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Amanda M. DeLoreto

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Workforce characteristics and the Burden of Occupational Injuries and Illnesses in Connecticut: A Retrospective Review

Amanda DeLoreto
B.S., Westfield State College, 2000

A Thesis
Submitted in Partial Fulfillment of the Requirements for the Degree of Master of Public Health at the University of Connecticut
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Abstract

The purpose of this study was to examine historic data for workforce characteristics and work-related illnesses and injuries in Connecticut using existing state-based occupational health indicator methodology.

Analysis for this study was divided into two primary sections. The first section was designed to identify changes in Connecticut’s workforce during the time period 1944-2002, focusing on demographics (age, gender, race, ethnicity), and the industries and occupations in which Connecticut’s workers were employed. The second section of this study reviewed historical data for occupational injuries and illnesses in Connecticut from 1974-2002, examining the change in occupational illness and injury rates and the
extent to which changes in the industry composition of the workforce during that time period played a role. This analysis utilized data extracted from a series of reports titled *Occupational Injuries and Illnesses in Connecticut* that is published annually by the Connecticut Department of Labor.¹⁰

The overall incidence rates of occupational illness and injuries have decreased substantially in most of the industries. Rates decreased overall from 10 cases of illness and injury per 100 workers in 1976, to a low of 5.7 cases per 100 workers in 2002. The demographic composition of Connecticut’s workforce has changed over the study period, with increases in Non-White workers, and workers of Hispanic ethnicity. Older workers (aged 65 and older) have also increased over the study period. In addition, the proportion of workers employed in certain industries and occupations has shifted based on changes in the economy and technology.

A statistical analysis was performed as part of the study to control for the possibility that shifts within individual industries accounted for the declines in injuries and illnesses that were seen consistently over all industries (i.e. employment decreased in more dangerous industries). This analysis confirmed changing industry distributions were not solely responsible for the declining rates of injury and illness noted in this study. Changing industry distributions however were accountable for 18% of the declining injury and illness rates.

With the decreases in the incidence rates of occupational illness and injury from the period 1974-2002 in spite of changing industry distributions, we can begin to say that the declines seen are potentially the result of some other factor or factors affecting worker safety and health. Examples of these may include, modern safety implementations over
the past decade, increased awareness of the importance of workplace safety, and laws pertaining to worker safety and health such as the Fall Protection Standard.

This study did not examine what other factors may have also contributed to the decline in injury and illness rates, but there are a number of factors that may have contributed to the declines. Examples include such changes as increased awareness of the importance of workplace safety that led to laws such as the Fall Protection Standard, CONNOSHA's adoption of the state plan which may have influenced declines noted in the Government industry, and protection from OSHA for workers employed in the private sector. Other improvements such as voluntary programs by industries, health and safety committees etc. could also have contributed to the declines. Although it was determined that changes in industry distribution were not solely responsible for the declines seen in occupational illnesses and injuries over the period of study, this study did not investigate relative contribution of any other causal factors in the decline of these rates.
Acknowledgements

I would like to take this opportunity to acknowledge some very important people that have made the completion of my thesis and graduate education possible.

To begin with, I would like to thank my wife and family for giving me the encouragement to pursue a Master’s degree. Second, I extend a deep appreciation to my academic advisor Timothy Morse, and the rest of my thesis review committee (Richard Stevens and Thomas St. Louis) for taking the time to work with me on this project and help guide me along the way. In addition, I would like to thank the professors at the University of Connecticut Health Center for their dedication to public health and for teaching me the skills that are essential for excellence in the field of public health.
BACKGROUND:

In Connecticut, there are nearly two million workers potentially exposed to occupational hazards in the workplace each day. In many cases these hazards lead to occupational injuries and illnesses. Workplace illnesses and injuries carry an economic burden to society, employers, and to workers. In 2003, the Connecticut Workers’ Compensation Commission paid out approximately $753 million in Workers’ Compensation benefits. Workers who are injured or become ill on the job can also experience quality of life issues that may not have a direct financial price tag.

Occupational illnesses and injuries occur very frequently, but are also preventable (63,500 in Connecticut in 2003). Some ways to prevent occupational illness and injury include implementing engineering controls, utilizing personal protective equipment (PPE), and educating individuals working in hazardous environments. Surveillance is a key instrument in the development of future interventions and ideas to address safety at work.

Often times there are certain demographic characteristics within a working population, that may put workers at a higher than average risk of workplace injury and illness. Demographic groups that carry with them an increased risk of illness and injury include, older workers, younger workers, and non-English speaking workers. Workers of Hispanic ethnicity are making up a larger part of Connecticut’s workforce, (Figure 8) but remain disadvantaged in terms of training and union status. Evidence suggests that older workers can expect to experience disproportionate rates of workplace illnesses.
Older workers experience injuries less frequently, due to factors such as job experience or safer positions, but when they do occur, they debilitate older workers more significantly than younger workers.\(^4\) For example, researchers at the University of Iowa studied a cohort of material handlers and found a higher proportion of workers over the age of 55 missed work time due to acute low back injury, and workers over 45 had a higher average number of lost workdays per injury.\(^5\) In addition, this study showed some of the economic impacts experienced when workers experience longer than average time periods of lost work time, such as costs to the employer and lost wages to the worker.\(^5\)

Another study by Smith et al. found that older construction workers were 1.4 times more likely to experience a back problem, and 1.3 times more likely to have a foot or leg problem than were younger “blue-collar” workers.\(^6\) Furthermore, nonsmoking older construction workers were 3.2 times more likely to have a chronic lung disease than their non-smoking younger counter parts.\(^6\)

Occupational injuries and illnesses are significantly underreported in the United States, and in Connecticut.\(^19\) There are many obstacles referred to as filters that prevent a single occupational injury or illness from being captured in surveillance systems. For an injury and illness to be captured in the U.S. Bureau of Labor Statistics (BLS) annual survey, the event must make it through all the filters that are detailed below. In a study conducted by Azaroff et al., filters are detailed to help explain why underreporting occurs, which helps to demonstrate requirements for an event to be captured in the surveillance system that was used for this study.
Event Sequence:

- Private employer pays employees according to legal processes.
- Event occurs on shop floor.
- Worker perceives that he or she is injured or sick.
- Worker perceives work-relatedness of illness or injury.
- Worker perceives desirability of reporting injury or illness to supervisor.
- Worker reports injury or illness to supervisor.
- Supervisor perceives that the worker has a legitimate work-related health problem.
- Supervisor allows worker to take a full day away from work or provides restricted work or worker perceives means to pay for medical treatment, obtains medical treatment, and informs the supervisor.
- Supervisor logs the injury according to Occupational Safety and Health Administration (OSHA) record-keeping requirements.
- Log is sampled by BLS survey.  

**Occupational Health Indicators**

The Council of State and Territorial Epidemiologists (CSTE), in collaboration with the National Institute for Occupational Safety and Health (NIOSH) has developed a set of occupational health indicators. The occupational health indicators were developed to provide a tool to work toward the development of a comprehensive surveillance system to be used to conduct occupational health surveillance in the U.S. Some goals of
the project are to generate new data, and develop collaborative projects between different states. Although the Bureau of Labor Statistics conducts occupational health surveillance, significant gaps exist (particularly in chronic illness and in vulnerable populations), and the occupational health indicators allow states to bridge the gaps toward the goal of a comprehensive data source.  

There are 19 occupational health indicators that were decided upon based on the significance of the problem, the ease of data collection, and the applicability of use for all participating states. CSTE in collaboration with NIOSH and occupational health surveillance programs from 13 U.S. states comprised a workgroup that decided upon the appropriate 19 health indicators.  

