



Building users' perceptions of importance of indoor environmental quality in long-term care facilities



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ABSTRACT

This study investigated whether the characteristics of the users of long-term care (LTC) facilities were associated with differing perceptions of the importance of indoor environmental quality. Questionnaires were distributed to three types of building users—managers of LTC facilities, people residing at LTC facilities for at least three months, and family members of residents—to assess their perceived importance of indoor environmental factors (temperature, humidity, natural lighting, illumination, ventilation, and noise). The results showed that the characteristics of managers did not affect their perceived importance of the indoor environmental index. Among residents, their education level and whether they suffered from hyperlipidemia, osteoporosis or stroke were associated with differing perceptions; the perceptions of family members differed according to education level, age, the residents' length of stay in LTC facilities, the number of beds at the facility, and the number of other LTC facilities visited. Family members attached less importance to indoor environmental indicators when the payment for staying at an LTC facility was made by the resident's spouse. The findings could serve as a reference for the design and management of indoor environments in LTC facilities in order to meet the needs of individual building users.

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1. Introduction

Increasing importance has been attached to the indoor environmental quality of long-term care (LTC) facilities, which provide care for the infirm and the elderly with moderate to severe disabilities [1]. Most previous studies have shown that the physical and psychological status of building users can be affected by various indoor environmental parameters, such as temperature, humidity, ventilation [2–4], natural lighting or illumination [5–7], and noise [6,8–10].

Perceptions of the same indoor environment will vary among different building users. Most previous studies of indoor

environmental quality focused on office buildings. Those results indicated that gender [5,9], education level, age, and type of work [8] were correlated with perceptions of the indoor environment.

Understanding the characteristics and specific needs of various categories of building users could help improve the management of the indoor environment. However, few studies have investigated potential correlations between the characteristics of LTC facility users and their perceptions of the indoor environment, and thus, it is difficult to know whether indoor environmental conditions are appropriate for users' needs.

Many previous studies have investigated perceptions of the indoor environment among users of hospital-type LTC facilities. Previous results have shown that indoor environmental factors directly or indirectly affect the health and wellbeing of different building users, such as patients, staff, and visitors [11]. For example, hospitals designed according to feedback from patients have been shown to increase patient satisfaction and their willingness to be readmitted to the hospital [12]. In addition, taking the opinions of doctors and nursing personnel into consideration can improve staff

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satisfaction, reduce work-related stress, and improve the quality of the working environment [13].

Previous studies have suggested that, when designing medical care facilities, user suggestions should be incorporated in order to improve the medical care environment. However, the differing perceptions of indoor environments in LTC facilities have seldom been investigated from the perspective of users' individual characteristics. Moreover, the long-term care and services provided by LTC facilities differ from those provided by hospitals. Therefore, this study investigated whether the characteristics of individual users of LTC facilities affect their perceptions of the importance of indoor environmental quality. The research findings could provide a reference for the design and planning of appropriate indoor environments for LTC facilities.

2. Research sample

Three categories of building users were selected for this study: 1) managers, including head nurses, supervisors, directors, superintendents, and owners; or those who directed others' work and had subordinates within the organization [14]; 2) Individuals residing at the facility for at least three months, who were conscious and did not suffer from any mental disorder; 3) family members (RFs) of those residents. Participation in the study was voluntary.

LTC facilities in Taiwan can be classified into two main types. The first type consists of senior citizen welfare institutions (SCWIs), which are supervised by the Department of Social Affairs. The second type consists of nursing homes (NHs), which are supervised by the Department of Health. Both types of facilities provide residents with daily care and general nursing care. Residents of NHs have greater care requirements than those living in SCWIs. This study collected data from residents living in both types of LTC facilities.

This study was approved by the Medical Ethics Committee of Asia University (No. 1006011). Closed-ended questionnaires were sent to LTC facilities that agreed to participate in this study, for review and approval of the content. Managers, RFs, and residents received written information regarding the research objectives, and letters of consent were obtained from those agreeing to participate in the study. All interviewers were trained prior to conducting the survey.

