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Effects of work hours and health-related information on undertaking health checkups: An empirical study using Japanese micro data[1]

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Abstract

With the advancement of the improvement of medical technologies, people are living longer and more healthily. However, there is a gap between average life expectancy and a healthy life. People can take control of their health care by viewing the results of health checkups and following the advice of doctors. Using medical data from the Hyogo branch of the Japan Health Insurance Association, this study investigates the determinants of employees in small and medium enterprises in their decision to undertake health checkups. Specifically, we examine what kind of workers participate in health checkups and investigate what kind of health-related information has an impact on the decision-making process for undertaking health checkups. The estimation results suggest that work hours increase the probability of participating in health checkups. This may suggest that employees with especially long work hours are received an active check by their industrial physician to undertake health checkups. The number of dentists visits and the appearance of hyperlipidemia also increase the probability of undertaking a health checkup. These results indicate that employees who take care of their health are likely to confirm their health condition via checkups from the Japan Health Insurance Association.

Keywords: health checkup; work hours; health-related information; Japan Health Insurance Association; small and medium enterprise workers
JEL classification: I12; J21

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1. Introduction

Along with the advancement of medical technologies, people in Japan are living longer but there is a gap between average life expectancy and a healthy life. To reduce this gap, the prevention of lifestyle-related diseases has been emphasized. For example, according to KENKOUNIPPON21 (i.e., Health Japan 21), a project initiated in 2013 by the Japanese Ministry of Health, Labor, and Welfare, goals related to health promotion and disease prevention have been set based on the Health Promotion Act. Meanwhile, to prevent lifestyle-related diseases, individuals are encouraged to be proactive. If people consider their own health by having health checkups, they can take control of their health care based on the results and doctors' advice. People expect a positive relationship between checkups and early discovery of disease and prevention of severe conditions, thus it is important to clarify the reasons for undertaking health checkups. Using combined medical data from the Japan Health Insurance Association, this study investigates the determinants of employees in small and medium-sized enterprises deciding to undertake health checkups.

Many previous studies have reported the effects of socio-demographic factors on undergoing health checkups [1, 2, 3, 4]. Moreover, the availability of support from the those close to individuals also affects taking health checkups [5,6].

As a previous study on factors affecting the rate of health checkups, Yamada [7] focused on health-related information, and investigated the influence of age, income, the number of medical examinations, and past medical history on undertaking health checkups. Since the number of medical examinations and the presence of a past medical history indicate that an individual has regularly visited medical institutions, such individuals may have a lower probability of receiving a health checkup. The results of using three types of medical examination, days of hospitalization, outpatient, and dentistry, indicated that the number of days of hospitalization had a negative effect, and the number of days as an outpatient or for dentistry had a positive effect on participating in health checkups. Regarding the positive effect of outpatient and dentistry, the subject may have received a health checkup to confirm the results of past treatment intervention. In addition, as a result of including dummies for diabetes and heart disease in terms of health status, a negative effect was only reported for the diabetes dummy [7].

With reference to health conditions, work style is important for discussions on health behavior. For regular workers, working hours are a major part of the day, and for non-regular workers, working hours also may be an important factor in planning a lifestyle. There are numerous studies on the relationship between work style and health [8], [9]. For example, Kouno and Saito (2010) showed that salary gaps and retirement rates have a negative effect on employee health [8]. Suzuki (2011) reported that long working hours lead to high levels of obesity [9]. On the whole, work style and its outcomes have a significant impact on lifestyle diseases.

Many previous studies have reported the relationship between undergoing health checkups and the working environment. Kawaguchi et al. (2010) reported that many self-employed men do not receive a specific medical checkup and that their awareness of such checkups remains low [10]. In addition, using data from the Japan Health Insurance Association, Adachi and Nukiba (2016) found that lifestyles and the rate of undertaking health checkups differ depending on the type of business [11].

