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ISIC

RESEARCH ARTICLE

Compensation for Asbestos-Related Diseases in Japan: Utilization of Standard Classifications of Industry and Occupations

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Abstract

Background: Asbestos-related diseases (ARD) are occupational hazards with high mortality rates. To identify asbestos exposure by previous occupation is the main issue for ARD compensation for workers. This study aimed to identify risk groups by applying standard classifications of industries and occupations to a national database of compensated ARD victims in Japan. **Methods:** We identified occupations that carry a risk of asbestos exposure according to the International Standard Industrial Classification of All Economic Activities (ISIC). ARD compensation data from Japan between 2006 and 2013 were retrieved. Each compensated worker was classified by job section and group according to the ISIC code. Risk ratios for compensation were calculated according to the percentage of workers compensated because of ARD in each ISIC category. **Results:** In total, there were 6,916 workers with ARD who received compensation in Japan between 2008 and 2013. ISIC classification section F (construction) had the highest compensated risk ratio of 6.3. Section C (manufacturing) and section F (construction) had the largest number of compensated workers (2,868 and 3,463, respectively). In the manufacturing section C, 9 out of 13 divisions had a risk ratio of more than 1. For ISIC divisions in the construction section, construction of buildings (division 41) had the highest number of workers registering claims (2,504). **Conclusion:** ISIC classification of occupations that are at risk of developing ARD can be used to identify the actual risk of workers' compensation at the national level.

Keywords: Risk- ratio- compensation- asbestos related diseases- mesothelioma- occupation- ISIC

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Introduction

Asbestos-related diseases (ARD) are occupational diseases with high mortality rates that are caused by asbestos exposure. The WHO has identified all forms of asbestos as being carcinogenic. Asbestos exposure can occur either through working directly with the material, or from exposure to nearby asbestos sources. Numbers of ARD patients are estimated by the amount of national asbestos consumption (Lin et al., 2007). The mortality rates from all types of mesothelioma were significantly related to previous national levels of asbestos consumption. For example, a population that lived closed to a fibrous cement factory in Spain had an incidence rate of ARD of 35.5 cases per 100,000 population (Tarrés et al., 2009).

Although some countries have banned asbestos completely, the numbers of ARD patients continues to increase due to its long latency period (Lacourt et al., 2012). The main issue of ARD is compensation for asbestos exposure in workers or people who have lived nearby. In Japan, the so-called "Kubota Shock" led to many patients coming forward with ARD in the city of Amagasaki in Hyogo prefecture. ARD patients and their physicians have been faced with the problem of asbestos exposure identification in the past two or three decades, which would allow them to receive compensation.

The International Standard Industrial Classification of All Economic Activities (ISIC) is a universal list of industries. It has been shown to be satisfactory in identifying occupations at risk for asbestos exposure (Pilorget et al., 2003). Referring to 425 questionnaires, occupations were coded using ISIC by two coders. The

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kappa correlation coefficient was 0.64. To our knowledge, there are no reports using ISIC items as a tool to identify industries and occupations frequently compensated for ARDs. This study aimed to identify such industries and occupations by applying the standard classifications of industries and occupations to a national database of compensated ARD victims in Japan.

Materials and Methods

Identification of occupations that carry a risk of asbestos exposure according to ISIC There were 6 steps involved in identifying occupations that carry a risk of asbestos exposure, as follows:

Step 1. We consulted a document (in Japanese) produced by the Japanese Ministry of Health, Labour and Welfare that described occupations in which there are potential risks of asbestos exposure. We then added other occupations that have been reported by other sources, such as websites, papers, books, etc., to carry this risk.

Step 2. The list of occupations was translated from Japanese into English.

Step 3. The ISIC was used to classify the occupations or industries.

Step 4. The ISIC code(s) for each occupation was determined.

Step 5. The layout was created based on the ISIC classification codes.

Step 6. All of the ISIC occupations and industries in which there was a risk of asbestos exposure were listed and counted.

