Short communication

Factors associated with adherence to recommendations for medical visits following annual health checkups among Japanese employees: A prospective cohort study

Eiko Goto [a,*], Hirono Ishikawa [b], Tsuyoshi Okuhara [a], Hiroko Okada [a], Aiko Tsunezumi [a], Yumi Kagawa [a], Takahiro Kiuchi [a]

[a] *Department of Health Communication, School of Public Health, Graduate School of Medicine, The University of Tokyo, 7-3-1 Hongo, Bunkyo-ku, Tokyo 113-8655, Japan*
[b] *Graduate School of Public Health, Teikyo University, 2-11-1 Kaga, Itabashi-ku, Tokyo 173-8605, Japan*

ABSTRACT

There are growing concerns in Japanese workplaces that many employees do not follow recommendations to visit medical institutions for further examinations following annual health checkups. Although previous studies have shown that job- and health-related factors affect adherence to such recommendations, these longitudinal associations are unknown. We examined the longitudinal associations between job- and health-related factors and visiting medical institutions after annual health checkups among Japanese employees. We conducted a prospective cohort study in a food-related company in fiscal year 2019. Participants completed a self-administered questionnaire to assess job- and health-related factors. Of 2914 employees who completed the questionnaire, 615 received recommendations to visit medical institutions following annual health checkups in fiscal year 2020; these employees comprised our sample. We used logistic regression analysis to examine the associations between each factor and medical institution visits. Of participants, 474 (77.1 %) were men, 432 (70.2 %) were aged over 40 years, and 293 (47.6 %) visited a medical institution. Logistic regression analysis showed that participants with a primary doctor and those with obesity were more likely to visit medical institutions. In Japanese workplaces, having a primary doctor may be important in increasing adherence to medical visit recommendations following annual health checkups. However, more focus is also needed on employees without obesity who may be more confident about their health and so less likely to follow recommendations. Further intervention studies focusing on these factors are needed to identify effective interventions to improve adherence to medical recommendations.

1. Introduction

Annual health checkups are an important public health strategy in workplaces to prevent disease onset and promote healthy behaviors (Yanagisawa, 2016). In Japan, all employers are legally required by the Industrial Safety and Health Act to conduct annual health checkups for their employees, so most employees undergo such checkups. Based on the results of these checkups, some employees are advised to undergo further examinations at medical institutions because of concerns about cerebrocardiovascular disease. However, partly because of job- and

health-related factors, employees do not necessarily follow such recommendations. According to the National Federation of Health Insurance Societies, of 3,716,158 employees who underwent annual health checkups in 2020, 546,275 (14.7 %) required further examinations but did not undertake them (National Federation of Health Insurance Societies, 2020). Such employees are at high risk of cerebrocardiovascular disease morbidity. Thus, improving adherence to such recommendations is important in Japanese workplaces (Suzuki et al., 2019).

Although several researches have explored what factors affect an individual's decision to have health checkup (Noguchi et al., 2019; Lal

et al., 2022), a few researches have explored what factors affect an adherence to recommendations for visiting medical institutions following health checkups (Tsuda et al., 2004; Goto et al., 2018). These researches suggested that employees working longer hours were less likely to follow up medical visits for diabetes mellitus treatment after annual health checkups and employees living alone, those with a primary doctor, and those with lower self-rated health were substantially more likely to adhere to such recommendations. In addition, there is no study which have longitudinally examined the factors associated with adherence to such recommendations among Japanese employees requiring further examinations after annual health checkups. There has been much debate about the effectiveness of routine general health checkups (Liss et al., 2021). For such checkups to be effective, it is essential that appropriate follow-up care is provided. Identifying factors associated with adherence to follow-up recommendations may help to prevent wasteful healthcare spending. The present study examined longitudinal associations between job- and health-related factors and medical institution visits after annual health checkups among Japanese employees. Job-related factors were factors related to employees' working environment and employment status (e.g., overtime). Health-related factors were those related to employees' health status (e.g., self-rated health). We considered both types of factors to be potential disincentives or facilitators of medical institution visits after annual health checkups. For example, long working hours or overtime may be a disincentive to medical institution visits. Low self-rated health may be a facilitator of medical institution visits. Using these findings, we discuss educational factors that might improve adherence to medical recommendations in Japanese workplaces.

