資料. 居住市町村の概況（平成 17 年 3 月現在）

	和歌山市	和歌山県南部	
		A 町	B 町
住基人口（人）	386559	15162	5664
第一号被保険者（人）	82059	4793	2009
要介護認定者数（人）	16520	798	319
軽度要介護者（人）（%）	11334 (68.6)	515 (64.5)	199 (62.4)
重度要介護者（人）（%）	5186 (31.4)	283 (35.5)	120 (37.6)
被保険者 1 人あたりの支給額			
居宅サービス（平均月額・円）	12,169	9,753	9,186
施設サービス（平均月額・円）	8,951	6,756	9,178
受給者 1 人あたりの支給額			
居宅サービス（平均月額・円）	92,541	84,091	90,382
施設サービス（平均月額・円）	307,983	295,318	291,591
高齢化率（%）	21.2	31.6	35.5
認定率（%）	20.1	16.6	15.9
受給率（%）			
居宅サービス（%）	65.9	71.6	66.8
施設サービス（%）	14.6	14.1	20.7

平成 16 年度　和歌山県介護保険事業年報より

注 1：要介護認定者数には第二号被保険者は含まない

注 2：軽度要介護者：要支援～要介護 2

　　重度要介護者：要介護 3～要介護 5

注 3：高齢化率とは全人口に占める高齢者(第一号被保険者)の割合

注 4：認定率とは第一号被保険者に占める認定者の割合

注 5：受給率とは認定者（累計）に占める受給者（累計）の割合

別紙４

研究成果の刊行に関する一覧表

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REVIEW ARTICLE

Family caregiver burden and quality of home care in the context of the Long-Term Care insurance scheme: an overview

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Key words: *burden, caregiver, home care, Japan, long-term care, quality.*

Abstract

This review outlines the findings of 22 studies conducted between 1997 and 2005 by Arai and 19 collaborators regarding caregiver burden and assessment of quality of home care for the elderly. The published research covers the following: cross-sectional studies on caregiver burden; changes in caregiver burden; appropriateness of the Long-Term Care insurance assessment scheme; attitudes towards caregiving among caregivers; the development of the short Japanese version of the Zarit Caregiver Burden Interview (J-ZBI_8); and the effectiveness of service use in reducing caregiver burden and development of a Home Care Quality Assessment Index (HCQAI).

INTRODUCTION

An increase in the number of impaired elderly people and a concomitant decrease in the capacity of informal care (partly due to the increasing development of the nuclear family and more career-oriented women) have now made caregivers' burden a social issue not only in Japan but also in many developed countries. In Japan for example, in a survey conducted by Arai *et al.* targeting a general population of 2224 people, 70% gave as the second reason for not wanting to live long their wish not to be a burden to their own family members.[1,2] And when asked what they would feel if diagnosed with dementia, approximately 70% stated they would feel embarrassed to become a burden to their family.[1,3]

It was Professor Steven Zarit of Pennsylvania State University who first proposed an operational definition of caregiver burden as the extent to which caregivers perceived their emotional or physical health, social life and financial status as suffering as a result of caring for their relative. He then developed an assessment tool for the feelings of caregiver burden based on the above definition, the Zarit Burden Interview (ZBI).[4,5] The ZBI is now the instrument most widely used in North America and Europe for assessing the burden experienced by family caregivers who look after the community-residing impaired elderly.

Arai *et al.* developed a Japanese version of this assessment scheme, called J-ZBI,[6] which is currently the most widely used assessment tool for caregiver burden in Japan.

This review outlines the findings of 22 studies conducted between 1997 and 2005 by Arai and 19 collaborators regarding caregiver burden and assessments of the quality of home care for the elderly.

Cross-sectional studies on caregiver burden

A study was conducted using the J-ZBI in Japan prior to the implementation of the Long-Term Care (LTC) insurance scheme in order to identify the factors related to the feelings of burden experienced by family caregivers who looked after the impaired elderly. As in previous studies in North America and Europe, it was found that behavioral and psychological symptoms of dementia (BPSD) and behavioral disturbances of the disabled elderly were strongly correlated to feelings of caregiver burden (odds

ratio = 4.75, 95% confidence interval = 1.45–15.54, $P = 0.01$).[7] The above findings did not differ after the LTC insurance scheme was implemented; BPSD have remained a strong correlate of the feelings of caregiver burden (odds ratio = 7.16, 95% confidence interval = 1.48–34.70, $P = 0.01$).[8] We also found that the subscore of health-related quality of life (HRQOL) with respect to mental health and satisfaction with verbal communication was a factor influencing caregiver burden.[9]

Subsequently, Schreiner *et al.* found that a cutoff score ranging from 24 to 26 has significant predictive validity for identifying caregivers at risk for depression.[10] A J-ZBI cutoff of 24 correctly identified 72% of caregivers with probable depression.[10]

In addition, a qualitative study was conducted in order to elucidate the caregiver burden and problems associated with the care of patients with frontotemporal dementia (FTD) in home-care settings. Behavioral symptoms peculiar to FTD were found to pose huge problems and a heavy burden to the family caregiver. The conclusion was that more resources should be allocated to meet the specific needs of FTD patients and their families.[11]

Changes in caregiver burden

Arai *et al.* conducted a survey every year from 1998 through 2001 targeting all disabled elderly and their principal caregivers residing in Matsuyama Town located in rural northern Japan. The design of this Matsuyama Caregiver study has been described in detail elsewhere.[12,13]

As a part of the study, a longitudinal analysis was conducted between October 1998 and October 2000 in an attempt to determine how caregiver burden may have changed before and after the implementation of the LTC insurance scheme. It was found that the number of services used in 2000 was significantly greater than in 1998. However, caregiver burden itself did not change from 1998 to 2000, the first year in which the new system was in place.[14] A similar analysis was then undertaken to compare caregiver burden between 1999 and 2001; there was no significant difference between the mean J-ZBI scores in 1999 and 2001.[15] Overall, these longitudinal studies showed that the degree of caregiver burden did not change among the caregivers who had been continuously providing care prior to the launch of the LTC insurance scheme.

