

# Factors associated with occupational accidents during part-time work among international students in Japan

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**Abstract:** This study investigated the status of and risk factors for occupational accidents occurring during part-time work among international students in Japan. In total, 390 international students who had registered with an online survey company were invited to participate in a cross-sectional study using an online self-administered questionnaire in October 2020. Multiple regression analysis was performed to evaluate factors associated with accidents with absence from work. Among 311 participants, 126 (40.5%) had experienced an occupational accident at their part-time job in the past year, and 27 (8.7%) had lost working days because of accidents. The likelihood of accident with work absence was significantly higher among those with high income (adjusted odds ratio [OR] = 4.39, 95% confidence interval [CI]: 1.57–12.24) and language barrier (adjusted OR = 2.37, 95% CI: 1.03–5.47). International students experienced occupational accidents relatively frequently. These results provide insight to guide occupational safety measures for migrants.

**Key words:** Foreigner, Japan, Migrant, Occupational accident, Occupational injury

Migrant workers are often considered a vulnerable population in society<sup>1</sup>). In Japan, international students and technical interns make up a major group of migrant workers. The number of migrants reached 1.65 million in 2019, with an increasing trend, especially among those from China, Vietnam and the Philippines<sup>2</sup>). The Japanese government does not permit migrants to engage in unskilled la-

bour; therefore, migrants who seek unskilled labour chose either ‘study abroad’ (international students) or ‘technology transfer’ (technical interns) as a pretext. It has been reported that some of these migrants have absconded or been exploited under conditions of forced labour, especially among those who borrowed a great deal of money from brokers to come to Japan<sup>3</sup>).

Migrant workers have a higher risk of occupational accidents compared with native workers because of the hazardous environments associated with low-paid jobs. A systematic review has reported that migrant workers are involved

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in occupational accidents twice as often as native workers, especially for falls, eye injuries and cuts<sup>4</sup>). Many risk factors for occupational accidents among migrant workers have been identified, including age<sup>4</sup>, sex<sup>4</sup>, occupation<sup>4</sup>, language barrier<sup>5</sup> and education<sup>6</sup>. In Japan, the number of occupational fatalities and injuries among domestic migrant workers steadily increased from 1,055 in 2009 to 3,928 in 2019, along with an increase in the number of migrants<sup>7</sup>). However, little quantitative work has explored the current circumstances and risk factors among migrant workers in Japan.

National-level evidence is important for developing occupational health and safety strategies to reduce occupational accidents among migrants. A single case report described the work ability of technical interns with specific diseases<sup>8</sup>). Clearly, further investigation is needed to clarify the situation regarding occupational accidents among migrants, especially international students. In Japan, international students are legally permitted to engage in part-time employment, working a maximum of 28 h/wk<sup>9</sup>), but occupational accidents have not been well evaluated in this group. Therefore, the purpose of this study was to investigate the status of and risk factors for occupational accidents occurring at part-time jobs among international students in Japan.

The current study used a cross-sectional design with an online self-administered questionnaire. The target population was international students in Japan. International students who had registered with an online survey company were invited to participate in the present study. The inclusion criteria were (1) being aged 18 yrs or older; (2) coming from an Asian country; (3) holding a student visa; (4) working as a part-time employee for at least 1 yr and (5) understanding Japanese used in everyday situations to a certain degree (Japanese-Language Proficiency Test level N3 or equivalent). In total, 390 students met these criteria, and the online survey company invited them to participate in the study via email from 8 to 19 October 2020. The participants accessed a website linked in the email, where they responded the questionnaire. All participants were given an informed consent document, which was included in the invitation email in both Japanese and English. Participation was fully voluntary, and the information was collected anonymously with no personal details. The study was approved by the Ethics Committee of the University of Occupational and Environmental Health, Japan (R2-024).

