

Health and Productivity of the U.S. Department of Energy

FINAL REPORT

Prepared by the University of Maryland with
the Integrated Benefits Institute

2012



Executive Summary

The U.S. Department of Energy (DOE) has been concerned about employees' health and well-being for several years, especially as they relate to workplace productivity and safety. Additionally, the DOE's reliance on an aging workforce makes it even more critical for the Department to ensure that its programs and policies support employees, regardless of their age, to perform their jobs safely, while maintaining productivity, overall health, and well-being. The DOE asked researchers from the University of Maryland, School of Social Work (UMSSW) to study the health and productivity of a sample of the DOE workforce. Specific research objectives included: 1) conducting a cross-sectional survey of health and productivity at DOE; 2) employing a valid and reliable standardized measure to assess the relationship between chronic health conditions and productivity at DOE, with attention to the needs of an aging workforce; and 3) reviewing trends in health and productivity data for various age groups and major job classification groups at DOE.

Results from the cross-sectional survey of health and productivity at two DOE national laboratories are based on a final sample of 1147 and are reported in aggregate to represent a singular DOE worksite. The findings incorporate data reviewed within the broader context of employer-level data regarding salaries and benefits to provide a comprehensive picture of health and productivity, measured with the Health and Productivity Questionnaire (HPQ-Select). This measure assesses 29 chronic health conditions and includes questions related to accidents, injuries, and work performance.

Results suggest that health-related lost productivity for the DOE worksite equals \$57,949,749 or 4.2% of human capital costs. The five most common chronic conditions reported are Allergy, Overweight, Back/Neck Pain, Sleeping Problems, and High Cholesterol. On average, these conditions are treated professionally only about 25% of the time. The five most important chronic conditions for this workforce from a lost work time perspective are Depression, Sleeping Problems, Fatigue, Allergy, and High Cholesterol. These five conditions represent 67% of all lost productivity, while the top 10 chronic account for 92%. Eighty-nine percent of the DOE worksite suffers from chronic health conditions, either alone or in combination with acute conditions. The workforce's prominent chronic conditions can be clustered into nine groups by way of prevalence in the workforce: Respiratory (59%), Metabolic (53%), Socio-Emotional (40%), Arthritis/Pain (40%), and Digestive (28%). Allergy is the most common health condition with a prevalence of 56%; however, only 18% of Allergy sufferers report being treated.

Over all 29 conditions analyzed, an average of 32% of employees are being treated. Only 11% of the workforce has no (0) chronic health conditions, while 15% of the workforce has only one chronic condition; 11% of the workforce has eight or more. The average number of chronic conditions per employee is 3.7. Overweight and Allergy is the most common co-morbid pair of chronic health conditions with a 21% prevalence rate; of the 21% of employees with these two conditions, medical professionals are treating only 4.8%.

Presenteeism lost time, defined as time spent at work focusing on non-work-related tasks, accounts for 65% of the 809 total lost workdays per 100 full-time equivalent (FTE) employees in the DOE worksite. Depression (132 days/100 FTEs) and Sleeping Problems

(123 days/100 FTEs) are the two biggest contributors to lost work time for chronic conditions. Presenteeism accounts for 78% of the lost time for Depression and 81% for Sleeping Problems. Lost productivity resulting from presenteeism accounts for \$37,564,255 of the \$57,949,749 of health-related lost productivity in the workforce from chronic diseases. The two most important health conditions from the lost-productivity perspective are Depression (accounting for 16% of the \$57,949,749 in lost productivity) and Sleeping Problems (contributing 15%). Lost productivity represents 4.2% of human capital costs, and the time loss associated with this lost productivity is the equivalent of 3.1% of available work days. From the perspective of two levels of the organization, improving health-related lost productivity can help improve business results. For example, a 10% productivity improvement in the work force translates to an equivalent of 0.42% gain in human capital assets and could contribute an additional 9477 workdays to assist in delivering DOE's products and services.

With regard to employee age groups, health conditions, and productivity, the most commonly reported chronic health conditions in the overall sample: Depression, Sleeping Problems, Overweight, Hypertension, and High Cholesterol, are most prevalent among employees age 50 or older. The best opportunities to improve costs associated with lost work time, when looking at the total work population are Depression, Sleeping Problems, and Fatigue. Those ≤ 34 years old reported lower levels of work performance, or higher presenteeism, as compared to employees ≥ 50 years old.

The researchers looked at four key occupation groups (Group 1: Executive, Administrator, Senior Manager, & Professional; Group 2: Technical Support, Precision Production, & Craft Workers; Group 3: Sales, Clerical, & Administrative Support; Group 4: Service occupations, Operator, & Laborer) and found that employees in Group 1 report working more relative work hours as compared to employees in Group 2. However, employees in Group 1 also report greater levels of presenteeism on the self-reported work performance scale, as compared to employees in Group 2 and Group 4. Employees in Group 1 tend to have higher salaries than the other three occupational groups and therefore, are likely high drivers of lost productivity costs through presenteeism.

This study represents an important first step in DOE's study of health and productivity, especially as it relates to its aging workforce. Data from this initial study provide baseline information about the health and the productivity of the DOE workforce. Results should be used to support workplace recommendations and proposed program plans to support employee health and wellness. Results should be shared with DOE worksites to increase site participation in the HPQ-Select survey and related health and productivity studies in the future. Additional participation would allow for benchmarking across DOE worksites and outcomes measures to evaluate site-specific intervention. The researchers recommend that DOE continue research on employee health and productivity by expanding this study to include additional worksites and to conduct follow-up surveys to compare results over time after changes to programs and policies have been implemented. 10 CFR 851 includes a provision requiring DOE sites to assess and respond to employees' health and productivity needs. The HPQ-Select represents a valid and cost-effective survey tool that sites should consider using to demonstrate the relationship between employee health, safety and productivity. Results from such measures can be used to support budgetary needs related to improving and enhancing workplace-based health and wellness programs, in addition to

evaluating their effectiveness by comparing pre-test and post-test / follow-up survey data over time. Additional recommendations for policy and program changes are included within the final report.

Acknowledgements

Research Team

Dr. Jacobson has established relationships with experts at the University of Maryland, Integrated Benefits Institute, and Harvard University for this study. Specific members of the research team include:

- Dr. Jodi Jacobson, Associate Professor and Chair of the Employee Assistance Program (EAP) Subspecialization at the University of Maryland, Baltimore, School of Social Work (Role – Principal Investigator)
- Dr. Phillip Osteen, Assistant Professor, University of Maryland, School of Social Work (Role – Co-Principal Investigator)
- Dr. Amy Cohen-Callow, Clinical Professor, University of Maryland, School of Social Work (Role – Co-Investigator)
- Dr. Tom Parry, President, and Dr. Kimberly Jinnett, Senior Researcher, Integrated Benefits Institute (Role – Consultant)
- Dr. Ronald Kessler, Professor, Harvard University, School of Public Health (Role – Consultant)
- Ms. Andrea Jones, Doctoral Student, University of Maryland (Role – Graduate Research Assistant)
- Ms. Jungyai Ko, Doctoral Student, University of Maryland (Role – Graduate Research Assistance)
- Ms. Jennifer Pastoor, Master Student, University of Maryland (Role – Research Assistant)

Funding

The researchers wish to thank the U.S. Department of Energy and the two participating DOE worksites for their financial support of this study. We also appreciate coordination and management of this grant by Oak Ridge Associated Universities.

Health and Productivity of the U.S. Department of Energy

The U.S. Department of Energy (DOE), along with other DOE contractor worksites, have been concerned about employees' health and well-being, especially as it relates to workplace productivity and safety. Additionally, DOE is relying on an aging workforce and therefore, faces a dual burden, as they will need to replace skilled workers and other valued employees in the near future. In fact, 33% of DOE employees are eligible for retirement by 2014¹. This expected loss of knowledge, talent, and critical skills, due to retirement and turnover, in addition to the existing challenges of recruiting and retaining the next generation of engineers, scientists, and other highly skilled workers, may impede DOE's mission.

DOE recognizes that many employees are choosing to postpone retirement and continue working, even when eligible for retirement. Aging presents an increased risk for chronic health conditions and workplace injuries that may be more complicated in older workers as compared to younger workers. It is critical that policies and programs at DOE support the workforce, encouraging employees, regardless of their age, to perform their jobs safely, while maintaining productivity, overall health, and employee well-being.

Measuring productivity is a challenge for employers. DOE does not have a standardized definition that can be applied to its many contractor worksites. Productivity, traditionally measured by absenteeism, cannot predict actual work performance. Presenteeism, a term referring to the time spent at work by employees who are not focusing on work-related tasks, is a more accurate predictor of actual lost work time. When presenteeism is considered in calculations of lost work time with traditional counts of absenteeism, estimations of productivity are greatly enhanced^{2,3}.

The DOE values the connection between health and productivity and is interested in understanding how chronic health conditions affect productivity, with a commitment to the needs of its aging workforce. DOE has invested in the analysis [e.g., the Injury and Illness Surveillance Program (IISP)] and the support (e.g., the promulgation of 10 CFR 851 Worker Safety and Health Program) of the health and safety of its workforce. Existing DOE IISP data reflect the general health status of approximately 80,000 of the 140,000 DOE workforce but do not include the full range of physical and mental health conditions associated with decreased levels of productivity. The sole reliance on employer-sponsored medical and health benefits data limits an employer's ability to determine the prevalence of chronic illness due to under-diagnosis, under-reporting, and under-treatment.

¹ U.S. Department of Energy (2009, October). *Department of Energy (Complex Wide)*. Retrieved from: <http://humancapital.doe.gov/resources-workforce-demog-pdfs/1004DOE.pdf>

² Kessler, R. C., Ames, M., Hymel, P. A., Loeppke, R., McKenas, D. K., et al. (2004). Using the World Health Organization Health and Work Performance Questionnaire (HPQ) to evaluate the indirect workplace costs of illness. *Journal of Occupational and Environmental Medicine*, 46(6), 523-537.

³ Loeppke, R., Taitel, M., Richling, D., Parry, T., Kessler, R.C., Hymel, P., & Konicki, D. (2007). Health and productivity as a business strategy. *Journal of Occupational and Environmental Medicine*, 49, 712-21.

Prior research conducted for DOE by the University of Maryland in 2009 suggested a need to develop a standardized measure of health and productivity for the current workforce. Using a standardized measure of health and productivity, the Health and Productivity Questionnaire Select (HPQ-Select), the researchers collected data from a random sample of permanent DOE contractor employees. Results may be used to inform policies, procedures, and programs regarding health, safety, and productivity at the DOE.

Dr. Jacobson, Principal Investigator (PI) for this study, formed a research team with experts from the University of Maryland, Harvard University, and the Integrated Benefits Institute to conduct the study. This study was approved by the University of Maryland and Central Department of Energy Institutional Review Boards (see Appendices A & B for a copy of the IRB approval letters).

Specific objectives for the present study included:

1. To conduct a cross-sectional survey of health and productivity at DOE,
2. To utilize a valid and reliable standardized measure to assess the relationship between chronic health conditions and productivity at DOE, with attention to the needs of an aging workforce, and
3. To review trends in health and productivity data for various age groups and major job classification groups at DOE.

Method

The researchers employed a cross-sectional research design to collect self-report, anonymous employee responses to survey questions focused on health and productivity. In winter and spring of 2011, the Principal Investigator (PI) emailed the sample of DOE permanent contractor employees and invited them to participate in the survey. The email contained a link to the online informed consent letter and survey. Participation was voluntary and all responses were anonymous. For employees who did not have a work email address, the PI mailed a copy of the survey, with the informed consent, along with a self-addressed, stamped envelope to the employee's work address. To increase participation, the PI sent two reminders to employees, in addition to working with employees at DOE, to advertise the study in the employee electronic newsletter.

Population and Sample

From a list of 11,718 permanent employees furnished by the two participating worksites, the researchers selected a random sample of 2000 employees from each worksite for the study (combined random sample of 4000 employees). The sample was constructed based on two criteria: (1) enroll a sufficient number of participants to achieve statistical power, and (2) draw proportionally equal subgroups based on employees' age. The developers of the HPQ-Select recommend that the final sample size exceed a minimum of 500 participants per worksite (1000 total for both worksites) in order to identify any trends involving low-prevalence chronic health conditions measured by the HPQ-Select.

Based on an estimated minimum survey return rate of 25%, a total sample of 2000 (500*4) employees per site were identified for the initial study sample. This minimum response rate was determined by the researchers in collaboration with DOE and was based on employees' response to past worksite surveys, in addition to considering the sensitive nature of the survey questions. Prior to selecting the study sample, employees were classified according to the following three age categories: ≤ 34 years old, 35-49 years old, and ≥ 50 years old. Employees were then randomly sampled and recruited from each age group.

A total of 1854 surveys were returned between the two sites for a final response rate of 46%, well in excess of the minimum required response rate of 25%.

The researchers used aggregate data from the two participating sites to comprise responses for a newly created worksite referred to henceforth as "DOE Contractor Worksite." The final sample for this report ($N=1147$) includes respondents from the two worksites with comparable 28-day survey recall periods that did not overlap known holiday periods. Estimates are weighted to represent the overall demographics (e.g. age, gender, and occupational distribution) for the combined demographics of both sites. Accordingly, when the term "DOE Contractor Worksite" is referenced throughout the report, it represents the aggregate findings from the two participating work sites. A detailed description of the sample characteristics for the aggregate worksite as compared to the overall workforce is displayed in the Table 1 below.

Analyses consisted of multivariate regression based procedures to assess the contribution of chronic illnesses to absenteeism and presenteeism lost time. Age, gender, occupation and chronic illness, as well as control variables, were included as predictors of lost time. Analysis of variance (ANOVA) based procedures were used to test for statistical significance of the differences in means on health outcome measures between age groups and between job classification groups. Outcomes of interest include magnitude of lost productivity, the prevalence of key chronic conditions and their treatment, and health-related lost time (absenteeism and presenteeism days).

The developers of the HPQ-Select recommend that the final sample size exceed a minimum of 500 participants in order to identify any trends related to low-prevalence chronic health conditions measured by the survey. Additional formal power analyses were conducted using G*Power (v. 3.3.10). Power analyses were based on the assumption of normal distribution of outcome variables using the following parameters (power=.8, $\alpha=.05$ (primary), $\alpha=.01$ (posthoc)) for detection of moderate effect sizes (Cohen, 1988).

Table 1:

Demographics for the DOE Contractor Worksite⁴

DOE CONTRACTOR WORKSITE		Total Workers	Study Respondents
Year		2011	2011
Total Workers		11,718	1147
Demographics		% of Workers	% of Respondents
Gender	Women	34%	31%
	Men	66%	69%
Occupation	Executive/Administrator/ Senior Manager/Professional	73%	70%
	Technical Support/Precision Production & Craft Workers	9%	9%
	Sales/Clerical & Administrative Support*	14%	11%
	Service Occupations/Operator & Laborer*	4%	10%
Age	≤34*	28%	23%
	35 to 49	36%	34%
	≥50*	36%	43%
Annual Income	<\$25,000	4%	2%
	\$25,000 to \$49,000*	13%	2%
	\$50,000 to 74,000	24%	25%
	\$75,000 to 99,000*	23%	29%
	≥\$100,000*	36%	41%
Work Status	Full-Time	†	98%
	Part-Time	†	2%

⁴ Note that not all demographics and workforce characteristics were available to the research team.

