



NATIONAL OCCUPATIONAL RESEARCH AGENDA (NORA)

NATIONAL OCCUPATIONAL RESEARCH AGENDA FOR SERVICES

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Developed by the NORA Services Sector Council

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INTRODUCTION

What is the National Occupational Research Agenda?

The National Occupational Research Agenda (NORA) is a partnership program to stimulate innovative research and workplace interventions. In combination with other initiatives, the products of this program are expected to reduce the occurrence of injuries and illnesses at work. Unveiled in 1996, NORA has become a research framework for the Nation and National Institute for Occupational Safety and Health (NIOSH). Diverse parties collaborate to identify the most critical issues in workplace safety and health and develop research objectives for addressing those needs.

NORA enters its third decade in 2016 with an enhanced structure. The ten sectors formed for the second decade continue to prioritize occupational safety and health research by major areas of the U.S. economy. In addition, there are seven cross-sectors organized according to the major health and safety issues affecting the U.S. working population. While NIOSH is serving as the steward to move this effort forward, it is truly a national effort. NORA is carried out through multi-stakeholder councils, which are developing and implementing research agendas for the occupational safety and health community over the decade (2016-2026). Councils address objectives through information exchange, partnership building, and enhanced dissemination and implementation of evidence-based solutions.

NORA groups industries into ten sectors using North American Industry Classification System (NAICS) codes. The Services sector encompasses eleven North American Industry Classification System [NAICS, 2017] groups:

- Information (51)
- Finance and Insurance (52)
- Real Estate and Rental and Leasing (53)
- Professional, Scientific, and Technical Services (54)
- Management of Companies and Enterprises (55)
- Administrative and Support and Waste Management and Remediation Services (56)
- Educational Services (61)
- Arts, Entertainment, and Recreation (71)
- Accommodation and Food Services (72)
- Other Services (except Public Administration) (81)
- Public Administration (92)

Note that veterinary medicine and animal care workers are part of the Healthcare and Social Assistance sector. Firefighters, law enforcement and other public safety workers are part of the Public Safety sector.

What are NORA Councils?

Participation in NORA Councils is broad, including stakeholders from universities, large and small businesses, professional societies, government agencies, and worker organizations. Councils are co-chaired by one NIOSH representative and another member from outside NIOSH.

Statement of Purpose

NORA councils are a national venue for individuals and organizations with common interests in occupational safety and health topics to come together. Councils have started the third decade by identifying broad occupational safety and health research objectives for the nation. These research objectives build from advances in knowledge

in the last decade, address emerging issues, and are based on council member and public input. Councils will spend the remainder of the decade working together to address the agenda through information exchange, collaboration, and enhanced dissemination and implementation of solutions that work.

Although NIOSH is the steward of NORA, it is just one of many partners that make NORA possible. Councils are not an opportunity to give consensus advice to NIOSH, but instead a way to maximize resources towards improved occupational safety and health nationwide. Councils are platforms that help build close partnerships among members and broader collaborations between councils and other organizations. The resulting information sharing and leveraging efforts promotes widespread adoption of improved workplace practices based on research results.

Councils are diverse and dynamic, and are open to anyone with an interest in occupational safety and health. Members benefit by hearing about cutting-edge research findings, learning about evidence-based ways to improve safety and health efforts in their organization, and forming new partnerships. In turn, members share their knowledge and experiences with others and reciprocate partnerships.

Services Sector Council Background

The NORA Services Sector Council was first convened in 2006 at the beginning of the second decade of NORA. At that time, the council examined summaries of stakeholder input generated from Town Hall meetings that took place between December 2005 to December 2006 and from comments submitted through the NIOSH website during the same time period. Occupational safety and health surveillance data for Service industries were then reviewed and summarized for the Council and significant gaps in surveillance data were identified. Bureau of Labor Statistics (BLS) surveillance data for the Services sector between 2003 and 2007 were also summarized in a peer-reviewed publication [Utterback et al. 2012]. The members of the council included industry professionals, labor representatives, academic researchers and public health practitioners. Based on these findings, the Council focused on surveillance, musculoskeletal disorders and these Services industries:

- Automotive Repair and Maintenance
- Building Services
- Education and Schools
- Hotels and Motels
- Public Administration (aka Government) except Public Safety
- Recreation and Entertainment
- Restaurants and Food Services
- Telecommunications
- Temporary Labor Industry
- Waste Collection and Disposal
- Hair and Nail Salons

In its current form the Services Sector Council continues to provide leadership through information exchange from a diverse group of members for the prevention of disease and injury in the Services sector.