2. Methods

2.1. Study design and participants

We conducted a prospective cohort study at a Japanese food-related company. Our selection of study design and variables based on the previous studies (Tsuda et al., 2004; Goto et al., 2018; Inoue et al., 2012; Yamaguchi et al., 2018). We assessed participants' work environment and health status using a self-administered questionnaire in fiscal year 2019 (March 18–29, 2019). We asked employees to respond to an online questionnaire posted on the company's intranet. Of the company's 5204 employees, 2914 completed the questionnaire (response rate, 56.0 %). Of those 2914 employees, 615 received recommendations to visit a medical institution for further examination following annual health checkups conducted in fiscal year 2020. Those 615 employees constituted our study sample, and provided their informed consent for study participation using the online system. The study was approved by the ethical review committee of the Graduate School of Medicine, The University of Tokyo (examination number, 11926). Our study met the institution's guidelines for protection of human participants concerning safety and privacy.

2.2. Objective variables: medical institution visits after annual health checkups

To determine whether participants actually visited a medical institution following checkups conducted in fiscal year 2020, we obtained health insurance claims data for that year. Using the disease classification for social insurance (119 classification codes) of the International Statistical Classification of Diseases in Japan, we defined participants according to the following codes with respect to visiting a physician: 0402 (diabetes); 0403 (other internal secretion, nourishment, and metabolic disease); 0901 (hypertensive disease); 0903 (other cardiovascular disease); 0904 (subarachnoid hemorrhage); 0905 (bleeding in the brain); 0906 (brain infarct); 0907 (brain arteriosclerosis); 0908 (other cerebrovascular disease); 0909 (arteriosclerosis); 0912 (other arteriosclerosis); 1106 (alcoholic hepatic disease); 1107 (chronic hepatitis); 1108 (cirrhosis); and 1109 (other hepatic disease).

2.3. Explanatory variables: job- and health-related factors

We assessed job- and health-related factors in fiscal year 2019 using the questionnaire. Regarding job-related factors (type of work, overtime, and employment status), for type of work, we asked participants, "Which of the following best describes your work?" Participants responded by choosing one of six response options (desk duty, sales/ sales-related position, production line work, research, executive officer, or other). For overtime, we asked participants, "How many hours of overtime do you work per day in a typical week? If it varies, please state the average time." For employment status, we asked participants, "What is your employment status?" Participants responded by choosing one of two response options (permanent employee or contracted employee/ non-permanent employee). Because these assessment tools were developed with food-related company (our study field) and have been used, we used these tools to assess our participants' work situation.

Regarding health-related factors, we determined whether participants had a primary doctor and evaluated their knowledge of consulting medical staff, self-rated health status, and body mass index (BMI). For self-rated health status, we asked participants, "How healthy do you think you are now?" We rated responses on a five-point Likert scale ranging from 1 (not healthy at all) to 5 (very healthy). We categorized participants as follows: 1 (not healthy at all) or 2 (not very healthy) as low; 3 (cannot say either way) as medium; and 4 (moderately healthy) or 5 (very healthy) as high. For sociodemographic characteristics, we assessed participants' sex, age, education, and marital status.

2.4. Statistical analysis

We conducted bivariate analyses (chi-square tests) to determine the bivariate associations between the independent variables and visiting a medical institution after checkups. We then used logistic regression analysis to examine the longitudinal associations between job- and health-related factors and visiting a medical institution after checkups. As objective variables, we entered all the factors that showed significant associations into the bivariate analysis. Thus, the outcome variable used in the logistic regression analysis was medical institution visits after annual health checkups and the covariates were having a primary doctor, knowledge of how to consult medical staff, self-rated health status, and obesity. We used sex and age as adjustment variables. We analyzed the data using SPSS version 21.0 (IBM Corp., Armonk, NY, USA).

