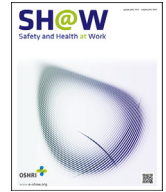




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Original Article

Workplace Accidents and Work-related Illnesses of Household Waste Collectors



Byung Yong Jeong*, Sangbok Lee, Jae Deuk Lee

Department of Industrial and Management Engineering, Hansung University, Seoul, Republic of Korea

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ABSTRACT

Background: Household waste collectors (HWCs) are exposed to hazardous conditions. This study investigates the patterns of workplace injuries and work-related illnesses of HWCs.

Methods: This study uses cases of workplace injuries and work-related illnesses of HWCs that occurred between 2010 and 2011. We analyzed 325 cases of injuries and 36 cases of illnesses according to the workers' age, length of employment, size of workplace, injured part of body, day and month of injury, type of accident, agency of accident, and collection process.

Results: There were significant differences in the effect of workers' length of employment, injured part of body, type of accident, agency of accident, and collection process. Results show that most injuries occur in workers in their 50s and older. This study also shows that 51.4% of injuries occur at businesses with 49 employees or fewer. Injuries to waste collectors happen most often when workers are electrocuted after slipping on the ground. The second most prevalent form of injury is falling, which usually happens when workers hang from the rear of the truck during transportation or otherwise slip and fall from the truck. Work-related illnesses amongst waste collectors are mostly musculoskeletal conditions due to damaging postures.

Conclusion: These findings will be instructive in devising policies and guidelines for preventing workplace injuries and work-related illnesses of HWCs.

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1. Introduction

According to Korea Standard Industry Code (KSIC) [1], the waste management industry includes traditional services such as collecting waste from households, public spaces, and businesses, and then transporting them to recycling, incineration, or landfill. The waste management services industry has multiple areas: collection and transportation of waste materials; treatment of waste materials; recycling; cleaning business facilities, and industrial supplies. The waste collection and transportation industry is further classified into: collection and transportation of nontoxic waste from households and businesses; collection and transportation of toxic waste from industrial sites which require special handling; and collection of transportation of waste from construction sites (e.g., disassembled building material). The treatment industry is further classified into: treatment of nontoxic waste by containment in

landfills or incineration; treatment of toxic waste such as biological or medical waste matter; and treatment of construction industry waste. The recycling industry is classified into: recycling waste matter into metal materials; and recycling waste matter into nonmetal materials.

Meanwhile, the Korean Standard Classification of Occupations [2] classifies waste collection occupations into: sanitation workers; collectors of recycled matter; and others. Waste management occupations are classified into: recycling equipment operators, incinerator operators, and others.

In the waste management industry, the accident rate has increased from 1.27 to 1.37 from 2010 to 2011, and the fatality rate has actually increased from 2.57 to 2.67 during the same period [3]. It is known that waste collectors are exposed to various accidental risks, such as traffic accidents by waste vehicles, caught in and between the trash compressor, cut/puncture by sharp waste

* Corresponding author. Department of Industrial and Management Engineering, Hansung University, 116 Samseongyoro-16Gil, Seongbuk-Gu, Seoul, 02876, Republic of Korea.

E-mail address: byjeong@hansung.ac.kr (B.Y. Jeong).

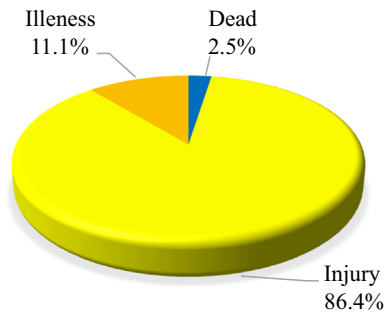


Fig. 1. Distribution of injuries and illnesses.

materials, slipping, or falling down [4–6]. In addition, garbage collectors repeatedly bend over to lift and deliver heavy wastes, thus, it is associated with a high prevalence rate of musculoskeletal disorders [7].

