

Abstract

Statistical Analysis of Domestic Work Environment Monitoring Big Data

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1. Objective

The aims of this study is to analyze domestic work environment monitoring database that has been accumulate for 13 years, from 2002 to 2014. Variables for this assessment includes monitoring years, hazardous agents, administrative districts, business sectors, and the size of businesses.

2. Methods

This study was conducted by following methodologies:

(1) Among hazardous chemicals that should be monitored periodically at work environments, 107 were selected for statistically analysis for this study, which includes 61 monitoring agents that had abundant measurement numbers. For physical hazards noise and high temperature were also selected.

(2) Microsoft spreadsheet program (Excel) could successfully extract monitoring data from the database system in the Korea Occupational Safety and Health Agency (KOSHA), Occupational Safety and Health Research Institute (OSHRI). Each agent allocated to one Excel file with 13 worksheets for yearly measured data separately. In the context of a worksheet, one row represented a single measurement value(8-hr TWA) that arranged according to administrative district, business sector, and the size of business along the column.

(3) In case of chemical agents, extreme measurement values that exceeded 3 to 5 times of occupational exposure limits set by the Korea Ministry of Employment and Labor (KMOEL- OEL) and that were 1,000 to 10,000 times lower than KOEL were filtered by ordered data for each worksheet. For noise measurement levels below 80 dB(A) and above 120 dB(A) were excluded. Incase of heat data analysis range was 20~50°C as WBGT.

(4) Arithmetic means and standard deviations were calculated for each measurement agent by considering monitoring years, districts, business sectors, and business sizes.

3. Results

(1) Most abundantly measured chemical agent was iron oxide and fume followed by manganese and its inorganic salts, toluene, titanium dioxide, isopropyl alcohol, xylene, acetone, copper(fume), sodium hydroxide, and methylethyl ketone by descending order.

(2) Average concentration levels for 107 monitoring agents recorded lower than about 5 to 10% of KMOEL-OEL. As year passed, agents which had

been changed KOEL showed decreasing trend in mean values.

(3) For chemical agents, some administrative districts including Taebaek, Yangsan, Tongyoung, Jinju, and Euljeongbu held slight higher mean values for certain chemical agents. Also some business sectors including coalmine etc. and business sizes showed a little elevated mean values for certain measurement agents.

(4) Annual average levels ranged from 86.2 to 87.2 dB(A) for noise and from 24.5 to 25.2 °C for WBGT. The annual noise levels goes down slightly while WBGT levels is in stagnation.

4. Conclusion

As mean values, domestic work environment monitoring data for 107 monitoring chemical agents showed less than 5 to 10% of KMOEL-OEL. Some business sectors and administrative districts held higher exposure levels compare with other sectors or districts for certain agents. Management options including engineering controls might be polished for the sectors and/or districts. Average noise and WBGT levels were also lower than various exposure limits.

Key words : work environment monitoring, big data, chemical agent, noise, WBGT