This study examines what kind of workers participate in health checkups and investigates what kind of health-related information on health status has an impact on the decision-making process for undertaking health checkups.

2. Analysis framework

This study uses data on employees working at enterprises that joined the Hyogo branch of the Japan Health Insurance Association[3]. Although employees who work in small and medium-sized companies and their dependent families are members of the Association, we only use data on the insured employees themselves and exclude that of their families. Therefore, the sample only includes employees[4]. A total of 1,741 responded to the "Survey on Mental and Physical Health and Work Environment" and we obtained their consent as the subjects of the analysis.

Regarding whether the subjects have undertaken health checkups, we used their health checkup questionnaire data. However, due to data limitations, we cannot strictly say that a subject definitely does not undergo health checkups if such data does not exist or is not available. This is because the questionnaire data may not be submitted due to the status of cooperation with the Japan Health Insurance Association, or when a non-regular worker in a large organization is a member of the Japan Health Insurance Association, but their data has not been submitted[5].

In addition, the target of the general health checkup for a lifestyle-related disease prevention health checkup is an insured person who is 35 to 74 years old in the current year. Therefore, the analysis is performed by excluding the respondents under 35 and over 75. For the health checkup status of the subjects, we used the data received in 2017.

The "Survey on Mental and Physical Health and Work Environment" has questions related to work styles such as working hours, business types, and employment forms. Furthermore, based on the data, we use variables about the number of days they visited a medical institution visited and the number of appearances of lifestyle-related diseases. In summary, the final data for analysis

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[3] The health checkups used in this study are different from those conducted in the workplace.

[4] In this data, employees do not necessarily have a health checkup.

[5] The issue of creating a variable representing whether a subject has undertaken a health check is discussed in Section 4.

is a combination data collected from the "Survey on Mental and Physical Health and Work Environment," and health checkup questionnaire data.

In the empirical study, we examine not only the entire sample, but also two subsamples. In the first subsample, we exclude employees working for companies in the public service industry; and in the second subsample, in addition to public service industry, we also exclude the academic, professional, and technical service industries. In addition, most of the members currently affiliated with the Japan Health Insurance Association are small and medium-sized enterprises. Therefore, the industry ratio of the sample used here differs from that from the national statistics. In this regard, Tables 1 and 2 show the number of employed workers by industry in this sample. The tables also show the number of workers by the industry for each company size.

After grouping the entire sample according to the presence or absence of data on health checkups, the characteristics of industry and company scale for each group are described below.

3. Characteristics of Group A and B samples

We divided the data into group A and group B. Subjects were categorized into Group A if checkup questionnaire data was available in a company where the subject works. If no checkup data was available, the sample was categorized into Group B. Tables 1 and 2 present the characteristics of company size and industry in each group.

First, Table 1 shows the classification of industries by group size for Group A. Among the samples, there are many subjects working in the medical and welfare field. Furthermore, the number of employees working in this field is the largest in for companies with 5 to 9 employees to 100 to 299 employees.

In addition, for subjects working in a small company that belong to Group B, it is difficult to conduct a health checkup in their companies, so even though there is a high possibility of undertaking a health checkup at the Japan Health Insurance Association however they did not. From Table 2, of the Group B subjects working in a small company (5–9 employees) 12.12% were in industries such as the medical/welfare, 10.61% in academic, professional, and technical services, and 10.61% in public affairs. Next, for companies with 10–29 employees, medical and welfare industry accounted for 25.35%, the construction industry for 12.68%, and the academic, professional, and technical service industry for 11.27%. Moreover, for companies with 30–49 employees, medical and welfare industry accounted for 41.09%, the construction industry for 10.85%, and the public service industry for 9.3%.