What does the National Occupational Research Agenda for Services represent?

The National Occupational Research Agenda for Services is informed by the priorities established by the Services Sector Council. This Agenda is therefore based on research, information, and actions most urgently needed to prevent occupational injuries and illnesses in the Services sector. This Agenda provides a vehicle for Services sector stakeholders to describe the most relevant issues, gaps, and safety and health needs for the sector. Each NORA research agenda is meant to guide or promote high priority research efforts on a national level, conducted by various entities, including: government, higher education, and the private sector. Because the Agenda is intended

to guide national occupational health and safety efforts for the Services sector, it cannot at the same time be an *inventory* of all issues worthy of attention. The omission of a topic does not mean that topic was viewed as unimportant. Those who developed this Agenda did, however, believe that the number of topics should be small enough so that resources could be focused on a manageable set of objectives, thereby increasing the likelihood of real impact in the workplace.

NIOSH used the draft Agendas created by the sector and cross-sector NORA councils as an input into the [NIOSH Strategic Plan](#). Programs used the [burden, need and impact method](#) to write research goals that articulate and operationalize the components of the NORA sector and cross-sector Agendas that NIOSH will take up. NORA Agendas and the NIOSH Strategic Plan are to be separate but linked.

Who are the target audiences?

The National Occupational Research Agenda for Services provides research and information to industry; labor; federal, state, and local governments; as well as to experts in professional associations, academia, and public interest/advocacy groups. The Services Council expects that researchers and other occupational safety and health professionals will use this Agenda to plan for further investigation of illness and injury in the Services sector.

It is ultimately hoped that safety and health professionals and standard-setting groups (including government agencies and international bodies) will use the Agenda to form new guidelines and standards to minimize worker exposure to occupational hazards. The Agenda will also provide information gaps that need to be addressed by future research. Furthermore, employers, unions, and employees will use research findings that result from this Agenda to eliminate occupational hazards and reduce risks in their workplace.

How was the research agenda developed?

Jobs in the Services sector are highly diverse. Work environments in the Services industries include offices, hotel rooms, outdoor and indoor entertainment facilities, restaurant kitchens, classrooms, automotive garages, public roads, and private households. Services workers are exposed to traffic/travel hazards as they frequently travel on roadways as part of their job. Young workers represent a large portion of the sector as they are often employed in Services jobs, especially in Food Service and in Arts, Entertainment and Recreation industries. On the other hand, some Services sector occupations require academic degrees and many jobs are physically demanding. This diversity means that an extraordinarily large variety of occupational hazards potentially affect the health and safety of these workers.

In the past, the council has grouped its goals by Services industries. Those industries were chosen by the council after deliberations at the 2006 and 2007 meetings. Draft goals were made available for public comment in 2008.

The development of the current research agenda is based in part on: the second decade NORA National Services Agenda; NIOSH surveillance on this the Services sector [Utterback et al. 2012]; current information from the scientific literature; expertise, experience, and discussion within and among the Services Sector Council members. The final version incorporated input from the general public received via responses to a request for comments posted in the Federal Register.

THE OBJECTIVES

Objective 1: Reduce the incidence and severity of traumatic injuries in the Services sector

This fundamental objective prioritizes industries within Services based on documented injury and illness data [Utterback et al. 2012]. Taking into account both injury rates and the total number of injuries, these industries within Services should be targeted for specific research and intervention. When considering these data the industries with the highest prevention index (highest combined ranking of number of injuries and the rate of those injuries) should be targeted for further research and intervention:

Table 1. Top ten Services industries based on a combination of the number of cases and the rate of injury, using 2015 Bureau of Labor Statistics Survey of Occupational Injury

Industry*	NAICS	2015 Number (in thousands)	2015 Rate Per 100 full time workers	Prevention Index
Traveler accommodation	7211	68.6	4.7	1
Waste collection	5621	10.8	6.1	2
Restaurants and other eating places	7225	181.3	2.9	3
Services to buildings and dwellings	5617	52.1	3.4	4
Amusement parks and arcades	7131	6.9	5.4	5
Other personal services (pet care, parking lots)	8129	9.9	4.6	6
Other amusement and recreation industries	7139	19.2	3.1	7
Special food services (caterers, mobile food)	7223	14.6	3.8	8
Consumer Good Rental	5322	6.5	4.9	9
Performing Arts	7111	4.0	5.2	10

*Note: Other Professional, Scientific and Technical Services (NAICS 5419) had a low Prevention Index but was removed from this table because NAICS 54194 Veterinary Services is placed in the Health Care and Social Assistance sector.

