationship/correlation between current/most recent job and longest-held job,[14] which is important because many sources of occupational health surveillance data do not make a clear distinction between these job constructs.

We also prepared profiles for each NORA sector presenting key outcomes from the 2010 NHIS-OHS, which are available on-line (Table 2; http://www.cdc.gov/niosh/topics/nhis/). These include the eight sectors represented in the NIOSH documents based on core NHIS data, 1997–2007, described earlier, plus public safety, which became a separate NORA sector in 2008. (Oil and gas extraction has also become a separate sector, but it was combined with the mining sector for these profiles because of small sample sizes.) These

TABLE 1. Information About NIOSH Documents Based on Core National Health Interview Survey Data, 1997–2007

NORA Sector	Link	# in NHIS Sample, 1997–2007	Estimated Annual Population Represented by Sample	Weighted % of Sample Adults Employed at Time of Survey
Agriculture, forestry, and fishing	http://www.cdc.gov/niosh/docs/2012-154/	4,378	2,694,267	2.12
Mining	http://www.cdc.gov/niosh/docs/2012-155/	726	514,699	0.41
Construction	http://www.cdc.gov/niosh/docs/2012-156/	13,626	9,442,958	7.44
Manufacturing	http://www.cdc.gov/niosh/docs/2012-157/	26,679	17,581,632	13.85
Wholesale and retail trade	http://www.cdc.gov/niosh/docs/2012-158/	33,505	21,885,852	17.25
Transportation, warehousing, and utilities	http://www.cdc.gov/niosh/docs/2012-159/	12,871	8,317,014	6.55
Services	http://www.cdc.gov/niosh/docs/2012-160/	77,835	49,913,381	39.33
Health care and social assistance	http://www.cdc.gov/niosh/docs/2012-161/	27,304	16,548,227	13.04
Total		196,924	126,898,030	100

NIOSH, National Institute for Occupational Safety and Health; NORA, National Occupational Research Agenda.

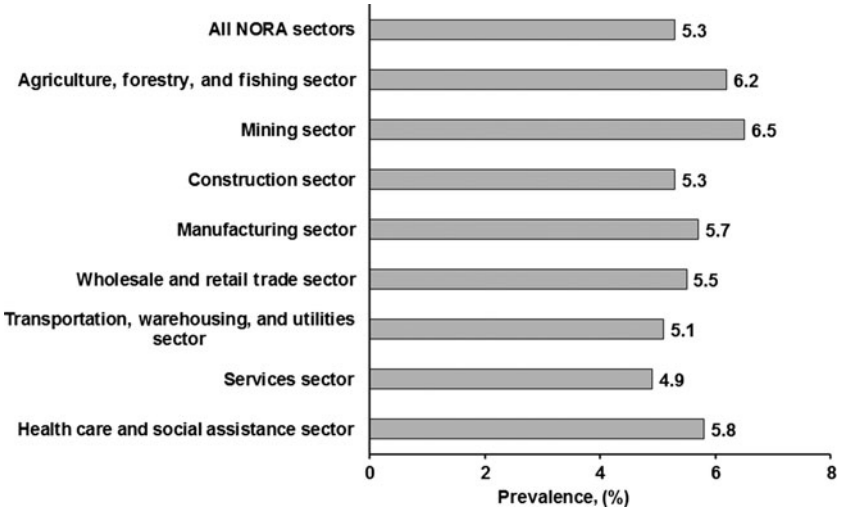

FIGURE 1. Sample chart of prevalence of fair or poor self-rated health status estimated for workers aged 18 years and older by NORA sectors from the National Institute for Occupational Safety and Health documents based on core National Health Interview Survey data, 1997–2007. NORA, National Occupational Research Agenda.

TABLE 2. Information About Sector Profiles Based on the 2010 National Health Interview Survey Occupational Health Supplement*

NORA Sector	Link	# in NHIS Sample, 2010 (Sample Adults Employed in Past 12 mo)	Estimated Annual Population Represented by Sample	Weighted % of Sample Adults Employed in Past 12 Mo
Agriculture, forestry, and fishing	http://www.cdc.gov/niosh/topics/nhis/agriculture.html	269	2,307,864	1.5
Mining and oil and gas extraction	http://www.cdc.gov/niosh/topics/nhis/mining.html	75	720,938	0.5
Construction	http://www.cdc.gov/niosh/topics/nhis/construction.html	1,115	10,639,327	7.0
Manufacturing	http://www.cdc.gov/niosh/topics/nhis/manufacturing.html	1,590	14,555,583	9.5
Wholesale and retail trade	http://www.cdc.gov/niosh/topics/nhis/wholesale.html; http://www.cdc.gov/niosh/topics/nhis/retail.html	2,191	20,994,763	13.7
Transportation, warehousing, and utilities	http://www.cdc.gov/niosh/topics/nhis/transind.html; http://www.cdc.gov/niosh/topics/nhis/transocc.html	854	7,638,934	5.0
Services	http://www.cdc.gov/niosh/topics/nhis/service.html	8,467	73,941,622	48.3
Health care and social assistance	http://www.cdc.gov/niosh/topics/nhis/healthcareind.html; http://www.cdc.gov/niosh/topics/nhis/healthcareocc.html; http://www.cdc.gov/niosh/topics/nhis/healthcareoccsa.html	2,478	20,520,877	13.4
Public safety	http://www.cdc.gov/niosh/topics/nhis/public.html	204	1,771,159	1.2
Total	http://www.cdc.gov/niosh/topics/nhis/allnora.html	17,227	152,978,419	100

*All sectors were defined by industry codes, except for *public safety*, which was defined by occupation codes. Public safety workers in service industries ($n = 188$) are excluded from the services sector estimates, but public safety workers in other industries are included in the estimates for those industry sectors in addition to being included in the public safety sector estimates. The mining and oil and gas extraction sectors were combined because of small sample sizes.