All questions were written in plain Japanese, with Chinese characters provided as ruby characters to aid understanding. The questionnaire included sex, age, national ori-

gin, duration of stay abroad, type of school, industry, monthly income, and verbal communication ability in the host language. Industry was classified as sales (e.g., shops), food service (e.g., restaurants), or other (e.g., factories, construction sites, hotels, or other services). Monthly income was assessed by asking about part-time job income, and this variable did not include other income such as scholarships. Monthly income was categorized as < 100,000 yen, 100,000–159,999 yen or ≥ 160,000 yen. In Japan, the average minimum wage in 2020 was 902 yen/h nationwide, with the highest hourly earnings found in Tokyo (1,013 yen/h). Verbal communication ability in the host language was assessed by asking about perceptions of language barriers at work, with responses given on a four-point Likert-type scale.

Occurrence of an occupational accident, the outcome variable, was measure by asking, ‘Have you ever been injured during your part-time job in the past year, and, if so, how seriously?’ The participants chose a response from the following four options: *none*, *accident with no work absence*, *accident with 1–3 days’ work absence* and *accident with at least 4 days’ work absence*.

Frequencies and proportions for all variables were calculated by the occurrence of occupational accidents. We merged the responses of *accident with 1–3 days’ work absence* and *accident with at least 4 days’ work absence* into ‘accident with work absence’ because of the small number of participants giving the latter response ( $n=1$ ). The outcome variable of occupational accident occurrence was then dichotomized as accident with work absence (accident with 1–3 days’ absence or accident with at least 4 days’ absence) and other (none or accident without work absence) for the subsequent analyses. The chi-square test, Fisher’s exact test and multiple logistic regression analysis were performed to calculate crude and adjusted odds ratios (ORs) and 95% confidence intervals (CIs) for the factors associated with experiencing an accident with work absence. We adjusted for sex and age in the adjusted model to allow for comparisons without the effect of differences in the sex and age distributions. Goodness of fit was assessed using the Hosmer–Lemeshow test. Two-tailed tests were applied, and statistical significance was set at  $p=0.05$ . All analyses were performed using Stata/SE 16.1 (StataCorp, College Station, TX, USA).

In results, Table 1 shows the characteristics of the study participants by the occurrence of occupational accidents in the past year. A total of 311 participants completed the questionnaire (response rate = 79.7%). The majority of the participants were female (57.9%), aged 23–26 yrs (52.7%)

and came from an East Asian country (73.3%). Fifty-three (17.0%) were students at Japanese language schools. Monthly income of 160,000 yen or higher was observed in one-tenth of the participants ( $n=29$ , 9.3%). Around half reported having very poor or poor verbal communication ability in the host language at work ( $n=147$ , 47.3%). Regarding occupational accidents, 99 participants (31.8%) had experienced an accident without work absence, 27 (8.7%) had experienced an accident with work absence. Thus, a total of 126 (40.5%) had experienced occupational accidents in the previous year.

Table 2 displays factors associated with experiencing an accident with work absence at part-time jobs among international students. In the univariate model, experiencing an accident with work absence was positively associated with monthly income of 160,000 yen or higher ( $p=0.004$ ) and poor or very poor verbal communication ability ( $p=0.035$ ). However, other variables, such as sex and age, were not associated with experiencing an accident with work absence. In the adjusted model, the odds of having experienced an accident with work absence were higher for participants with monthly incomes of 160,000 yen or higher than for those with monthly incomes of less than 100,000 yen (adjusted OR = 4.39, 95% CI: 1.57–12.24). In addition, poor or very poor verbal communication ability was more likely to experience an accident with work absence, compared with good or very good verbal communication ability (adjusted OR = 2.37, 95% CI: 1.03–5.47). The Hosmer–Lemeshow test confirmed the goodness of fit of the adjusted model ( $p>0.20$ ).

To the best of our knowledge, this is the first study to evaluate the status of and risk factors for occupational accidents among domestic migrants in Japan. We found that 40.5% of international students had experienced an occupational accident at their part-time job in the past year, and 8.7% had lost working days because of such accidents. Experiencing an accident with work absence was positively associated with high income and language barrier. Similar results were observed in both the univariate and the adjusted models. Therefore, we can assume that these findings are consistent, regardless of the sex and age distributions. Further systematic occupational surveillance for migrants is needed to verify these results, which could contribute to developing and implementing policies to protect migrants' health and wellbeing.