ISIC consists of four levels and 21 sections (A through U), 88 divisions, 238 groups, and 419 classes. Each item is coded as one letter plus four digits. For example, the code B 0891 can be interpreted as follow: B represents mining and quarrying, 08 indicates “other mining and quarrying” (division), 9 indicates mining and quarrying n.e.c. (group), and 1 indicates mining of chemical and fertilizer minerals (class).

Real compensation data for occupations that carry the risk of asbestos exposure

There are two types of ARD compensation programs in Japan: Workers compensation and relief compensation. Workers’ Compensation is administered by the Ministry of Health, Labour and Welfare, and Relief Compensation is administered by the Environmental Restoration and Conservation Agency under the Ministry of the Environment. The latter is for ARD cases not covered by Workers’ Compensation. The workers compensation is due to occupational exposure, while the relief compensation is from environmental exposure. ARD in this study included mesothelioma, asbestos-related lung cancer, asbestosis, benign asbestos pleural effusion, and diffuse pleural thickening. Benign asbestos pleural effusion is only covered by the Workers Compensation. This study focused only on Workers Compensation, which is more specific to direct asbestos exposure.

ARD compensation data from Japan between 2006 and 2013 were retrieved. Each compensated worker was classified by job section and group according to the ISIC code, which provided the total number of compensated patients at each level of ISIC.

Estimated of risk for compensated ARD by ISIC

The population of workers in 2010 was used as the population at risk. This assumes that the worker population did not vary significantly from year to year. The number of workers in 2010 was obtained from the Labour Force Survey by the Statistics Bureau, the Ministry of Internal Affairs and Communications, Item 14: “Work Force by Industry/Job”. The percentages of workers in each ISIC category were tabulated. Then, risk ratios for compensation were calculated dividing the percentage of workers compensated because of ARD in the ISIC category, by the percentage of workers in that particular category. The risk ratios of compensation were calculated for ISIC sections and divisions that had available data.

Results

In total, there were 6,916 workers with ARD who received compensation in Japan between 2008 and 2013.

Table 1. Numbers of Workers Compensated for Asbestos Related Diseases (ARD), Workers' Population and Compensated Risk Ratios by Level of "Section" of the International Standard Industrial Classification of All Economic (ISIC)

ISIC sections	Workers compensated for ARD		Workers' population		Compensated risk ratio
	n = 6,916	%	N = 62,570,000	%	
B: Mining and quarrying	9	0.0%	30,000	0.005%	2.6
C: Manufacturing	2,868	41.5%	10,480,000	16.8%	2.5
D: Electricity, gas, steam and air conditioning supply	37	0.5%	340,000	0.5%	1.0
E: Water supply; sewerage, waste management and remediation activities					
F: Construction	3,463	50.1%	4,980,000	8.0%	6.3
H: Transportation and storage	177	2.6%	3,500,000	5.6%	0.5
Others (A, G, I to U)	362	5.2%	43,240,000	69.1%	0.1

ARD, asbestos related diseases; compensated ratio equals percentage of compensated ARD workers/percentage of workers in each section

Table 2. Numbers of Workers Compensated for Asbestos Related Diseases (ARD), Workers' Population and Compensated Risk Ratios by Level of "Manufacturing Section (Section C)" of the International Standard Industrial Classification of All Economic (ISIC)

ISIC divisions	Workers compensated for ARD		Workers' population		Compensated risk ratio
	n = 2,868	%	N = 11,470,000	%	
10 Food products	16	0.2%	1,360,000	2.2%	0.1
13-14 Textiles and wearing apparel	119	1.7%	540,000	0.9%	2
16 Wood products	40	0.6%	150,000	0.2%	2.4
17 Paper products	31	0.4%	270,000	0.4%	1
18 Printing	2	0.0%	500,000	0.8%	0
20, 21 Chemical products etc.	265	3.8%	580,000	0.9%	4.1
23 Non-metallic mineral products	428	6.2%	330,000	0.5%	11.7
24 Basic metals	215	3.1%	410,000	0.7%	4.7
25 Fabricated metal products	167	2.4%	980,000	1.6%	1.5
27 Electrical equipments	87	1.3%	630,000	1.0%	1.2
28 Machinery equipments	267	3.9%	1,390,000	2.2%	1.7
29, 30 Transport equipments	1,142	16.5%	1,000,000	1.6%	10.3
Other manufacturing	89	1.3%	1,350,000	3.7%	0.3
Total	2,868	41.5%	11,470,000	16.8%	2.5