Employment Type	Salaried	†	77%
	Paid Hourly	†	23%
Union Membership	No	†	92%
	Yes	†	8%
Highest Education	High school graduate or GED	†	3%
	Some college or 2yr graduate	†	19%
	4yr college graduate	†	13%
	More than 4yr college graduate	†	65%
Race	White, not Hispanic	†	74%
	Black, not Hispanic	†	2%
	Hispanic	†	13%
	Asian or PI	†	7%
	Other	†	4%

*significant difference between sample and population proportions at $p < .01$

† data not currently available

Measures

Questions regarding safety, specifically injuries, illnesses, or poisonings affecting lost workdays, were included in the survey and reported within the productivity estimations. Data were reviewed within the broader context of employer-level data regarding salaries and benefits to provide a comprehensive picture of health and productivity, measured with the HPQ-Select. The HPQ-Select has been used in different work settings⁵ and represents the state-of-the-art in reliable and valid indicators of *employee health* (i.e. 29 different health conditions) and *productivity*. Productivity in this study is defined as the combination of absenteeism, presenteeism, and critical incidents. Presenteeism days are translated into dollars to establish the amount of “lost productivity” due to chronic conditions. To calculate this, the researchers converted days to dollars by applying the average daily wage (salary and benefits) as a base cost. Further, an industry-specific multiplier is applied based on prior research by Nicholson et al⁶. These multipliers capture additional costs beyond wage including ease of replacement, the time value of output, and degree of teamwork. This monetized lost time is reported as “Lost Productivity” in the report.

The original Health and Productivity Questionnaire (HPQ) was developed in partnership with the World Health Organization and Dr. Ronald Kessler, Professor in the Department of Health Care Policy, Harvard University Medical School. It was designed to assess employers’ costs associated with employees’ health conditions in the workplace. When compared to other existing measures, the newer version of the HPQ, the HPQ-Select, provides a more comprehensive measure of productivity and lost work time related to health conditions and related treatments that are not limited to traditional methods of assessing health care usage and costs as reflected in medical and pharmacy claims alone.

Over the past several years, the HPQ-Select has undergone rigorous psychometric testing to validate the instrument across a diverse range of work organizations and job classifications. One initiative involved a large-scale calibration effort of the survey measuring results against employee data from four different business strata, including airline industry reservation clerks, telecom customer service representatives, auto-manufacturing executives, and railroad engineers⁷. Found to be reliable and valid, the HPQ-Select has also been used to assess modifiable risk health concerns, such as cardio-respiratory fitness and obesity among American workers⁸.

⁵ Kessler, R.C., Barber, C., Beck, A., Berglund, P., Cleary, P. D., McKenas, D., et al. (2003). The World Health Organization Health and Work Performance Questionnaire (HPQ). *Journal of Occupational and Environmental Medicine* 45(2), 156-174.

⁶ Nicholson, S., Pauly, M. V., Polsky, D., Sharda, C., Szrek, H. & Berger, M. L. (2003). Measuring the effects of work loss on productivity with team production." *Health Economics*, 15(2), 111-123.

⁷ Kessler, R.C., Barber, C., Beck, A., Berglund, P., Cleary, P.D., McKenas, D., et al. (2003). The World Health Organization Health and Work Performance Questionnaire (HPQ). *Journal of Occupational and Environmental Medicine* 45(2), 156-174.

⁸ Pronk, N. P., Martinson, B., Kessler, R. C., Beck, A. L., Simon, G. E., & Wang, P. D. H. (2004). The association between work performance and physical activity, cardiorespiratory fitness, and obesity. *Journal of Occupational and Environmental Medicine*, 46, 19-25.

The HPQ-Select survey takes approximately 10 minutes to complete and can be done online or via a mailed paper survey. The survey assesses 29 chronic health conditions using a 4-point rating scale. The 29 conditions are further categorized into 9 chronic condition groups. These include:

1. Socio-emotional conditions: depression, anxiety, fatigue, sleeping problems and other emotional conditions.
2. Metabolic conditions: hypertension, diabetes, obesity and high cholesterol.
3. Arthritis and Pain conditions: arthritis, chronic pain, back/neck pain and osteoporosis.
4. Headache conditions: migraine and other headache.
5. Respiratory conditions: asthma, bronchitis and allergy.
6. Digestive conditions: ulcer, gastroesophageal reflux disease (GERD), irritable bowel and bladder/urinary conditions.
7. Heart and Pulmonary conditions: congestive heart failure, coronary heart disease and chronic obstructive, pulmonary disease (COPD).
8. Cancer conditions: skin cancer and other cancers.
9. Substance abuse: nicotine dependency and alcohol or drug problems

The survey also includes questions related to accidents, injuries, and work performance, as well as employee demographics. A description of the raw outcome measures and calculations for outcomes purposes is included in the next section. A copy of the paper-version of the HPQ-Select can be viewed in Appendix F.

Absence is measured as expected hours minus actual hours in a 28 day period (7days *4):

B5. About how many hours a week does your employer expect you to work? (If you are expected to work as many hours as it takes to get the job done, estimate that number for a typical 7-day week. If it varies, estimate the average. If more than 97, enter 97.)

Number of hours (00-97)

B6. Now please think of your work experiences over the past 4 weeks (28 days). About how many hours altogether did you work in the past 4 weeks (28 days)? (See examples below.)

Number of hours in the past 4 weeks (28 days)

Presenteeism is measured on the following 0-to-10 scale⁹:

B12. Using the same 0-to-10 scale, how would you rate your overall job performance on the days you worked during the past 4 weeks (28 days)?

Worst											Top
Performance											Performance
0	1	2	3	4	5	6	7	8	9	10	
○	○	○	○	○	○	○	○	○	○	○	○

Conversion of raw measurement to days

Absence lost time is converted to days by assuming 20 workdays at 8 hours per day for a total of 160 hours for a typical full-time work week. These days over the past 28 days are then subtracted from the maximum workdays to obtain the remaining “at work” days. A presenteeism percentage is applied to these remaining “at work” days. This percentage is a simple conversion of the 0 to 10 scale where an employee reporting '10' is assigned 100%, an employee reporting '9' is assigned 90%, and so on until '0' is assigned 0%. Since 100% is considered high performance implying that the employee is working at the highest level, the measurement is reversed so that the '100%' becomes '0%'. This is done in order to ensure that when the percentage is applied to the remaining non-absence or “at work” days, an employee with no presenteeism will be assigned a '0'.

⁹ Wang, P., Beck, A.L., Berglund, P.A., Leutzinger, J. A., Pronk, N.P., Richling, D., Simon, G.E., Stang, P.E., Ustun, T.B., Kessler, R.C. (2003). Chronic Medical Conditions and Work Performance in the HPQ Calibration Surveys. Journal of Occupational and Environmental Medicine, 45(12), 1303-1311.

Model of health-related lost days

Multivariate regression analysis is used to assess the contribution of chronic illnesses to absence and presenteeism lost time. Age, gender, occupation and chronic illness are included as predictors of lost time. The beta effects associated with each chronic illness are used to report the health-related lost time (absence and presenteeism days).

Translation of health-related lost days to dollars

Once the health-related absence and presenteeism days have been obtained, they are converted to dollars or “monetized” by applying the average daily wage (salary and benefits) as a base cost. Further, an industry-specific multiplier is applied based on prior research by Nicholson et al¹⁰. These multipliers capture additional costs beyond wage including ease of replacement, the time value of output and degree of teamwork. This monetized lost time is reported as “Lost Productivity” in HPQ-Select reports. Several savings equivalents in key operational measures for the company are also offered in Table 2.

Table 2:

<u>Target Productivity Savings Levels</u>	<u>\$ Productivity Gains¹¹</u>	<u>Added Workdays¹²</u>	<u>Human Capital Growth¹³</u>	<u>Equivalent FTEs¹⁴</u>
1%	\$67,428	250	.05%	1.0
5%	\$337,139	1,250	.25%	4.8
10%	\$674,279	2,500	.51%	9.6

Due to the increased concern about employee smoking by the DOE Chief Medical Officer, the researchers added two questions about smoking from the National Health Interview Survey (NHIS) to estimate the prevalence of smoking among employees¹⁵. The first question was “Have you smoked at least 100 cigarettes in your entire life?” and the second was “If yes, do you NOW smoke cigarettes?” Additionally, the original HPQ-Select question related to job classification was modified to parallel the job categories used by DOE’s IISP. The researchers also added several demographic questions to the survey that were not included in the original

¹⁰ Reference Nicholson, S., Pauly, M.V., Polsky, D., Sharda, C., Szrek, H. and Berger, M.L. "Measuring the Effects of Work loss on Productivity with Team Production." *Health Economics*. 2006;15(2):111-123.

¹¹ Productivity gains are calculated as the % savings in total health-related lost productivity at each improvement level

¹² The number of additional workdays that could be funded at each productivity savings level (assumes 260 workdays per FTE).

¹³ The % increase in human capital (wages plus benefits) that could be funded at each productivity savings level.

¹⁴ The equivalent number of FTEs (assumes 260 workdays per FTE).

¹⁵ U.S. Centers for Disease Control and Prevention. (2007). National Health Interview Survey. Retrieved from <http://www.cdc.gov/nchs/nhis/2007paradata.htm>.

HPQ-Select to better understand the DOE contractor workforce, including union status, marital status, number of children, and race/ethnicity.

Description of Report Sections

Section I includes primary results from the HPQ-Select survey with attention to the effect of health conditions on productivity. **Section II** includes answers to the second research question focused on the effect of employee age on health conditions and productivity. **Section III** focuses on a comparison of primary employee job classifications on health conditions and productivity. **Section IV** includes a report on data analysis related to the nicotine questions that were added to the DOE study. **Section V** is the conclusion to the report and includes a description of the strengths and limitations of the study, in addition to recommendations for DOE and future research related to employee health, productivity, and safety.

Section I: HPQ-Select Primary Results

This section of the final report quantifies the link between chronic health conditions and their business outcomes based on 1147 employee survey responses to the HPQ-Select questionnaire. It is intended to help the DOE broaden their understanding about the true costs of employee health and to promote new strategies for managing chronic medical conditions. The report summarizes information gathered from employees completing the HPQ-Select survey instrument and details the prevalence and treatment penetration of chronic health conditions in the workforce, integrates information on lost work time and chronic conditions, quantifies the amount of lost productivity associated with that lost work time, and summarizes opportunities to improve business performance through productivity gains.

Principle Findings:

The magnitude of health-related lost productivity costs for chronic conditions is too large to ignore. Health-related lost productivity in this workforce equals \$57,949,749. Lost productivity costs are equal to 4.2% of human capital costs for the DOE Contractor Worksite surveyed.

Improvements in lost productivity can represent a significant business opportunity. Every employer desires to improve earnings. Given the DOE Contractor Worksite's revenue-to-earnings ratio, lost productivity improvements may be an important adjunct strategy to assist employers to improve earnings, rather than solely focusing on top-line revenue growth.

The most prevalent chronic conditions are not often treated by health professionals. The five most common chronic conditions are Allergy, Overweight, Back/Neck Pain, Sleeping Problems and High Cholesterol. On average, these conditions are treated professionally only about 25% of the time. These results underscore the need for DOE to look beyond medical and pharmacy claims data which under-report chronic health conditions in order to determine who to best manage such conditions.

The best productivity-improvement opportunities can be found by focusing on a core group of key chronic health conditions. Employers may be hesitant to expand medical treatment due to concerns over medical costs. However, when employers link chronic conditions to loss productivity consequences, they may re-think their health management strategies. The data show that not every chronic health condition contributes the same amount to lost productivity and thus represents an opportunity to drive overall gains. The five most important chronic conditions for this workforce from a lost work time perspective: (1) Depression, (2) Sleeping Problems, (3) Fatigue, (4) Allergy, and (5) High Cholesterol. These five conditions represent 67% of all lost productivity, while the top 10 chronic account for 92% .

Section I, Part I. Health Conditions and Their Treatment

Employers historically have managed health care by focusing on high-cost conditions identified in medical and pharmacy claims files. Although an important starting point, medical and pharmacy claims databases miss two important aspects of employee health: (1) they only include conditions for which medical care is provided and a medical claim generated, and (2) they may exclude conditions that are symptomatic of broader health issues that cannot be narrowly defined with a diagnosis code yet significantly affect employee productivity.

This report includes analysis of the following 29 chronic health conditions: alcohol or drug problems, allergy, anxiety, arthritis, asthma, back/neck pain, bladder/urinary, bronchitis, chronic obstructive pulmonary disease (COPD), congestive heart failure, coronary heart disease, depression, diabetes, fatigue, gastroesophageal reflux disease (GERD), headache, high cholesterol, hypertension, irritable bowel syndrome, migraine, nicotine dependency, overweight, osteoporosis, other cancer, other emotional problem, skin cancer, sleeping problems, and ulcer.

Section 1, Part 1 of the report highlights findings from that analysis for the following dimensions: chronic conditions relative to acute conditions (such as colds, flu, injuries, etc.), prevalence and treatment penetration for chronic conditions in the workforce reflected in broad health classes (such as respiratory conditions and socio-emotional problems), individual chronic conditions and co-morbid pairs of conditions, and opportunities to improve care by closing the treatment gap for important conditions.

A. Acute vs. chronic conditions. Although treatment for acute conditions may be reflected in medical and pharmacy claims databases, acute conditions rarely represent a dominant share of medical conditions or medical costs for an employer. This exhibit shows the relative importance of acute vs. chronic conditions for the DOE Contractor Worksite. See Figure 1.

Figure 1:

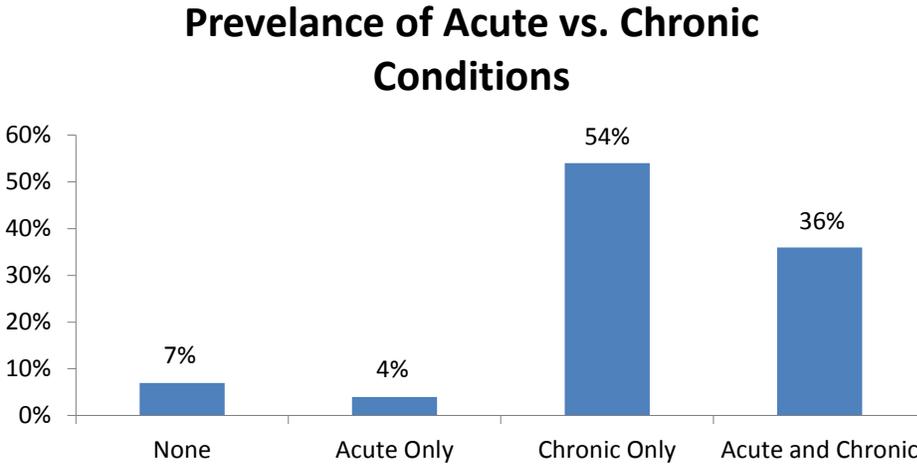


Figure 1 Key Findings: 89% of the DOE Contractor Worksite suffers from chronic health conditions, either alone or in combination with acute conditions.

B. Chronic health groupings. A first step in understanding the range of chronic health conditions in the workforce is to examine the broad health classes into which they fit. The exhibit below shows the prevalence of chronic conditions by nine key health-condition classes as reported by survey participants. See Figure 2.

