A Questionnaire Survey for Living Environment of Special Old Age Nursing Homes and Elderly Health Care Facilities in Japan

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Abstract

We intended to clarify the present states of special old age nursing homes and elderly health care facilities in Japan especially in a cold climate region. A questionnaire survey about maintenance and control of living environment for all special old age nursing homes and elderly health care facilities in Sapporo and Fukuoka City, and Hokkaido, Saitama, Kanagawa, Osaka Prefecture and Tokyo Metropolis was performed. The main questionnaire asks about heating, air-cooling, ventilation system, sanitary system and indoor air quality including bio-aerosol and odors. We send the questionnaire sheets, which were A-4 size and four pages, to total 1,479 homes and facilities. We received total 646 answers, about 44% of total number. The 95 questionnaire items were converted 249 categories for statistical analyses.

The present database for special old age nursing homes and elderly health care facilities consists of about 160,000 data. The data obtained from Sapporo City and Hokkaido Prefecture were compared with those of other regions. We show the characteristics of special old age nursing homes and elderly health care facilities in a cold climate region in this paper. The main differences were set values of air temperature in both winter and mid-summer, and air-cooling system.

Key words: special old age nursing homes, elderly health care facilities, questionnaire survey, air conditioning and ventilation system, sanitary system, indoor air quality

1. Introduction

In Japan, the number of person of advanced age are increasing (Hase et al., 2005). However the actual hygienic conditions of the present special old age nursing homes and elderly health care facilities are uncertain (Hase et al., 2005; Mituda et al., 2005). Therefore we performed a questionnaire survey for special old age nursing homes and elderly health care facilities in six main regions, Sapporo and Fukuoka City, and Hokkaido, Saitama, Kanagawa, and Osaka Prefecture, and Tokyo Metropolis. We made efforts to select the subject regions all over the Japan. Consequently, Hokkaido, Kanto, Kansai and Kyusyu dis-

trict were selected. In addition, we had the strategy to select the number of facilities according to population density. As a result, three populated prefectures, Saitama, Kanagawa, and Tokyo were selected.

The main questionnaire asks about heating, air-cooling, ventilation system, sanitary system and indoor air quality including bio-aerosol and odors. We made the database consisted of about 160,000 data.

We show some data of the database in this paper, and refer to the characteristics of facilities in a cold climate region compared with those of other regions.

Table 1. Outline of questionnaire survey.

Main Item	Sub Item
Outline of Facility	Name; Place; Year; Floor Area; No. of Capacity; No. of Visitor;
Maintenance and Management	Keeping Blueprint of Facilities; Program for the Year; Keeping Record of Maintenance and Management;
Practice of Maintenance and Management	Measurement of Indoor Air (Air Temperature; Humidity; Air Velocity; CO; CO ₂ ; Particulate Aerosol and Dust) Checking and Cleaning (Air Filter; Cooling Tower; Humidifier) Inspection of Drinking Water (Residual Chlorine; Odor; Taste; Color; Muddiness and Quality) Checking and Cleaning of Water Works (Water Tank; Water Supply System) Checking and Cleaning Sewerage (Drain and Sewer Pipe); Biannual through Cleaning Checking and Cleaning of Gathering and Transport and Disposal of Refuse; Control of Insect and Pests
Control of Air Temperature and Humidity	Mean Value of Air Temperature and Humidity (Summer; Winter; Spring and Autumn); Complaint for Hot and Cold Sensation its Detail (Summer; Winter; Spring and Autumn) Problem of Maintenance and Management of Air Temperature; Problem of Maintenance and Management of Humidity
Counterplan of Odor	Odoriferous Place; Deodorization Method; Acceptance of Deodorization by Ozone
Complaint by Occupant	Frequency; Detail; Reason and Counterplan of Complaint (Air Conditioning; Water Supply; Swage; Cleaning; Insect & Pests and Others)
Problem of Maintenance and Management	Point at Issue; Reason and Counterplan (Air Conditioning; Water Supply; Swage; Cleaning; Insect & Pests and Others)
Comments	Free Description

2. Outline of Questionnaire Survey

The subjects were special old age nursing homes and elderly health care facilities in Sapporo and Fukuoka City, and Hokkaido, Saitama, Kanagawa, and Osaka Prefecture, and Tokyo Metropolis, where are the representative regions in Japan. Table 1 shows the main questionnaire items mainly asked about heating, air-cooling, ventilation system, sanitary system and indoor air quality including bio-aerosol and odors (Cheung et al., 2003; Lloyd, 1990; Luscuere and Borst, 2002; Morawska et al., 1998; Nazaroff et al., 1998). We send the questionnaire sheets, which were A-4 size and four pages, to total 1,479 homes and facilities. We received total 646 answers about 44% of total number (see Table 2).