The Occupational Health Indicators include:

Twelve **health effect indicators**, which are measures of injury or illness that indicate adverse effects from exposure to known or suspected occupational hazards. These include:

1. Non-Fatal Injuries and Illness Reported by Employer
2. Work-Related Hospitalizations
3. Fatal Work-Related Injuries
4. Amputations Reported by Employers
5. Amputations Identified in State Workers’ Compensation Systems
6. Hospitalizations for Work-Related Burns
7. Musculoskeletal Disorders Reported by Employers
8. Carpal Tunnel Syndrome Cases Identified in State Workers’ Compensation Systems

9. Pneumoconiosis Hospitalizations

10. Pneumoconiosis Mortality

11. Acute Work-Related Pesticide Poisonings Reported to Poison Control Centers

12. Incidence of Malignant Mesothelioma

One **exposure indicator**, which measures human markers in tissue or fluids, indicative of the presence of a potentially harmful substance that results from exposure in the workplace.

1. Elevated Blood Lead Levels Among Adults

Three **hazard indicators**, which are a measure for a workers potential exposure to health and safety hazards in the workplace.

1. Workers Employed In Industries with High Risk for Occupational Morbidity
2. Workers Employed In Occupations At High Risk for Occupational Morbidity
3. Workers Employed in Industries and Occupations with High Risk for Occupational Mortality
Two intervention indicators, which measure the potential for a workers exposure to health and safety hazards in the workplace.

1. Occupational Safety and Health Professionals
2. Occupational Safety and Health Administration (OSHA) Enforcement Activities

One socioeconomic impact indicator, which measures the economic impact of work-related injury and illness.

1. Workers’ Compensation Awards

**Employment Demographic Profile**

The Employment Demographic Profile is an addendum to the occupational health indicators that was put in place in order to track changes in workforce characteristics that have importance for occupational injury and illness. This profile provides a comprehensive data resource to researchers, and occupational health surveillance staff. The demographic profile provides occupational health professionals with data to analyze changing demographics in the workforce, including age, race, gender, and ethnicity. This is particularly important for identifying disparities in the occupational illness and injury burden within the working population. If disparities are found to exist, steps can be taken to remedy any identified problems. This can be done through many means; some examples are the development of multilingual educational materials and implementing
workplace controls to help workers of advancing age. Work done at the University of Massachusetts Lowell, showed that Hispanics have a growing participation in the construction workforce and that their fatal and non-fatal injuries rates are higher than in any other ethnic group. At the same time there is very little research being conducted in the U.S. on this issue.

Demographic shifts can also be important in the future planning and development of safety interventions that pertain to Connecticut’s workers. For example, if an increase was observed in the average age of the Connecticut worker, which might have implications for chronic musculoskeletal conditions, occupational health professionals could begin to develop new policies and safety protocols that could specifically benefit older workers.

There are ten components that make up the demographic profile. The components are as follows:

1. Percentage of the civilian workforce that is unemployed.
2. Percentage of civilian employment by gender. (Male, Female)
3. Percentage of civilian employment by age grouping. (16-17, 18-64, 65+)
4. Percentage of civilian employment by race. (White, Black, Other Races)
5. Percentage of civilian employment by Hispanic ethnicity.
6. Percentage of civilian employment self-employed.
7. Percentage of civilian employment employed part-time.
8. Percentage of civilian employment by number of hours worked. (Less Than 40 Hours per Week, 40 Hours per Week, More Than 40 Hours per Week)

10. Percentage of civilian employment by occupation.

(Executive/Administrative/Managerial, Professional Specialty, Technicians and Related Support, Sales, Administrative Support Including Clerical, Service Occupations, Precision Production/Craft/Repair, Machine Operators/Assemblers/Inspectors, Transportation/Material Moving, Handlers/Equipment Cleaners/Helpers/Laborers, Farming/Forestry/Fishing)

Connecticut-specific data for indicator, “Non-Fatal Work Related Illnesses and Injuries Reported by Employer” was examined retrospectively over the time period 1974-2004. This data was analyzed to identify any increases or decreases in illness and injury rates and more importantly in what specific industry sectors these changes occurred. The Connecticut Department of Labor (CTDOL) provided data that was used to derive the occupational injury and illness incidence rates in Connecticut for the years 1974-2002. 9 The CTDOL publishes an annual report titled “Occupational Injuries and Illnesses” 10, which is available for all years since 1974. Effective January 1, 2002 The Occupational Safety and Health Administration (OSHA) substantially revised its requirement for recording occupational injuries and illnesses. Additional changes were implemented in 2003, primarily a change in the industry classification methodology from Standard
Industrial Classification (SIC), to the North American Industry Classification System (NAICS). These changes prevented meaningful comparisons to prior data, so this analysis includes 29 years of data, ending in 2002.

When looking at rate changes in a population in a period of close to 30 years, it is important to ascertain whether the changes that are observed are changes that are due to occupational health interventions such as development and utilization of personal protective equipment, improving worker training, and/or worker protection legislation, or if the changes are solely due to shifts in specific industry employment. (See Analysis of the Impact of Changing Industry Distributions in the methodology section.)

Formal surveillance for occupational injuries and illness began in Connecticut in the 1940’s, and since then, major strides have been made in the prevention of various occupational illness and injuries.

There are industries that are expected to see higher than average rates of workplace injury and illness due to the nature of the work being done. However, the broad results may obscure significant specific hazards within industries. For instance, a study from the UCLA School of Public Health study found that although workers in the retail industry were at a lower risk for most types of workplace deaths, they had an increased risk of violent death than workers in other industries. The two leading causes for death in retail were violence (69.5%) and motor vehicle crashes (19.3%). Although this study deals with fatalities, the same causes are likely to also lead to non-fatal injuries.

In addition young workers in retail aged 19 and under experience a greater proportion of these violent incidents than counterparts in other industries. Retail is a growing industry in Connecticut, and a study analyzing occupational homicides involving
workers 19 years old and younger suggests that although overall illness and injury rates are lower than in other industries, the industry should not be neglected. 12

METHODOLOGY:

Demographic Profile

As part of the occupational health indicators, the demographic profile is completed annually. Specific demographic components that are collected for this profile include unemployment, racial, ethnic, age, occupation/industry, and gender statistics. Data sources used in the compilation of these statistics include, the Current Population Survey (CPS) and the Local Area Unemployment Statistics (LAUS). The CPS is a monthly survey conducted jointly by the U.S. Census Bureau, and the Bureau of Labor Statistics (BLS), that uses a sample of 60,000 households to produce the national unemployment rate. In addition, the CPS provided the data required to compute the rates for gender, race, ethnicity, occupation, and industry in this study. Data from the CPS was extracted using the DataFerrett data-mining tool.

Data Ferret

Data Ferret is an acronym for the Federated Electronic Research, Review, Extract, and Tabulation Tool. Data Ferret is a data extraction and mining tool that can be used to access data that is stored in the DataWeb, an Internet repository for data. DataFerret allows for searches to take place across all of the data published to the DataWeb. Using DataFerret, the user is allowed to tabulate data from various sources, and create summary statistics from the data. 13
DataFerret is a joint endeavor that was developed and is maintained by the Census Bureau and the Centers for Disease Control and Prevention, with support from the Bureau of Labor Statistics and the National Center for Health Statistics. The first version of DataFerret was released in 1997 by the U.S. Census Bureau and the Bureau of Labor Statistics, and was a generalized search system for extracting and tabulating data. The current version of DataFerret was designed to enhance online statistical analysis and gain more participation from statistical agencies from all levels of State Federal, and Local governments. 13

DataFerret was used to compile and analyze some of the data that went into this report; specifically when determining the percentage of civilian employment by age grouping (16-17, and 65+ years of age). Data extracted using DataFerret was available though the Current Population Survey (CPS), and data was selected by the variables Demographic-age, Geography-state, and Labor Force-employment status. 13

The definition of an employed person for the sake of determining the unemployment rate is as follows: Employed people include all people that worked as paid employees (at least one hour), worked in their own business, farm or profession, or worked fifteen hours or more as an unpaid worker for a business owned by a member of their family. Also included in this definition are people that were not working but had businesses or jobs, but were absent only temporarily due to illness, vacation, weather related causes, childcare issues, maternity and paternity leave, labor management dispute, job training, or any other family or personal reasons.