Figure 2:

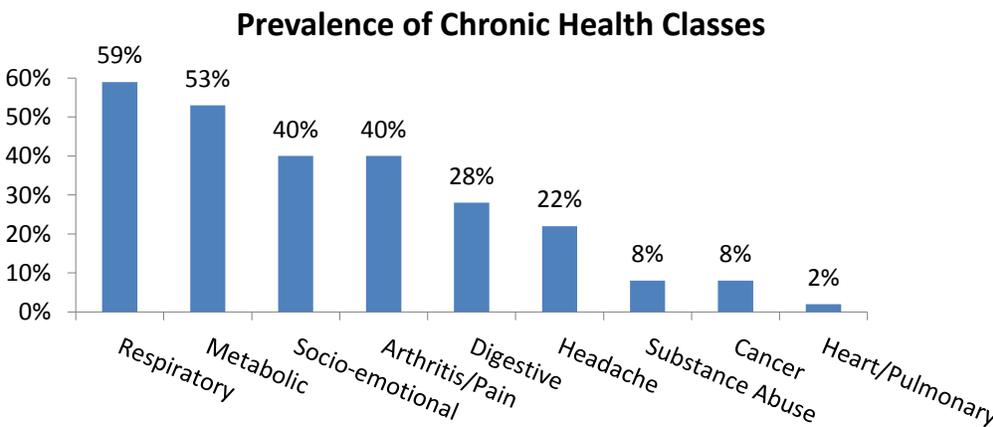


Figure 2 Key Findings: The workforce's prominent chronic conditions can be clustered into nine groups by way of prevalence in the workforce: Respiratory (59%),

Metabolic (53%), Socio-Emotional (40%), Arthritis/Pain (40%), and Digestive (28%). The least common chronic condition is Heart/Pulmonary (2%).

C. Health conditions in the workforce. Health-condition classes are helpful to get an overview of the range of chronic conditions. However, treatment and other interventions target discrete health conditions. The exhibit below displays the 10 most prominent chronic health conditions ranked by their prevalence in the workforce during the survey period and, for each condition, the proportion of cases for that condition being treated by medical professionals. See Figure 3.

Figure 3:

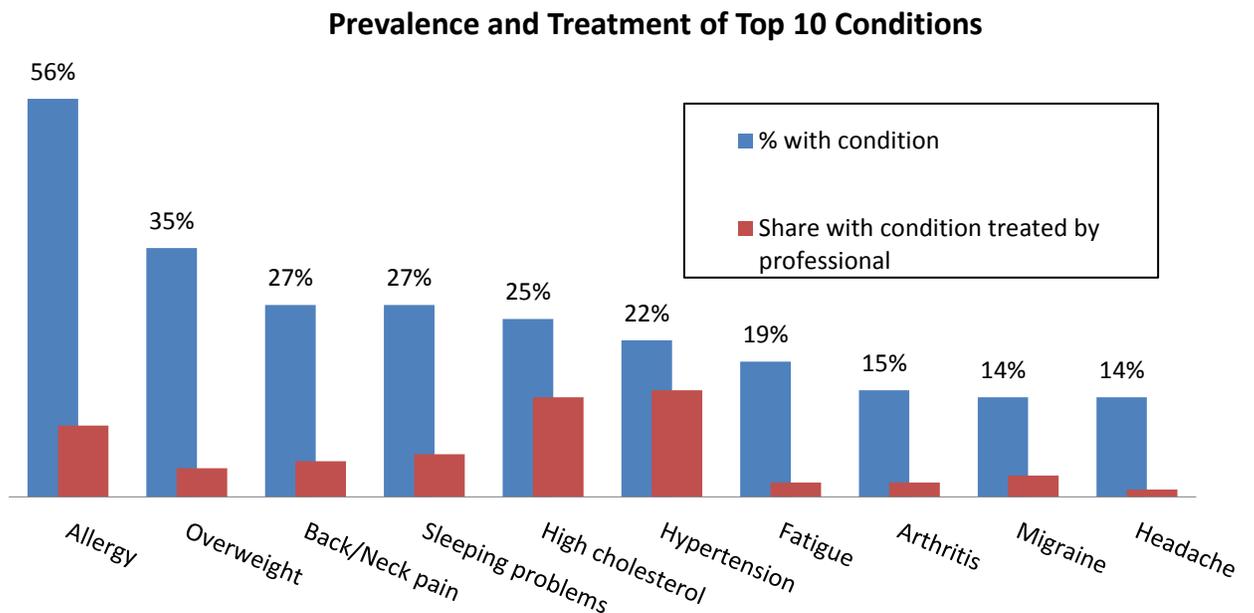


Figure 3 Key Findings: In the DOE Contractor Worksite studied, Allergy was the most common health condition with a prevalence of 56%, while only 18% of Allergy sufferers reported being treated at the time of the survey. On the other end of the spectrum, 14% of the workforce reporting suffering from Headache, and 10% were being treated. Over all 29 conditions analyzed, an average of 32% were being treated at the time of the study.

*Note: “share with condition treated by professional” represents a share of individuals in treatment as a visual comparison point

D. Co-morbid groups. Finally, chronic conditions often exist in combinations; as the employer develops intervention strategies, the DOE Contractor Worksite may want to consider these broader classes. The following exhibit shows the number of chronic conditions in the workforce; the next displays the five most prominent co-morbid pairs of conditions and shows the treatment penetration for each. See Figures 4 and 5.

Figure 4:

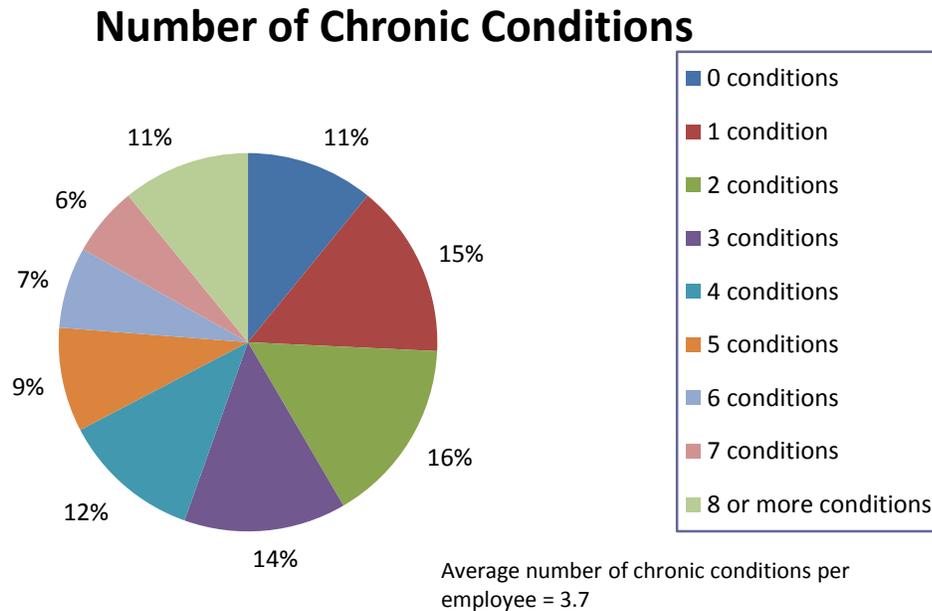


Figure 4 Key Findings: Only 11% of the workforce has no (0) chronic health conditions, while 15% have only one chronic condition; 11% have eight or more. The average number of chronic conditions per employee is 3.7. The average number of chronic conditions per employee among the 264 companies participating in the HPQ-Select is 2.56.

Figure 5:

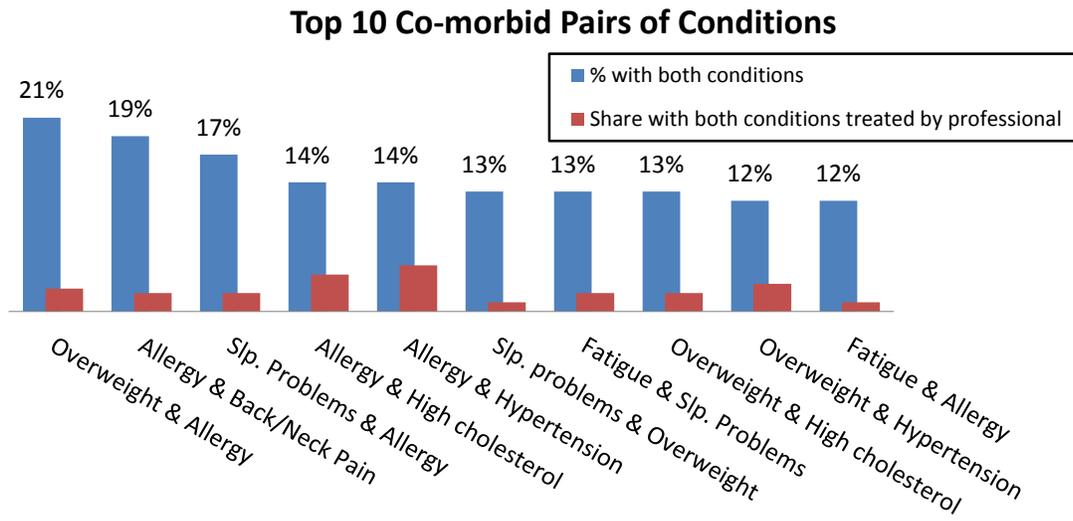


Figure 5 Key Findings: Overweight and Allergy is the most common co-morbid pair of chronic health conditions with a 21% prevalence rate; of the 21% of employees with these two conditions, medical professionals are treating only 4.8%. Ranked tenth is Fatigue and Allergy with a prevalence of 12%; 4.2% with these conditions are being professionally treated for these two conditions.

E. Opportunities to improve treatment of chronic conditions. Closing the gap in treatment for the most common conditions is often a goal of chronic medical care. The exhibit below shows the top 10 health conditions based on the combination of percent prevalence in the workforce (shown on the horizontal axis) and percent in treatment (shown on the vertical axis). Appendix C provides a listing of prevalence and percent treated for all health conditions surveyed.

Conditions in quadrant I are those that are highly prevalent and have a large percent being treated by medical professionals; those in quadrant II are less prevalent but still have a large percentage being treated. Quadrant III includes conditions with lower prevalence and lower treatment penetration, while Quadrant IV includes conditions with high prevalence and low treatment penetration. See Figure 6.

Figure 6:

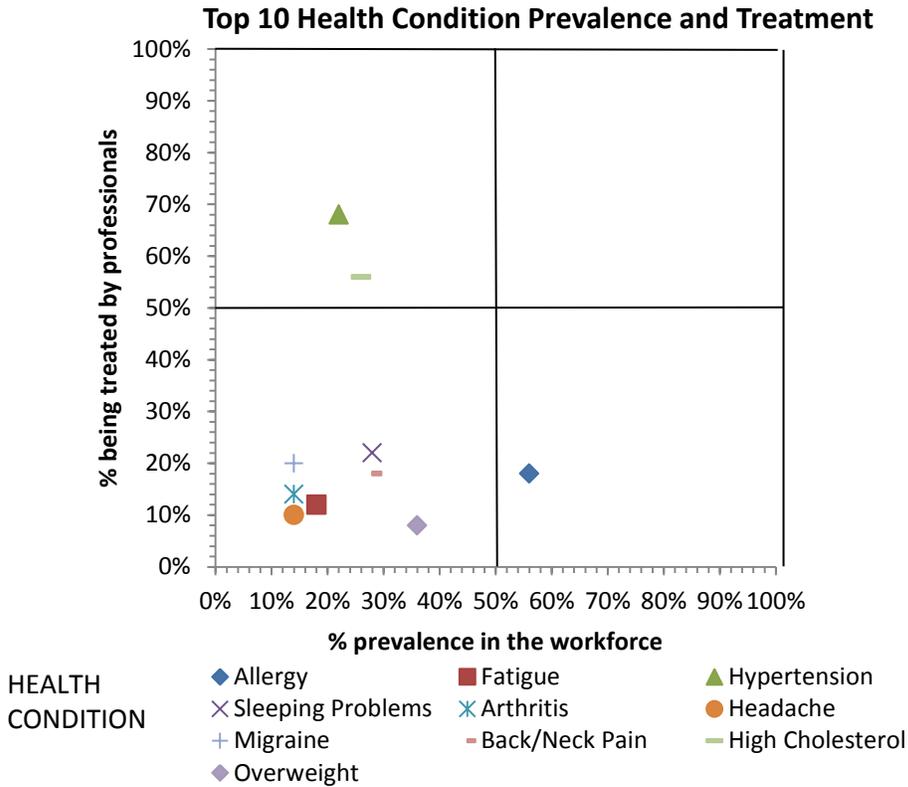


Figure 6 Key Findings: The best opportunities to improve treatment are a function both of the prevalence of the condition in the workforce and the degree to which the condition is being treated. Conditions in quadrants III and IV appear to be the best targets for taking action.

Section I, Part II. The Link between Chronic Conditions and Lost Work Time

Time away from work links chronic conditions to lost productivity. In Section I, Part II, we examine the amount of lost work time associated with chronic health conditions in two forms: (1) absence from work and (2) reduced performance while at work resulting in lost work time (presenteeism).

A. The Magnitude of Lost Work Time and its Contributors. The relative magnitude of these two components of time away from work will influence the DOE’s strategy in both health and lost-time management. This exhibit below shows the relative contributions of absence and presenteeism to total lost work time for the workforce. See Figure 7.

Figure 7:

Contribution of Absence and Presenteeism to Lost Work Time

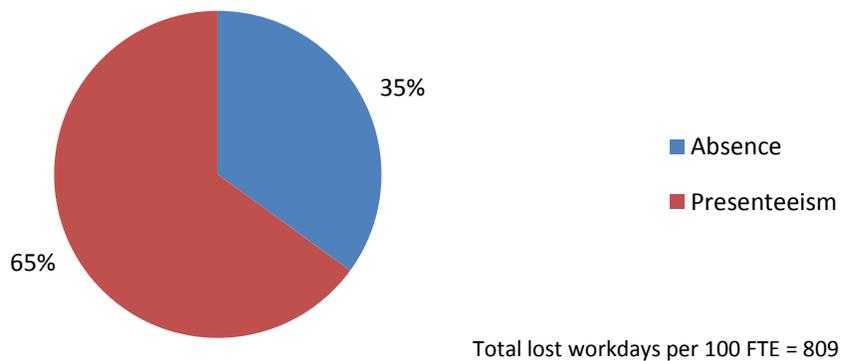


Figure 7 Key Findings: Presenteeism lost time accounts for 65% of the 809 total lost workdays per 100 full-time equivalent employees in this DOE Contractor Worksite.

B. Chronic Conditions and Lost Work Time. Developing strategies for managing total time away from work due to chronic conditions requires the employer to link individual conditions to lost work-time outcomes. The following exhibit displays the amount of absence and presenteeism for each of the top 10 health conditions ranked by total time loss from work (see Appendices C and C for a complete list of all health conditions and the amount of lost time associated with each). See Figure 8.