NORA, National Occupational Research Agenda.

profiles each contain charts and tables describing the prevalence of 14 outcomes.

Results are categorized by industry, occupation, or both subgroups within each sector profile on the basis of the subgroup preferences/requests of the sector leadership. These subgroups are defined by US Census Bureau industry and occupation codes (see http://www.census.gov/hhes/www/ioindex/crosswalks.html). Some of these subgroups are included in the public use NHIS data sets described hereafter, but others are only available through the NCHS Research Data Center (see http://www.cdc.gov/rdc/). An additional

profile compares sector-level results and includes some additional outcomes that cannot be shown for subsectors because of small subsamples.

Sample results from the articles and NORA sector profiles include that among US workers in 2010,

- 9.8% experienced dermatitis in the past year;
- 3.1% experienced carpal tunnel syndrome in the past year and 67.1% of these cases were attributed to work;
- 7.2% experienced asthma in the past year and 6.6% of these cases were attributed to work;
- 18.7% of those with one job worked 48 or more hours per week and 7.2% worked at least 60 hours per week;
- 18.7% had nonstandard work arrangements;
- 7.2% had temporary positions;
- 28.7% worked nonstandard shifts (eg, nights);
- 16.3% reported having trouble combining work and family responsibilities;
- 31.7% worried about becoming unemployed;
- 7.8% had been threatened, bullied, or harassed on the job;
- 20.6% experienced frequent occupational skin contact with chemicals;
- 24.7% frequently worked outdoors;
- 10.0% of nonsmokers were regularly exposed to secondhand smoke at work; and
- 25.0% reported chronic exposure to vapors, dust, gas, or fumes on the job.

Figure 2 shows the prevalence of nonstandard shifts by NORA sector as an example of the type of charts included in the on-line sector profiles. Preliminary analyses (unpublished) suggest that all of the hazardous occupational psychosocial and physical exposures covered in the 2010 NHIS-OHS are associated with increased odds of fair/poor self-rated health among exposed workers compared with unexposed workers.

DISCUSSION

Accessing and Analyzing NHIS Data

One of the most important features of the NHIS is that the data are publicly available on-line. Therefore, anyone can download the data and analyze it according to their specific surveillance or research interests rather than having to rely only on published reports. The public data sets are available on the NCHS Web site at http://www.cdc.gov/nchs/nhis/quest_data_related_1997_forward.htm. All direct identifiers, as well as any characteristics that might lead to identification (eg, 4-digit industry and occupation codes), are omitted from the public use data files. The public use files recode workers into 20 simple and 78 detailed industry groups, and 22 simple and 93 detailed occupational groups. There are multiple data sets for each year because of the organization of the survey into household, family, sample adult, and sample child components. Extensive survey documentation and sample analysis programs are also available.

The complex sample design of the NHIS requires special analytic procedures. The National Center for Health Statistics provides sample SAS (SAS Institute Inc, Cary, NC), Statistical Package for the Social Sciences (SPSS, Chicago, IL), and Stata Statistics/Data Analysis (Stata Corp, College Station, TX) input statement programs for each data file and information about how to merge the data files so that variables from more than one data set can be combined for analysis. The 2010 NHIS-OHS questions are embedded within the Sample Adult Questionnaire, and the data are embedded within the sample adult data set.

The NHIS data are also available through the Integrated Health Interview Series (IHIS) Web site created by the University of Minnesota: http://www.ihis.us/ihis/. The IHIS is a harmonized set of data for more than 40 years (1969–2011) of the NHIS. The IHIS facilitates creation of multiyear NHIS data files by coding variables identically across time. The IHIS also provides some on-line analytic capability through the IHIS Online Data Analysis System, which uses high-speed tabulation software developed at University of California Berkeley's computer-assisted Survey Methods Program.

CONCLUSIONS: IMPLICATIONS FOR TOTAL WORKER HEALTH

The NHIS is a valuable tool for examining national trends in worker health. Published findings from the NHIS can be used to estimate the burden of morbidity, disability, and specific health conditions among US workers; prioritize limited public resources for occupational health; and prioritize industry-wide interventions. Researchers and others can also use the public NHIS data sets to calculate other national estimates of interest. The National Institute for Occupational Safety and Health investigators continue to examine the data from the NHIS-OHS for relationships between workplace exposures and health conditions or health behaviors, such as whether women who work alternative shifts are more or less likely than day-shift workers to be screened for breast cancer. We invite readers to perform analyses using their own unique knowledge and background. In addition, researchers and employers should consider

FIGURE 2. Sample chart of prevalence of nonstandard shifts among US adults who worked in the past 12 months from profile comparing all NORA sectors based on the 2010 National Health Interview Survey occupational health supplement. NORA, National Occupational Research Agenda.

including questions from the NHIS in workplace surveys to allow benchmarking of the health of their study population/workers against NHIS national estimates.

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