3. Developing Database

The 95 questionnaire items as shown in Table 1 were converted 249 categories for statistical analyses. We made the database for special old age nursing homes and elderly health care facilities consisted of about 160,000 data.

4. Results and Discussion

Building age

There are 37 special old age nursing homes in Sapporo city, Hokkaido. The oldest one was built in 1965

Table 2. Total number of the subjects and the replies.

	No. of subject	No. of reply	reply (%)
Hokkaido	174	112	64.4
Saitama	257	66	25.7
Tokyo	426	138	32.4
Kanagawa	283	79	27.9
Osaka	291	220	75.6
Fukuoka	48	33	68.8
Total	1479	648	43.8

and the newest one was built in 2001. The central value of building year is 1989. On the other hand the oldest elderly health care facility in Hokkaido was built in 1988. The newest one was built in 2001. The central value of building year of elderly health care facilities in Hokkaido is 1996. In general special old age nursing homes were time-honored compared with elderly health care facilities in Hokkaido.

Floor area and accommodation

The floor area of special old age nursing homes in Sapporo ranged from 1,612 m² to 15,749 m² and the mean value was 4,648 m². The floor area of elderly

Table 3. Each number of the subjects and the replies in special nursing old age home and elderly health care facilities.

	Special nursing old age home			Elderly health care facilities		
	No. of subject	No. of reply	reply (%)	No. of subject	No. of reply	reply (%)
Hokkaido	37	37	100.0	137	75	54.7
Saitama	171	45	26.3	86	21	24.4
Tokyo	320	107	33.4	106	31	29.2
Kanagawa	185	55	29.7	98	24	24.5
Osaka	153	112	73.2	138	108	78.3
Fukuoka	26	17	65.4	22	16	72.7
Total	892	373	41.8	587	275	46.8

Table 4. The mean, the minimum and the maximum values of floor area.

	Floor area (m ²)		
	mean	min	max
Hokkaido	4423	1483	15749
Saitama	3721	1118	9813
Tokyo	4413	907	9617
Kanagawa	3696	1516	8940
Osaka	3696	1134	6542
Fukuoka	3796	1574	9786
Total	4015	907	15749

Table 5. The mean, the minimum and the maximum values of the number of accommodation.

	No. of Accommodation		
	mean	min	max
Hokkaido	92	41	200
Saitama	78	50	150
Tokyo	96	30	185
Kanagawa	90	36	160
Osaka	89	43	157
Fukuoka	99	30	380
Total	89	30	380

health care facilities in Hokkaido ranged from 1,483 m² to 7,481 m² and the mean value was 4,312 m², the same level as special old age nursing homes.

The number of accommodation of special old age nursing homes in Sapporo ranged from 50 to 200 and the mean value was about 95.

The number of capacity of elderly health care facilities in Hokkaido ranged from 41 to 185 and the mean value was 90.8.

The number of visitor (outpatient) of special old age nursing homes in Sapporo ranged from 2 to 150 and the mean value was 28.1 per day.

The number of visitor of elderly health care facilities in Hokkaido ranged from 4 to 88 and the mean value was 30.4 per day.

Table 4 and Table 5 summarize the mean, the minimum and the maximum values of the floor area and the number of accommodation respectively.

The floor area of the total 648 facilities ranged from 907 to 15,749 m². According to Table 4, the mean values of the floor area in Hokkaido and Tokyo Metropolis were relatively larger than the other regions.

The number of accommodation of the total 648 facilities ranged from 30 to 380 persons and the mean value was 89. The mean value of the number of accommodation in Saitama was smaller than the other

Fig. 1. The relationship between the floor area and the number of accommodation.

regions.

Figure 1 shows the relationship between the floor area and the number of accommodation.

The floor area was proportional to the number of capacity ($R=0.587$). It was indicated that the present floor area per person of Japanese special old age nursing homes and elderly health care facilities was about 44 m².

Measurements of air temperature and humidity

Table 6 shows the measurement times of air temperature. The total 73% of special old age nursing homes and elderly health care facilities measured air temperature. The 52% of homes and facilities meas-

Table 6. The ratio of measurements of air temperature.

(%)	Periodical	Temporary	Non	Unknown
Hokkaido	56	27	14	3
Saitama	44	20	34	2
Tokyo	58	12	28	2
Kanagawa	47	27	25	1
Osaka	55	20	23	2
Fukuoka	43	18	39	0
Total	52	21	25	2

Table 7. The ratio of checking of air filter.

(%)	Periodical	Temporary	Non	Unknown
Hokkaido	76	16	6	2
Saitama	79	14	5	2
Tokyo	88	8	3	1
Kanagawa	89	7	4	0
Osaka	80	18	2	0
Fukuoka	82	15	3	0
Total	82	14	3	1

Table 8. The setting values of air temperature and humidity in each season.