Table1 Frequency distribution of company size and industry: Group A

Company size2（5～9）		freq.	Percent
1	Agriculture, forestry and fisheries	3	5.26
3	Construction industry	5	8.77
5	Electricity, gas, heat supply, water supply	2	3.51
6	Information and communication industry	5	8.77
7	Transportation and postal services	1	1.75
8	Wholesale / Retail	2	3.51
9	Finance / Insurance	5	8.77
10	Real estate and goods rental business	3	5.26
11	Academic, professional, and technical service industries	6	10.53
13	Life-related services and entertainment	3	5.26
14	Education and learning support	3	5.26
15	Medical / Welfare	8	14.04
16	Other service industries	5	8.77
17	Public service	2	3.51
18	Other	4	7.02
Total		57	100
Company size3（10～29）			
1	Agriculture, forestry and fisheries	1	0.66
2	Mining	4	2.65
3	Construction industry	8	5.3
4	Manufacturing industry	7	4.64
5	Electricity, gas, heat supply, water supply	11	7.28
6	Information and communication industry	9	5.96
7	Transportation and postal services	6	3.97
8	Wholesale / Retail	8	5.3
9	Finance / Insurance	5	3.31
10	Real estate and goods rental business	7	4.64
11	Academic, professional, and technical service industries	17	11.26
12	Accommodation and food service industry	3	1.99
13	Life-related services and entertainment	6	3.97
14	Education and learning support	12	7.95
15	Medical / Welfare	26	17.22
16	Other service industries	8	5.3
17	Public service	9	5.96
18	Other	4	2.65
Total		151	100
Company size4（30～49）			
1	Agriculture, forestry and fisheries	3	2.08
3	Construction industry	13	9.03
4	Manufacturing industry	12	8.33
5	Electricity, gas, heat supply, water supply	3	2.08
6	Information and communication industry	4	2.78
7	Transportation and postal services	5	3.47
8	Wholesale / Retail	20	13.89
10	Real estate and goods rental business	4	2.78
11	Academic, professional, and technical service industries	5	3.47
12	Accommodation and food service industry	2	1.39
13	Life-related services and entertainment	9	6.25
14	Education and learning support	4	2.78
15	Medical / Welfare	42	29.17
17	Public service	17	11.81
18	Other	1	0.69
Total		144	100

Company size5（50～99）			
1	Agriculture, forestry and fisheries	2	0.77
3	Construction industry	8	3.09
4	Manufacturing industry	34	13.13
6	Information and communication industry	4	1.54
7	Transportation and postal services	12	4.63
8	Wholesale / Retail	16	6.18
9	Finance / Insurance	1	0.39
11	Academic, professional, and technical service industries	5	1.93
12	Accommodation and food service industry	7	2.7
13	Life-related services and entertainment	8	3.09
14	Education and learning support	6	2.32
15	Medical / Welfare	84	32.43
16	Other service industries	2	0.77
17	Public service	52	20.08
18	Other	18	6.95
Total		259	100
Company size6（100～299）			
3	Construction industry	13	6.95
4	Manufacturing industry	28	14.97
6	Information and communication industry	2	1.07
7	Transportation and postal services	20	10.7
8	Wholesale / Retail	10	5.35
10	Real estate and goods rental business	2	1.07
11	Academic, professional, and technical service industries	7	3.74
12	Accommodation and food service industry	4	2.14
13	Life-related services and entertainment	4	2.14
14	Education and learning support	7	3.74
15	Medical / Welfare	39	20.86
16	Other service industries	2	1.07
17	Public service	24	12.83
18	Other	25	13.37
Total		187	100
Company size7（300～499）			
4	Manufacturing industry	2	3.28
7	Transportation and postal services	4	6.56
8	Wholesale / Retail	5	8.2
9	Finance / Insurance	7	11.48
11	Academic, professional, and technical service industries	1	1.64
14	Education and learning support	2	3.28
15	Medical / Welfare	1	1.64
16	Other service industries	11	18.03
17	Public service	10	16.39
18	Other	18	29.51
Total		61	100
Company size8（500～999）			
8	Wholesale / Retail	6	19.35
11	Academic, professional, and technical service industries	1	3.23
12	Accommodation and food service industry	1	3.23
15	Medical / Welfare	8	25.81
18	Other	15	48.39
Total		31	100
Company size9（1000～1999）			
7	Transportation and postal services	15	18.07
16	Other service industries	41	49.4
17	Public service	9	10.84
18	Other	18	21.69
Total		83	100