The industries in the table above are priorities for research on traumatic injuries. The following are some suggested areas to focus research:

- Intervention research is needed that focuses on falls on the same level for food service industry employees, which include restaurants (NAICS 7225) and special food services (NAICS 7223).
- Fatal injuries among installation, maintenance, and repair occupations account for 7.9% of fatal injuries. Building and grounds cleaning and maintenance occupations account for 5.6% of fatal injuries [BLS 2017c]. Interventions and dissemination methods are needed to reduce these fatalities.
- The waste collection industry has a high burden of occupational injury and should be targeted for prevention resources. Workers in this industry have elevated rates of motor vehicle injuries, falls to the same level, and struck by or against.
- California State Department of Health has developed informative videos (in [English](#) and [Spanish](#)) for landscape workers (NAICS 56173 under Services to Building and Dwellings) that have been successful in reaching individual workers and small businesses. Extending this model to other parts of the country and to other services industries may be an effective prevention method.

- Foreign-born Hispanic/Latino workers have higher fatal occupational injury rates than native-born Hispanic/Latino workers and all workers. This is especially the case with building and grounds cleaning and maintenance occupations [Byler 2013]. Foreign-born workers face language and literacy challenges that create barriers for health and safety training and can lead to workplace discrimination. These industries could benefit from more emphasis on overcoming language barriers and cultural differences.
- Volunteers are common in some Services industries. Developing different strategies to reach this population of workers may be beneficial.

Emphasis on Landscaping and Tree Care

One occupation that has a particularly high prevalence of traumatic injury is professional landscapers. They comprise many of the injuries reported in some of the top ten industries for injuries listed above: Services to Building and Dwellings (NAICS 5617), Traveler Accommodations (NAICS 7211) and Restaurants (NAICS 7225). However, other industries that have injuries to landscapers are often not targeted because the numbers are masked by the majority of people in lower risk occupations in the industry, e.g., public administration, finance, professional services, education. This is especially true for Lessors of Real Estate (NAICS 5311) that is not listed in Table 1. Because many landscaping safety hazards are known and materials have been developed to prevent injury for this occupation, the following suggestions to reduce injuries among service workers were generated:

- Evaluate small businesses that perform landscaping and tree care and determine the barriers for them in performing basic occupational safety and health functions that are routinely performed in other industries (e.g., construction) with emphasis starting at the top of the hierarchy of controls (i.e. engineering controls, administrative controls, and personal protective equipment).
- New Jersey has recently [passed a law](#) that requires at least one person in each company that performs tree-care services to be licensed. An initial research question could be to evaluate the effectiveness of this law. If effective, other states may be encouraged to pass similar laws.
- Evaluate how increased association membership in industries such as landscaping and tree service can improve health and safety in those industries.
- The National Association of Landscape Professionals and the Occupational Safety and Health Administration have an [alliance](#) to develop safety training for landscapers that could be disseminated to small businesses and evaluated for effectiveness. Once effective tools are developed, they can be disseminated to companies in other Services industries (e.g., education, restaurants, hotels) and other industry sectors (e.g., manufacturing, healthcare) that do their own landscaping with in-house staff. This training may also raise awareness of landscaping/tree service hazards in other industry sectors that hire small companies via contract.

Objective 2: Develop, test and disseminate intervention programs for musculoskeletal disorders.

Workers across many Services industries are engaged in tasks that have been associated with musculoskeletal disorders (MSDs). MSDs are injuries or inflammation of the nerves, tendons, muscles and support structures of the upper and lower limbs, neck, and lower back. The disorders are caused, precipitated, or exacerbated by sudden exertion or prolonged exposure to physical factors such as repetition, force, vibration, or awkward posture. Many Services sector workers are required to complete repetitive tasks and often exert considerable force in sometimes awkward positions. Figures 1, 2 and 3 below show three data sources in which service industries are compared on MSDs. Taken together these graphs show that these industries should be targeted for research on interventions and outreach to reduce the incidence of musculoskeletal disorders:

- Services to Buildings and Dwellings (NAICS 5617),
- Employment Services (NAICS 5613),
- Automotive Repair and Maintenance (NAICS 8111)
- Lessors of Real estate (NAICS 5311),
- Waste Collection (NAICS 5621),
- Spectator Sports (NAICS 7112)

Figure 1 uses the state of Washington workers compensation system to compare lost time injuries in the area of musculoskeletal disorders for industries within the Services sector. The bubble size is proportional to the number of full time equivalent (FTE) employees in the sector. As can be seen from the figure, Services to Buildings and Dwellings and Automotive Repair and Maintenance are relatively large industries while Waste Collection and Spectator Sports are smaller industries. Waste Collection, although small, is notable because the rate of MSDs are comparatively high.