Unemployed people include all people who had no employment during the “reference week”, were available for work (with the exception of temporary illness), and
had made specific attempts to find employment at some time during the four-week period ending with the “reference week.” People that were waiting to be recalled to a job where they were laid off from do not need to have been looking for work during the reference period to be classified as an unemployed worker.

**Sampling Procedures of the CPS**

The CPS is conducted monthly by the Bureau of Labor Statistics, using trained interviewers, with a scientifically selected sample of approximately 60,000 households in the U.S. This selected sample is designed to be representative of the civilian non-institutional population; included are persons 16 years of age and older residing in the 50 U.S. States and the District of Columbia who are not inmates of institutions (for example, penal and mental facilities, homes for the aged), and who are not on active duty in the Armed Forces. Each of the selected households is interviewed concerning employment for each member of the household that is 16 years of age or older. Interviewing is conducted each month during the week following the “reference week”, which is the calendar week that includes the 12th of the month.

The 2002 CPS sample encompasses 754 sample areas, with coverage in every state and also the District of Columbia. The sampling procedures are based largely on information about population distribution reported in the 1990 decennial U.S. census.

Results for a given month are based on the returns for the entire sample of respondents, and then becomes available. The procedures involved in the estimation include weighting the data received from each sample subject by the inverse of the probability of the person being in the sample. This procedure provides the CPS with a
representative sample that allows for the measurement of the entire population. Steps involved in this estimation procedure include non-interview adjustment, and survey under coverage. In addition data from prior months are included in the estimates through the composition estimation procedure. \(^{14}\)

Non-interview adjustment is conducted in order to control for occupied households in the sample that no information was obtained from. This could be due to criteria such as absence, refusals, or for unavailability of respondents for other reasons. \(^{14}\)

Ratio estimates are performed because the sample of the population selected for the survey may differ from the whole population. This can be by chance for certain criteria such as gender, race, age, and the state of residence. Labor force participation and other principal measures relate closely to the previously mentioned criteria, and because of this, improvement can be made to the survey estimates when the known distribution of the demographic attributes of the population are taken into consideration. \(^{14}\)

Composite estimation procedure is the last step of CPS estimates. The goal of the compositing procedure is to achieve a further reduction in the sampling error that would occur, beyond the achieved reduction from the two stages of ratio adjustment. The composite estimation procedure is a weighted average of the second stage ratio estimate based on the entire current month’s sample, and the composite estimate for the previous month, plus an estimate of the month-to-month change that is based on the groups common to both months. An adjustment to account for bias is then induced to the derived weighted average, in order to account for relative bias that is associated with month-in-sample estimates. \(^{14}\)
The reliability of the estimates is only based on a population sample as opposed to a complete survey of the entire population. As a result, these estimates can differ from the numbers that would have been achieved if a complete census count were possible using the same questionnaire and procedures. This is one of the reasons that in the figures results are only given to one decimal place. More decimals would give an impression that the numbers are accurate, when they are only an estimate.

Local Area Unemployment Statistics (LAUS)

Another major source of data for the compilation of the demographic profile is the Local Area Unemployment Statistics (LAUS). Data from the LAUS was used to calculate the unemployment rate for the demographic profile. The LAUS is a cooperative Federal and State endeavor, where State employment security agencies prepare unemployment estimates using estimation procedures, definitions, and concepts prepared by the BLS.  

Estimates of national unemployment rates are strictly based on a survey as opposed to a complete population census; as a result, estimates are subject to sampling error. Error ranges have been calculated in the form of 95% confidence intervals, and displayed for the unemployment rates in tabulated form in the publication “Geographic Profile of Employment and Unemployment”. The BLS publishes the “Geographic Profile of Employment and Unemployment” annually. Calculations are performed once all results from sampling are achieved. The numerator is the number of unemployed people in Connecticut, and the numerator is divided by the denominator, which is the civilian non-institutionalized population.
CONN-OSHA

The Connecticut Department of Labor's Division of Occupational Safety and Health CONN-OSHA administers Connecticut's Public Employer-Only State Plan and enforces occupational safety and health standards as they apply to all municipal and state employees. Section 18 of the Occupational Safety and Health Act of 1970 encourages States to develop and operate their own job safety and health programs. OSHA approves and monitors “State Plans”, such as the one in Connecticut, and provides up to 50 percent of an approved plan's operating costs. Connecticut along with 21 other states operate State Plans.

CONN-OSHA adopts and enforces standards that are minimally as effective as the Federal requirements. In addition to CONN-OSHA's enforcement responsibilities, they provide on-site free of charge consultations to both private and public sector employers.

CONN-OSHA is not responsible for the enforcement of occupational safety and health standards in Connecticut's private sector employees. OSHA standards are enforced for private sector employees in Connecticut by the United States Department of Labor and the Occupational Safety and Health Administration (Federal-OSHA). The two Federal-OSHA Area Offices in Connecticut are located regionally in Bridgeport and Hartford.
Industry and Occupational Classification Systems (SIC and SOC)

The Standard Occupational Classification System (SOC), and the Standard Industrial Classification System (SIC) are the two classification systems that were used to derive the statistics pertaining to employment rates by industry and occupation. The 2000 Standard Occupational Classification (SOC) system is used by Federal statistical agencies to classify workers into occupational categories for the purpose of collecting, calculating, or disseminating data. All workers are classified into one of over 820 occupations according to their occupational definition. To facilitate classification, occupations are combined to form 23 major groups, 96 minor groups, and 449 broad occupations. Each broad occupation includes detailed occupations requiring similar job duties, skills, education, or experience. Data obtained that was coded according to the SOC was used to compile “Percentage of Civilian Employment by Occupation” statistics in the demographic profile.

The SIC, was established in the 1930’s by the U.S. Government to promote uniformity and comparability of data collected and published by agencies within the U.S. government, state agencies, trade associations, and research organizations. It was developed as an establishment-based industry classification system that classified each establishment (defined as a single physical location at which economic activity occurs) according to its primary activity. The SIC covers the entire field of economic activities by defining industries in accordance with the composition and structure of the economy. For this study, SIC was used to compile statistics for the “Percentage of Civilian Employment by Industry Connecticut 1994-2002” portion of the demographic profile.
The North American Industry Classification System (NAICS) replaced the SIC in 2002 as the standard for classifying employees, makes comparability of earlier years to data from 2002 and on very difficult due to the inability to easily compare SIC to NAICS industry classification groups. This is the reason why analysis for years 2003 and forward were not included in this study. 17

BLS Survey and the OSHA 300 Log

For the purposes of this study, data pertaining to the rates of occupational illness and injury was derived from reports that compiled data from the BLS annual survey. Whenever an occupationally related illness or injury occurs in the workplace, employers are required to complete an OSHA Form 301, which is referred to as the Injury and Illness Incident Report. Together with the Log of Work-Related Injuries and Illnesses, and the accompanying summary, data is generated to detail the severity and extent of work related illnesses or injuries.

OSHA regulation regarding that these forms be completed within seven days of the employer receiving notification or information that a work-related injury or illness event has occurred in the workplace. In addition, information entered into the OSHA log must be kept on record for a minimum of five years following the year in which the injury occurred.

The Occupational Safety and Health Act of 1970 and amendments require that OSHA 300 logs be kept by private industry employers and that they regularly maintain these records (logs), which include all disabling, serious, or significant injuries and illnesses, whether or not involving time away from work. These logs have become an
important source of occupational illness and injury data for the Bureau of Labor Statistics, and without this data, it would be significantly more difficult to analyze data to calculate occupational injury and illness rates.

In Connecticut the Department of Labor mails report forms to selected employers in February to cover the past calendar year's illness and injury experience. Each employer completes a single report form that is used for both National and State estimates of occupational injuries and illnesses. This procedure eliminates duplicate reporting by respondents, and together with the use of identical survey techniques at the National and State levels, ensures maximum comparability of estimates.

Usually by September of each year, the active collection phase of the survey is completed and the preparation of data for both National and State estimates of occupational injuries and illnesses begins. Priority goes to processing the summary information on injury and illness counts by type of case, so that initial estimates of those data can be issued in mid-December. Coding and related processing of the characteristics of days-away-from-work cases continues through the following February, with initial estimates of injury and illness characteristics published sometime in late April or early May.  