Table2 Frequency distribution of company size and industry: Group B

Company size2（5～9）		freq.	Percent
1	Agriculture, forestry and fisheries	4	6.06
2	Mining	2	3.03
3	Construction industry	5	7.58
6	Information and communication industry	4	6.06
7	Transportation and postal services	4	6.06
9	Finance / Insurance	1	1.52
10	Real estate and goods rental business	2	3.03
11	Academic, professional, and technical service industries	7	10.61
12	Accommodation and food service industry	2	3.03
13	Life-related services and entertainment	3	4.55
14	Education and learning support	6	9.09
15	Medical / Welfare	8	12.12
16	Other service industries (other than 11-15)	4	6.06
17	Public service	7	10.61
18	Other	7	10.61
Total		66	100
Company size3（10～29）			
1	Agriculture, forestry and fisheries	6	4.23
2	Mining	1	0.7
3	Construction industry	18	12.68
4	Manufacturing industry	8	5.63
5	Electricity, gas, heat supply, water supply	3	2.11
6	Information and communication industry	7	4.93
7	Transportation and postal services	3	2.11
8	Wholesale / Retail	1	0.7
9	Finance / Insurance	3	2.11
10	Real estate and goods rental business	6	4.23
11	Academic, professional, and technical service industries	16	11.27
12	Accommodation and food service industry	1	0.7
13	Life-related services and entertainment	4	2.82
14	Education and learning support	11	7.75
15	Medical / Welfare	36	25.35
16	Other service industries (other than 11-15)	1	0.7
17	Public service	9	6.34
18	Other	8	5.63
Total		142	100
Company size4（30～49）			
1	Agriculture, forestry and fisheries	2	1.55
3	Construction industry	14	10.85
4	Manufacturing industry	6	4.65
5	Electricity, gas, heat supply, water supply	3	2.33
7	Transportation and postal services	3	2.33
8	Wholesale / Retail	7	5.43
10	Real estate and goods rental business	7	5.43
11	Academic, professional, and technical service industries	5	3.88
12	Accommodation and food service industry	1	0.78
13	Life-related services and entertainment	4	3.1
14	Education and learning support	7	5.43
15	Medical / Welfare	53	41.09
17	Public service	12	9.3
18	Other	5	3.88
Total		129	100

Company size5（50～99）			
1	Agriculture, forestry and fisheries	5	3.55
3	Construction industry	5	3.55
4	Manufacturing industry	17	12.06
6	Information and communication industry	4	2.84
7	Transportation and postal services	6	4.26
8	Wholesale / Retail	4	2.84
9	Finance / Insurance	3	2.13
11	Academic, professional, and technical service industries	5	3.55
12	Accommodation and food service industry	3	2.13
13	Life-related services and entertainment	8	5.67
14	Education and learning support	9	6.38
15	Medical / Welfare	44	31.21
17	Public service	18	12.77
18	Other	10	7.09
Total		141	100
Company size6（100～299）			
3	Construction industry	5	3.79
4	Manufacturing industry	24	18.18
6	Information and communication industry	4	3.03
7	Transportation and postal services	9	6.82
8	Wholesale / Retail	6	4.55
11	Academic, professional, and technical service industries	4	3.03
12	Accommodation and food service industry	7	5.3
13	Life-related services and entertainment	1	0.76
14	Education and learning support	6	4.55
15	Medical / Welfare	37	28.03
16	Other service industries (other than 11-15)	1	0.76
17	Public service	18	13.64
18	Other	10	7.58
Total		132	100
Company size7（300～499）			
3	Construction industry	3	6.67
7	Transportation and postal services	1	2.22
8	Wholesale / Retail	3	6.67
9	Finance / Insurance	2	4.44
11	Academic, professional, and technical service industries	1	2.22
15	Medical / Welfare	27	60
16	Other service industries (other than 11-15)	4	8.89
18	Other	4	8.89
Total		45	100
8（500～999）			
4	Manufacturing industry	3	4.41
8	Wholesale / Retail	4	5.88
11	Academic, professional, and technical service industries	7	10.29
15	Medical / Welfare	36	52.94
17	Public service	13	19.12
18	Other	5	7.35
Total		68	100
Company size9（1000～1999）			
7	Transportation and postal services	4	8.89
15	Medical / Welfare	15	33.33
16	Other service industries (other than 11-15)	8	17.78
17	Public service	13	28.89
18	Other	5	11.11
Total		45	100