Figure 1. Comparison of Selected Industries for Musculoskeletal Disorders from Washington State [Washington State 2017]

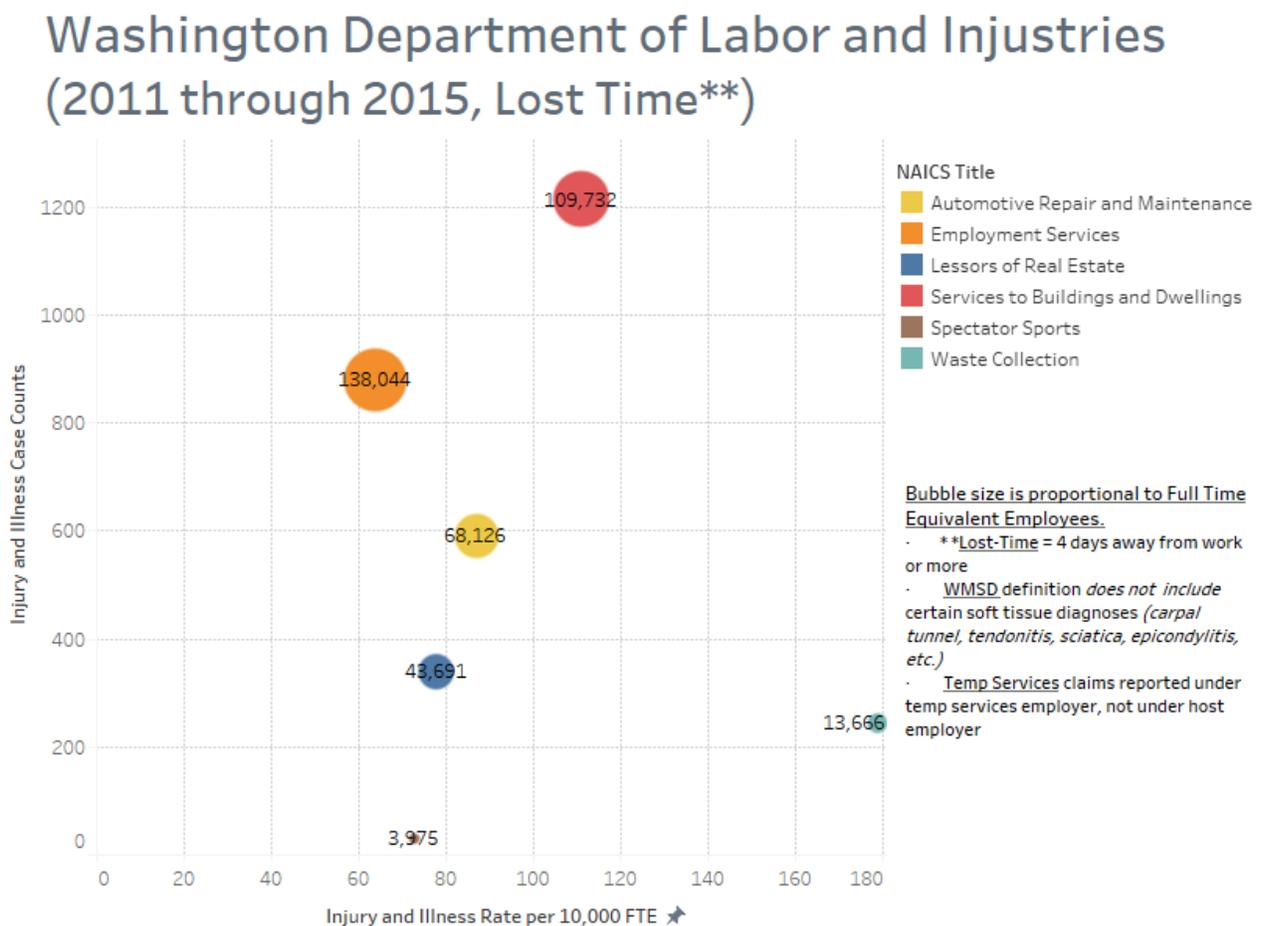


Figure 2 uses the state of Ohio workers' compensation system to compare lost time injuries in the area of musculoskeletal disorders. The same service industries are plotted as in the previous figure and with a fairly similar layout. The Employment Services industry has a high count in comparison to other industries. As in Washington State, Waste Collection has a high rate of MSDs but is a small industry.