Figure 8:

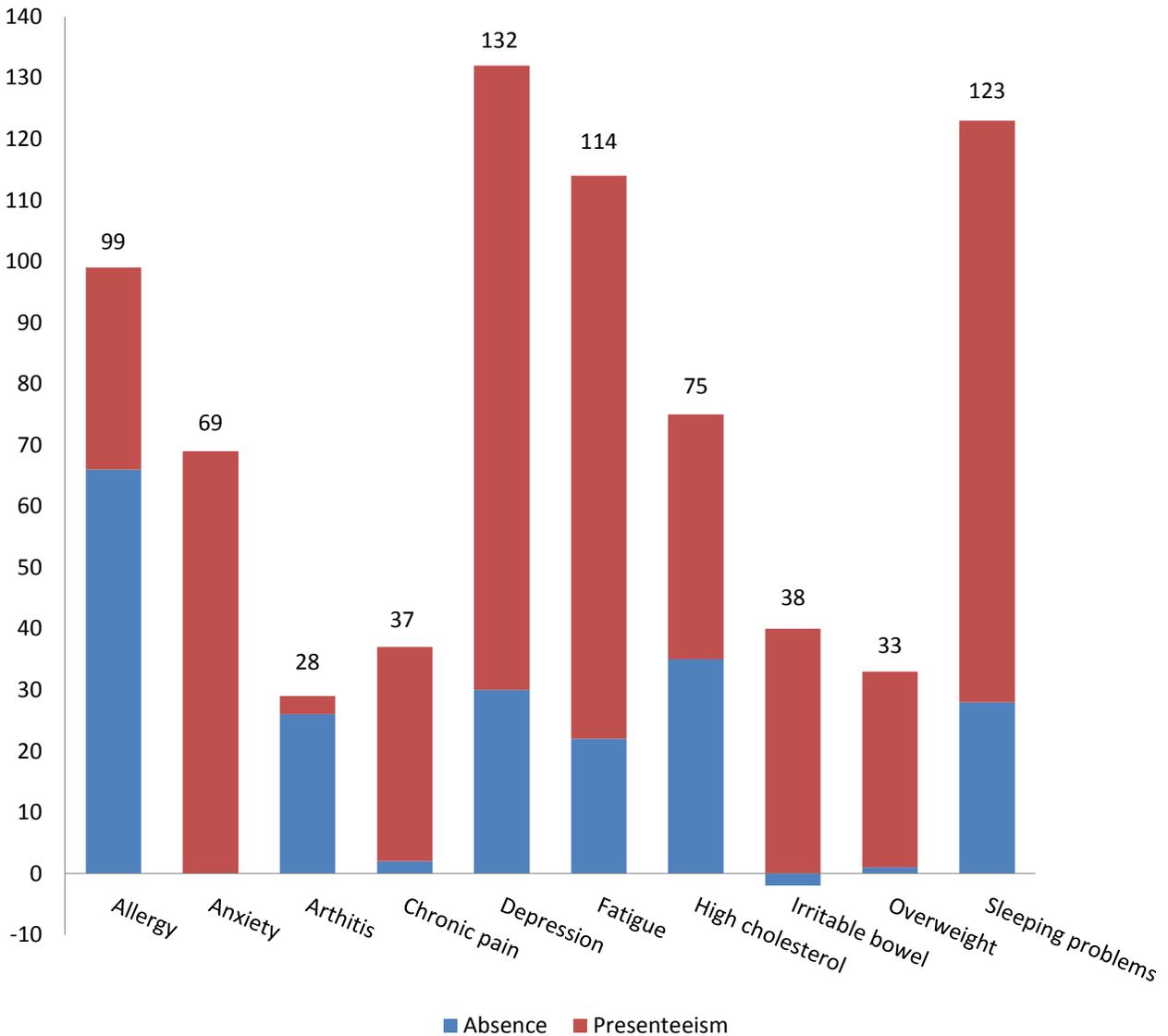


Figure 8 Key Findings: Depression (132 days/100 FTEs) and Sleeping Problems (123 days/100 FTEs) are the two biggest contributors to lost work time for chronic conditions. Presenteeism accounts for 78% of the lost time for Depression and 81% for Sleeping Problems. Fatigue is ranked third in importance from a lost-time perspective.

C. Opportunities for Improvement. We expand the exhibit from the previous section on opportunities to improve chronic care by including lost work time – a key factor in lost productivity. Opportunities for improvement in this broader perspective are a function of prevalence of the condition in the workplace, the degree to which the condition is being treated, and the lost time associated with the condition.

Similar to the exhibit on opportunities for improvement in the previous section, we show the prevalence-treatment relationship for each of the 10 chronic conditions (with quadrant numbers showing prevalence-treatment relationships), but in this exhibit, ranked by total lost work time. The size of the bubble at the prevalence-treatment nexus represents the amount of time loss for each condition (larger bubbles indicate conditions with more lost time). The center point in the bubble represents the intersection of prevalence and treatment on the X and Y axes. Knowing the prevalence-treatment-time loss will help focus the DOE on where the best improvement opportunities exist. See Figure 9.

Figure 9:

Lost Time, Prevalence and Treatment for Top 10 Conditions

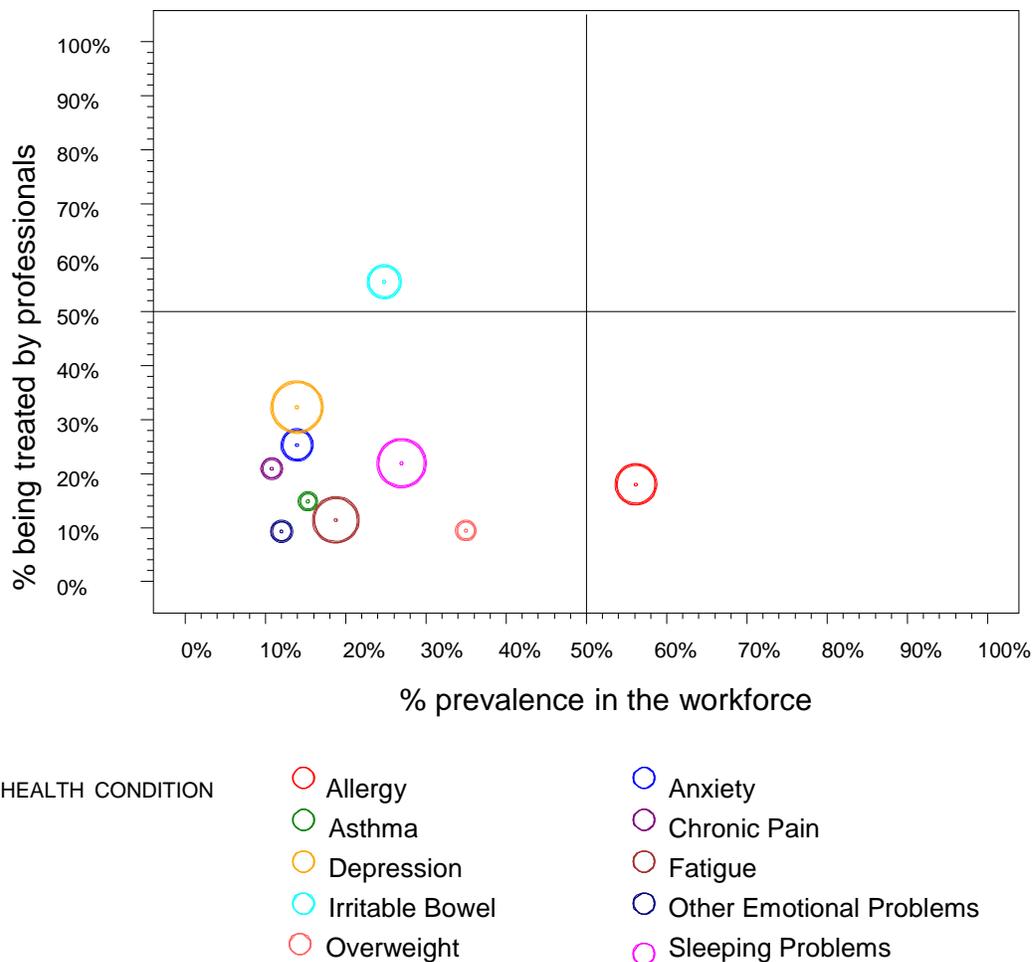


Figure 9 Key Findings: The inclusion of lost work time as a key factor in the broader

opportunities to improve care changes some of the top 10 conditions (conditions with relative high prevalence and low treatment penetration - but little lost time - may drop out of this exhibit). Conditions in quadrants III and IV tend to be conditions with low treatment penetration and increasing prevalence in moving from quadrant III to IV. Conditions with larger bubble sizes in these quadrants represent the best opportunities to improve lost work time through better care. For this group of employees, Depression, Sleeping Problems, and Fatigue conditions may be good targets for interventions.

Section I, Part III. Lost Productivity and Business Impacts

The ability of a company to make the business case for the value of health will depend on the ability of benefits/risk professionals to translate the impacts of chronic health conditions into terms consistent with senior management's activities. Section I, Part III of the report translates absence and presenteeism lost work time into financial lost productivity; reflects lost productivity in terms relevant to the Board of Directors and Chief Executive Officer, Chief Financial Officer, and Chief Operating Officer; and reflects opportunities to improve productivity using key business metrics for each level of the organization.

A. The Magnitude of Health-related Lost Productivity. Lost productivity resulting from chronic health conditions can most straightforwardly be quantified as the opportunity costs of ill health of its employees. Research shows that these costs are a function of: (1) the amount of time lost from work due to absence and presenteeism, (2) the amount employees are remunerated for their labor (based on salary and benefits) as a measure of their 'direct value' to the business and, (3) the labor-output relationship (which is related to the ease with which labor can be replaced, the time value of output, and the degree to which employees work in teams).¹⁶

This exhibit below displays how much productivity is lost from all 29 chronic health conditions in the DOE and how absence and presenteeism contribute. See Figure 10.

Figure 10:

Amount of Absence and Presenteeism Lost Productivity

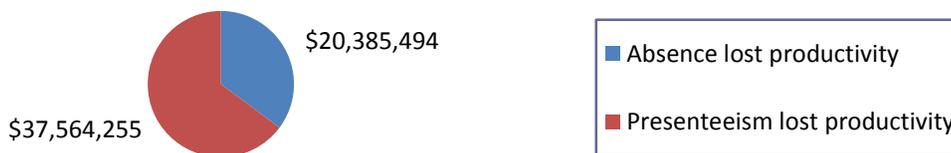


Figure 10 Key Findings: Lost productivity resulting from presenteeism accounts for \$37,564,255 of the \$57,949,749 of health-related lost productivity in the workforce from chronic diseases.

¹⁶ Nicholson, S., Pauly, M., Polsky, D., Baase, C., Billotti, G., Ozminkowski, R., Berger, M., & Sharda, C. (2005). How to present the business case for healthcare quality to employers. *Applied Health Economics and Health Policy*. 4(4), 209-218.

B. Lost productivity and health conditions. How do individual health conditions contribute to health-related lost productivity? The amount of lost productivity by condition will help DOE focus on where to spend limited resources with potentially the greatest returns. The exhibit below displays the contribution to lost productivity for the top 10 health conditions. See Figure 11.

Figure 11:

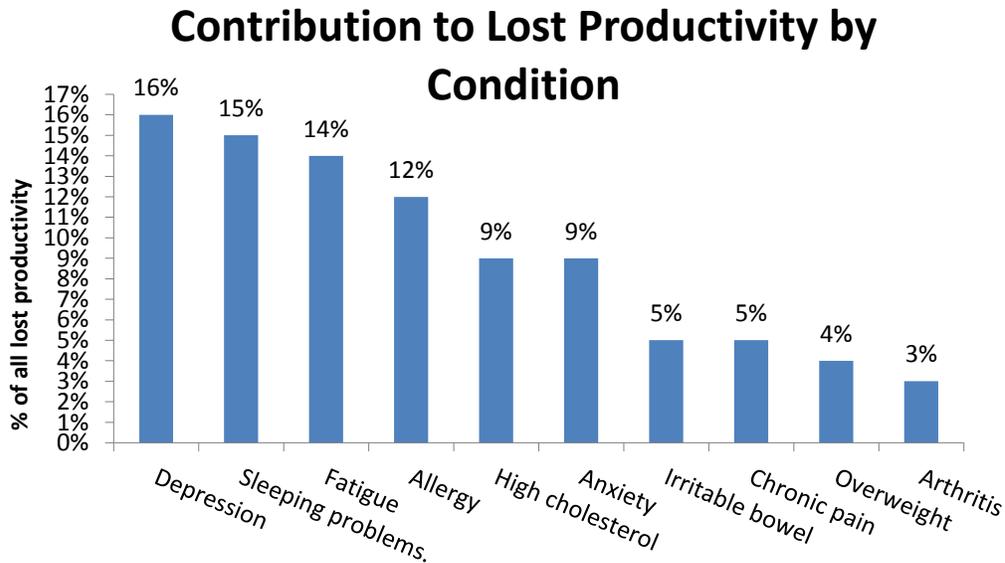


Figure 11 Key Findings: The two most important health conditions from the lost-productivity perspective are Depression (accounting for 16% of the \$57,949,749 in lost productivity) and Sleeping Problems (contributing 15%).

C. Lost Productivity in the Business Context. The importance of lost productivity and its potential in improving business performance is reflected by its magnitude relative to key operating metrics in the business. At the same time, what are considered 'key operating metrics' varies by the interests of those with different organizational roles and responsibilities. For example, the Board of Directors may be particularly interested in maintaining the company's assets - including its human capital assets - under its Sarbanes-Oxley responsibilities. The Chief Financial Officer may be primarily concerned with strategies to grow earnings, while the head of operations is focused on ensuring that there are sufficient workers to produce the company's goods and services. Improving health-related lost productivity can lead to gains in each of these three areas.

As a reference point, the following table (Table 3) shows the DOE Contractor Worksite’s numbers for two of these perspectives.

Table 3:

Organization Level	Operational Concern	Key Measure	Company Values
Board of Directors	Asset maintenance	Human capital investment	\$1,380,010,422
Chief of Operations	Workflow	Size of workforce	11,718

Figure 12 shows the magnitude of health-related lost productivity relative to these key measures for the DOE Contractor Worksite.

Figure 12:

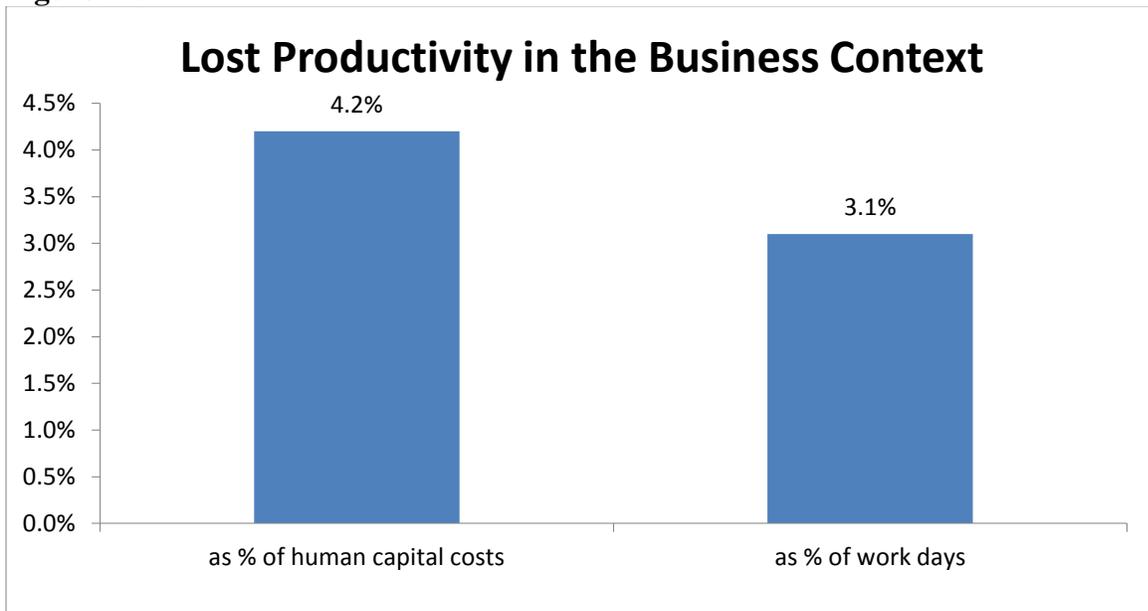


Table 3 and Figure 12 Key Findings: Lost productivity is significant, relative to these key operational metrics. It represents 4.2% of human capital costs, and the time loss associated with this lost productivity is the equivalent of 3.1% of available work days.

D. The Business Impact of Improvements. The final step in understanding the meaning of lost productivity is to analyze potential impacts of lost productivity improvements in these business metrics. Table 4 below shows overall productivity improvements of 1%, 5%, and 10%, relative to these operational levels.