3. Results

3.1. Participant characteristics and descriptive results

Table 1 shows the participant characteristics and descriptive results for the study variables. Of participants, 474 (77.1 %) were men, 432 (70.2 %) were aged over 40 years, 195 (31.7 %) were single, 310 (50.4 %) had a primary doctor, and 271 (48.3 %) were obese. After checkups in fiscal year 2020, 293 participants (47.6 %) visited a medical institution. Participants with a primary doctor, knowledge of consulting medical staff, higher self-rated health status, and obesity were significantly more likely to visit a medical institution.

3.2. Factors associated with medical institution visits

Table 2 shows the logistic regression results for the associations between medical visits following checkups and health-related factors. After adjustment for sex and age, having a primary doctor and obesity were significantly associated with medical visits: adjusted odds ratio (OR), 2.363 and 95 % confidence interval (CI), 1.627–3.432; adjusted OR, 1.681 and 95 % CI, 1.147–2.463, respectively.

Table 1

Participants' characteristics and association between study variables and medical institution visits after annual health checkups: A study with employees at a Japanese food-related company who received recommendation to visit a medical institution in fiscal year 2019 and 2020 (N = 615).

Variable	Range or category	Total (n = 615)		Visiting a medical institution (n = 293)		Not visiting a medical institution (n = 322)		P^a
		N	%	N	%	N	%	
Sociodemographic characteristics								
Sex	Male	474	77.1	241	82.3	233	72.4	0.002
(n = 615)	Female	141	22.9	52	17.7	89	27.6	
Age (years)	<30	46	7.5	9	3.1	37	11.5	<0.001
(n = 615)	30–39	137	22.3	46	15.7	91	28.3	
	40–49	228	37.1	105	35.8	123	38.2	
	50–59	164	26.7	102	34.8	62	19.3	
	≥60	40	6.5	31	10.6	9	2.8	
Education	Junior or senior high school	230	37.4	130	44.4	100	31.1	0.001
(n = 615)	Higher professional school/vocational school/junior college	103	16.7	37	12.6	66	20.5	
	College or graduate school	282	45.9	126	43.0	156	48.4	
Marital status	Single	195	31.7	74	25.3	121	37.6	0.004
(n = 615)	Married	380	61.8	196	66.9	184	57.1	
	Divorced or widowed	40	6.5	23	7.8	17	5.3	
Job-related factors								
Type of work	Desk duty	369	60.0	172	58.7	197	61.2	0.241
(n = 615)	Sales/sales-related position	55	8.9	23	7.8	32	9.9	
	Production line work	69	11.2	30	10.2	39	12.1	
	Research	14	2.3	7	2.4	7	2.2	
	Executive officer	87	14.1	52	17.7	35	10.9	
	Other	21	3.4	9	3.1	12	3.7	
Overtime	<1.0 h per day	156	25.4	89	30.4	67	20.8	0.057
(n = 615)	1.0–1.9 h per day	227	36.9	102	34.8	125	38.8	
	2.0–2.9 h per day	117	19.0	50	17.1	67	20.8	
	≥3.0 h per day	114	18.5	52	17.7	62	19.3	
Employment status	Permanent employee	558	90.7	262	89.4	296	91.9	0.285
(n = 615)	Contracted employee/non-permanent employee	57	9.3	31	10.6	26	8.1	
Health-related factors								
Having a primary doctor (n = 615)	Yes	310	50.4	193	65.9	117	36.3	<0.001
	No	305	49.6	100	34.1	205	63.7	
Knowledge of how to consult medical staff	Knows how to consult	310	50.4	203	69.3	90	28.0	0.001
(n = 615)	Does not know how to consult	305	49.6	90	30.7	140	43.5	
Self-rated health status (n = 615)	Low (Not healthy at all or Not very healthy)	191	31.1	113	38.6	78	24.2	<0.001
	Medium (Cannot say either way)	192	31.2	89	30.4	103	32.0	
	High (Moderately healthy or Very healthy)	232	37.7	91	31.1	141	43.8	
Obesity	Obese (BMI ≥ 25)	271	48.3	156	58.0	115	39.4	<0.001
(n = 561)	Non-obese (BMI < 25)	290	51.7	113	42.0	177	60.6	

Missing values were deleted listwise. BMI, body mass index.

[a] Chi-square test.

