

Key Research Findings from OSHRI, KOSHA

In 2024, OSHRI carried out a wide range of research projects. Among them, key areas of focus included the protection of vulnerable workers, proactive analysis of occupational diseases to support a sustainable development and strengthen the resilience of next-generation leading industries—particularly the secondary battery industry—along with studies utilizing the internal database, and research on the development of in-house patents. The main findings and implications from these core studies are summarized below.

Study on Vulnerable Workers (1): Strategies to Strengthen the Prevention of Occupational Accidents among Foreign Workers

This study presents policy measures to enhance the prevention of occupational accidents among foreign workers through a comparative legal analysis of Germany, the United States, the United Kingdom, and Japan. It also proposes strategies to enhance field-level applicability, encourage active participation, and promote regional-level implementation. In particular, the study suggests activating Korean language education and introducing a certification system for foreign worker integration-friendly enterprises.

[Background of study]

Foreign workers are inherently vulnerable in terms of language and are primarily concentrated in hazardous industries such as small- and medium-sized manufacturing, construction, and livestock sectors. Recently, with the expansion of foreign workforce inflow under the Employment Permit System, it has become urgent to establish measures for the prevention of occupational accidents among foreign workers.

[Implications]

To effectively prevent occupational accidents among foreign workers, it is essential to enhance the usability of safety and health signage, which serves as a key preventive measure. Recent studies have shown positive outcomes from the use of Toolbox Meetings (TBMs), particularly when they incorporate cross-translation features between workers' native languages and Korean, helping to overcome language barriers in the field. Moreover, securing foreign workers' access to occupational safety and health management systems is critical. Encouraging their active participation in safety programs and decision-making processes will contribute to more inclusive and effective workplace safety practices.

Study on Vulnerable Workers (2): Preventive Measures against Occupational Accidents among Special-Type Delivery Workers Engaged in Early-Morning Labor

To improve the working conditions and protect the health of early-morning delivery workers, this study examined their work and self-reported health status through in-depth interviews and surveys. Workers frequently reported incidents such as slips and falls, musculoskeletal disorders, and poor sleep quality. Further research is needed to objectively assess their health conditions and work intensity and to establish legal standards for occupational health protection tailored to their working environment.

[Background of the Study]

Among special-type workers, early-morning delivery drivers are exposed to significant health risks due to night shifts, extended working hours, and extreme weather conditions such as heat waves and cold spells. Despite working under poor conditions, these workers often fall outside the scope of legal protection under the Labor Standards Act and related regulations. Therefore, it is essential to investigate the working and health conditions of early-morning special-type delivery workers and develop proactive health protection measures to prevent occupational injuries.

[Implications]

Policy-Oriented Preventive Measures:

- ▶ Encouraging the establishment of worker rest areas with access to restroom facilities through local government support.
- ▶ Utilization of AI-based health management systems and regional Workers' Health Centers.
- ▶ Designation of joint occupational safety and health managers.
- ▶ Recommendation of weight limits for delivered parcels.

Study on Vulnerable Workers (3): Characteristics and Management Strategies of Hazardous Agents Generated during Cooking Tasks

This study reviewed and summarized literature on the hazardous substances contained in cooking fumes and their health effects. Laboratory experiments were conducted to evaluate the emission characteristics of hazardous agents during cooking tasks and to analyze relevant correlations. Based on both the literature review and laboratory findings, the study proposes qualitative and quantitative assessment methods for cooking fumes. For quantitative evaluation, three indicator substances—particulate matter (PM), formaldehyde, and total volatile organic compounds (TVOCs)—were identified.

[Background of the Study]

In Korea, occupational disease compensation claims for school cafeteria cooks began in 2018. Since lung cancer was officially recognized as a work-related illness in 2021, the number of claims and approved cases has steadily increased, drawing significant public attention. Accordingly, it is necessary to investigate the composition of cooking fumes and their health impacts, and to explore how these issues can be systematically managed under the Occupational Safety and Health Act.

[Implications]

With the recent recognition of occupational cancer (lung cancer) in cooking workers as a work-related illness, the need to manage and protect the safety and health of those engaged in cooking tasks has become increasingly urgent. The study reviewed the potential for incorporating protective measures for cooking workers into the Occupational Safety and Health Act to prevent occupational disease and ensure a safe working environments. Although many epidemiological studies have found low exposure levels to hazardous agents, cooking fumes consist of various harmful substances. Therefore, selecting appropriate indicator substances is essential for indirect management of health hazards. The study suggests that risk assessment should be introduced as a method of managing health hazards such as cooking fumes, enabling the establishment of a self-regulated, preventive safety and health system in cooking workplaces.

Study on Establishing a Sustainable and Resilient Foundation for the Secondary Battery Industry (I): Current Status of the Domestic Secondary Battery Industry and Management Measures for Hazardous Chemicals (III)

The domestic secondary battery industry can be classified into ten sectors: cathode active materials, anode active materials, electrolytes, separators, current collectors, lithium, conductive agents, binders, battery manufacturing, and battery recycling. This study assessed worker exposure levels to particulate metals, graphite, and various solvents (such as dichloromethane and carbonate-based solvents) commonly used in each sector and proposed corresponding workplace management strategies.