In 2001, OSHA issued a new record-keeping rule, under which the OSHA 300 Log replaces the older OSHA 200 Log, the Form 300-A replaces the Form 200-A and the Form 301 replaces the Form 101. Employers are mandated to use the new forms beginning on January 1, 2002. Most of the data obtained from these logs that pertains to this study was obtained from the OSHA 200 forms. Some of the key differences between the OSHA 200 forms and the present 300 forms are that on the 300 forms, calendar days
rather than scheduled workdays are now being used to record days away from work. Other changes took place, such as definitions of "first aid" cases, especially those that are treated with hot or cold compresses on more than one occasion are now considered "first aid" cases and are not required to be recorded on the OSHA 300 Log. This change can potentially reduce the total number of cases of injury when comparing old data to newer data. In addition, time limits for employers to provide record keeping information to workers, union representatives and others have been established.¹⁸

**Injury and Illnesses in Connecticut’s Workforce 1974-2002**

All data that was used to analyze injury and illness in Connecticut’s workforce was extracted from data reports that were published by the State of Connecticut Department of Labor (CT DOL). Annually, program staff at the CT DOL compiles a report titled “Occupational Illness and Injuries in Connecticut”. This report is the result of data collection by the CT DOL through the Annual Survey of Occupational Injuries and Illnesses. This annual survey is a Federal-State program in which employer reports are collected and processed by the CT DOL in cooperation with BLS. Approximately 4,500 establishments in Connecticut representing private industry (except for mines and railroads) and state and local government were sampled for 2001.⁹ The survey excludes the self-employed farmers with fewer than 11 employees, private households, and employees in Federal government agencies. Under a separate system, agencies of the Federal government file work injury and illness reports with the U.S. Labor Secretary.

The annual survey estimates of occupational injuries and illnesses are based on a scientifically selected sample, as opposed to a census of the entire population. Results for
sample-based estimates may differ from the results obtained from a population census. The sample used was one of many possible samples, each of which could have produced different estimates. The variation in the sample estimates across all possible samples that could have been drawn is measured by the standard error. This was used to calculate a confidence interval around the sample estimate.\(^9\)

Program staff at the CTDOL provided manual paper reports for completion of this historic analysis. The reports were provided for the years 1974-2002. Reports for years 2003 and later were not obtained because the changeover from SIC to NAICS classification made comparisons from pre-2002 data to most recent data unreliable.

**RESULTS:**

Worker demographic characteristics were analyzed for 1994-2002, and illness and injury data was analyzed for years 1974-2002. Figures 1-9 and Tables 1 and 2 show the results for each component of Connecticut’s workforce demographics profile. As previously mentioned, 2003 data was not included in the data analysis for injury and illness rates due to the changes in the classification system from SIC to NAICS after 2002.

Figures 10-18 show the changing injury and illness rates by industry sector. Data was unavailable for certain years and is represented in the figures as blank fields.
Figure 1. Unemployment rate in Connecticut, 1994-2003


Figure 1 shows the Connecticut unemployment rate from 1994 through 2003. From 1994 through 1997, unemployment rates were consistently, over 5%. Unemployment rates declined from 1998 through 2000, and a low of 2.2% was observed in year 2000. In 2001, unemployment levels began to rise to levels similar to those observed in the early 1990’s (5.5%) by 2003.
Figure 2. Self-Employment Rates in Connecticut, 1999-2002


Figure 3. Percentage of Civilian Employment in Part-time Jobs Connecticut, 1994-2003


Figure 3 shows the percentage of civilian employment in part-time jobs from 1994-2003 in Connecticut. A part-time worker is defined as a worker that works between 1-34 hours per week. This rate has remained relatively constant from 1994 to 2003. There was a slight decrease in the percentage of part-time employment during the late 1990’s and early 2000’s, and then a slight increase to bring rates back to the earlier numbers that were seen in the 1990’s.
Figure 4. Percentage of Civilian Employment by Number of Hours Workers Connecticut 1994-2002


Figure 4 shows the percentage of civilian employment by number of hours worked in Connecticut for the years 1994-2002. Data was grouped into three subcategories (less than forty hours, exactly forty hours, and greater than forty hours per week). Although the changes over the past decade were not substantial, there were some declines noted. Over the past ten years there has been an overall decline in those working less than 40 hours. In 1994 the average percentage of employees who worked less than 40 hours was 40.7%, and in 2002 that percentage dropped to 37.5%. The percentage of civilian employment that worked exactly 40 hours per week has increased over the study
period, from 30.6% in 1994 to 34.2% in 2002. Civilian employment for those who work
greater than 40 hours has remained fairly constant, with a decrease from 28.5% in 1994
to 28.1% in 2002. The percentage of workers who worked 41 or more hours per week
ranged from a low of 28.1 in 2002, to a high of 32.3 in year 2000.

Figure 5. Percentage of Civilian Employment by Gender Connecticut, 1994-2003

of Employment and Unemployment

Figure 5 shows the percentage of the civilian workforce by gender in Connecticut
for the years 1994-2003. The percentage of males and females in Connecticut’s
workforce has remained relatively unchanged over the study period. In 1994 males
comprised 54.2% of the workforce, and in 2003 they comprised 51.9%. Females
comprised 47.2% of the workforce in 1994, and in 2003 made up 48.1%. In every year
from 1994-2003, males comprised a greater portion of Connecticut’s workforce than females.

Figure 6. Percentage of Civilian Employment by Age Group Connecticut, 1994-2003

Figure 6 shows the percentage of civilian employment in Connecticut by age grouping for the years 1994-2002. Civilian employment by age was broken down into two sub-categories, young workers 16 to 17 years of age and older workers 65 years of age or older. The percentages of older workers had two peaks: one in 1995, and the other in 2001. For workers aged 65 and older the range was from a low of 2.5% in 1997 to a high of 4.4% in 2001. For young workers aged 16 and 17 years of age, the numbers ranged from a low of 1.9% in both 1998 and 2002, to a high in 1994 of 2.9%.

Figure 7. Percentage of Civilian Employment by Non-White Race Connecticut, 1994-2003

*Sources: Bureau of Labor Statistics’ Current Population Survey, and Geographic Profile of Employment and Unemployment*
Figure 7 shows the percentage of civilian employment by race in Connecticut for the years 1994-2003. Race was broken down into two sub-categories, Black and “other” races. In 1994 Black workers made up 6.4% of the workforce, and there has been an increase to a high of 10.2% in 2002 and 8.7% in 2003. Workers who fell into the category of “Other” races have steadily increased in Connecticut’s workforce as well. Workers in grouping other include Asians, Native Americans, and any other races that do not identify themselves as being Black or White. The workers in the racial category “other” races had grown from 1.8% of Connecticut’s workforce in 1994, to 4.9% of the workforce in 2003.

Figure 8. Percentage of Civilian Employment by Hispanic Ethnicity Connecticut, 1994-2003

Figure 8 shows the percentage of civilian employment by Hispanic ethnicity in Connecticut for the years 1994-2003. Workers of Hispanic ethnicity have increased considerably over the study period. In 1994, Hispanic workers only comprised 4.5% of Connecticut’s workforce. In 2003 Hispanic workers made up 8.3% of Connecticut’s workforce. This is nearly a doubling of Hispanic workers in Connecticut’s workforce over a ten-year period.