Table 2

Estimated adjusted odds-ratios and 95 % confidence intervals for the association between medical institution visits after annual health checkups and health-related factors among employees at a Japanese food-related company in fiscal year 2019 and 2020 (N = 615).

Variable	Multiple logistic regression analysis		
	OR^a	95 % CI	P
Having a primary doctor (yes)	2.363	1.627–3.432	<0.001
Knowledge of how to consult medical staff (Knows how to consult)	1.174	0.795–1.734	0.419
Self-rated health status (higher score)	0.824	0.673–1.009	0.061
Obesity (obese)	1.681	1.147–2.463	0.008

[a] Odds ratios (OR) (visiting a medical institution compared with not visiting one) were calculated using logistic regression analyses adjusted for sex and age. CI, confidence interval.

4. Discussion

In this study, we examined the longitudinal associations between job- and health-related factors and visiting a medical institution after annual health checkups among Japanese employees. Using logistic regression analyses, we determined the associations between health-related factors (having a primary doctor and obesity) and medical visits. Previous research suggests that having a primary doctor has a substantial effect on the utilization of primary care (Goto et al., 2018; Thode et al., 2005; Blackwell et al., 2009) and promotes screening behavior by providing health guidance and emotional support (Mitsuhashi et al., 2006; Funahashi, 2013). Employees who have a primary doctor are thus better informed about medical institutions that provide further health examinations, and more likely to visit such institutions. Under Japan's free-access healthcare system, people are able to use any medical institution. However, this makes it difficult for primary doctors to maintain their gatekeeping function (Kaneko et al., 2019). Thus, in Japan, gatekeepers such as primary doctors and nurses may not fulfill all aspects of their role (Japan Primary Care Association, 2023).

Encouraging the use of a primary doctor could help to promote adherence to medical recommendations in Japanese workplaces.

We observed that obese participants were more likely to visit medical institutions. A possible reason for this may be the existence of the National Health Program in Japan (which is known as "Specific Health Checkups and Specific Health Guidance"). This program consists of health screenings and educational guidance, including medical recommendations, and focuses on metabolic syndrome (Japanese Ministry of Health, Labour and Welfare, 2023). As part of this program, some of our obese participants may have received one recommendation to visit medical institutions in fiscal year 2020. This may explain why obese participants were more likely to visit medical institutions. In addition, previous research has shown that normal-weight individuals report better self-rated health than obese people (Micciolo et al., 2013; Tang et al., 2017). We found that normal-weight employees had risk factors related to cerebrocardiovascular disease; however, they tended to lack symptoms. Because normal-weight employees tended to overestimate their health status, they may have been less likely to visit medical institutions. This could partly explain why obese employees were more likely to visit medical institutions. To improve adherence to medical recommendations, strategies are needed to encourage medical visits, especially among normal-weight individuals. For example, medical staff could use employees' checkup results to explain the risk of lifestyle-related and cerebrocardiovascular disease.