[Background of the Study]

With the global rise in IT device usage, the small-sized secondary battery market is rapidly growing. Additionally, due to international carbon emission regulations, the medium- and large-sized battery markets—such as those for electric vehicles and energy storage systems—are expanding

significantly. Until now, research on the secondary battery industry has primarily focused on accident risks such as fires and explosions, while studies on the protection of workers' health have been relatively lacking. This study aims to investigate the circulation structure, processes, and chemicals handled in the secondary battery industry, evaluate worker exposure levels, and provide foundational data for the prevention of occupational diseases.

[Implications]

The study identified the industrial structure, manufacturing processes, and hazardous chemicals used within Korea's secondary battery industry, confirming that workers are exposed to various harmful agents. As the types and levels of hazardous exposure vary across different sectors of the industry, it is necessary for each workplace to establish and implement proactive work environment management strategies tailored to its specific processes, substances handled, and workplace conditions.

Study on Establishing a Sustainable and Resilient Foundation for the Secondary Battery Industry (2): Survey on the Health Management Status of Workers in the Lithium-Based Secondary Battery Industry

This study was conducted to protect workers in the lithium-ion battery manufacturing industry from potential health hazards. It was confirmed that raw materials used in lithium-ion battery production may affect the respiratory system, skin, and cardiovascular system. Based on these findings, the study recommends improvements to worker health examination systems, including the introduction of biological exposure index (BEI) testing.*

* Biological Exposure Index (BEI) Testing: A method to evaluate internal absorption or potential health impacts caused by hazardous substances by analyzing the presence of such substances or their metabolites in biological samples like blood or urine.

[Background of the Study]

With the expansion of related industries such as electric vehicles and energy storage systems, the production volume of secondary batteries is expected to increase continuously. The manufacturing process of lithium-ion batteries involves not only designated hazardous substances requiring special health checkups—such as nickel, cobalt, manganese, and dichloromethane—but also various other materials like lithium and carbonate solvents whose long-term health effects have not yet been clearly identified. There is a need to support domestic companies in the secondary battery sector by enabling them to operate safely through timely assessments and proactive responses to potential risk factors.

[Implications]

Workers involved in the manufacturing and recycling of lithium-ion batteries face elevated risks of respiratory and skin-related diseases. To better protect the health of workers, it is necessary to improve current occupational health examination systems, including the implementation of biological exposure index testing. Long-term health impacts of hazardous agents used in lithium-ion battery production should be systematically considered and managed.

Study Utilizing Internal Databases: Strategies for Exposure Monitoring and Risk Assessment Using the Work Environment Measurement Database (II)

This study reviewed hazardous substances associated with occupational diseases as specified in the Occupational Safety and Health Act and the Serious Accidents Punishment Act. Based on this review, 54 target substances were selected for analysis. The study assessed exposure status by hazardous agent and identified high-risk industries at the sub-industry level.

[Background of the Study]

Under the Occupational Safety and Health Act, employers are required to conduct work environment measurements to ensure a safe working environment and to protect workers' health. The results of these measurements must be submitted to the Ministry of Employment and Labor and are continuously accumulated in the Korea Occupational Safety and Health Agency's (KOSHA) database. However, the use of these data for comprehensive analysis and policy development has remained limited. Therefore, this study aims to explore how to extract and utilize meaningful information from the accumulated database for practical application.

[Implications]

Through analysis of the accumulated database, this study successfully identified measurement trends for each hazardous agent and pinpointed high-risk industries. Follow-up studies involving more detailed analysis by substance, and cross-comparisons between agents, are needed to extract more refined and meaningful information for use in risk assessment and workplace health and safety strategies.

Proprietary Technology Development Study: Strategies for Expanding On-Site Applicability of the Korean Safety Ladder (K-Ladder)

As part of efforts to prevent ladder-related accidents, this study aimed to promote the broader use of the Korean Safety Ladder (K-Ladder), a safety ladder model developed in Korea. The study incorporated feedback from users and the industrial sector to propose improved designs and industry-specific variations, thereby facilitating wider adoption and fostering a culture of safe ladder use in workplaces.

[Background of the Study]

Ladders are widely used both at home and in industrial sites—not only as means for ascent and descent, but also as working platforms for tasks at

height. However, due to structural instability and inadequate safety practices by users, ladder-related accidents claim approximately 35 lives annually in Korea. In response, the Korea Occupational Safety and Health Agency (KOSHA) developed and began distributing the Korean Safety Ladder (K-Ladder) as a preventive measure. However, widespread adoption has been limited due to factors such as workers' familiarity with conventional A-frame ladders and the lack of diverse models suited to specific job requirements. This study seeks to address these challenges by presenting improved models and specialized designs that reflect the needs of users and industries, thereby enhancing on-site applicability and contributing to more effective accident prevention.

[Implications]

By proposing strategies to promote the use of the K-Ladder, developed to prevent ladder-related accidents at industrial sites, the study contributes to the establishment of a proper ladder safety culture. This case also serves as a model for the development of innovative safety technologies aimed at preventing accidents in high-risk environments where regulatory compliance is often lacking. Furthermore, the newly developed safety technology may be provided free of charge to relevant small and medium-sized enterprises, contributing to mutual growth and the revitalization of the commercial safety equipment market.