Table 4:

Savings

Savings equivalents in key operational measures for DOE

Target Productivity Improvements	Productivity Gains ¹⁷	Added Workdays ¹⁸	Human Capital Growth ¹⁹
1%	\$579,497	948	0.04%
5%	\$2,897,487	4738	0.21%
10%	\$5,794,975	9477	0.42%

Table 4 Key Findings: From the perspective of two levels of the organization, improving health-related lost productivity can help improve business results. For example, a 10% productivity improvement in the work force translates to an equivalent of 0.42% gain in human capital assets and could contribute an additional 9477 workdays to assist in delivering DOE’s products and services.

¹¹ Productivity gains are calculated as the percent savings in total health-related lost productivity at each improvement level.

¹⁸ The number of additional workdays that could be funded at each productivity savings level.

¹⁹ The percent increase in human capital (wages plus benefits) that could be funded at each productivity savings level.

Section II: Age Groups, Health Conditions, and Productivity

The DOE is interested in the relationship between increasing age and risk for chronic health conditions. How these two factors relate to productivity is another interest for DOE, as they continue to rely on an aging workforce for critical work tasks and functions. Even though a significant percentage of DOE workers are currently or soon will be eligible to retire, many employees are choosing to postpone retirement and continue working. Increased age presents several strengths to DOE, such as increased knowledge, experience and wisdom; however, age can also be a risk factor for chronic health conditions and workplace-related accidents and injuries that may negatively affect productivity. It is critical that policies and programs at DOE support the workforce, encouraging employees, regardless of their age, to perform their jobs safely, while maintaining productivity, overall health, and employee well-being.

Methods

To assess the effect of age on health and productivity, the researchers used a random stratified sample by age with three primary age groups (≤ 34 ; 35-49; ≥ 50). The first research question within this section was focused on describing the prevalence of chronic health conditions and their effects on lost productivity within each age group (comparing employees with any condition to employees without any condition for each age group) and between the three age groups (comparing only employees with one or more conditions in each age group to the other two age groups). To do this, we compared HPQ-Select chronic health conditions by condition across age group and measured its impact on productivity (i.e. lost days). Table 5 below shows the prevalence of each condition across age groups and lost productivity, relative to condition. We also examined total absenteeism, presenteeism, and total lost days among employees with and without one or more conditions across the three age groups. See Table 6 below for results from this analysis.

To test for statistical differences by age group for those employees with and without at least one chronic health condition, we used ANOVA and relative hours worked as the dependent variable. We also ran ANOVA to assess differences in relative hours worked between the three age groups, using only those employees with one or more health condition. Relative hours worked (RHW) is measured as the proportion of actual hours worked in the 28 day recall period to the expected hours worked over the same period.

To assess statistical differences on presenteeism, we ran ANOVA with self-reported work performance as the dependent variable. This was done by age group, between those with and without at least one chronic condition and between the three age groups using only those with one or more conditions. Presenteeism was measured as a self-reported rating of quality of work

performance answered using an 11-point scale ranging from Worst Performance (0) to Top Performance (10).

Results

Data provided in Table 5 below (Chronic Health Condition by Age Group and Lost Days) are organized alphabetically by chronic health condition and by age group. Within each age group, data are provided for prevalence of the chronic health condition, percentage of those employees reporting the chronic condition who are currently in treatment, and the total lost productivity (calculated as the sum of absenteeism and presenteeism and reported as lost days per 100 FTEs). Results for total lost productivity should be interpreted in comparison to respondents within the same age group who did not report the specific chronic health condition. For example, consider the chronic health condition of Allergy for the 35-49 year old age group; 58.3% of respondents in this age group reported having this chronic health condition, and 20.9% were in treatment for this condition. This compared to employees in the 35-49 year old age group who did not report having Allergy, employees 35-49 years old with Allergy had 486.64 (per 100 FTEs) more lost days of productivity.

In Table 6, we can see that across the three age groups, employees in Group 2 (35-49 years old) reported the most lost work days and employees in Group 1 (≤ 34 years old) reported the least.

Results from ANOVA with relative hours worked as the dependent variable revealed that there was no statistical difference for relative hours worked by age group for employees with and without at least one chronic health condition [for age ≤ 34 group, $F_{1,323}=0.98, p=.32$; for age 35-49 group, $F_{1,408}=1.46, p=.23$; and for age ≥ 50 group, $F_{1,410}=1.94, p=.16$]. ANOVA comparing relative hours worked between the three age groups, using only employee cases with one or more conditions, revealed no statistical difference for relative hours work between any of the three age groups ($F_{2,1019}=1.59, p=.20$).

Results from ANOVA with self-reported work performance as the dependent variable and by age group comparing those employees with and without at least one chronic condition revealed no statistical difference for employees in Group 1 (≤ 34) ($F_{1,323}=.64, p=.42$) or Group 3 (≥ 50) ($F_{1,410}=.87, p=.35$). A statistical difference for employees in Group 2 (age 35-49) was detected ($F_{1,408}=7.01, p=.008$). On average, employees without one or more conditions scored 0.55 points higher on the 11-point self-reported work performance question as compared to employees with one or more health conditions.

Between the three age groups and using only those employees with one or more conditions, the overall model was significant ($F_{2,1018}=7.32, p=.001$). Post-hoc analyses indicated significant differences between Group 1 (≤ 34 age group) and Group 3 (≥ 50 age group), with older employees having higher self-reported work performance ratings (difference = 0.39)

Table 5. Chronic Health Condition by Age Group with Lost Days

Health Condition	Age group 1: <= 34			Age group 2: 35-49			Age group 3: >= 50		
	Prevalence	% in Treatment	Lost Days/ 100 FTEs (Total)	Prevalence	% in Treatment	Lost Days/ 100 FTEs (Total)	Prevalence	% in Treatment	Lost Days/ 100 FTEs (Total)
Alcohol/Drug Problems	†	†	†	†	†	†	1.7%	14.3%	-1.71
Allergy	51.4%	16.8%	1,028.31	58.3%	20.9%	485.64	57.0%	16.2%	504.76
Anxiety	13.5%	20.5%	-768.80	14.9%	31.1%	75.81	13.3%	23.6%	-84.85
Arthritis	4.0%	15.4%	-304.32	11.2%	13.0%	168.63	24.3%	16.0%	30.59
Asthma	12.6%	29.3%	562.87	10.7%	40.9%	28.82	10.2%	42.9%	-4.65
Back/Neck pain	20.6%	23.9%	65.27	26.6%	14.7%	151.90	32.0%	21.2%	238.17
Bladder/ Urinary	4.6%	20.0%	56.13	6.6%	22.2%	98.76	10.2%	16.7%	45.42
Bronchitis	1.5%	0.0%	194.90	1.5%	0.0%	-56.44	2.4%	30.0%	19.67
Chronic pain	7.7%	12.0%	-393.43	10.0%	19.5%	107.11	13.6%	21.4%	-125.53
Congestive Heart Failure	†	†	†	†	†	†	†	†	†
COPD	†	†	†	†	†	†	†	†	†
Coronary heart disease	†	†	†	†	†	†	2.4%	100.0%	30.07
Depression	9.8%	28.1%	-407.57	13.9%	31.6%	316.21	16.3%	34.3%	-131.58
Diabetes	0.9%	100.0%	3.98	3.9%	68.8%	-121.67	8.3%	70.6%	156.82
Fatigue	14.5%	4.3%	846.22	19.5%	12.5%	131.92	20.6%	15.3%	-108.78
GERD	4.3%	28.6%	-349.08	14.1%	34.5%	-83.71	17.0%	42.9%	-23.19
Headache	15.4%	8.0%	36.37	15.4%	12.7%	83.44	13.1%	13.0%	18.78
High cholesterol	13.2%	23.3%	170.02	20.0%	39.0%	139.53	34.7%	69.2%	16.24
Hypertension	11.1%	25.0%	335.90	14.9%	57.4%	67.41	32.3%	85.0%	246.90
Irritable bowel	10.2%	12.1%	51.08	14.6%	10.0%	-11.00	12.4%	7.8%	8.16
Migraine	15.1%	14.3%	-674.97	18.0%	24.3%	154.80	11.9%	20.4%	-75.27
Nicotine dependency	3.7%	8.3%	-635.54	6.1%	0.0%	-25.33	9.0%	2.7%	14.99
Osteoporosis	†	†	†	†	†	†	6.1%	44.0%	53.32
Other cancer	†	†	†	1.5%	50.0%	13.81	6.6%	51.9%	-1.55
Other emotional problem	3.1%	10.0%	-53.80	2.7%	27.3%	0.88	2.4%	30.0%	31.60
Overweight	21.8%	8.5%	202.75	33.4%	8.8%	69.13	41.7%	11.0%	-107.44
Skin cancer	†	†	†	3.4%	28.6%	-45.43	9.0%	40.5%	-40.27
Sleeping problems	17.8%	8.6%	67.08	25.4%	20.2%	244.07	32.3%	27.1%	-149.04
Ulcer	2.5%	12.5%	-189.16	4.1%	11.8%	101.68	4.9%	5.0%	7.93

†<5 cases

Table 6. Absenteeism, Presenteeism, and Lost Days by Age Group

ESTIMATED TOTAL LOST TIME VALUES BY AGE GROUP			
Age Group	Absence per 100 FTE	Presenteeism per 100 FTE	Total Lost Days per 100 FTE
Age Group 1: <=34	-142.87	138.64	-4.23
Age Group 2: 35-49	209.87	423.78	633.65
Age Group 3: >=50	282.50	-102.91	179.58
<i>Total</i>	<i>349.51</i>	<i>459.50</i>	<i>809.00</i>

Discussion

While workers in all age groups reported having chronic health conditions, there is a great deal of variation between age groups for prevalence, percent in treatment, and lost productivity relative to each chronic health condition. The overall most commonly reported chronic health conditions in this study, Depression, Sleeping Problems, Overweight, Hypertension, and High Cholesterol, are most prevalent in Age Group 3 (≥50 years old). The best opportunities to improve lost work when looking at the total work population are Depression, Sleeping Problems, and Fatigue.

Interestingly, when comparing the age groups to each other on overall lost productivity measured with relative hours worked, there were no statistical differences. However, when age was compared on self-reported work performance, differences were found between the youngest and oldest worker age groups. Those ≤ 34 years old reported lower levels of work performance, or higher presenteeism, as compared to employees ≥50 years old.

Section III: Job Classification, Health Conditions, and Productivity

A second question of interest, after age differences, was whether there were differences in chronic health conditions and productivity among DOE employees within different job classifications groups.

Methods

To compare employees across job classification groups, the researchers modified the HPQ-Select survey to match the four primary job classification categories used by the DOE Injury and Illness Surveillance Program (IISP). The four categories include Executive, Administrator, Senior Manager, and Professional (Occupational Group 1), Technical Support, Precision Production, and Craft Workers (Occupational Group 2), Sales, Clerical, and Administrative Support Job Positions (Occupational Group 3) and, Service Occupations, Operator, and Laborer Job Positions (Occupational Group 4).

The first research question in this section focused on describing the prevalence of chronic health conditions and their effects on lost productivity within each occupational group (comparing employees with any condition to employees without any condition for each occupational group) and between the four occupational groups (comparing only employees with one or more conditions in each occupational group to the other three occupational groups). To do this, we compared HPQ-Select chronic health conditions by condition across occupational group and measured its impact on productivity (i.e. lost days). Table 7 below shows the prevalence of each condition across occupational groups and lost productivity, relative to condition. We also examined total absenteeism, presenteeism, and total lost days among employees with and without one or more conditions across the four occupational groups. See Table 8 below for results from this analysis.

To test for statistical differences by occupational group for those employees with and without at least one chronic health condition, we used ANOVA and relative hours worked as the dependent variable. Relative hours worked is measured as the proportion of actual hours worked in the 28 day recall period to the expected hours worked over the same period). We also ran ANOVA to assess differences in relative hours worked between the four job groups using only those with one or more health condition.

To assess statistical differences on presenteeism, we ran ANOVA with self-reported work performance as the dependent variable. This was done by job group, between those with and without at least one chronic condition and between the four job groups using only those with one or more conditions. Presenteeism was measured as a self-reported rating of quality of work performance answered using an 11-point scale ranging from Worst Performance (0) to Top Performance (10).

Results

Data provided in Table 7 below (Chronic Health Condition by Occupational Classification), are organized alphabetically by chronic health condition and by job classification. Within each job classification group, data are provided for prevalence of chronic health condition, percentage of those reporting the chronic condition who are currently in treatment, and total lost productivity (calculated as the sum of absenteeism and presenteeism and reported as lost days per 100 FTEs). Results for total lost productivity should be interpreted as compared to respondents in the same job classification who did not report the specific chronic health condition. For example, consider the chronic health condition of Allergy for Occupation Group 1 (Executive, Administrator, Senior Manager, & Professional); 13.4% of respondents in this occupation group reported having this chronic health condition, and 17.6% are currently in treatment for this condition. This is compared to employees in Occupation Group 1 who did not report having Allergy, employees in Occupation Group 1 with Allergy had 227.41 (per 100 FTEs) more lost days of productivity.

Compared to employees who reported no chronic health conditions, employees in Occupation Group 1 (Executive, Administrator, Senior Manager, & Professional) had the highest lost work days and employees in Occupational Group 2 (Technical Support, Precision Production, & Craft Workers) had the fewest lost work days (Table 8).

Results from ANOVA with relative hours worked revealed that there was no statistical difference for relative hours worked by occupational group for employees with and without at least one chronic health condition [for Occupational Group 1, $F_{1,835}=1.17$, $p=.28$; for Occupational Group 2, $F_{1,97}=3.73$, $p=.06$; for Occupational Group 3, $F_{1,163}=1.47$, $p=.23$; and for Occupational Group 4, $F_{1,44}=.39$, $p=.54$].

ANOVA comparing relative hours worked between the four occupational groups, using only employee cases with one or more conditions, revealed an overall model that was statistically significant ($F_{3, 1055}=4.74$, $p=.003$). The only significant difference was between Group 1 and Group 3; the difference in relative hours worked is 6% meaning that Group 1 worked more than Group 3.

Results from ANOVA with self-reported work performance as the dependent variable and by age group comparing those employees with and without at least one chronic condition revealed no statistical difference for employees in Occupational Group 1 ($F_{1,835}=2.14$, $p=.14$), Occupational Group 2 ($F_{1,97}=.003$, $p=.95$), Occupational Group 3 ($F_{1,163}=2.16$, $p=.14$), and Occupational Group 4 ($F_{1,44}=.08$, $p=.78$).

Between the four occupational groups and using only those employees with one or more conditions, the overall model was significant ($f_{2, 1025}=11.21$, $p<.001$). Post-hoc analyses indicated significant differences between Occupational Group 1 and Occupational Group 3 and between Occupational Group 1 and Occupational Group 4. Occupational Group 1 compared to Occupational Group 3 reported lower self-reported job performance with a difference of 0.56. For Occupational Group 1 and Occupational Group 4, Group 1 reported performing 0.66 less than Group 4.