Table 1 summarizes how the questionnaires were distributed. From January to April 2010, questionnaires were distributed to 676 LTC facilities (500 SCWIs; 176 NHs). A total of 630 questionnaires were mailed to managers individually at 188 SCWIs and 60 NHs; of these, 161 were returned, comprising 151 valid and 10 invalid samples, for a valid return rate of 23.97%. The LTC

facilities requested that face-to-face interviews be conducted with the RFs. A total of 286 interviews were completed in person with RFs at 111 SCWIs and 69 NHs, of which only two were invalid, giving a valid return rate of 99.3%. A total of 1280 questionnaires were mailed to residents individually at 63 SCWIs and 48 NHs; of these, 480 were returned (286 valid, 194 invalid) for a valid return rate of 22.34%.

3. Measurement and analysis

The study used a two-part questionnaire related to the indoor environments of the LTC institutions. The first part collected information about the background of the building users, e.g., gender, age, education level, marital status, and facility type. Additional items were included based on differences between building users.

For managers, additional questions on the number of beds at the facility (1 = less than 49 beds; 2 = more than 50 beds), facility type, job title, and job description were included. For residents, additional questions inquired whether they had been diagnosed with any of 14 chronic diseases (hypertension, hyperlipidemia, hepatitis, chronic obstructive pulmonary disease, asthma, heart disease, kidney disease, diabetes mellitus, osteoporosis, stroke, allergic disorder, uterine and ovarian disease, prostate disease, and gout). Further, the questionnaire also asked about the residents' Barthel Index of daily living activities (ADL), which is a common assessment tool. The ADL scale assesses 10 items, comprising feeding, bathing, grooming, dressing, bowels, bladder, toilet use, transfers, mobility, and stairs, and has a maximum total score of 100 points [15]. In Taiwan, the Barthel Index is one of the criteria used for the application for long-term care services [16]. A score of 0–60 points indicates that the subject is heavily dependent, 61–90 indicates moderate dependence, 91–99 indicates mild dependence, and a score of 100 points indicates that the subject is completely independent. This study also collected information on those paying for their residential care, the length of their stay, and whether they chose the LTC facilities themselves.

The RFs were asked additional questions concerning their relationship to the residents, the residents' length of stay in the LTC facilities, the number of beds in the LTC facilities, those paying for the residential care, and the number of other LTC facilities they visited before choosing the present facility.

The second part of the questionnaire inquired about the perceived importance of the indoor environment. Six indicators were selected, based on the results of previous studies: temperature, humidity, natural lighting, illumination, ventilation, and indoor noise [8,11]. Measurement was based on a 5-point Likert scale, where 1 = not important at all, 2 = not so important, 3 = neutral, 4 = important, and 5 = very important.

To verify the validity of the questionnaire, ten LTC facility operators and scholars were invited to complete a modified Delphi technique questionnaire between October and December 2009. Reliability was determined based on Cronbach's alpha coefficient. The statistical results showed that the measured values for the perceived importance of managers, RFs, and residents were greater than 0.94, indicating high reliability of the questionnaire.

Data analysis used SPSS 12.0 for Windows and results are presented as median, standard deviation (SD), average, and percentage. Nonparametric analysis was used to determine the effects of participants' characteristics on their perceptions of the six indoor environmental indicators. In addition, the Mann–Whitney *U*-test (two groups), the Kruskal–Wallis test (more than two groups), and Dunn's multiple comparison were employed in post-hoc testing to determine the differences between groups [1].

Table 1
Breakdown of the samples.

Sample	Building users		
	Managers	RFs	Residents
Total sample	630	286	1280
Number of questionnaires returned	161	286	480
Valid sample	151	284	286
Invalid samples	10	2	194
Valid return rate (%)	22.97	99.3	22.34
Number of questionnaires distributed to LTC facilities	240	180	111
SCWIs	188	111	63
NHs	60	69	48

Note: RFs = family members of the resident. SCWIs = senior citizen welfare institutions. NHs = nursing homes.

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