Table 1. Percentage of Civilian Employment by Industry, Connecticut, 1994-2002

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</thead>
<tbody>
<tr>
<td>Construction</td>
<td>3.4%</td>
<td>2.7%</td>
<td>3.6%</td>
<td>4.2%</td>
<td>4.1%</td>
<td>3.8%</td>
<td>4.0%</td>
<td>4.0%</td>
<td>4.5%</td>
</tr>
<tr>
<td>Manufacturing - Durable goods</td>
<td>11.9%</td>
<td>13.0%</td>
<td>12.6%</td>
<td>12.1%</td>
<td>12.9%</td>
<td>11.5%</td>
<td>11.0%</td>
<td>10.3%</td>
<td>10.3%</td>
</tr>
<tr>
<td>Manufacturing - Non-durable goods</td>
<td>5.9%</td>
<td>5.0%</td>
<td>5.1%</td>
<td>5.6%</td>
<td>6.4%</td>
<td>5.9%</td>
<td>5.8%</td>
<td>4.5%</td>
<td>5.3%</td>
</tr>
<tr>
<td>Transportation/communications/public utilities</td>
<td>4.9%</td>
<td>4.5%</td>
<td>4.0%</td>
<td>5.1%</td>
<td>5.8%</td>
<td>5.9%</td>
<td>4.6%</td>
<td>4.4%</td>
<td>5.3%</td>
</tr>
<tr>
<td>Trade</td>
<td>17.6%</td>
<td>18.5%</td>
<td>17.3%</td>
<td>17.2%</td>
<td>16.0%</td>
<td>16.5%</td>
<td>17.2%</td>
<td>17.5%</td>
<td>16.5%</td>
</tr>
<tr>
<td>Finance/insurance/real estate</td>
<td>8.9%</td>
<td>9.2%</td>
<td>9.1%</td>
<td>8.1%</td>
<td>8.4%</td>
<td>8.8%</td>
<td>8.6%</td>
<td>8.4%</td>
<td>8.3%</td>
</tr>
<tr>
<td>Services</td>
<td>25.0%</td>
<td>25.0%</td>
<td>27.6%</td>
<td>29.3%</td>
<td>27.1%</td>
<td>25.0%</td>
<td>28.1%</td>
<td>29.4%</td>
<td>29.9%</td>
</tr>
<tr>
<td>Government</td>
<td>13.1%</td>
<td>12.8%</td>
<td>11.2%</td>
<td>10.7%</td>
<td>11.3%</td>
<td>13.2%</td>
<td>11.8%</td>
<td>13.0%</td>
<td>11.8%</td>
</tr>
<tr>
<td>Agriculture</td>
<td>1.4%</td>
<td>1.1%</td>
<td>1.1%</td>
<td>1.2%</td>
<td>1.0%</td>
<td>0.9%</td>
<td>0.9%</td>
<td>1.3%</td>
<td>1.3%</td>
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</table>

From the period 1994 through 2002, data was collected to determine the percentage of civilian employment by industry and industry group (construction, manufacturing durable goods, manufacturing non-durable goods,
transportation/communications/public utilities, trade, finance/insurance/real estate, services, government, and agriculture). This data is detailed in Table 1 and Figure 9.

Workers employed in construction have increased slightly from 1994 and 1995 to 2001 and 2002; 3.4%, 2.7% 4.0%, and 4.5% respectively. The manufacturing industry, both durable goods and non-durable goods, has had a slight decrease in the same period. For durable goods manufacturing, there has been a decrease from 11.9% in 1994 to 10.3% in 2002, and for non-durable goods, from 5.9% in 1994 to 5.3% in 2002. Transportation, Communications, and Public Utilities has remained fairly stable from 1994 through 2002, 4.9% and 5.3% respectively. The trade industry has experienced a decline of almost one percent from 1994 through 2002. Trade consisted of 17.6% in 1994 and 16.5% in 2002. The low for the Trade industry was 16.0% in 1988. Finance, Insurance and Real Estate has remained fairly stable, however declines have occurred over the period, from 8.9% in 1994 to 8.3% in 2002. The Services industry has undergone a steady increase in employment. In 1994 the services industry comprised 25.0% of civilian employment; by 2002 there was an increase of nearly 5 percentage points (a 19.6% increase) to a high of 29.9%. The Government group has remained fairly constant with a range of 11.2% in 1996 to a high of 13.2% in 1999. Agricultural employment has also remained fairly constant over the same time period; 1.4% in 1994 to 1.3% in 2002.
Table 2 shows the changing rates of Connecticut workers employed in the SOC occupation sectors from 1994-2002. There has been an increase in the percentage of those employed in the executive, administrative, managerial, and professional category between 1994-2002. In 1994, 14.3% of Connecticut's workforce was employed in those occupations, which increased to a high of 18.1% in 1999, and leveled out to 17.8% in 2002. Professionals increased similarly to the executive, administrative and managerial category. In 1994, professionals comprised 16.6% of the workforce, and 17.9% in 2002. Technicians and related support increased from 2.9% in 1995 and 1998 to 4.0% in 2002. Sales occupations have remained fairly constant over the period.
Table 2. Percentage of Civilian Employment by Occupation, Connecticut, 1994-2002

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</tr>
</thead>
<tbody>
<tr>
<td>Executive/administrative/managerial</td>
<td>14.3%</td>
<td>17.0%</td>
<td>17.7%</td>
<td>16.5%</td>
<td>17.0%</td>
<td>18.1%</td>
<td>16.9%</td>
<td>17.5%</td>
<td>17.8%</td>
</tr>
<tr>
<td>Professional specialty</td>
<td>16.6%</td>
<td>18.3%</td>
<td>17.6%</td>
<td>16.2%</td>
<td>17.4%</td>
<td>18.7%</td>
<td>19.4%</td>
<td>18.9%</td>
<td>17.9%</td>
</tr>
<tr>
<td>Technicians and related support</td>
<td>3.3%</td>
<td>2.9%</td>
<td>3.6%</td>
<td>3.7%</td>
<td>2.9%</td>
<td>3.7%</td>
<td>3.0%</td>
<td>3.7%</td>
<td>4.0%</td>
</tr>
<tr>
<td>Sales</td>
<td>12.6%</td>
<td>12.7%</td>
<td>12.0%</td>
<td>12.7%</td>
<td>12.0%</td>
<td>11.8%</td>
<td>12.0%</td>
<td>12.7%</td>
<td>12.3%</td>
</tr>
<tr>
<td>Administrative support including clerical</td>
<td>15.2%</td>
<td>15.2%</td>
<td>14.0%</td>
<td>14.6%</td>
<td>14.7%</td>
<td>13.8%</td>
<td>14.6%</td>
<td>13.2%</td>
<td>13.7%</td>
</tr>
<tr>
<td>Service occupations</td>
<td>13.2%</td>
<td>13.0%</td>
<td>13.0%</td>
<td>13.6%</td>
<td>12.6%</td>
<td>11.6%</td>
<td>12.1%</td>
<td>12.7%</td>
<td>12.8%</td>
</tr>
<tr>
<td>Precision production/craft/repair</td>
<td>11.3%</td>
<td>9.8%</td>
<td>10.3%</td>
<td>9.5%</td>
<td>11.1%</td>
<td>10.4%</td>
<td>9.9%</td>
<td>10.5%</td>
<td>10.6%</td>
</tr>
<tr>
<td>Machine operators/assemblersinspectors</td>
<td>5.1%</td>
<td>4.2%</td>
<td>5.0%</td>
<td>5.7%</td>
<td>5.4%</td>
<td>4.8%</td>
<td>4.5%</td>
<td>4.3%</td>
<td>3.9%</td>
</tr>
<tr>
<td>Transportation/material moving</td>
<td>3.6%</td>
<td>3.0%</td>
<td>2.6%</td>
<td>2.8%</td>
<td>2.6%</td>
<td>3.2%</td>
<td>3.5%</td>
<td>3.2%</td>
<td>2.9%</td>
</tr>
<tr>
<td>Handlers/equipment cleaners/ helpers/ laborers</td>
<td>3.5%</td>
<td>2.7%</td>
<td>2.8%</td>
<td>3.3%</td>
<td>3.1%</td>
<td>3.0%</td>
<td>3.2%</td>
<td>2.3%</td>
<td>2.7%</td>
</tr>
<tr>
<td>Farming/forestry/fishing</td>
<td>1.3%</td>
<td>1.3%</td>
<td>1.4%</td>
<td>1.5%</td>
<td>1.1%</td>
<td>0.9%</td>
<td>0.8%</td>
<td>1.1%</td>
<td>1.3%</td>
</tr>
</tbody>
</table>

Those employed in administrative support including clerical has declined slightly from 15.2% in 1994 to 13.7% in 2002, even though those employed in administrative positions has increased. Service occupations have remained fairly constant from 1994 to 2002, with a range of 13.6 in 1997 to 11.6% in 1999. Workers employed in precision production, craft and repair occupations have also remained fairly constant, with a range of 11.3% in 1994 to 9.5% in 1997. Machine operators, assemblers and inspectors have decreased from 5.1% in 1994 to 3.9% in 2002. Employment levels in transportation and material moving look similar to machine operators, assemblers, and inspectors, with a
range of 3.6% in 1994 to 2.6% in 1996 and 1998. Handlers, equipment cleaners, helpers, and laborers have remained constant from 1994 to 2002. Farming, fishing and forestry, has also remained almost unchanged from 1994 to 2002, with a percent of 1.3% percent both in 1994 and 2002.