Table 7. Chronic Health Condition by Occupational Classification

Health Condition	Occupation group 1: Executive, administrator, senior manager & professional			Occupation group 2: Technical support, precision production & craft workers			Occupation group 3: Sales, clerical & administrative support			Occupation group 4: Service occupations, operator & laborer		
	Prevalence	% in Treatment	Lost Days/ 100 FTEs (Total)	Prev.	% in Treatment	Lost Days/ 100 FTEs (Total)	Prev.	% in Treatment	Lost Days/ 100 FTEs (Total)	Prev.	% in Treatment	Lost Days/ 100 FTEs (Total)
Alcohol/Drug problems	0.7%	16.7%	6.72	†	†	†	†	†	†	†	†	†
Allergy	53.5%	17.6%	227.41	63.6%	12.7%	-1891.87	61.8%	22.5%	505.64	60.9%	21.4%	-49.63
Anxiety	13.4%	20.5%	98.27	14.1%	50.0%	-1001.53	16.4%	33.3%	290.28	15.2%	28.6%	91.09
Arthritis	11.5%	12.5%	3.10	22.2%	22.7%	1,673.67	19.4%	18.8%	50.15	19.6%	11.1%	72.98
Asthma	10.2%	37.6%	37.70	10.1%	10.0%	903.28	15.2%	48.0%	193.36	15.2%	42.9%	99.89
Back/Neck pain	25.0%	19.6%	-26.47	27.3%	22.2%	641.24	36.4%	18.3%	307.61	26.1%	16.7%	-40.12
Bladder/Urinary	6.5%	20.4%	32.82	10.1%	20.0%	-152.62	10.9%	16.7%	71.13	†	†	†
Bronchitis	1.6%	7.7%	-3.80	†	†	†	3.0%	20.0%	13.19	†	†	†
Chronic pain	10.5%	17.0%	64.85	12.1%	33.3%	13.93	10.9%	11.1%	48.14	†	†	†
Congestive Heart Failure	†	†	†	†	†	†	†	†	†	†	†	†
COPD	†	†	†	†	†	†	†	†	†	†	†	†
Coronary heart disease	1.2%	100.0%	39.89	†	†	†	†	†	†	†	†	†
Depression	12.2%	34.3%	186.67	18.2%	33.3%	-1117.17	17.6%	24.1%	385.06	5.2%	28.6%	102.21
Diabetes	4.3%	75.0%	-56.75	6.1%	66.7%	-606.35	4.2%	57.1%	-119.91			
Fatigue	15.4%	11.6%	149.39	21.2%	19.0%	1,171.70	30.9%	11.8%	218.41	23.9%	0.0%	154.86
GERD	10.2%	41.2%	-8.51	13.1%	30.8%	-858.33	21.2%	31.4%	22.42	19.6%	44.4%	85.52
Headache	11.6%	8.2%	-50.80	9.1%	22.2%	-724.29	30.9%	17.6%	463.35	21.7%	0.0%	74.26
High cholesterol	23.2%	54.6%	115.99	26.3%	46.2%	-718.55	22.4%	45.9%	50.26	23.9%	54.5%	282.04
Hypertension	17.8%	70.5%	-7.46	28.3%	67.9%	488.93	24.8%	68.3%	28.50	26.1%	41.7%	76.44
Irritable bowel	11.0%	12.0%	49.00	11.1%	9.1%	532.15	22.4%	5.4%	188.82	†	†	†
Migraine	12.9%	18.5%	31.96	14.1%	14.3%	-259.18	26.1%	27.9%	319.43	15.2%	14.3%	-72.52
Nicotine dependency	4.5%	2.6%	-46.92	12.1%	0.0%	-83.12	7.9%	7.7%	-39.44	23.9%	0.0%	9.75
Osteoporosis	2.0%	58.8%	-14.56	†	†	†	4.2%	28.6%	-17.26	†	†	†
Other cancer	2.4%	60.0%	-8.32	6.1%	33.3%	-543.63	4.2%	42.9%	50.26	†	†	†
Other emotional problem	2.3%	21.1%	34.84	†	†	†	3.6%	33.3%	-3.98	†	†	†
Overweight	28.7%	8.3%	31.02	39.4%	12.8%	-982.17	46.7%	13.0%	-44.28	52.2%	8.3%	127.89
Skin cancer	4.1%	38.2%	7.89	7.1%	42.9%	-989.46	6.1%	40.0%	-61.74	†	†	†
Sleeping problems	23.4%	18.4%	143.08	32.3%	34.4%	-124.30	31.5%	23.1%	548.85	32.6%	20.0%	191.21
Ulcer	3.1%	11.5%	-31.01	†	†	†	7.9%	0.0%	60.36	†	†	†

† < 5 cases

Table 8: Occupational Group and Absenteeism, Presenteeism, and Lost Days

ESTIMATED TOTAL LOST TIME VALUES BY OCCUPATIONAL GROUP			
Occupational group	Absence per 100 FTE	Presenteeism per 100 FTE	Total lost days per 100 FTE
Occ Group 1: Executive, Administrator, Senior Manager, & Professional (01, 03, 04, 06)	214.18	372.1 1	586.27
Occ Group 2: Technical Support, Precision Production, & Craft Workers (05)	-223.97	-12.87	-236.84
Occ Group 3: Sales, Clerical, & Administrative Support (02, 09)	215.73	190.8 4	406.57
Occ Group 4: Service Occupations, Operator, & Laborer (07, 08, 10)	49.91	3.08	53.00
Total	255.86	553.1 6	809.00

Discussion

In summary, results suggest that employees in Group 1 (Executive, Administrator, Senior Manager, & Professional) report working more relative work hours as compared to employees in Group 2 (Technical, Support, Precision Production, & Craft Workers). However, employees in Group 1 also report greater levels of presenteeism on the self-reported work performance scale, as compared to employees in Group 2 and Group 4 (Service Occupations, Operator, & Laborer). Employees in Group 1 tend to have higher salaries than the other three occupational groups and therefore, are likely high drivers of lost productivity costs through presenteeism.

Section IV: Nicotine Questions and Analysis

Introduction and Methods

The HPQ-Select survey asks participants to report nicotine dependence. After consultation with DOE's Chief Medical Director, the researchers added two additional questions about nicotine use from the National Health Interview Survey (NHIS) to estimate the prevalence of smoking among employees²⁰. The first question was "Have you smoked at least 100 cigarettes in your entire life?" and the second was "If yes, do you NOW smoke cigarettes?"

Analysis of the additional questions is presented in three parts. Part 1 addresses the tests of differences in proportions between DOE and the CDC in four areas: ever Smoked, currently smoke, and age and gender differences on each. Part 2 addresses occupational classification differences in ever smoked and currently smokes. There is no CDC reference group for this analysis. Part 3 addresses the test of differences in proportions responding to the nicotine dependency question on the HPQ-Select compared to the additional smoking questions we added (ever smoked, currently smoke). Results pertaining to currently smoking employees are based only on those respondents who indicated that they had ever smoked.

Part 1: DOE Compared to CDC

Ever Smoked

Based on the CDC report, 41% of the total sample (age 18 and older) reported ever smoking, compared to 25.6% for the combined DOE sample. This difference is statistically significant ($z=12.19$, $p<.001$), with a smaller proportion of individuals who smoked in the DOE sample as compared to the CDC national sample. After controlling for geographic location, it was found that a significant difference only existed between one site and the CDC national average. For this site, employees responding to the HPQ-Select ($N=915$), 35.1% ($n=307$) indicated that they had smoked at least 100 cigarettes in their lifetime. This rate is statistically significantly lower ($p<.001$) than the national proportion of 41%. No significant differences were found for the second site.

Current Smokers

Based on the CDC report, 20% of those who reported having ever smoked (age 18 and older) reported currently smoking, compared to 27.4% for the combined DOE sample. This difference is statistically significant ($z=-2.98$, $p<.005$), with a larger proportion of individuals who currently smoke in the DOE sample as compared to the CDC national sample. After controlling for geographic location, it was found that this significant difference only existed for one site. For this site, employees who responded to the HPQ-Select and reported ever smoking ($N=307$), 28.2% ($n=86$) indicated that they currently smoke. This proportion is statistically significantly higher than both the State (16.9%; $p<.001$) and National (17%; $p<.001$) proportions of current smokers. No significant differences were found for the second site with regards to State and National averages.

²⁰ U.S. Centers for Disease Control and Prevention. (2007). National Health Interview Survey. Retrieved from <http://www.cdc.gov/nchs/nhis/2007paradata.htm>.

Age Differences

The only directly comparable result between DOE and CDC is the relationship between age (continuous) and current smokers. According to the CDC, age was predictive of being a current smoker, with increasing age related to lower probability of being a current smoker. This result was not replicated in the DOE sample, with age not being a significant predictor of being a current smoker ($p=.27$). No site-specific analyses were conducted.

For the DOE sample, age (continuous) was found to be a significant predictor of ever smoking ($OR=1.04$, $p<.001$), with the odds of ever being a smoker increasing with age. CDC only used a binary age variable (under 45 vs. over 45). For DOE sample, age group (categorical) was not related to being a current smoker, but it was related to ever being a smoker. Individuals age 50 and older were more likely to have ever smoked (consistent with the results when using age as a continuous variable). No site-specific analyses were conducted.

Gender Differences (Currently Smoke)

Based on the CDC report, 21% of men were current smokers, compared to 25% for the combined DOE sample. This difference is not statistically significant ($z=-1.33$, $p<.05$). However, after controlling for geographic location, it was found that a significant difference existed for one site. Among male employees at this site who responded to the HPQ-Select and reported ever smoking ($N=200$), 26.0% ($n=52$) indicated that they currently smoke. This proportion is statistically significantly higher than both the State (20.3%; $p=.02$) and National (21%; $p=.04$) proportions of current smokers. No significant differences were found for the second site with regards to State and National averages.

Based on the CDC report, 18% of women were current smokers, compared to 31.5% for the combined DOE sample. This difference is statistically significant ($z=-3.27$, $p<.001$), indicating that a higher proportion of women in the DOE sample are current smokers compared to CDC's national sample. After controlling for geographic location, it was found that a significant difference only existed between one site and State and National averages. For this site, female employees who responded to the HPQ-Select and reported ever smoking ($N=101$), 33.6% ($n=34$) indicated that they currently smoke. This proportion is statistically significantly higher than both the State (13.7%; $p<.001$) and National (18%; $p<.001$) proportions of current smokers. Notably, the proportion of current female smokers in this sub-sample is nearly twice the National rate and two and a half times the State rate. No significant differences were found for the second site.

Part 2: Occupational Classification Differences²¹

A statistically significant difference was found in the proportions of those having ever smoked versus never smoked by occupational classification ($\chi^2=38.01, p<.001$). Bonferroni-adjusted post-hoc comparisons revealed the following results: Group 1 was less likely to have ever smoked than Group 2 ($\chi^2=15.19, p<.001$), Group 3 ($\chi^2=17.91, p<.001$), and Group 4 ($\chi^2=15.61, p<.001$). There was no difference in proportion ever smoking between Group 2, Group 3, and Group 4. No site-specific analyses were conducted.

Between Occupational Classification Differences (Currently Smoke)

A statistically significant difference was found in the proportions of those who reported that they currently smoke versus those who do not currently smoke by occupational classification ($\chi^2=9.09, p=.028$). Bonferroni-adjusted post-hoc comparisons revealed the following results: Group 1 less likely to currently smoke than Group 4 ($\chi^2=8.18, p=.003$). Group 2 was less likely to currently smoke than Group 4 ($\chi^2=5.94, p=.015$). Group 3 was less likely to currently smoke than Group 4 ($\chi^2=5.07, p=.024$). There was no difference in proportion of currently smoking employees between Group 1, Group 2, and Group 3. No site-specific analyses were conducted.

²¹ Note: Group 1 = Professional
 Group 2 = Technical Support/Precision Craft Workers
 Group 3 = Administrative Support
 Group 4 = Service/Line Operator/Security & Fire

Section 3: Differences between HPQ Nicotine Dependence Question and Added Smoking Behavior Questions

Nicotine Dependence and Current Smokers

Crosstab

			Current Smoke		Total
			No	Yes	
Nicotine Dependence	No	Count	208	27	235
		% of Total	67.1%	8.7%	75.8%
	Yes	Count	17	58	75
		% of Total	5.5%	18.7%	24.2%
Total	Count	225	85	310	
	% of Total	72.6%	27.4%	100.0%	

$\chi^2=123.86, p<.001$

Key Findings: Among those that have ever smoked ($n=310$), 75.8% said they have “never” been nicotine dependent.

Nicotine Dependence and Employees Who Ever Smoked

Crosstab

			Ever Smoked		Total
			No	Yes	
Nicotine Dependence	No	Count	879	237	1116
		% of Total	73.6%	19.8%	93.5%
	Yes	Count	3	75	78
		% of Total	.3%	6.3%	6.5%
Total	Count	882	312	1194	
	% of Total	73.9%	26.1%	100.0%	

$\chi^2=211.98, p<.001$

Key Findings: 26.1% of the total sample reported having ever smoked ($n=312$), but only 6.3% stated they had ever been nicotine dependent.

Section V: Discussion and Conclusion

This study represents an important first step in DOE's study of health and productivity, especially as it relates to an aging workforce. As with any research study, there are both strengths and limitations that should be considered when interpreting the results.

With regard to strengths of the present study, in comparison to a 25% response rate in previous studies lacking incentives, the overall response rate of 46% was much higher. The PI received several emails from employees during the data collection period with questions regarding the purpose of the study, the methodology and data analysis plans, and interest in the topic. This relates to the higher than expected response rate and interest in employee health and productivity at DOE as there were multiple points of contact with potential respondents. The use of random sampling methods increased the researchers' ability to generalize results to the broader workplaces who participated. The use of a standardized measure to assess health and productivity, in addition to nicotine use, allowed for comparisons of results to other similar and national samples. While an overall understanding of health and productivity is useful, the more detailed analysis by age and occupational category will help better inform and target next step strategies.

With regard to limitations, results represent only two DOE worksites. While the response rate was higher than expected, it was still less than 50%, which is considered a moderate response rate for anonymous surveys. Due to the anonymous nature of the surveys, the researchers had to rely solely on self-report data for measures of health and productivity.

Data from this initial study provide baseline information about the health and productivity of the DOE Contractor workforce. Results should be used to support workplace recommendations and proposed program plans to support employee health and wellness. Results should also be used to inform and respond to policy guidelines, specifically the employer's response to 10 CFR 851, DOE Worker Safety and Health Program (DOE, 2006). DOE can work to increase the number of worksites participating in the HPQ-Select to allow for further comparisons across worksites and across the DOE workforce. The HPQ-Select proved to be a valid and reliable data collection option for DOE worksites. This survey meets the requirements set forth in 10 CFR 851 for sites to participate in health and productivity management data collection. Specific recommendations for DOE practice, policy change, and future research are listed below.

DOE Policy and Program Recommendations:

1. Bring together medical, pharmacy, lost time, and lost productivity costs into a single framework for analysis and develop strategies for attacking key health conditions on such a 'full-cost' basis.
2. Discuss results with senior DOE management and discuss the full costs of health and what improvements might mean to DOE's overall work performance.

3. Review employee health-plan design and related programs to identify financial, access, and/or quality barriers to appropriate medical care.
4. Evaluate health and lost-time benefit program modifications in the context of how they may generate value for DOE, including determining whether targeted strategies for varying populations (age and job classification) are necessary and more beneficial given the costs.
5. Educate employees about what their health means to the success of DOE and quality of life.
6. Consider broadening sources for health data to include employee biometric data, health-risk assessments, and other employee census and self-reported information in order to understand drivers of full costs and identify opportunities to improve health and productivity of DOE employees.
7. Three of the top five chronic health conditions driving productivity were related to behavioral health conditions (depression, sleeping problems, and fatigue), which can be prevented or managed with appropriate health and wellness interventions. The researchers recommend that DOE consult with their health and wellness professionals, including their Employee Assistance Program (EAP) professionals and fitness directors, to identify interventions that will be cost-effective and utilized within the culture of the workplace.
8. Depression was identified as the most common chronic health condition contributing to lost productivity and the top driver of cost from lost work time. However, it was encouraging to see that 32% of DOE employees with depression reported being actively engaged in treatment at the time of the survey. This percentage of employees in treatment is higher than the national standard for depression treatment and lends support to any past efforts DOE may have implemented to reduce stigma about depression, increase identification, and engage employees in depression treatment. One intervention to consider would be the inclusion of a standardized brief screen for depression within the occupational health and EAP intake procedures. The Patient Health Questionnaire (PHQ-2²² and PHQ-9²³) is a two-tiered screening measure that is available within the public domain and shown to be a reliable and valid screening measure to detect depressive symptoms among non-clinical adult populations.
9. The PI for this study worked with DOE in the past to address workplace suicide prevention. Given the high prevalence of depression, we recommend that DOE work with Dr. Jacobson again to review the proposed comprehensive suicide prevention program and consider implementing it for at-risk worksites.