4. Estimation method

We use work hours and health information such as the number of days in hospital and the number of appearances of symptoms related to lifestyle-related diseases from received data. For patients aged 35 to 74 years old, we examine the determinants of whether the subject undertakes health checkups.

The estimation model is as follows:

$$P(checkup_i = 1) = \Phi(\beta_0 + \beta_W W_i + \beta_H H_i + \beta_X X_i)$$

The estimation was performed using a logit model in which W_i is working hours, H_i is the information about health, and X_i is a vector of personal attributes.

It should be noted that there may be two reasons for the lack of questionnaire data, which should be reported by the enterprises after their employees undertook the health checkups, from the Japan Health Insurance Association. First, the subject may not have undergone a health checkup, and second, the data was not reported to the Association. To distinguish these two statuses clearly and create the variable of whether a subject has undertaken a health check more accurately, we used the data of Group A only to generate a binary variable representing undergoing a health checkup. The data of Group B was excluded because the subjects in this group are those who worked in such companies that such data reported to the Japan Health Insurance Association, and if the companies did report, they generally reported that all employees had undertaken health checkups.

Table 3 shows descriptive statistics of variables used for estimation. The number of employees taking health checkups represents the total sample for our estimation. A total of 88% of employees took health checkups, in other words, data is available for 575 employees, while no data exists for 78 employees. Work hours are generally distributed around eight hours. A total of 45% of the sample is female. About 70% of the sample have a spouse or partner and 50% have children. Days of hospitalization, as an outpatient, or for dentistry represent the number of full days a person spent in a medical institution this year. In addition, the number of cases of high blood pressure, hyperlipidemia, and diabetes are also represented . On these health-related variables (the number of visit days and lifestyle-related diseases), there are individual differences widely. Regular employees make up the majority and enterprises with the fewest employees (5–9 employees) account for 5% of the sample.

Table 3 Descriptive statistics

	obs.	mean	std. dev.	min	max
having health checkups	653	0.8806	0.3246	0	1
work hours	653	7.8038	1.0044	4	15
spouse or partner	653	0.7381	0.44	0	1
female	653	0.4533	0.4982	0	1
days of hospitalization	653	0.7029	4.0489	0	59
visit days as outpatient	653	8.464	10.86	0	84
visit days for dentistry	653	2.928	5.1493	0	25
high blood pressure	653	1.3507	3.4806	0	23
hyperlipidemia	653	1.412	3.8112	0	24
diabetes	653	1.0429	3.7192	0	44
income	653	293.1394	166.5119	98	1390
children	653	0.513	0.8767	0	4
34-39 years old	653	0.1501	0.3574	0	1
40-44 years old	653	0.1394	0.3466	0	1
45-49 years old	653	0.1639	0.3704	0	1
50-54 years old	653	0.1332	0.3401	0	1
55-59 years old	653	0.1501	0.3574	0	1
60-64 years old	653	0.1761	0.3812	0	1
65-69 years old	653	0.0674	0.2509	0	1
70-74 years old	653	0.0199	0.1398	0	1
regular employment	653	0.5375	0.4990	0	1
non-regular employment	653	0.3920	0.4886	0	1
company officers/self-employed	653	0.0475	0.2128	0	1
other	653	0.0214	0.145	0	1
no. of employees (5-9)	653	0.0521	0.2223	0	1