**Injury and Illnesses in Connecticut’s Workforce, 1974-2002**

In addition to looking at the demographic profile of the State, it is important to analyze the changing rates in occupational illnesses and injuries over time. Illness and injury incidence rates were compared to specific employment industries and industry groups to identify increases or decreases in disease and injury rates from 1974-2002. Data was available from 1974 through 2002 for most industries, and was obtained from the CTDOL. As a result, close to thirty years of data were available and analyzed in this study.

There were notable changes in the incidence rates of injury and illness in many of the industry sectors. The figures below show each of the SIC industry sectors compared to the rates of illness and injury that occurred within them during each given year. In addition a figure comparing the percent change of each individual SIC industry is included for comparison.

**Impact of changing industry distributions on injury and illness rates**

Decreases in overall injury and illness rates could result from improvements in safety measures, changes in completeness of reporting, or a demographic shift away from employment in more dangerous industries to safer ones. We explored the possibility that
changes in the distribution of the Connecticut workforce across industry sectors was a significant factor in the observed decrease in the All Industries occupational illness and injury rate during the 30-year period. The overall occupational illness and injury rate in Connecticut for 1976 was calculated as 10.0 per 100 full-time equivalents (FTE) and the rate for 2000 was 7.28 per 100 FTE, a 27% decrease. To assess the impact of industry sector distribution on the difference in these overall illness and injury rates, sector-specific rates from 2000 were standardized to the 1976 industry distribution of the Connecticut workforce to obtain an industry-adjusted rate for 2000. The resulting industry-adjusted rate for 2000 was calculated as 7.77 per 100 FTE. Although this is slightly different than the crude rate for 2000, the industry-adjusted rate remained statistically significantly lower than the rate for 1976. Industry composition changes accounted for the difference between 7.77 and 7.28 (=0.49), approximately 18% of the difference of 2.72 percentage points (10-7.28). The other 82% can be deemed attributable to causes outside of industry composition changes.
Figure 10. Illness and Injury Rate Per 100 Workers by Year Agriculture and All Industries, Connecticut, 1975-2002

Sources: Bureau of Labor Statistics’ Annual Survey of Occupational Injuries and Illnesses, Connecticut Department of Labor

Figure 10 shows the incidence rates of all-industries and the agriculture industry in Connecticut for the years 1975-2002. Data specifically for agriculture was unavailable in 1974, and is therefore absent from the figure. In agriculture, the incidence rate of occupational illness and injury per 100 workers was above the rate for all industries combined for all years from 1975-2002. The highest observed incidence rate was 18.8 cases per 100 full time equivalent (FTE) workers in 1976. The lowest incidence rate was observed in 2002, with a rate of 7.0 cases per 100 FTE workers.
Figure 11 shows the incidence rates of all-industries and the construction industry in Connecticut for the years 1974-2002. The incidence rate of occupational illness and injury per 100 FTE workers in construction remained above the rate for all industries combined, for all years from 1974-2002. The highest observed incidence rate was 18.7 cases per 100 FTE workers; observed in 1987. The lowest incidence rate was observed in 2002 with a rate of 7.2 cases of injury and illness per 100 FTE workers. In 1974-1991,
every year the incidence rate of illness and injury cases was above 14 cases per 100 FTE.

In all years following 1991, incidence rates remained lower than 14 cases per 100 FTE.

![Figure 12. Illness and Injury Rate Per 100 Workers by Year Manufacturing- Durable Goods and All Industries](image)

"Figure 12 shows the incidence rates of all-industries and the manufacturing-durable goods industry in Connecticut for the years 1974-2002. The highest illness and injury incidence rate occurred in 1989 and was 14.5 cases per 100 FTE’s. The lowest incidence rate was in 2002 when there was 4.3 injury and illness cases per 100 FTE’s."
Figure 12, shows the incidence rates for manufacturing-durable goods alone and a comparison to all industries combined per 100 FTE workers, from 1974-2002. In manufacturing-durable goods, the incidence rate of occupational illness and injury per 100 FTE’s remained above the rate for all industries combined, with the exception of 2002 where it fell below for the first time in 29 years. An increase in the illness and injury cases was observed just after 1986, until the early 1990’s where rates increased from 10.9 to 14.5 and then a decrease occurred.

Figure 13: Illness and Injury Rate Per 100 Workers by Year Transportation/Communications/Public Utilities and All Industries, Connecticut 1974-2002

Sources: Bureau of Labor Statistics’ Annual Survey of Occupational Injuries and Illnesses, Connecticut Department of Labor
Figure 13 shows the incidence rates of all-industries and the transportation, communication, and public utilities industry grouping in Connecticut for the years 1974-2002. In the industry grouping of transportation, communication and public utilities industries, the incidence rate of occupational illness and injury per 100 workers remained both above and below the rate for all industries combined. For 18 of the 29 years, illness and injury rates were at or above the total incidence rate for all industries. The highest observed incidence rate was 10.9 cases per 100 FTE; observed in 1990. The lowest incidence rate was observed in 2002 with a rate of 7.1 per 100 FTE workers.

Figure 14: Illness and Injury Rate Per 100 Workers by Year Trade and All Industries, Connecticut 1974-2002

*Sources:* Bureau of Labor Statistics’ Annual Survey of Occupational Injuries and Illnesses, Connecticut Department of Labor
Figure 14 shows the incidence rates of all-industries and the trade industry in Connecticut for the years 1974-2002. In trade, the incidence rate of occupational illness and injury per 100 FTE workers remained below the rate for all industries combined for all but 5 years. The highest observed incidence rate was 9.4 per 100 FTE workers; observed in 1993. The lowest incidence rate was observed in 2002 with a rate of 6.0 cases of injury and illness per 100 workers. Although the rates in trade remained fairly constant in the industry from 1974-2002, there was a decrease in overall occupational injury and illness. This overall decrease, but not specifically in the trade industry, resulted in the rates in trade becoming closer to and rising above the total all industry average during the late 1990’s and early 2000’s.