²² Kroenke, K., Spitzer, R., & Williams, J. (2003). The patient health questionnaire-2: Validity of a two-item depression screener. *Medical Care, 41*, 1284.

²³ Spitzer, R.L., Kroenke, K., & Williams, J.B.W. (1999). Validation and utility of a self-report version of the PRIME-MD: The PHQ Primary Care Study. *Journal of the American Medical Association, 282*(18), 1737-1744.

10. “Allergy” was one of the most prevalent chronic health conditions although, and the fourth highest cost driver of lost productivity. DOE should consider further examination of work and building conditions that could contribute to or exacerbate allergy symptoms. One concerned research participant contacted the research team requesting that the report include a comment about the need to review procedures for dealing with asbestos when renovating older buildings. Additionally, DOE may want to consider reviewing their promotion of on-site allergy services to reach out to untreated employees.
11. “Overweight” was one of the most common co-morbid pair conditions with other chronic health conditions measured by the HPQ-Select. The researchers would encourage DOE to compare self-report rates for overweight and related conditions using data already collected through the occupational health program in addition to reports based on medical and/or pharmacy claims data. Interventions designed to help employees lose or manage their weight may also have a secondary impact on reducing symptoms of related chronic illnesses, such as depression, that may be more stigmatized than weight loss.
12. Problems related to sleep were prevalent among employees surveyed. Employee education about proper sleeping patterns and benefits from rest, in conjunction with stress management programs, can further decrease the negative impact of sleep problems on productivity.
13. With regard to nicotine use, women current smokers, were represented at a greater rate than national statistics. Therefore, smoking cessation programs designed for women are recommended as a cost-effective program that can be implemented in-person, by telephone through coaching, or on-line.
14. The HPQ-Select also collects information regarding injuries at work that relate to health conditions. The researchers recommend that DOE collect data using the HPQ-Select in conjunction with a more comprehensive measure of safety and injury / accidents to gain a comprehensive picture of health, safety and productivity at the various DOE worksites.
15. Given the finding that employees in the Executive/Professional occupational group reported higher levels of presenteeism, DOE should consider intervention geared at improving engagement among senior management which has been shown to reduce presenteeism. Additionally, programs designed to improve work-life balance have also been linked to lower presenteeism.

DOE Research Recommendations

1. Collect data using HPQ-Select at additional DOE worksites that are more inclusive of the contractor workforce.

2. Add safety and safety culture data to the analysis of overall health and productivity at DOE.
3. Conduct follow-up interviews, focus groups, or surveys with employees to assess potential or real barriers to using health care resources and referrals, considering the low rate of treatment by medical professionals coupled by the fact that employees at these sites receive time off and insurance to be treated by a professional.
4. Conduct follow-up surveys at participating sites on an annual or bi-annual basis (or more if additional time is needed) to evaluate changes following implementation of new programs and policies.
5. The researchers plan to present research findings at professional conferences for occupational health and wellness, gerontology, and employee assistance, in addition to preparing manuscripts for referred journals in related fields.

Appendices

Appendix A: University of Maryland, IRB Approval Letter



University of Maryland, Baltimore
Institutional Review Board (IRB)
Phone: (410) 706-5037
Fax: (410) 706-4189
Email: hrpo@som.umaryland.edu
Exempt Confirmed Notification

Date: August 7, 2010

To: Jodi Jacobson
From: IRB Chair/Vice Chair: Christopher deFilippi
RE: HP-00045305
Risk designation: Minimal Risk
Exempt Confirmed Date: August 7, 2010

This is to certify that University of Maryland, Baltimore (UMB) Institutional Review Board (IRB) has received and reviewed correspondence regarding the above referenced protocol entitled, "Health and Productivity of U.S. Department of Energy Contractor Employees."

Your protocol has been determined to be exempt under 45 CFR 46.101(b), from IRB review based on the following category(ies):

45 CFR 46.101(2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless: (i) information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and (ii) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.

Investigators are reminded that the IRB must be notified of any changes in the study. In addition, the PI is responsible for ensuring prompt reporting to the IRB of proposed changes in a research activity, and for ensuring that such changes in approved research, during the period for which IRB approval has already been given, may not be initiated without IRB review and approval except when necessary to eliminate apparent immediate hazards to the subject (45 CFR 46.103(4)(iii)).

Research activity involving veterans or the Baltimore VA Maryland Healthcare System (BVAMHCS) as a site, must also be approved by the BVAMHCS Research and Development

Committee prior to initiation. Contact the VA Research Office at 410-605-7131 for assistance.

The UMB IRB is organized and operated according to guidelines of the International Council on Harmonization, the United States Office for Human Research Protections and the United States Code of Federal Regulations and operates under Federal Wide Assurance No. FWA00007145.

Appendix B: Department of Energy, IRB Approval Letter

REVIEW OF HUMAN SUBJECTS PROPOSALS

Central Department of Energy Institutional Review Board
P.O. Box 117 MS-21
Fed Ex: 1299 Bethel Valley Road (37830)
Oak Ridge, TN 37831-0117
FWA #00015568
Date: November 8, 2010

Type of Review

(check one)

- Expedited review Initial Review
- Full Board Review (New Project)
- Scheduled re-review (e.g., annual)
- Minor Modification or Revision

Principal Investigator: Jodi Jacobson, Ph.D. University of Maryland

Project Title: Health and Productivity of the U.S. Department of Energy Contractor Employees.

Review Date: October 26, 2010

The Central Department of Energy Institutional Review Board (CDOEIRB) reviewed your response to the conditions set forth by the Full Board at its meeting on August 23, 2010.

The committee granted full approval of this project and it is approved until August 22, 2011.

Please review the attached documents and acknowledge the minor typographical errors that have been corrected.

Pg 13 – Under OUTCOME: change data “collection” to “analysis.”

Pg 78 – Change from “centralized DOE IRB” to “Central DOE IRB.”

Pg 78 – Second to last paragraph should note that it takes approximately 10 minutes to complete the survey.

If you have any questions or comments, you may contact Becky Hawkins at 865-576-1725 or Becky.Hawkins@orise.ornl.gov

Appendix C - Health status (ordered by health condition prevalence)

Health Status			
	Health Condition	Prevalence %	% in Treatment
1.	Allergy	56.2%	18.0%
2.	Overweight	35.0%	9.4%
3.	Back/Neck Pain	27.1%	19.3%
4.	Sleeping Problems	27.0%	21.9%
5.	High Cholesterol	24.8%	55.6%
6.	Hypertension	21.7%	69.4%
7.	Fatigue	18.8%	11.4%
8.	Arthritis	15.3%	14.9%
9.	Migraine	14.3%	19.5%
10.	Headache	14.2%	10.1%
11.	Anxiety	14.0%	25.3%
12.	Depression	13.9%	32.3%
13.	GERD	13.1%	39.5%
14.	Irritable Bowel	12.0%	9.3%
15.	Asthma	11.0%	38.5%
16.	Chronic Pain	10.8%	20.9%
17.	Nicotine Dependency	7.8%	1.9%
18.	Bladder/Urinary	7.4%	18.3%
19.	Diabetes	5.3%	72.3%
20.	Skin Cancer	5.1%	40.2%
21.	Ulcer	4.0%	8.3%
22.	Other Cancer	3.3%	49.1%
23.	Osteoporosis	3.1%	36.4%
24.	Other Emotional Problem	2.8%	26.2%
25.	Bronchitis	2.0%	14.2%
26.	Coronary Heart Disease	1.4%	100.0%
27.	Alcohol or Drug Problems	0.8%	13.1%
28.	COPD	0.7%	38.9%
29.	Congestive Heart Failure*		

*Under 5 cases and therefore cannot be reported due to IRB restrictions.

Appendix D - Health status, absence, and presenteeism lost work time (ordered by total lost work days)

Health Status				Lost Time**		
Health Condition		Prevalence %	% in Treatment	Absenteeism Lost Workdays/100 FTEs	Presenteeism Lost Workdays/100 FTEs	Total Lost Workdays/100 FTEs
1.	Depression	13.9%	32.3%	28.70	103.59	132.28
2.	Sleeping Problems	27.0%	21.9%	23.13	99.38	122.50
3.	Fatigue	18.8%	11.4%	22.14	92.13	114.27
4.	Allergy	56.2%	18.0%	66.11	32.55	98.65
5.	High Cholesterol	24.8%	55.6%	34.94	39.81	74.75
6.	Anxiety	14.0%	25.3%	-0.37	69.76	69.39
7.	Irritable Bowel	12.0%	9.3%	-2.44	39.95	37.51
8.	Chronic Pain	10.8%	20.9%	1.55	35.23	36.78
9.	Overweight	35.0%	9.4%	1.37	31.38	32.76
10.	Arthritis	15.3%	14.9%	24.56	3.64	28.20
11.	Migraine	14.3%	19.5%	-7.29	32.06	24.77
12.	Bladder/Urinary	7.4%	18.3%	13.28	10.36	23.64
13.	Other Emotional	2.8%	26.2%	10.28	12.68	22.95
14.	Asthma	11.0%	38.5%	7.92	8.52	16.44
15.	Headache	14.2%	10.1%	0.08	14.11	14.19
16.	Other Cancer	3.3%	49.1%	-2.02	15.29	13.27
17.	Coronary Heart Disease	1.4%	100.0%	12.09	0.75	12.84
18.	GERD	13.1%	39.5%	-11.48	18.36	6.88
19.	Alcohol or Drug Problems	0.8%	13.1%	1.99	2.88	4.87
20.	COPD	0.7%	38.9%	3.81	-0.12	3.69
21.	Back/Neck Pain	27.1%	19.3%	19.94	-18.16	1.77
22.	Hypertension	21.7%	69.4%	32.53	-31.66	0.88
23.	Ulcer	4.0%	8.3%	-0.01	0.58	0.58
24.	Bronchitis	2.0%	14.2%	1.91	-2.75	-0.85
25.	Congestive Heart Failure*					
26.	Skin cancer	5.1%	40.2%	0.95	-4.75	-3.81

27.	Osteoporosis	3.1%	36.4%	2.37	-8.03	-5.67
28.	Nicotine Dependency	7.8%	1.9%	-9.32	-17.63	-26.94
29.	Diabetes	5.3%	72.3%	5.09	-49.96	-44.87

**Under 5 cases and therefore cannot be reported due to IRB restrictions.*

*** When negative values are reported individuals with the condition have fewer lost workdays than individuals without the condition.*

Appendix E - Health status, lost time and lost productivity (ordered by lost productivity amount)

Health Status			Lost Time**			Lost Productivity***	
Health Condition	Prevalence %	% in Treatment	Absenteeism Lost Workdays /100 FTEs	Presenteeism Lost Workdays/100 FTEs	Total Lost Workdays/100FT	Lost Productivity/100 FTEs	% of All Lost Productivity
1. Depression	13.9%	32.3%	28.70	103.59	132.28	\$80,889	16.4%
2. Sleeping problems	27.0%	21.9%	23.13	99.38	122.50	\$74,910	15.1%
3. Fatigue	18.8%	11.4%	22.14	92.13	114.27	\$69,872	14.1%
4. Allergy	56.2%	18.0%	66.11	32.55	98.65	\$60,325	12.2%
5. High cholesterol	24.8%	55.6%	34.94	39.81	74.75	\$45,711	9.2%
6. Anxiety	14.0%	25.3%	-0.37	69.76	69.39	\$42,429	8.6%
7. Irritable bowel	12.0%	9.3%	-2.44	39.95	37.51	\$22,939	4.6%
8. Chronic pain	10.8%	20.9%	1.55	35.23	36.78	\$22,489	4.5%
9. Overweight	35.0%	9.4%	1.37	31.38	32.76	\$20,031	4.1%
10. Arthritis	15.3%	14.9%	24.56	3.64	28.20	\$17,243	3.5%
11. Migraine	14.3%	19.5%	-7.29	32.06	24.77	\$15,146	3.1%
12. Bladder/Urinary	7.4%	18.3%	13.28	10.36	23.64	\$14,453	2.9%
13. Other emotional problem	2.8%	26.2%	10.28	12.68	22.95	\$14,036	2.8%
14. Asthma	11.0%	38.5%	7.92	8.52	16.44	\$10,050	2.0%
15. Headache	14.2%	10.1%	0.08	14.11	14.19	\$8,678	1.8%
16. Other cancer	3.3%	49.1%	-2.02	15.29	13.27	\$8,114	1.6%
17. Coronary heart disease	1.4%	100.0%	12.09	0.75	12.84	\$7,849	1.6%
18. GERD	13.1%	39.5%	-11.48	18.36	6.88	\$4,208	0.9%
19. Alcohol or Drug problems	0.8%	13.1%	1.99	2.88	4.87	\$2,979	0.6%

20	COPD	0.7%	38.9%	3.81	-0.12	3.69	\$2,256	0.5%
21	Back/Neck pain	27.1%	19.3%	19.94	-18.16	1.77	\$1,085	0.2%
22	Hypertension	21.7%	69.4%	32.53	-31.66	0.88	\$537	0.1%
23	Ulcer	4.0%	8.3%	-0.01	0.58	0.58	\$352	0.1%
24	Bronchitis	2.0%	14.2%	1.91	-2.75	-0.85	\$-517	(0.1%)
25	Congestive heart failure*							
26	Skin cancer	5.1%	40.2%	0.95	-4.75	-3.81	\$-2,328	(0.5%)
27	Osteoporosis	3.1%	36.4%	2.37	-8.03	-5.67	\$-3,465	(0.7%)
28	Nicotine	7.8%	1.9%	-9.32	-17.63	-26.94	\$-16,475	(3.3%)
29	Diabetes	5.3%	72.3%	5.09	-49.96	-44.87	\$-27,437	(5.5%)

*Under 5 cases and therefore cannot be reported due to IRB restrictions.

** When negative values are reported individuals with the condition have fewer lost workdays than individuals without the condition.

*** The lost productivity model is based on the assumption that there are 260 workdays available per year.

Appendix F – HPQ-Select Survey for U.S. Department of Energy (Paper Version)



HPQ-SELECT
SURVEY



Welcome to the HPQ-Select survey. This confidential employee survey is based on work by Dr. Ronald Kessler of Harvard Medical School and the World Health Organization. Dr. Kessler worked with the Integrated Benefits Institute and the Midwest Business Group on Health to create the next generation of this self-report survey, the HPQ-Select. The survey takes approximately 10 minutes to complete.

A. Your Health

	Excellent	Very Good	Good	Fair	Poor
A1. In general, how would you rate <u>your overall health</u> now?	<input type="radio"/>				
A2. In general, how would you rate <u>your overall mental health</u> now?	<input type="radio"/>				

A3. Do you have any of the following conditions? If your answer is YES, mark whether you never, previously, or currently receive professional treatment. (Professional treatment is any treatment supervised by a health professional.) If you are unsure if you have a condition, please mark the NO response option.