The current study found that international students experienced a relatively high frequency of occupational accident (40.5%), compared with the results of previous relevant studies of minor accidents in Japan<sup>10, 11</sup>). A recent study

of full-time native workers in Japan reported that only 1.6% had experienced an accident with work absence and that only 2.4% had experienced an accident without work absence in the previous year<sup>10</sup>). In contrast, a previous study of kitchen workers in Japan, most of whom were part-time workers, reported that 15.8% had experienced burn injuries and that 23.8% had experienced cut injuries in the previous year<sup>11</sup>). A meta-analysis has suggested that migrant workers often engage in hazardous work and that 22% of these workers experience at least one occupational injury<sup>4</sup>). Although these results cannot be compared directly with the present study because of differences in the industries, work details and backgrounds of the study populations, the findings suggest that international students may be engaged in risky jobs.

The present study revealed a positive association between high income and experiencing an accident with work absence among international students. This result needs to be evaluated from two key angles. First, it is natural that the probability of occupational accidents increases with long working hours, especially in risky jobs<sup>12</sup>). Fatigue and stress caused by overwork while studying and working two or three part-time jobs may be additional risk factors for occupational accidents among international students<sup>10</sup>). Another consideration is the possibility of illegal overwork. Having an illegal contract is known to be an important determinant of negative health outcomes among migrant workers<sup>13</sup>). We set the monthly income categories to be roughly aligned with the estimated working hours of < 25 h/wk (< 100,000 yen/month), 25–40 h/wk (100,000–159,999 yen/month) and  $\geq 40$  h/wk ( $\geq 160,000$  yen/month). Therefore, international students who earned 160,000 yen or more per month might have been working in excess of the legal limit of 28 h/wk. Employers are required to implement fair recruitment policies and management to ensure appropriate working hours for international students.

Social factors including language barriers are also key causes of occupational accidents. The current study found a positive relationship between language barrier and experiencing an accident with work absence. This problem is not unique to Japan; a previous study in the United States have shown that migrant workers with low levels of English skills were more likely to work in hazardous jobs compared with American citizens<sup>5</sup>). Language barriers also contributed to post-injury behaviour. Migrant workers delay injury reporting and rarely receive compensation<sup>14</sup>); this is compounded by a lack of access to health care, as well as difficulties with handling accident procedures and negotiation with employers. Thus, previous work suggests that there

Table 1. Characteristics of the study participants by experience of an occupational accident in the past year

	Overall		No accident or minor accident (accident without work absence)		Accident with work absence	
	N=311 (100.0%)	Total n=284 (91.3%)	No accident n=185 (59.5%)	Minor accident n=99 (31.8%)		
Sex, n (%)						
Female	180 (57.9)	165 (58.1)	111 (60.0)	54 (54.5)	15 (55.6)	
Male	131 (42.1)	119 (41.9)	74 (40.0)	45 (45.5)	12 (44.4)	
Age, n (%)						
19-22 yrs	50 (16.1)	45 (15.8)	27 (14.6)	18 (18.2)	5 (18.5)	
23-26 yrs	164 (52.7)	149 (52.5)	95 (51.4)	54 (54.5)	15 (55.6)	
≥27 yrs	97 (31.2)	90 (31.7)	63 (34.1)	27 (27.3)	7 (25.9)	
National origin, n (%)						
East Asia	228 (73.3)	210 (73.9)	139 (75.1)	71 (71.7)	18 (66.7)	
Southeast Asia/South Asia	83 (26.7)	74 (26.1)	46 (24.9)	28 (28.3)	9 (33.3)	
Duration of stay abroad, n (%)						
1 yr	86 (27.7)	77 (27.1)	47 (25.4)	30 (30.3)	9 (33.3)	
≥2 yrs	225 (72.3)	207 (72.9)	138 (74.6)	69 (69.7)	18 (66.7)	
Type of school, n (%)						
College/University/Graduate school	258 (83.0)	237 (83.5)	164 (88.6)	73 (73.7)	21 (77.8)	
Japanese language school	53 (17.0)	47 (16.5)	21 (11.4)	26 (26.3)	6 (22.2)	
Industry, n (%)						
Sales	103 (33.2)	97 (34.2)	64 (34.6)	33 (33.3)	6 (22.2)	
Food service	104 (33.4)	93 (32.7)	46 (24.9)	47 (47.5)	11 (40.7)	
Other	104 (33.4)	94 (33.1)	75 (40.5)	19 (40.7)	10 (37.0)	
Income (per month), n (%)						
<100,000 yen	228 (73.3)	211 (74.3)	138 (74.6)	73 (73.7)	17 (63.0)	
100,000-159,999 yen	54 (17.4)	51 (18.0)	33 (17.8)	18 (18.2)	3 (11.1)	
≥160,000 yen	29 (9.3)	22 (7.7)	14 (7.6)	8 (8.1)	7 (25.9)	
Verbal communication skill in host language, n (%)						
Very good/Good	164 (52.7)	155 (54.6)	113 (61.1)	42 (42.4)	9 (33.3)	
Very poor/Poor	147 (47.3)	129 (45.4)	72 (38.9)	57 (57.6)	18 (66.7)	