	Summer		Winter		Spring/Autumn	
	Temperature (°C)	Humidity (%)	Temperature (°C)	Humidity (%)	Temperature (°C)	Humidity (%)
Hokkaido	25.3	51	24.4	38	24.0	45
Saitama	25.2	56	23.2	42	23.6	49
Tokyo	25.5	54	23.4	40	24.0	47
Kanagawa	25.1	54	23.9	42	23.9	48
Osaka	25.1	50	23.1	41	23.6	45
Fukuoka	25.7	52	23.7	41	24.2	47
Total	25.4	53	23.7	41	24.0	47

ured air temperature periodically. The rate of measurements of air temperature in Hokkaido was 83%, which was relatively higher than those in the other regions. The relative humidity was measured in 63% of total facilities. The rate of measurements of relative humidity in Hokkaido was 74%, which was also relatively higher than those in the other regions.

Checking and cleaning of air filter

Table 7 shows checking times of air filter. The total 96% of special old age nursing homes and elderly health care facilities checked air filter. The 86% of the homes and facilities checked air filter periodically. The value of checking times of air filter in Hokkaido was 92%, which was relatively lower than those in the other regions. It was thought to be one of the improving points.

The total 98% of special old age nursing homes and elderly health care facilities cleaned air filter. The 86% of the homes and facilities cleaned air filter periodically. The value of cleaning times of air filter in Hokkaido was 93%, which was relatively lower than those in the other regions. It was thought to be also one of the improving points in Hokkaido district.

Control of air temperature and humidity

Table 8 summarizes the setting values of air temperature and humidity in each district and season. In summer the mean of setting values of air temperature was 25.2°C. The setting air temperature of Fukuoka,

the south part of Japan, was the highest value of 25.7°C. In winter the mean value of setting values of air temperature was 23.7°C. The setting air temperature of Hokkaido, the northland in Japan, was the highest value of 24.4°C. The setting air temperature of Saitama and Osaka were 23.2°C and 23.2°C, those were relatively lower values than other districts.

In summer, the mean of setting values of relative humidity was 53%. The setting values of relative humidity of Hokkaido and Osaka were lower than those of the other districts. In winter, the mean value of the relative humidity was 41%. The setting value of relative humidity of Hokkaido in winter was the lowest value of 38%.

Complaint by occupants

Table 9 shows the complaints by occupants concerning cold, hot and dizzy sensations in each season. In winter, the value of complaints about cold sensation was 43%. It was supposed to be caused by poor heating system. In summer, there were complaints by occupants about cold sensation in the 14–24% of the homes and facilities except Hokkaido district. It seemed to be caused by over cooling. On the other hand, the value of complaints about hot sensation in winter was less than other districts. In summer, the value of complaints about hot sensation was 44%. It was hoped the optimization of both heating and cooling systems in Japanese elderly homes and facilities.

Table 9. The ratio of complaints by occupants in each season (%).

(%)	Cold sensation			Hot sensation			Dizzy sensation		
	Summer	Winter	Spring/Autumn	Summer	Winter	Spring/Autumn	Summer	Winter	Spring/Autumn
Hokkaido	4	44	32	40	15	10	5	2	1
Saitama	23	40	12	42	9	9	0	0	0
Tokyo	14	37	21	38	13	20	3	4	2
Kanagawa	23	44	13	38	9	16	4	4	1
Osaka	24	46	24	48	11	18	2	6	1
Fukuoka	24	52	21	45	9	21	9	0	0
Total	18	43	22	43	11	16	3	4	1

5. Conclusion

1) We intended to clarify the present states of special old age nursing homes and elderly health care facilities in Japan especially in a cold climate region. A questionnaire survey for all special old age nursing homes and elderly health care facilities in Sapporo and Fukuoka City, and Hokkaido, Saitama, Kanagawa, and Osaka Prefecture, and Tokyo Metropolis was performed.

2) The main questionnaire asks about heating, air-cooling, ventilation system, sanitary system and indoor air quality including bio-aerosol and odors. We send the questionnaire sheets to total 1,479 homes and facilities. We received total 646 answers, about 44% of total number. The 95 questionnaire items were converted 249 categories for statistical analyses. The present database for special old age nursing homes and elderly health care facilities consists of about 160,000 data.

3) The data obtained from Sapporo City and Hokkaido Prefecture were compared with those of the other regions especially the following building age, floor area, building capacity, air temperature, humidity, maintenance of air filter, complaints by occupants. And, the main differences were setting values of air temperature in both winter and summer and air-cooling system. In summer, the mean setting air temperature of Hokkaido was slightly higher than the mean value of total. In winter, the mean setting air temperature of Hokkaido was the highest in six districts. And, the value of complaints of Hokkaido about cold sensation in summer was the lowest in six districts, the value was only 4%.

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