ARD, asbestos related diseases; compensated ratio equals percentage of compensated ARD workers/percentage of workers in each division

Table 3. Numbers of Workers Compensated for Asbestos Related Diseases (ARD), Workers' Population and Compensated Risk Ratios by Level of "Construction Section (Section F)" of the International Standard Industrial Classification of All Economic (ISIC)

ISIC divisions	Workers compensated for ARD		Workers' population		Compensated risk ratio
	n = 6,916	%	N = 62,570,000	%	
41 Construction of buildings	2,504	NA	NA	NA	NA
42 Civil engineering	35	NA	NA	NA	NA
43 Specialized construction activities	804	NA	NA	NA	NA
Others	120	NA	NA	NA	NA
Total	3,463	50.1%	4,980,000	8.0%	6.3

ARD, asbestos related diseases; compensated ratio equals percentage of compensated ARD workers/percentage of workers in each division; NA, not available

ISIC classification section F (construction) had the highest compensated risk ratio of 6.3 (Table 1). Section C (Manufacturing) and section F (Construction) had the largest number of compensated workers (2,868 and 3,463 workers, respectively) as shown in Table 1.

In the manufacturing section (section C), 9 out of 13 divisions had a risk ratio of more than 1. Division 23 (non metallic mineral products) had the highest risk ratio at 11.7 (Table 2). For ISIC divisions in the construction section (Table 3), construction of buildings (division 41) had the highest number of workers registering claims (2,504 workers).

Discussion

This study showed that using ISIC to analyse jobs that have an asbestos exposure risk allows for the estimation of risk ratios of compensation by job category (Swuste et al., 2008). This is a useful tool, because the magnitude of the risk ratios can be used to identify the risk of a worker for developing ARD. This can inform the development of health surveillance strategies for certain job categories (van Oyen et al., 2015).

The highest compensated risk ratio was in section F (construction), in which workers are still being exposed to asbestos during maintenance, renovation, and asbestos removal from buildings with asbestos containing products (Teschke et al., 2002). Only section C (manufacturing) had all the data required to estimate compensation risk ratios for each division (Table 2). Almost all divisions (9/13; 69.2%) in this category had a compensation ratio above 1, indicating a high rates of ARD worker compensations (Table 2). Divisions with compensation ratios above 1 suggest that those particular jobs have a higher risk of both ARD and levels of compensation compared to other ISIC categories.

One of the strengths of this study was that the estimates were based on actual statistics obtained from official databases from Japan. Compensation risk ratios can be used by workers, physicians, and decision makers to identify ISIC job categories in which workers are at high risk of ARD. Jobs that match with the standard ISIC

classification can be compensated.

There are some limitations to this study. The risk ratios for ARD compensation could be underestimated because of the standardized worker population used. The population of workers from 2010 was used as the reference value to estimate compensation risk ratios, which could differ with the population of the period studied (2008-2013). However, the population in Japan does not vary significantly from year to year. Furthermore, the proportion of workers in the mining section was low because of the asbestos ban that was implemented in Japan in 2005. Additionally, compensation risk ratios could not be calculated for all ISIC class levels because of the lack of data. Secondly, the results of this study may or may not universally apply to other countries. Finally, there could be some job misclassification in ISIC categories (Cicioni et al., 1991; Pilorget et al., 2003).

ISIC classification of occupations that are at risk of developing ARD can be used to identify the actual risk of workers' compensation from ARD at the national level.

Competing interests

None to declare.

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