Figure 2. Comparison of Selected Industries for Musculoskeletal Disorders from Ohio Bureau of Workers' Compensation [Meyers 2017]

Ohio Bureau of Workers Compensation (2001 through 2011, Lost Time^{***})

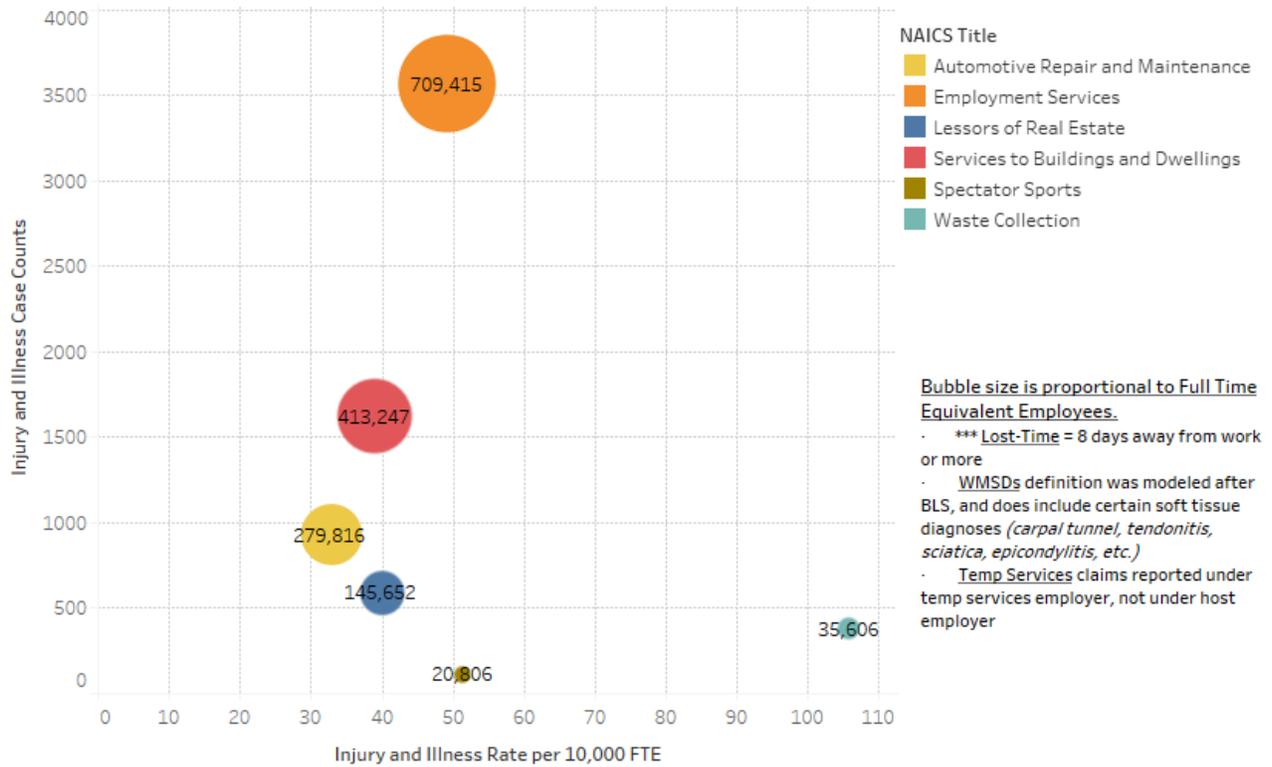
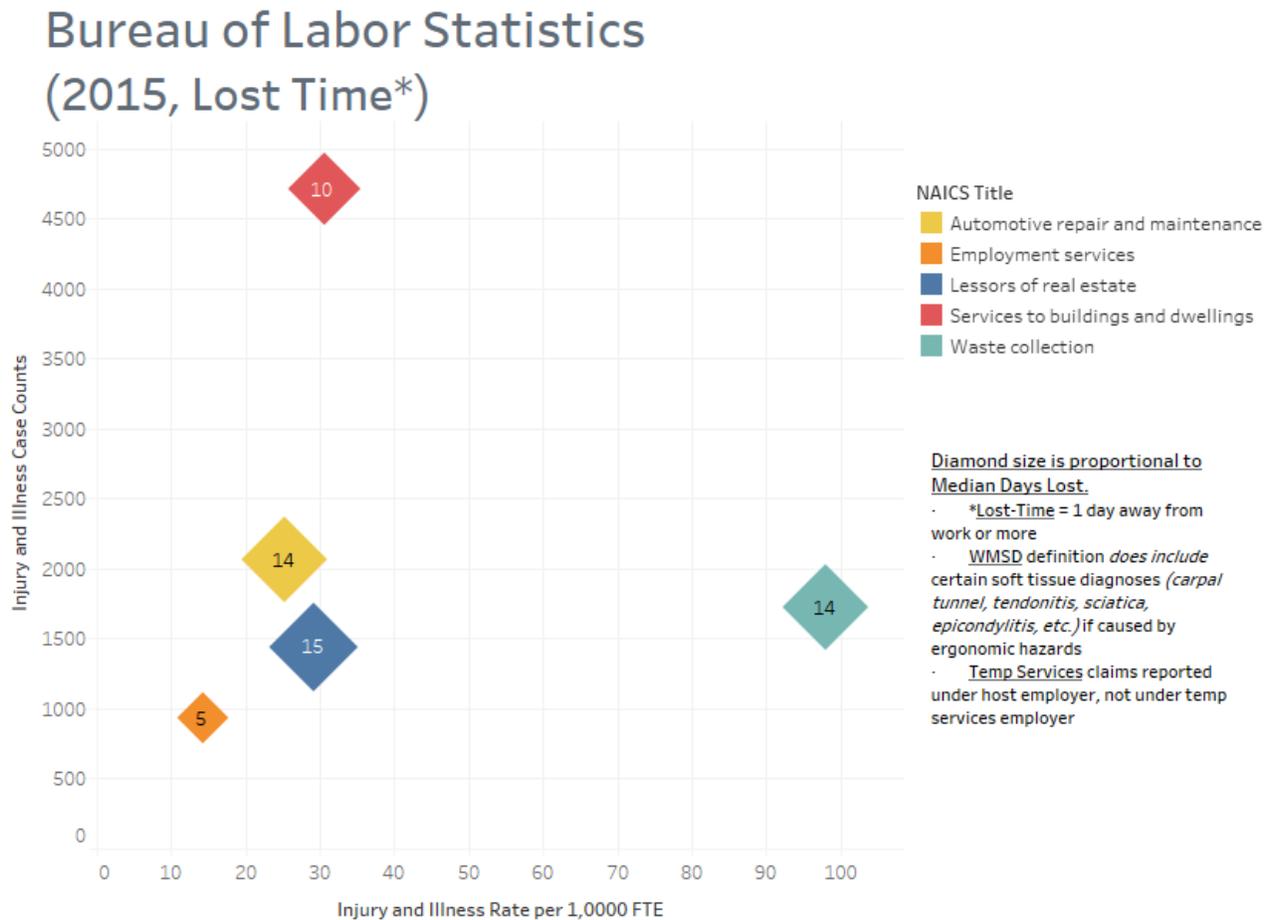