This study had several limitations. First, it was conducted at only one food-related company in Japan, so care is needed when generalizing the findings. Second, the lack of a control group in this prospective cohort study was a methodological weakness. Additional studies that include control groups are needed to confirm the present findings. Third, to assess participants' work and health status, we used tools that had been previously used by health managers at the food-related company. The reliability and validity of these assessment tools were not evaluated. Further studies are needed using valid and reliable assessment tools with good psychometric properties. Fourth, some aspects of participants' work and health status were not assessed, such as participants' geographic details. We were unable to determine the possible effect of geographic factors, which may affect access to medical institutions. Additionally, we could not confirm BMI values from the annual health checkup data. Obese employees with higher BMI may have poorer health status and thus may be more likely to visit medical institutions than those with lower BMI. However, we were unable to assess the influence of BMI level. Further studies are needed to examine association between undergoing medical examinations and obesity, taking into account the type of obesity. Moreover, the nature of the recommendations after annual health checkups may vary according to the results of different types of test. For example, the company particularly encourages employees with hypertension to undergo further examinations for reasons of occupational safety. However, we were unable to consider which types of test were associated with recommendations for further examinations. Fifth, it is possible that a few participants who had metabolic syndrome risk factors, including obesity, received a recommendation in fiscal year 2020 to undergo further examinations because of the Specific Health Checkups and Specific Health Guidance criteria. However, we could not confirm who received these guidance-based recommendations. Sixth, it is possible that the method of recommendation affected employees' medical examination behavior. However, we could not confirm the details of how participants received the recommendations for medical visits (e.g., telephone recommendation by an industrial physician, recommendation during an interview with an industrial health nurse, or recommendation via a letter from office personnel). Seventh, of participants who had a primary doctor, it is possible that some visited their doctor regularly whereas others did not. Although the frequency of visiting a primary doctor may affect adherence to medical visit recommendations, we were unable to consider the influence of this factor on the results. Eighth, although we assessed the work environment of participants in fiscal year 2019, we determined whether they actually visited medical institutions in fiscal year 2020. Thus, some participants would have experienced a change in their work environment between fiscal years 2019 and 2020, so job-related factors may have been less likely to be associated with medical visits for these participants. Sixth, medical visits for further examinations in fiscal year 2020 may have been affected by the COVID-19 pandemic. During that period, participants may have refrained from visiting clinics owing to the pandemic (Maejima et al., 2021). Additionally, the social conditions in fiscal year 2020 differed from those in the previous year, but we were unable to assess the effect of the COVID-19 pandemic on our results.

5. Conclusions

Despite these limitations, we found longitudinal associations between health-related factors (having a primary doctor and obesity) and visiting a medical institution after annual health checkups among Japanese employees. Having a primary doctor seems important in encouraging adherence to recommendations for medical visits following annual health checkups. In addition, more attention should be paid to employees without obesity who may be more confident about their health and so may be less likely to follow health recommendations. Additional intervention studies are needed to determine effective, implementable measures to improve adherence to medical recommendations in Japanese workplaces.

6. Ethics approval and consent to participate

The study was approved by the ethical review committee of the Graduate School of Medicine, The University of Tokyo (examination number 11926). All participants provided their informed consent via the online system.

CRediT authorship contribution statement

Eiko Goto: Validation. **Hirono Ishikawa:** Supervision. **Tsuyoshi Okuhara:** Validation. **Hiroko Okada:** Validation. **Aiko Tsunezumi:** Validation. **Yumi Kagawa:** Validation. **Takahiro Kiuchi:** Supervision.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

Acknowledgment

We would like to thank all study participants.

References

Blackwell, D.L., Martinez, M.E., Gentleman, J.F., Sanmartin, C., Berthelot, J.M., 2009. Socioeconomic status and utilization of health care services in Canada and the United States: findings from a binational health survey. Med Care. 47 (11), 1136–1146. https://doi.org/10.1097/MLR.0b013e3181adcbe9.

Funahashi, H. [Attributes of non-participants aged 40-59 years in specific health checkups]. Nihon Koshu Eisei Zasshi. 2013;60(3):119-127. Japanese.

Goto, E., Ishikawa, H., Okuhara, T., Kato, M., Okada, M., Kiuchi, T., 2018. Factors associated with adherence to recommendations to visit a physician after annual

health checkups among Japanese employees: a cross-sectional observational study. Ind Health. 56 (2), 155–159. https://doi.org/10.2486/indhealth.2017-0104.

Inoue, M., Tsurugano, S., Nishikitani, M., Yano, E., 2012. Full-time workers with precarious employment face lower protection for receiving annual health check-ups. Am J Ind Med. 55 (10), 884–892. https://doi.org/10.1002/ajim.22090.

Japan Primary Care Association. Japan Primary Care Association certified family physician. http://www.primary-care.or.jp/. Accessed 1 June 2023.

Japanese Ministry of Health, Labour and Welfare. Implementation status of specific health checkups and specific health guidance. https://www.mhlw.go.jp/stf/seisakun itsuite/bunya/0000161103.html. Accessed 1 June 2023.

Kaneko, M., Motomura, K., Mori, H., Ohta, R., Matsuzawa, H., Shimabukuro, A., Matsushima, M., 2019. Gatekeeping function of primary care physicians under Japan's free-access system: a prospective open cohort study involving 14 isolated islands. Fam Pract. 36 (4), 452–459. https://doi.org/10.1093/fampra/cmy084.