Table 2. Factors associated with accident with work absence occurring at part-time job among international students in Japan

	Univariate			Adjusted*		
	OR	(95% CI)	p value	OR	(95% CI)	p value
Sex						
Female	1.00	-	-	1.00	-	-
Male	1.11	(0.50–2.50)	0.798	1.10	(0.50–2.43)	0.821
Age						
19–22 yrs	1.00	-	-	1.00	-	-
23–26 yrs	0.91	(0.31–2.63)	0.856 <sup>†</sup>	0.91	(0.31–2.64)	0.860
≥27 yrs	0.70	(0.21–2.33)	0.559 <sup>†</sup>	0.70	(0.21–2.35)	0.568
National origin						
East Asia	1.00	-	-	1.00	-	-
Southeast Asia/South Asia	1.42	(0.61–3.30)	0.414	1.43	(0.61–3.32)	0.410
Duration of stay abroad						
1 yr	1.00	-	-	1.00	-	-
≥2 yrs	1.01	(0.36–2.81)	0.988	0.76	(0.32–1.77)	0.517
Type of school						
College/University/Graduate school	1.00	-	-	1.00	-	-
Japanese language school	1.44	(0.55–3.76)	0.454	1.45	(0.55–3.84)	0.454
Industry						
Sales	1.00	-	-	1.00	-	-
Food service	1.91	(0.68–5.38)	0.213	1.93	(0.69–5.44)	0.213
Other	1.72	(0.60–4.92)	0.307	1.81	(0.63–5.23)	0.275
Income (per month)						
<100,000 yen	1.00	-	-	1.00	-	-
100,000–159,999 yen	0.73	(0.21–2.59)	0.774 <sup>‡</sup>	0.76	(0.21–2.72)	0.675
≥160,000 yen	3.95	(1.48–10.56)	0.004 <sup>‡</sup>	4.39	(1.57–12.24)	0.005
Verbal communication skill in host language						
Very good/Good	1.00	-	-	1.00	-	-
Very poor/Poor	2.40	(1.04–5.53)	0.035	2.37	(1.03–5.47)	0.043

OR: odds ratio; CI: confidence interval

\*Adjusted for other variables including sex and age. <sup>†</sup>Fisher's exact test

may be an association between proficiency in the host language and both occupational accidents and post-injury behaviour.

This study has several limitations. First, because of the cross-sectional design of the study, causality cannot be established. For example, international students who experienced serious accidents might not have been able to participate in the survey. Second, the sampling population consisted of panellists who registered with an online survey company, and the sample size was relatively small. Consequently, the sample may not represent all international students in Japan. For example, this population may have a better understanding of Japanese compared with other international students. This could attenuate the findings in the current study, by underestimating the relationship between language barrier and occupational accidents, for example. Third, this study did not evaluate the types of occupational accidents. A previous study of Japanese workers identified that the most common occupational accidents, including minor accidents, were “falls and slips”, followed by “crashes” and “traffic accidents”<sup>10</sup>. Although a single study reported that there was no difference between migrant workers and native workers with respect to type of occupational accidents<sup>15</sup>, future research on this topic is needed to develop effective accident prevention programs in Japan.