Figure 3 shows the Bureau of Labor Statistics data to compare lost time injuries in the area of musculoskeletal disorders. In this figure the bubble size is proportional to the median lost days as opposed to the number of employees because the number of full-time equivalent (FTE) employees is not available. The same service industries are also seen in this figure with the exception of Spectator Sports. Waste Collection again has a high rate of MSDs.

Figure 3. Comparison of Selected Industries for Musculoskeletal Disorders from the Bureau of Labor Statistics [BLS 2017b].



These are some areas where research is needed:

- Develop and disseminate interventions to reduce the incidence of back and shoulder MSDs among Automotive Repair and Maintenance workers.
- Services to Building and Dwellings include exterminating and pest control, janitorial, landscaping, and carpet and upholstery cleaning services. Lessors of Real Estate include industries that engage in leasing residential, nonresidential buildings and other real estate property. Both of these industries include workers who take care of buildings by doing maintenance, landscaping, or cleaning. This work is labor intensive and not usually able to be mechanized. Back injuries and shoulder injuries (especially rotator cuff) are most prominent. Research is needed on the best ways to reduce these MSDs either through interventions or work practices. Research on identifying effective outreach methods to get interventions to the small employers is needed.

- Studies are needed to determine the best ways to reduce back, shoulder and knee MSDs among workers in the Waste Collection industry. Specific research should focus on testing known safety interventions, that will reduce awkward or heavy lifting, or reduce repetitive motion.
- Back, shoulder and wrist injuries are either the most common or the most expensive, so these areas should be a priority.
- Although all workers' compensation rates have seen a reduction in recent years, the Waste Management industry has shown a larger relative drop. Some research in determining the tactics used by the industry would be desirable.
- Younger and older age groups may need focused research to determine the causes and solutions.