Figure 15 shows the incidence rates of all-industries and the finance, insurance and real estate industry grouping in Connecticut for the years 1974-2002. In finance, insurance and real estate, the incidence rate of occupational illness and injury per 100 workers remained well below the rate for all industries combined, for all years from 1974-2002. The highest incidence rate was 3.5 cases per 100 FTE workers; observed in 1993. The lowest incidence rate was observed in 2001 and 2002 with a rate of 1.3 cases of injury and illness per 100 FTE workers.
Figure 15. Illness and Injury Rate Per 100 Workers by Year

Finance/Insurance/Real Estate and all Industries, Connecticut, 1974-2002

Sources: Bureau of Labor Statistics’ Annual Survey of Occupational Injuries and Illnesses, Connecticut Department of Labor

Figure 16 shows the incidence rates of all-industries and the services industry in Connecticut for the years 1974-2002. In the services industry, the incidence rate remained well below the rate for all industries combined for all years from 1974-2002. The highest observed incidence rate was 8.2 cases per 100 FTE workers; observed in 1993. The lowest incidence rate was observed in 2002 with a rate of 4.6 cases of injury and illness per 100 FTE workers.
Figure 16. Illness and Injury Rate Per 100 Workers by Year Services and All Industries, Connecticut, 1974-2002

Sources: Bureau of Labor Statistics’ Annual Survey of Occupational Injuries and Illnesses, Connecticut Department of Labor

Rates of illness and injury in Services remained somewhat constant from 1974-2002; however there has been a slight increase in the cases of injury and illness in the job sector that began in the early 1990’s.
Figure 17. Illness and Injury Rate Per 100 Workers by Year Government and All Industries, Connecticut, 1975-2002

Sources: Bureau of Labor Statistics’ Annual Survey of Occupational Injuries and Illnesses, Connecticut Department of Labor

Figure 17 shows the incidence rates of all-industries and the Government industry in Connecticut for the years 1975-2002. Data specific for government was unavailable in 1974, and is therefore not included in this figure. In government, the incidence rate of occupational illness and injury per 100 FTE workers remained well above the rate for all industries combined, for every year from 1975-2002. The highest observed incidence rate was 16.5 cases per 100 FTE workers; observed in 1985. The lowest incidence rate
was observed in 2002 with a rate of 8.4 cases per 100 FTE workers. A decrease leading to the lowest rate seen in Government in 2002 was observed beginning in the mid and late 1980s.

Figure 18. Work-Related Illness and Injury Rate, Percent Change, Connecticut, 1974-2002


Figure 18 shows the percent change for each of the major industry sectors from 1974-2002. Construction, Manufacturing, Agriculture, and Governments had more substantial changes than Trade, Transportation/Communications/Public Utilities, Finance/Insurance/Real Estate, and Services. The highest rate of change was seen in Construction (8.9%), and the lowest rate was seen in Finance/Insurance/Real Estate.
1.2%. For more detailed information regarding the 1976 and 2000 employment numbers, work-related illness and injury rates, and percent change by industry, see Appendix A.

CONCLUSIONS:

Important changes were observed concerning Connecticut’s workforce demographic composition over the past ten years, as well as workplace injury and illness rates over 29 years in Connecticut. Of particular interest are some of the demographic elements that have been changing over the past ten years in Connecticut. The percentage of workers of races other than white has increased steadily in Connecticut over the study period. Workers of Hispanic ethnicity have almost doubled over the study period, and older workers (over 65) have increased from 1997-2002. There have also been dramatic decreases in injury and illness incidence rates over the past 29 years in the state. These have been particularly dramatic in Construction, Manufacturing, and Agriculture. Perhaps of most importance is the conclusion that the decreases in injury and illness rates that were seen in Connecticut over the study period were not primarily due to changes in the distribution of the Connecticut workforce across industry sectors during the period. This study found that changing workforce distribution accounted for approximately 18% of the observed change in this study. The other 82% of the change although unknown, is attributable to other causes. An example of a number of possible variables may be increasing awareness of workplace safety, and the related economic costs of injuries to employers. In more recent years, wages in Connecticut have increased. Higher wages may have an indirect impact on the likelihood that an employer would support worker
safety interventions and programs. Higher paid employees are often not easily replaced, and provide companies with a valuable asset. The recognition of the importance of protecting workers health, to protect an employee that is difficult to replace may have led to an increase in programs and interventions such as providing PPE, safety training, etc. This recognition could have an impact of lowering rates of workplace illness and injury where this cause and effect relationship occurs.

Record keeping and reporting for occupational illness and injury are incomplete in Connecticut; using capture-recapture analysis, only an estimated 10.1% of occupational illness and injuries were captured in the Connecticut Workers’ Compensation system in 2004.\(^\text{19}\) In addition under-reporting of illness and injury has historically been an issue in occupational health throughout the U.S. A study out of the University of British Columbia found considerable underreporting in saw mill workers.\(^\text{20}\) Although probably not the main contributor, increased under-reporting over the time period cannot be ignored as a potential factor. Other reasons could include new legislation that has forced employers to provide a safer workplace to their employees; changing reporting patterns; effects of early return to work programs; and changes in Workers’ Compensation statutes that may have resulted in a shifting to group health and disability. This study did not explore these other potential causes for the declines. Further research is required to determine which if any these possibilities contributed to the declines, and how substantial a contribution they made.

The analysis performed on the demographic profile component of the Connecticut Specific Indicators Project allowed for us to draw conclusions as to why some of the
observed changes are occurring in Connecticut, as well as what Connecticut might experience in their workforce years down the road.

There were unemployment changes in Connecticut during the years 1994-2003. A decline in unemployment occurred between 1997 and 2002, and according to the Comptrollers report in January 2000, Connecticut was slow to recover from a recession from 1989 through December 2002. It was noted that there was a recovery in 1996 with strong job gains, rising incomes, low inflation, and exceptional financial market performance. This decline could be attributed to favorable economic growth during the late 1990’s prior to the corporate losses that occurred after year 2000. These losses could explain why unemployment rates increased steadily again through 2003. For the percentage of civilian employment in part-time jobs, the slight decrease in workers who were employed in part-time jobs occurred at approximately the same time as the decrease in unemployment rates in Connecticut, and this could possibly be attributed to an increase in the number of available full-time jobs during this time period, and people moving from part-time positions into full-time employment, which could lower illness and injury rates.

The observed patterns of change in the injury and illness rates during the study period may relate to changing demographics in Connecticut’s workforce. Changes in gender composition, unemployment, number of hours worked, and racial composition may all be contributing factors in the changing rates of illness and injury in Connecticut’s workforce. When gender is considered, a strongly patriarchal society such as in the U.S. frequently may not consider occupational health in female-dominated job sectors such as in retail and nursing. When this occurs, higher rates of illness could arise in those
industries that have had a shift of males to females (although this study did not analyze this issue).

Economics may play a role with many of the attributes that makes a workplace safe. According to Levy and Wegman, a shift in the U.S. from a manufacturing based economy to serviced based is occurring. This type of industry shift can have serious economic impacts to workers throughout Connecticut and the U.S. Traditional jobs in manufacturing were often union-based full-time positions that offered their employees job security, full time hours, and accessibility to many worker safety programs. Jobs in services, the most rapidly growing industry in the U.S., often do not include good benefits, health insurance, or union protection. As a result many of the employees employed in services earn lower wages, are employed less hours, receive less health and safety training, and are not covered by the law the same way full time workers are; however, jobs in services are generally thought to be intrinsically safer than in manufacturing. A study published by Greenberg states that contract workers get less health and safety training than non-contract workers, and their injury rates are higher as well. These are some of the demographics that may relate to some of the declines that were seen in specific industries over the study period. Furthermore predictions about what may occur in the future can be enhanced with an understanding on how changing demographics direct injury and illness rates.

After 1995, numbers of older workers (defined as 65 years and older) in Connecticut began to decline. This decline could have been partially due to economic growth promoting early retirements, but increases began after 1998. It is important to note that we would not expect illness and injury rates to increase as a result of increasing
rates of older workers in Connecticut’s workforce. Studies show that older workers tend
to be more experienced workers, and actually experience lower rates of injury and illness
in the workplace. When injuries do occur however, there is a longer average recovery
time than their younger counterpart workers. Changes in the racial composition of
Connecticut’s workforce were observed during the ten-year period, notably increases of
black workers and workers of “other” races.

The notable increase in black workers in Connecticut indicates that the potential
exists that there has been increased awareness in Connecticut of the value of a diverse
workforce. This increase could also be partially attributed to increases in opportunities
through affirmative action programs that have been implemented in workplaces.
Increases in immigrant workers, or migration of workers of other races could also
attribute to the increase in the rates of workers of other races. If migration of workers of
various races from other parts of the U.S. to Connecticut occurred, there could likely be
changes in workforce patterns. Further research will have to be conducted to determine
the causation of the changing racial demographics in Connecticut.