In conclusion, the current study found that international students experience a relatively high frequency of occupational accident in Japan and that the likelihood of occupational accident is higher among those with higher income and language barrier. These findings are in line with previous relevant studies of migrant workers in other countries. To prevent occupational accidents among migrant workers, the investigation of risk factors and the development of a robust evidence-based approach are needed. For example, research on the differences in types of occupational accidents between migrant workers and native workers would be very useful. The present findings provide insight that can guide occupational safety measures for migrants in Japan and elsewhere.

### Conflict of interest

The authors declare that there are no conflicts of interest.

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### References

- 1) Ujita Y, Douglas PJ, Adachi M (2019) Enhancing the health and safety of migrant workers. *J Travel Med* **26**, tay161.
- 2) Ministry of Health, Labour and Welfare, Japan (2019) [Vital statistics of Japan 2019, Ministry of Health, Labour and Welfare, Japan, Tokyo.] (in Japanese).
- 3) United States Department of State (2020) Trafficking in persons report 2020, United States Department of State, WA, USA.
- 4) Hargreaves S, Rustage K, Nellums LB, McAlpine A, Pocock N, Devakumar D, Aldridge RW, Abubakar I, Kristensen KL, Himmels JW, Friedland JS, Zimmerman C (2019) Occupational health outcomes among international migrant workers: a systematic review and meta-analysis. *The Lancet. Global health* **7**, e872–82.
- 5) Moyce SC, Schenker M (2018) Migrant workers and their occupational health and safety. *Annu Rev Public Health* **39**, 351–65.
- 6) Kazi MR, Ferdous M, Rumana N, Vaska M, Turin TC (2019) Injury among the immigrant population in Canada: exploring the research landscape through a systematic scoping review. *Int Health* **11**, 203–14.
- 7) Ministry of Health Labour and Welfare, Japan. [Industrial Accidents Statistics.] <https://anzeninfo.mhlw.go.jp/user/anzen/tok/anst00.htm> (in Japanese). Accessed February 1, 2021.
- 8) Morimatsu Y, Takagi A, Mori M, Hoshiko M, Ishitake T (2020) The scope of application according to foreign skills trainee general insurance: two cases of Vietnamese minors, both proved with congenital diseases after entering Japan, were judged on their ability to work. *Sangyo Eiseigaku Zasshi* **62**, 83–5 (in Japanese).
- 9) Liu-Farrer G (2009) Educationally channeled international labor mobility: contemporary student migration from China to Japan. *International Migration Review* **43**, 178–204.
- 10) Yamauchi T, Sasaki T, Takahashi K, Umezaki S, Takahashi M, Yoshikawa T, Suka M, Yanagisawa H (2019) Long working hours, sleep-related problems, and near-misses/injuries in industrial settings using a nationally representative sample of workers in Japan. *PLoS One* **14**, e0219657.
- 11) Haruyama Y, Matsuzuki H, Tomita S, Muto T, Haratani T, Muto S, Ito A (2014) Burn and cut injuries related to job stress among kitchen workers in Japan. *Industrial health* **52**, 113–20.
- 12) Dembe AE, Erickson JB, Delbos RG, Banks SM (2005) The impact of overtime and long work hours on occupational injuries and illnesses: new evidence from the United States. *Occup Environ Med* **62**, 588–97.
- 13) Sterud T, Tynes T, Mehlum IS, Veiersted KB, Bergbom B, Airila A, Johansson B, Brendler-Lindqvist M, Hviid K, Flyvholm MA (2018) A systematic review of working conditions and occupational health among immigrants in Europe and Canada. *BMC Public Health* **18**, 770.
- 14) Chen S, Chen Y, Feng Z, Chen X, Wang Z, Zhu J, Jin J, Yao

- Q, Xiang L, Yao L, Sun J, Zhao L, Fung H, Wong EL, Dong D (2020) Barriers of effective health insurance coverage for rural-to-urban migrant workers in China: a systematic review and policy gap analysis. *BMC Public Health* **20**, 408.
- 15) Döös M, Laflamme L, Backström T (1994) Immigrants and occupational accidents: a comparative study of the frequency and types of accidents encountered by foreign and Swedish citizens at an engineering plant in Sweden. *Safety Science* **18**, 15–32.