Domestic waste management services are generally provided by local government authorities. In Republic of Korea, household waste collectors are employed by private consignment companies, which are commissioned by local government, while street cleaners are involved in local government agencies. As household commodities come in various types and materials, the types and quantities of waste vary. There is little awareness or attention for waste-collection workers while the social and public role of them expands [8,9]. Furthermore, under the international agreements on recycling, intermediate treatment and selection of the waste gets complicated [10]. Therefore, a general purposed preventive plan is required [9], based on analyzing accidents and injuries-related data for waste-collection workers. This study aims to investigate the characteristics of occupational accidents and work-related injuries of household waste collectors.

2. Materials and methods

2.1. Definition and data collection

The term household waste, refers to municipal solid wastes from houses, which are very often the responsibility of municipal or other governmental authorities. In this paper 'household waste collectors' are people who collect the standard plastic garbage bag, excluding those who collect food waste and recyclable waste.

This study investigated 325 male workers who have suffered injury or illness while collecting waste between 2010 and 2011. Our focus was on workers who lost > 4 days of work due to illness or injury. Fig. 1 shows the distribution of these workers: 2.5% suffered fatalities, 86.4% suffered injuries, and 11.1% suffered work-related illnesses.

2.2. Data analysis

Accident data for injured persons were analyzed in terms of their age and length of employment, injured part of body, accident type, operating process, and agency of accident. The independent variables of the study include age, length of employment, size of workplace, day and month of injury, type of injury, agency of accident, operating process, and physical location of injury. The dependent variable is the distribution of injuries and illnesses incurred by workers. In order to see whether the distribution of injuries and illnesses vary according to the explanatory variables, we used SPSS (SPSS Inc., Chicago, IL, USA) to run a Chi-square test, considering p values < 0.1 as statistically significant.

Table 1
Distribution of injuries and illnesses by length of employment

Length of employment (y)	Injury		Illness		Total	
	No.	%	No.	%	No.	%
< 1	77	26.6	6	16.7	83	25.6
1–5	73	25.3	8	22.2	81	24.9
5–10	65	22.5	15	41.7	80	24.6
≥ 10	74	25.6	7	19.4	81	24.9
Total	289	100	36	100	325	100

3. Results

3.1. Characteristics of injured persons

3.1.1. Distribution by length of employment

Table 1 shows the distribution by worker's length of employment. It shows the length-distributions between injured and ill persons are different with confidence level 0.1 ($\chi^2 = 6.636$, $p = 0.084$). From Table 1, there is less difference in accident rates according to work experiences, because this job may not require complicated techniques. Meanwhile, the rate of work-related illnesses varies along with the work experiences. A total of 41.7% of the illnesses occurred in workers with 5–10 years of experience.

3.1.2. Distribution by age

Fig. 2 shows the distribution of the ages of workers who incurred injury or illness. Men in their 50s were the most common (46.7%), followed by men in their 40s (28.0%) and 60s and over (14.2%). Men in their 50s or older are 60.9% of the total. It implies that older workers are vulnerable to accidents because the workers have to keep moving around, work on their feet all day, and hold plastic garbage bags, which are not easy to handle. These cause tiredness and loss of concentration. There was no particular difference in the effect of age on injuries and illnesses ($\chi^2 = 5.686$, $p = 0.128$).

3.1.3. Distribution by size of employment

Fig. 3 shows the distribution by size of employment. Workplaces employing > 100 employees were most common (30.8%), followed by workplaces employing 10–29 people (27.7%), then workplaces employing 50–99 people (17.8%). There was no significant effect of workplace size on the distribution of illnesses and injuries ($\chi^2 = 1.197$, $p = 0.751$). Household waste is collected and transported by businesses to which the responsibility has been outsourced by municipal governments, and it seems that small businesses with < 50 employees are not educated properly in safety precautions and measures. This is an area in need of improvement.

3.1.4. Distribution by injured part of body

Table 2 shows the distribution of the physical locations of injuries. Multiple injuries denote any case in which there were

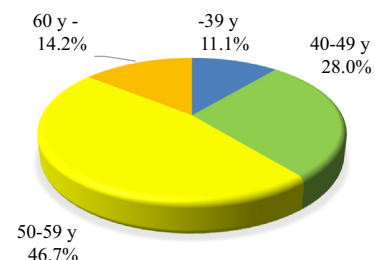


Fig. 2. Distribution of injuries and illnesses by age.

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