Objective 3: Reduce Injuries and Illnesses among Contingent Workers

Contingent workers are referred to by a variety of names, including non-standard, temporary help, on-call, direct hire, agency contract, app-based, on-demand, freelancer, and gig workers [GAO 2006, Howard 2016]. Contingent workers do not have an implicit or explicit contract for ongoing employment and do not expect their jobs to last. The Government Accountability Office (GAO) in 2015 estimated the “core contingent” workforce (agency- and direct-hire temps, on-call workers and day laborers) at 7.9% of the workforce (95% CI: +/- 1.7%) [GAO 2015]. This represents about 11 million workers, but does not include independent contractors, self-employed or part-timers with an expectation of stable employment. Occupational hazards can be greater for temporary agency workers because of a lack of clarity about which employer is responsible for their safety and the fact that they are more often likely to be performing a job for the first time. A hazard of temporary work is psychological morbidity possibly being related to job insecurity [Virtanen et al. 2005]. Other hazards are dependent on the work environment at the host establishment, which can be influenced by lack of training, protective measures, and adequate supervision. Temporary agency workers are often employed in Construction and Manufacturing but an article about workers in Washington State, found that temporary agency workers working in the Construction and Manufacturing industries had a rate-ratio that was more than two- to four-fold higher than construction or manufacturing workers in standard work arrangements. For all major injury types suffered by construction and manufacturing temporary agency workers, medical only claims were 88 to 300% higher than those for workers in standard arrangements [Smith et al. 2010].

The Services Sector Council held a webinar where participants identified the following issues that need to be addressed to reduce injuries and illnesses among contingent workers.

- Overlapping vulnerabilities due to the demographics of contingent workers (age, ethnic background, language, gender, educational level, lack of long-term job stability, etc.)
- Lack of information or awareness of hazards
- Lack of evidence-based strategies to address the problem
- Clarifications over the responsibility for complying with health and safety standards. Responsibilities of a staffing company differ from those of an independent contractor, the host employer, and the primary employer
- Evaluation of the host employer's worksite prior to accepting a new host employer as a client, or a new project from a current client host employer

The first three problems can be addressed by the following research considerations:

- Better defining which employees are contingent workers on large, national worker safety and health surveys (including the specific demographics mentioned above);
- Research safety climate, awareness, and risk tolerance (perceptions of susceptibility and severity of risk and health outcomes) on the part of employers and contingent workers;

- Conduct research into the benefits of and barriers to implementing health and safety interventions, including input from all stakeholders (temporary agencies, host employers and workers); and
- Disseminating information about model programs that benchmark best practices in protecting contingent worker safety and health.

Other issues should be addressed by outreach, such as providing model contracts for staffing agencies and potential clients, as well as by providing instruments to guide the evaluation of workplace safety by staffing agencies (e.g. hazards and how best to ensure protection).

Objective 4: Reduce incidence of chronic disease among Services sector workers

Services sector workers are routinely subjected to a wide array of exposures that can lead to chronic disease and illness. Three industries within Services have particularly high rates of illness, and are priorities for research. First, the Personal Care Services component of the sector employs approximately 1.45 million [BLS 2017]. Many of these workers are employed in hair and nail salons and are exposed to a variety of chemicals that potentially cause a number of health effects. Of particular concern are chemical exposures that lead to reproductive toxicity, as these exposures affect women of reproductive age – a large portion of whom work in the hair and nail salon industry. Second, approximately 2.5 million workers employed in building services who are exposed to pesticides and other chemicals [OSHA 2017]. It is suspected that these exposures lead to chronic effects including birth defects, toxicity to a fetus, production of benign or malignant tumors, genetic changes, blood disorders, nerve disorders, endocrine disruption, and adverse reproduction effects [Lorenz 2009]. And finally, automotive technicians are exposed to an array of industrial chemicals including heavy metals contained in break fluids, degreasers, detergents, lubricants, metal cleaners, paints, fuel, solvents, etc., resulting in various consequences, that include: skin disease; asbestosis and mesothelioma; increased risk of cancer; and increased risk of organic brain damage [International Labour Organization 2000].