	NO, I don't have this condition	YES, but I've <u>never</u> received professional treatment	YES, I've <u>previously</u> received (but don't currently receive) professional treatment	YES, and I <u>currently</u> receive professional treatment
A3a. Arthritis?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A3b. Chronic back/neck pain?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A3c. Osteoporosis	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A3d. Migraine headaches?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A3e. Other frequent or severe headaches?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A3f. Any other chronic pain not mentioned above?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A3g. High blood pressure or hypertension?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A3h. Congestive heart failure?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A3i. Coronary heart disease?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A3j. High blood cholesterol?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	NO, I don't have this condition	YES, but I've <u>never</u> received professional treatment	YES, I've <u>previously</u> received (but don't currently receive) professional treatment	YES, and I <u>currently</u> receive professional treatment
A3k. Diabetes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

A4. Do you have any of the following conditions? If your answer is YES, mark whether you never, previously, or currently receive professional treatment. (Professional treatment is any treatment supervised by a health professional.) If you are unsure if you have a condition, please mark the NO response option.

	NO, I don't have this condition	YES, but I've <u>never</u> received professional treatment	YES, I've <u>previously</u> received (but don't currently receive) professional treatment	YES, and I <u>currently</u> receive professional treatment
A4a. An ulcer in your stomach or intestine?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A4b. Irritable bowel disorder (e.g., frequent diarrhea/constipation/ loose bowels and/or nausea/gas/indigestion)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A4c. Chronic heartburn or GERD?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A4d. Seasonal allergies or hay fever?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A4e. Asthma?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A4f. Chronic bronchitis or emphysema?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

A4g. TB, COPD, or any other lung-disease?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A4h. Urinary or bladder problems?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A4i. Overweight?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A4j. Chronic sleeping problems (e.g., getting to sleep, staying asleep or waking up too early)?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A4k. Chronic fatigue or low energy?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	NO, I don't have this condition	YES, but I've <u>never</u> received professional treatment	YES, I've <u>previously</u> received (but don't currently receive) professional treatment	YES, and I <u>currently</u> receive professional treatment
A4l. Skin cancer?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A4m. Any other kind of cancer?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A4n. Depression?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A4o. Chronic nervousness, worry, or anxiety?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A4p. Any other emotional problem?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A4q. Alcohol or drug problems?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

A4r. Nicotine dependence?	○	○	○	○
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A5. Have you smoked at least 100 cigarettes in your entire life?

- Yes
- No
- Don't Know
- Refuse to Answer

A5a. If yes to A5, Do you NOW smoke cigarettes

- Every day
- Some days
- Not at all
- Don't Know
- Refuse to Answer

A6. In the past 12 months, how many accidents, injuries, or poisonings did you have that required medical attention?

Number of accidents (00-99)

A7. About how many days of work did you miss in the past 12 months because of your own work related accident, injury, or poisoning? (If less than 1 day, enter 000.)

Number of days (000-365)

A8. In the past 12 months, how many work-related accidents did you have that either damaged company property, led to a work delay, or otherwise had a financial cost to your company?

Number of accidents (00-99)

A9. In the past 30 days, did you have any of the following health problems?

	YES	NO
A9a. A cold or flu?	<input type="radio"/>	<input type="radio"/>
A9b. A strain or sprain?	<input type="radio"/>	<input type="radio"/>
A9c. A broken bone?	<input type="radio"/>	<input type="radio"/>
A9d. Any other condition that is not ongoing?	<input type="radio"/>	<input type="radio"/>

B. YOUR WORK

For all questions in this section, please think of the work you do for the XXXXXXXX when answering the questions.

B1. Please choose the category that best describes your main job. If none of the categories fits you exactly, please respond with the closest category to your experience. (Select only one.)

- Management
(e.g., first level supervisor and above)
- Administrative Support
(e.g., information technology, clerical, and secretarial staff)
- In-House Professionals
(e.g., professionals in the areas such as computer science, law, mathematics/statistics, engineering systems, safety, software engineering)
- Field Professionals
(e.g., chemist, engineer, biologist, physicist, safety)
- Technical Support
(e.g., drafter, radiation technician, general and chief technician)
- Biohazard
(e.g., medical technician, nurse, laboratory staff, animal caretaker, physician, veterinarian)
- Service
(e.g., custodian, driver, laborer, laundry worker, linemen, mail clerk, pilot, railroad engineer, utility worker, water plant operator)
- Security and Fire
(e.g., firefighters, protective forces, security)
- Crafts
(e.g., bargaining unit employees and laborers such as craft/operator supervisor, machining)
- Line Operators
(e.g., equipment worker, line operator, materials handler)

B1a&b. How long have you been in your main job?

b.months **a.years**

B1c. Are you a union member?

Yes

No

B2. Is your work schedule best described as a regular schedule (roughly the same hours every day), a rotating schedule (e.g., working a day shift some days and a night shift other days), or an irregular schedule (e.g., unpredictable hours controlled by situations or workload)?

- Regular schedule day shift
- Regular schedule evening shift
- Regular schedule night shift
- Rotating schedule
- Irregular schedule

B3. How many people do you personally supervise on your job?

(If more than 97, enter 97.)

Number of people (00-97)

B4. Are you employed full-time or part-time?

- Full-time
- Part-time
- Other

Again, Thinking of the work you do for XXXXXXXXX,

B5. About how many hours a week does your employer expect you to work? (If you are expected to work as many hours as it takes to get the job done, estimate that number for a typical 7-day week. If it varies, estimate the average. If more than 97, enter 97.)

Number of hours (00-97)

B5a. About how many hours in a 7-day week does the typical worker in your job work?

Number of hours (00-97)

B5b. About how many hours do you work in a typical 7-day week? (If it varies, estimate the average. If more than 97, enter 97.)

Number of hours (00-97)

B5c. How many hours altogether did you work in the past 7 days? (If more than 97, enter 97.)

Number of hours (00-97)

B6. Now, please think of your work experiences over the past 4 weeks (28 days). About how many hours altogether did you work in the past 4 weeks (28 days)? (See examples below.)

Number of hours in the past 4 weeks (28 days)

Number of hours (000-672)

Examples for Calculating Hours Worked in the Past 4 Weeks

40 hours per week for 4 weeks = 160 hours

35 hours per week for 4 weeks = 140 hours

40 hours per week for 4 weeks with 2 8-hour days missed = 144 hours

40 hours per week for 4 weeks with 3 4-hour partial days missed = 148 hours

35 hours per week for 4 weeks with 2 8-hour days missed and 3 4-hour partial days missed = 112 hours

Again, thinking of the work you do for XXXXXXXXXX,

B7. Please think of your work experiences over the past 4 weeks (28 days). In the spaces provided below, write the number of hours (00-160) you spent in each of the following work situations.

In the past 4 weeks (28 days), how many hours did you...

	Number of <u>hours</u> (00-160)
B7a. ...miss work because of problems with <u>your own</u> physical or mental health?	<input type="text"/> <input type="text"/> <input type="text"/>
B7b. ...miss work for any other reason (including vacation)?	<input type="text"/> <input type="text"/> <input type="text"/>
B7c. ...come in early, go home late, or work on your day off?	<input type="text"/> <input type="text"/> <input type="text"/>

B8. Consider your total missed work of (see your answer to B7a) in the past four weeks (28 days) when you missed work because of problems with your own physical or mental health.

How many of (see your answer to B7a) hour(s) were you paid ...

	Number of <u>hours</u> (00-160)
B8a. ...at full salary/wage?	<input type="text"/> <input type="text"/> <input type="text"/>
B8b. ...at partial salary/wage?	<input type="text"/> <input type="text"/> <input type="text"/>
B8c. ... unpaid?	<input type="text"/> <input type="text"/> <input type="text"/>
TOTAL: The total to the right should equal (see your answer to B7a) when done.	<input type="text"/> <input type="text"/> <input type="text"/>

Again, thinking of the work you do for XXXXXXXX,

B9. The next questions are about the time you spent during your hours at work in the past 4 weeks (28 days). Select the one response for each question that comes closest to your experience.

	All of the time	Most of the time	Some of the time	A little of the time	None of the time
B9a. How often did you not concentrate enough on your work?	<input type="radio"/>				
B9b. How often did you find yourself not working as carefully as you should?	<input type="radio"/>				
B9c. How often did you do no work at times when you were supposed to be working?	<input type="radio"/>				
B9d. How often did you get less done than other workers?	<input type="radio"/>				
B9e. How often did you have <u>any</u> difficulty doing minor physical activities, like walking, lifting, sitting or doing repetitive motions?	<input type="radio"/>				
B9f. How often did you have <u>a lot of</u> difficulty doing minor physical activities?	<input type="radio"/>				

Again, thinking of the work you do for XXXXXXXX,

B10. On a scale from 0 to 10 where 0 is the worst job performance anyone could have at your job and 10 is the performance of a top worker, how would you rate the usual performance of most workers in a job similar to yours?

Worst										Top
										Performance
0	1	2	3	4	5	6	7	8	9	10
<input type="radio"/>										

B11. Using the same 0-to-10 scale, how would you rate your usual job performance over the past year or two?

Worst										Top
										Performance
0	1	2	3	4	5	6	7	8	9	10
<input type="radio"/>										

B12. Using the same 0-to-10 scale, how would you rate your overall job performance on the days you worked during the past 4 weeks (28 days)?

Worst										Top
										Performance
0	1	2	3	4	5	6	7	8	9	10
<input type="radio"/>										

B13. How would you compare your overall job performance on the days you worked during the past 4 weeks (28 days) with the performance of most other workers who have a similar type of job? (Select only one.)

- You were **a lot better** than other workers
- You were **somewhat better** than other workers
- You were **a little better** than other workers
- You were about **average**
- You were **a little worse** than other workers
- You were **somewhat worse** than other workers
- You were **a lot worse** than other workers

C. DEMOGRAPHICS

C1. How old are you?

YEARS OLD (18-97)

C2. Are you male or female?

- Male
- Female

C3. What is your current marital status?

- Married or Cohabiting
- Separated
- Divorced
- Widowed
- Never Married

C4. How many children do you have?

- None
- One
- Two
- Three
- Four or more

C5. What is the highest grade or level of school that you have completed?

- 8th grade or less
- Some high school, but did not graduate
- High school graduate or GED
- Some college or 2-year degree
- 4-year college graduate
- More than 4-year college degree

C6. What is your height?

(foot equals 12 inches)

FEET (3-9)

Inches (00-11) (Please round to the nearest inch)

C7. What is your weight?

Pounds (Please round to the pound 060-700)

C7b. What is your race/ethnic background?

- White (not of Hispanic origin)
- Black (not of Hispanic origin)
- Hispanic
- Asian or Pacific Islander
- American Indian or Alaskan Native
- Other (please specify) _____

C8. Are you salaried or are you paid hourly? (“Salaried” means that you're paid the same amount each week or month no matter how many hours you work. “Hourly” means that you're paid a different amount each week or month depending on how many hours you work.)

- Salaried → GO TO C9
- Paid hourly → GO TO C10

C9. What is your annual income from your job, before taxes?

- | | | |
|---|---|---|
| <input type="radio"/> \$1 - \$999 | <input type="radio"/> \$11,000 - \$11,999 | <input type="radio"/> \$30,000 - \$34,999 |
| <input type="radio"/> \$1,000 - \$1,999 | <input type="radio"/> \$12,000 - \$12,999 | <input type="radio"/> \$35,000 - \$39,999 |
| <input type="radio"/> \$2,000 - \$2,999 | <input type="radio"/> \$13,000 - \$13,999 | <input type="radio"/> \$40,000 - \$44,999 |
| <input type="radio"/> \$3,000 - \$3,999 | <input type="radio"/> \$14,000 - \$14,999 | <input type="radio"/> \$45,000 - \$49,999 |
| <input type="radio"/> \$4,000 - \$4,999 | <input type="radio"/> \$15,000 - \$15,999 | <input type="radio"/> \$50,000 - \$74,999 |
| <input type="radio"/> \$5,000 - \$5,999 | <input type="radio"/> \$16,000 - \$16,999 | <input type="radio"/> \$75,000 - \$99,999 |
| <input type="radio"/> \$6,000 - \$6,999 | <input type="radio"/> \$17,000 - \$17,999 | <input type="radio"/> \$100,000 - \$149,999 |
| <input type="radio"/> \$7,000 - \$7,999 | <input type="radio"/> \$18,000 - \$18,999 | <input type="radio"/> \$150,000 - \$199,999 |
| <input type="radio"/> \$8,000 - \$8,999 | <input type="radio"/> \$19,000 - \$19,999 | <input type="radio"/> \$200,000 - \$299,999 |
| <input type="radio"/> \$9,000 - \$9,999 | <input type="radio"/> \$20,000 - \$24,999 | <input type="radio"/> \$300,000 - \$499,999 |
| <input type="radio"/> \$10,000 - \$10,999 | <input type="radio"/> \$25,000 - \$29,999 | <input type="radio"/> \$500,000 - \$999,999 |
| <input type="radio"/> \$1,000,000 or more | | |

C10. How much are you paid per hour, before taxes?

- | | | | |
|---|---|---|--|
| <input type="radio"/> \$5.00 - \$8.00 | <input type="radio"/> \$18.01-\$20.00 | <input type="radio"/> \$32.01 - \$35.00 | <input type="radio"/> \$55.01-60.00 |
| <input type="radio"/> \$8.01 - \$10.00 | <input type="radio"/> \$20.01 - \$22.00 | <input type="radio"/> \$35.01 - \$38.00 | <input type="radio"/> \$60.01 - \$70.00 |
| <input type="radio"/> \$10.01 - \$12.00 | <input type="radio"/> \$22.01 - \$24.00 | <input type="radio"/> \$38.01 - \$41.00 | <input type="radio"/> \$70.01 - \$80.00 |
| <input type="radio"/> \$12.01 - \$14.00 | <input type="radio"/> \$24.01 - \$26.00 | <input type="radio"/> \$41.01 - \$45.00 | <input type="radio"/> \$80.01 - \$90.00 |
| <input type="radio"/> \$14.01 - \$16.00 | <input type="radio"/> \$26.01 - \$29.00 | <input type="radio"/> \$45.01 - \$50.00 | <input type="radio"/> \$90.01 - \$100.00 |
| <input type="radio"/> \$16.01 - \$18.00 | <input type="radio"/> \$29.01 - \$32.00 | <input type="radio"/> \$50.01 - \$55.00 | <input type="radio"/> More than \$100 |

D1. Earlier in the interview you mentioned having one or more work-related accidents that damaged company property, led to a work delay, or otherwise had a financial cost to your company. What is your best estimate of the financial loss to your company caused by your accident(s) over the past 12 months?

- | | | |
|---|--|---|
| <input type="radio"/> Less than \$100 | <input type="radio"/> \$101 - 500 | <input type="radio"/> \$501 - 1000 |
| <input type="radio"/> \$1001 - 2000 | <input type="radio"/> \$2001 - 3000 | <input type="radio"/> \$3001 - 4000 |
| <input type="radio"/> \$4001 - 5000 | <input type="radio"/> \$5001 – 10,000 | <input type="radio"/> \$10,001 – 25,000 |
| <input type="radio"/> \$25,001 – 50,000 | <input type="radio"/> More than \$50,000 | |

THANK YOU!

That completes the survey. Thanks very much for your participation.

If you have any questions, concerns, or complaints about the survey, please contact

Dr. Jodi M. Jacobson, PhD directly at 410-706-3607 or email jjacobson@ssw.umaryland.edu

Support Resources for XXXXXX Employees: We realize the questions you just answered about your health and well-being may have resulted in your wanting to speak with a professional regarding any questions or concerns you have about your physical or mental health. Separate from the study, we would recommend that you contact the XXXXXXXXXX for a confidential consultation and referral for additional support if needed.