5. Estimation results

Table 4 shows the logit estimation results for the entire sample. We estimate two models using (i) a dummy variable with fewer than 10 employees in the company, and (ii) a dummy variable with fewer than 50 employees in the company to control for company size.

First, according to the estimation result using (i), the variables of working hours, the number of dental treatment days, the number of the appearance of hyperlipidemia, dummies for 40–44, 45–49, 50–54, and 60–64 years old (based on 35–39 years old) are supported by significant and positive effects on the decision to undertake health checkups. The result of working hours implies that the longer a subject's working hours are, the more likely they are to undertake a health checkup. This may be because employees with especially long working hours always receive an active check by their industrial physician and are prompted to take health checkups. In addition, health information such as the number of visits to a dentist and the number of the appearance of hyperlipidemia increases individuals' probability of participating in a health checkup. Moreover, according to the estimation results using a dummy with fewer than 50 employees, the female dummy is significantly positive, which suggests that female employees have a higher probability of undertaking a health checkup.

The estimation results for the entire sample include people who work for companies in the public affairs, academic, professional, and technical service industries. In such large organizations, companies can conduct health checkups in their workplace, thus, it is convenient for their employees to undertake these. To avoid this effect, we additionally estimate the model by excluding samples from the aforementioned industries.

Table 5 shows the estimation results using a dummy variable with fewer than 10 employees in the company for two subsamples excluding the public affairs industry only, and excluding public affairs, academic, professional, and technical service industries, respectively[6]. Compared to the results of the entire sample, the spouse or partner dummy became positively significant in the estimation of both subsamples. This result indicates that an individual who has a spouse or partner has a higher probability of undertaking a health checkup.

[6] The estimation results using a dummy variable with fewer than 50 employees in the company are similar to the results in Table 5 and are not reported here to conserve space.

Table 4 Estimation results for all samples

	(1)			(2)		
	Marginal effects	Robust std. err.		Marginal effects	Robust std. err.	
work hours	0.0473	0.0145	***	0.0463	0.0142	***
spouse or partner	0.0456	0.0298		0.0464	0.0301	
female	0.0581	0.0274		0.0579	0.0274	**
days of hospitalization	0.0001	0.0029		0.0002	0.0029	
visit days as outpatient	0.0004	0.0013		0.0006	0.0014	
visit days for dentistry	0.0066	0.0030	**	0.0065	0.0030	**
high blood pressure	0.0005	0.0041		0.0006	0.0041	
hyperlipidemia	0.0108	0.0047	**	0.0106	0.0046	**
diabetes	-0.0024	0.0037		-0.0022	0.0037	
income	0.0001	0.0001		0.0001	0.0001	
children	-0.0069	0.0149		-0.0085	0.0148	
40-44 years old	0.0758	0.0232	***	0.0755	0.0229	***
45-49 years old	0.0622	0.0255	**	0.0621	0.0251	**
50-54 years old	0.0518	0.0274	*	0.0530	0.0266	**
55-59 years old	0.0034	0.0391		0.0037	0.0387	
60-64 years old	0.0867	0.0243	***	0.0862	0.0240	***
65-69 years old	0.0277	0.0462		0.0259	0.0463	
70-74 years old	0.0160	0.0687		0.0075	0.0742	
non-regular employment	-0.0157	0.0296		-0.0106	0.0296	
company officers / self-employed	-0.0742	0.0899		-0.0874	0.0957	
other	-0.0357	0.0974		-0.0373	0.1001	
no. of employees (5-9)	0.0505	0.0376				
No. of employees (fewer than 50)				0.0339	0.0223	
Observations	653			653		
Log pseudolikelihood	-216.04919			-215.67034		
Pseudo R2	0.0956			0.0972		