Lal, S., Nguyen, T.X.T., Sulemana, A.S., Khan, M.S.R., Kadoya, Y., 2022. Does financial literacy influence preventive health check-up behavior in Japan? A cross-sectional study. BMC Public Health. 22(1):1704 https://doi.org/10.1186/s12889-022-14079-8.

Liss, D.T., Uchida, T., Wilkes, C.L., Radakrishnan, A., Linder, J.A., 2021. General health checks in adult primary care: a review. JAMA. 325 (22), 2294–2306. https://doi.org/10.1001/jama.2021.6524.

Maejima, K., Ono, S., Ito, S., Hosaka, S., Umeki, K., Sato, S., 2021. Effectiveness of screening using loop-mediated isothermal amplification before endoscopy during the coronavirus disease pandemic. Progress of Digestive Endoscopy. 99 (1), 41–46.

Micciolo, R., Canal, L., Minniti, A., Mazzali, G., Fantin, F., Corzato, F., Antonioli, A., Harris, T.B., Zamboni, M., 2013. The association between excess weight and comorbidity and self-rated health in the Italian population. Ann Epidemiol. 23 (4), 172–178. https://doi.org/10.1016/j.annepidem.2013.02.003.

Mitsuhashi, Y., Kishi, R., Ecuchi, T., Miyake, H., Sasatani, H., Maeda, N., Horikawa, N. [Study of influences of social support and social networks on participation in periodic health examination of the elderly at home comparison of three regions with different social backgrounds]. Nihon Koshu Eisei Zasshi. 2006;53(2):92-104. Japanese.

National Federation of Health Insurance Societies, 2020. Survey on the Health Status of Subscribers (aged 40–74) from the Viewpoint of Physical Examination Test Values. Accessed June 1, 2023. https://www.kenporen.com/toukei_data/.

Noguchi, R., Shen, J., 2019. Factors affecting participation in health checkups: Evidence from Japanese survey data. Health Policy. 123 (4), 360–366. https://doi.org/10.1016/j.healthpol.2018.10.013.

Suzuki, M., Sakai, H., Fukuda, Y. [Factors leading to consultation at medical institutions based on workplace health checkup results]. Sangyo Eiseigaku Zasshi. 2019;61(6): 247-255. Japanese. doi: 10.1539/sangyoeisei.2018-042-B.

Tang, K., Zhao, Y., Li, C., 2017. The association between self-rated health and different anthropometric and body composition measures in the Chinese population. BMC Public Health. 17 (1), 317. https://doi.org/10.1186/s12889-017-4249-0.

Thode, N., Bergmann, E., Kamtsiuris, P., Kurth, BM. Einflussfaktoren auf die ambulante Inanspruchnahme in Deutschland [Predictors for ambulatory medical care utilization in Germany]. Bundesgesundheitsblatt Gesundheitsforschung Gesundheitsschutz. 2005;48(3):296-306. German. doi: 10.1007/s00103-004-1004-3.

Tsuda, K., Tsutsumi, A., Kawakami, N., 2004. Work-related factors associated with visiting a doctor for a medical diagnosis after a worksite screening for diabetes mellitus in Japanese male employees. J Occup Health. 46 (5), 374–381. https://doi.org/10.1539/joh.46.374.

Yamaguchi, M., Yoshida, T., Yamada, Y., Watanabe, Y., Nanri, H., Yokoyama, K., Date, H., Miyake, M., Itoi, A., Yamagata, E., Masumoto, T., Okayama, Y., Yoshinaka, Y., Kimura, M., Kyoto-Kameoka study group. Sociodemographic and physical predictors of non-participation in community based physical checkup among older neighbors: a case-control study from the Kyoto-Kameoka longitudinal study, Japan. BMC Public Health. 2018;18(1):568. doi: 10.1186/s12889-018-5426-5.

Yanagisawa, N., 2016. The future of occupational and general health in Japan. Ind Health. 54 (3), 191–193. https://doi.org/10.2486/indhealth.54-191.