The percentage of civilian employment of Hispanic origin has shown similar
increases throughout the ten-year period as was noted in black and “other” workers. The
percentage of Hispanics in Connecticut’s workforce has doubled in a ten-year period.
This could be due in part to better recognition of Hispanic ethnicity and more focus on
health disparities relating to occupational health within this ethnic sector. These findings
show the importance of the development of educational materials in Spanish. Many
ethnically Hispanic workers do not use English as their primary language, and as a
result may not be able to read warning labels on toxic chemicals, for example. Studies
have found higher injury rates among Hispanics, such as higher fatality rates compared to non-Hispanic Black men. As a result, Hispanic men in the South appear to be emerging as the group with the nation’s highest unintentional fatal occupational injury rate. \(^{23}\)

Extra training, especially for those of Hispanic ethnicity, or training in Spanish could possibly benefit this population. Evidence suggests that Hispanics working in Construction receive inadequate training given the hazardous work that they performed. \(^{24}\)

One study found only 68-72% of respondents reported receiving some training, and that median training time was only one hour. Only 24% reported receiving written training, and those with less English Speaking ability received even less training. \(^{24}\)

Future study is suggested to determine which industries have a disproportionate number of Hispanic workers in Connecticut, in order to develop intervention materials detailed to the industry where Hispanics work, to best target the populations most in need of intervention.

In this study, individual level data was unavailable, so it is impossible to accurately ascertain whether Hispanic workers might have higher injury rates that are masked by lower injury rates among non-Hispanics in relation to overall declining injury rates in construction, agriculture, and other industries. \(^{26}\)
Historic Injury and Illness Analysis in Connecticut, 1974-2002

Declines were noted among most industries during the study period. Reasons why these declines have occurred are yet to be explored, however from our data it appears that a shifting workforce to safer industry sectors was responsible for approximately 18% of the decline.

Svenson conducted an international analysis on workplace injuries that focused on the reasons that workplace injury claims decreased even though there was an expanding workforce. Svenson’s analysis concluded that economic expansion could lead to increases in workplace injuries. This is because in an expanding workforce there are often new, inexperienced workers. Svenson concludes that some external means is responsible for the declines that are seen in the 1990’s in the workforces; safety measures have a counter effect, and may lead to a net reduction in claims. 25

For 28 years in the agriculture industry, there has never been a year where the rate per 100 FTE workers has fallen below the all industries rate for injuries and illnesses. This tells us that agriculture continues to be an area that needs special attention. Immigrant workers who are often Spanish-speaking workers of Hispanic ethnicity are commonly employed in agriculture in Connecticut. 26 Workers in agriculture are only partially covered by OSHA, such as under OSHA’s Field Sanitation Standard, which provides potable drinking water, hand washing, and restroom facilities to farm workers where there are 11 or more field workers. Although cases of field-related viral hepatitis, parasitic infections, and heat-related illness have decreased in part in the U.S. due in part to this standard, there remains a vulnerable population of workers due to the lack of
agency protection. At the same time, there were notable decreases in the incidence rate of injuries and illness in agriculture. The 2002 rate of illness and injury in Agriculture for the first time during the study period dropped below the 1974 all industries rate, which shows that although the rate of illness and industry in agriculture remains above the current all industry rate, progress has been made in the industry. The decline from 18.8 cases per 100 FTE workers in 1976, to the low of 7.0 cases per 100 FTE workers in 2002 may indicate that there have been safer farming practices implemented into farms, reporting issues, and possibly automation of some of the more hazardous jobs.

Toward the mid 1980’s, there was a dramatic decline in the rates of injuries and illnesses occurring in the construction industry. The Connecticut Occupational Safety and Health Administration (CONN-OSHA) has a program in place in an effort to reduce the numbers of occupational injury and illness cases in the state, and municipal public sector employees. CONN-OSHA also provides training and education programs and on-site consultations for both public and private sector workplaces in Connecticut. In addition, CONN-OSHA has posted a few sample written programs on-line. It is a possibility that the Fall Protection Standard in conjunction with a certified state plan, and other safety programs such as lock-out/tag-out and sloping and shoring of trenches, could have had an impact on the decrease in the numbers of injuries and illnesses in Connecticut’s construction industry. More research will be needed to determine which injuries specifically declined. As an example, if fewer electrocutions were seen, perhaps lock-out/tag-out and other electrical safety programs may have been responsible. Future study could compare the rates of OSHA inspections per employer by sector to see if it is related to the declines. For instance if rates of OSHA inspections per employer by sector
were higher in industries that showed the most declines in injury, it could lead to the conclusion that OSHA staffing and inspections should be increased.

For Durable Goods Manufacturing, there was a similar decrease in the numbers of injury and illness cases, although the decline was not as dramatic as was seen in the construction industry.

As might be expected, there was a very low incidence rate of occupational illness and injury in the finance, insurance, and real estate sector. The 2002 low of 1.3 cases of injury and illness per 100 FTE workers demonstrates that these industries represent some of the safer industries to work in Connecticut. This industry, however, has seen an increase in the amount of computer use, which is known to lead to musculoskeletal diseases (i.e. Carpal Tunnel Syndrome) in people that use incorrect wrist postures, or type for prolonged periods. Recognition of ergonomic hazards and MSD’s greatly affected this industry over the study period.

The Government sector has remained an industry with a high number of occupational illness and injuries. In government there is a degree of union protection to employees that experience an occupational injury or illness at work. As a result, employees may be more likely to report their injuries or illnesses to their employer. In addition, the Government sector includes occupations such as Corrections Officers, Department of Transportation workers, and other occupations that are expected to receive a disproportionate rate of illness and injury. This “catch all” industry “Government” consequently has rates of illness and injury closer to those experienced in Construction.

From a public health perspective, it is encouraging to see declining rates of work-related injury and illness in Connecticut’s workforce. Although it is promising to see
these declining rates, the problem is still very large, with 63,500 illness and injuries occurring in 2003. Continued education, intervention, and legislation are imperative to continue to see the declines in the rates that were seen from 1974-2002.

LIMITATIONS:

As with most studies, there are a number of limitations associated with the analysis and data collection that went into this study. The BLS annual survey has many limitations that influenced the results in this study. In addition to the conceptual filters that are detailed by Azaroff, the BLS annual survey is based on a sample that therefore has some sampling error (although the sample is quite large) that should be considered when interpreting results. In addition, reporting consistency (i.e. level of under-reporting) may have changed over the study period, and may have influenced the resulting rates.

Data that was extracted to compile the workplace demographics was the result of the CPS, which is a monthly sample of 60,000 households, and is not a complete census of the population.

Another limitation of the study, involved the fact that individual occupations within each industry were not studied to determine whether the most hazardous jobs within the industry were shifting out of Connecticut, or remained. If the most hazardous occupations within industries were moved to other regions of the U.S. or overseas, rates of occupational illness and injury would be expect to decline. This study did not explore those possibilities.
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Appendix A.


<table>
<thead>
<tr>
<th>Industry</th>
<th>1976 Average Annual Employment</th>
<th>1976 Rate of Injury and Illness per 100 Workers</th>
<th>2000 Employment Number</th>
<th>2000 Rate of Injury and Illness per 100 Workers</th>
<th>Percent Change</th>
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<tbody>
<tr>
<td>Total</td>
<td>1,198,700</td>
<td>10</td>
<td>1,651,800</td>
<td>7.3</td>
<td>-2.7</td>
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<tr>
<td>Agriculture</td>
<td>8,000</td>
<td>18.8</td>
<td>17700</td>
<td>11.2</td>
<td>-7.6</td>
</tr>
<tr>
<td>Construction</td>
<td>37,800</td>
<td>15.6</td>
<td>65300</td>
<td>8.8</td>
<td>-6.8</td>
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<tr>
<td>Manufacturing</td>
<td>392,300</td>
<td>11.6</td>
<td>262500</td>
<td>8.9</td>
<td>-2.7</td>
</tr>
<tr>
<td>Transportation and Public Utilities</td>
<td>53,600</td>
<td>9.1</td>
<td>77700</td>
<td>8.7</td>
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<td>Wholesale and Retail Trade</td>
<td>250,200</td>
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<td>364800</td>
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<td>Finance/Insurance</td>
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<td>Services</td>
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<td>Government</td>
<td>156,600</td>
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