*** p<0.01, ** p<0.05, * p<0.1

Table 5 Estimation results for samples excluding public affairs and academic, professional, and technical services

	(3) excluding public service			(4) excluding public service and academic, professional, and technical service industries		
	Marginal effects	Robust std. err.		Marginal effects	Robust std. err.	
work hours	0.0380	0.0137	***	0.0350	0.0135	**
spouse or partner	0.0528	0.0306	*	0.0564	0.0312	*
female	0.0387	0.0274		0.0415	0.0278	
days of hospitalization	0.0022	0.0032		0.0018	0.0028	
visit days as outpatient	0.0024	0.0018		0.0020	0.0018	
visit days for dentistry	0.0072	0.0033	**	0.0058	0.0032	*
high blood pressure	0.0004	0.0049		-0.0011	0.0048	
hyperlipidemia	0.0098	0.0058	*	0.0094	0.0056	*
diabetes	0.0002	0.0062		0.0011	0.0062	
income	0.00004	0.0001		0.00002	0.0001	
children	-0.0073	0.0138		-0.0037	0.0141	
40-44 years old	0.0539	0.0242	**	0.0483	0.0251	*
45-49 years old	0.0421	0.0258		0.0511	0.0237	**
50-54 years old	0.0585	0.0232	**	0.0532	0.0240	**
55-59 years old	0.0001	0.0390		0.0064	0.0381	
60-64 years old	0.0730	0.0228	***	0.0729	0.0226	***
65-69 years old	0.0191	0.0517		0.0283	0.0465	
70-74 years old	0.0045	0.0905		0.0099	0.0804	
non-regular employment	-0.0117	0.0285		-0.0301	0.0310	
company officers/self-employed	-0.0695	0.0884		-0.0881	0.1016	
other	-0.0809	0.1118		-0.1177	0.1282	
no. of employees (5-9)	0.0335	0.0382		0.0468	0.0360	
Observations	542			511		
Log pseudolikelihood	-166.2129			-150.3579		
Pseudo R2	0.1088			0.1055		

*** p<0.01, ** p<0.05, * p<0.1

6. Conclusion

This study uses data of employees who work at companies that joined the Hyogo branch of the Japan Health Insurance Association and investigates which factors affect the participation in the health checkups. As a characteristic of each group with and without health checkup data, we confirmed that many employees work in the medical and welfare field by examining the company size and industry of each group.

In addition, if small size companies do not have health checkup data, it may imply it is difficult to conduct health checkups in their workplace, so there should be a high possibility of undergoing a medical checkup at the Japan Health Insurance Association. However, sample's data in Group B do not exist.

Moreover, estimation results indicate that working hours, female dummy, and age increase the probability of undertaking a health checkup in the full sample. The subjects' health information, such as the number of dental treatment days and the appearance of hyperlipidemias, has a positive effect on their participation in health checkups. Furthermore, according to the estimation of the subsamples excluding the public affairs, academic, professional, and/or technical services, we additionally find that whether an individual has a spouse or partner has a significantly positive effect on their participation in health checkups.

Finally, the current study has two limitations. First, the data of Group B were excluded because no health checkup questionnaire data was reported to the Japan Health Insurance Association. We should determine a suitable way to distinguish if this occurred due to the fact that employees in these companies did not undertake a health checkup or that although several employees undertook health checks, the companies did not report the data. Successfully distinguishing this issue can enrich the data for further research. Second, since the analysis is based on data for a single year, an individual's behavioral changes regarding undertaking a health checkup and/or their health status changes are not considered. Panel data should be used to investigate these issues. Therefore, there is room for improvement in the future.

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