In the Services sector, 89% of the 3 million related firms have less than 20 employees [US Census Bureau 2011]. These small businesses have little access to health and safety specialists and often employ workers who are young, less educated, and immigrants [Belman and Levine 2004]. These business may have little information on protecting their workers from chronic illnesses and injury, including from occupational chemical exposures. Because of these challenges, the following topics are central in reducing incidence of chronic disease among Services sector workers:

- Studies are needed on the etiology of reproductive hazards from exposure to many of the chemicals used in nail and hair salons.
- Research is needed on methods of effective dissemination to reach employers and employees in the Building Services Industry for the reduction of chemical exposures. Hazards for these workers include pesticides, cleaning compounds, solvents, and degreasing agents. Many of the hazards of these chemicals are known but work is needed to more fully disseminate exposure reduction interventions.
- Conduct evaluations, disseminate results, and provide training materials to Automotive Repair and Maintenance employers and workers on the chemical exposure hazards in the industry including solvent exposures, engine exhaust, isocyanates (during painting), epoxies, and degreasing agents.
- Further surveillance and epidemiological research are needed to characterize the burden of chronic disease to Services sector workers.
- Studies identifying effective outreach methods to these special populations are needed. Since most employers are small and medium-sized businesses, it will be important to nurture alliances with trusted partners and stakeholders.

- Strategies to control the risk of chronic disease among Services sector workers that emphasize engineering controls and best practices for administrative controls and personal protective equipment (PPE) need to be developed.
- Conduct studies on shiftwork and health outcomes such as adverse reproductive health and cardiovascular disease in those industries within Services with a high proportion of non-standards workshifts such as 1) Accommodations, 2) Amusement, Gambling, and Recreation, 3) Food Services and Drinking Places, and 4) Personal Services [NIOSH 2015].
- Conduct evaluations and disseminate information to policy makers and employers about the health hazards of second hand smoke in industries within Services with a high prevalence of exposures such as 1) accommodations, 2) food services and drinking places, 3) rental and leasing services and 4) repair and maintenance [NIOSH 2015].
- The prevalence of asthma among service sector workers is 7.5 compared to 7.2 for all workers [NIOSH 2010]. Considering that the service sector employs over 70 million workers, research on work-related asthma is warranted especially in these industries: Scientific Research and Development Services, Educational Services, Personal Services, and Amusements, Gambling, and Recreation Industries [NIOSH 2010].
- Research on skin exposures and dermatitis should be conducted among workers in the Personal Services and Repair and Maintenance Industries because of the prevalence of potential skin hazards of 52.4% and 51.5%, respectively, compared to 20.5% in all industries [NIOSH 2010].

Objective 5: Reduce hearing loss among Services sector workers

Within the Services sector, there are very large groups of workers with hazardous noise exposure. For instance, 45% are exposed in Repair and Maintenance industry (approximately 900,000 workers); within Arts, Entertainment, and Recreation 22% of workers are exposed to hazardous noise exposure (approximately 550,000 workers); and approximately 13% are exposed within Public Administration (approx. 650,000 workers) [Tak et al. 2009]. Twenty percent of noise-exposed Services workers have a material hearing impairment in one or both ears (overall) [Masterson et al. 2015]. However, among some industries, 23-36% have impairment [Masterson et al. 2013]. Services workers lose 2.6 healthy years, each year, for every 1,000 noise-exposed workers [Masterson et al. 2016]. These lost healthy years are shared among the 13% of noise-exposed services workers with hearing impairment in both ears (about 130 workers out of each 1,000 workers). Over a 30-year working lifetime, about 78 healthy years are lost by 130 workers [Masterson et al. 2016].

The most effective approach for hearing loss prevention is to reduce or eliminate hazardous noise at the source using noise control interventions. However, U.S. employers often do not install engineering noise controls, as they are viewed as complicated and cost-prohibitive to implement. This misunderstanding about the benefits of implementing noise control interventions have led to pervasive and reflexive reliance on hearing protection devices to protect workers' hearing – a strategy proven to be ineffective due to poorly chosen or incorrectly/sporadically worn PPE [Bruce 2008; Suter 2012] . In the Services sector about 43% of noise-exposed Repair and Maintenance industry workers report not wearing hearing protection, as do 26% of noise-exposed workers in Arts, Entertainment, and Recreation, and approximately 22% in Public Administration [Tak et al. 2009].

These data demonstrate a need for research and outreach that emphasizes the following in order to reduce hearing loss of workers in the Services sector:

- Development and promotion of noise control interventions to reduce exposure to noise for Services sector workers.
- Promotion of evidence-based best practices for hearing conservation programs in the Services sector.

- Research regarding hearing protection devices including promotion of fit-testing systems for hearing protectors.
- Further surveillance and epidemiological research regarding the extent of risk of hearing loss/noise exposure for Services sector workers.
- Enhanced outreach to Services sector stakeholders regarding the hazards of noise-induced hearing loss as well as the means to address these hazards.

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