Comparisons were also made between caregivers of the disabled elderly in 1999 and those entrusted with their care in 2001 in terms of their degree of caregiver burden by analysis of co-variance (ANCOVA), adjusting for other variables. As shown in Figure 1, the adjusted J-ZBI mean score in 2001 was not significantly different from that in 1999, indicating that feelings of burden among caregivers did not change after the implementation of the LTC insurance scheme.[15]

Appropriateness of the Long-Term Care insurance assessment scheme

In the LTC insurance scheme, services are allocated based on the Government-certified Disability Index (GCDI) (Yokaigodo).[16] We were concerned at the time whether the LTC insurance scheme in Japan had indeed developed a fair and appropriate way of allocating resources to the nation's disabled elderly population, especially those with dementia. Specifically, we investigated whether the GCDI scores under the LTC insurance scheme adequately reflected the needs of people with dementia of Alzheimer's type (DAT) and vascular-type dementia (VD).[17] In fact, the GCDI score among DAT patients proved to be lower

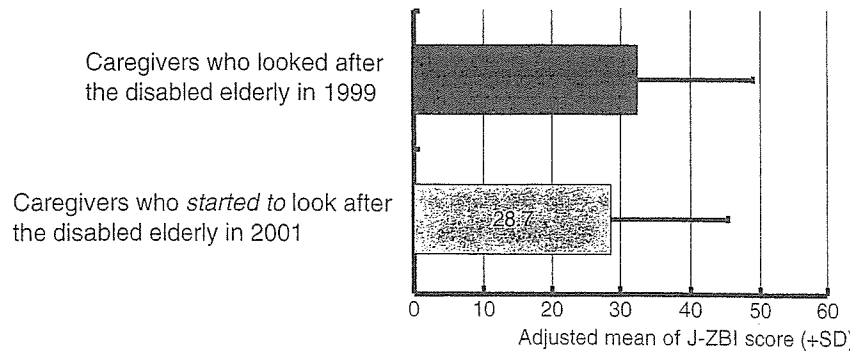

Figure 1 Comparisons of J-ZBI score between caregivers who looked after the disabled elderly in 1999 and those who *started to* look after the disabled elderly in 2001. Adjusted by caregivers' age, caregivers' sex (female = 1), age of disabled elderly, duration of caregiving (months), number of family members, ADL score (Barthel Index), score of behavioral disturbances (TBS).

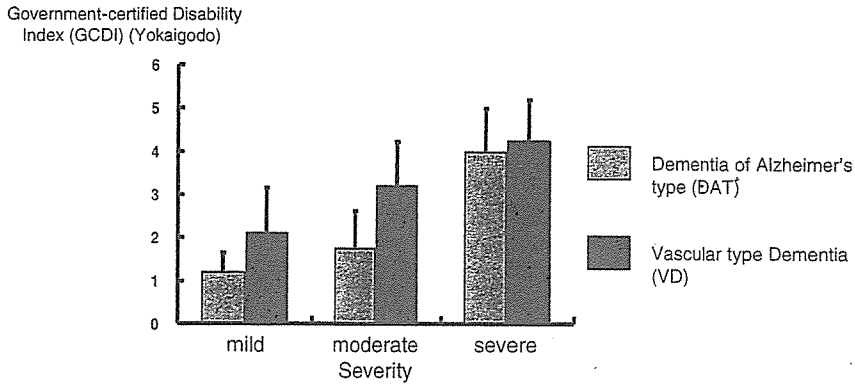

Figure 2 Government-certified Disability Index (GCDI) (Yokaigodo) and severity in dementia of Alzheimer's type (DAT) and vascular-type dementia (VD) patients.

Table 1 The short Japanese version of the Zarit Caregiver Burden Interview (J-ZBI_8)[20–22]

◎ 1. Do you feel embarrassed over your relative's behavior?
0. Never 1. Rarely 2. Sometimes 3. Quite frequently 4. Nearly always
◎ 2. Do you feel angry when you are around your relative?
0. Never 1. Rarely 2. Sometimes 3. Quite frequently 4. Nearly always
△ 3. Do you feel that your relative currently affects your relationship with other family members or friends in a negative way?
0. Never 1. Rarely 2. Sometimes 3. Quite frequently 4. Nearly always
◎ 4. Do you feel strained when you are around your relative?
0. Never 1. Rarely 2. Sometimes 3. Quite frequently 4. Nearly always
△ 5. Do you feel that your social life has suffered because you are caring for your relative?
0. Never 1. Rarely 2. Sometimes 3. Quite frequently 4. Nearly always
△ 6. Do you feel uncomfortable about having friends over because of your relative?
0. Never 1. Rarely 2. Sometimes 3. Quite frequently 4. Nearly always
◎ 7. Do you wish you could just leave the care of your relative to someone else?
0. Never 1. Rarely 2. Sometimes 3. Quite frequently 4. Nearly always
◎ 8. Do you feel uncertain about what to do about your relative?
0. Never 1. Rarely 2. Sometimes 3. Quite frequently 4. Nearly always

Notes: ◎ J-ZBI_8 Personal Strain; △ J-ZBI_8 Role Strain.

than among VD patients (Fig. 2), indicating that DAT patients were classified as 'less disabled' on their GCDI than VD patients. Since the amount of care services patients were allowed to use under the existing LTC insurance plan was determined solely by the GCDI score, it appeared that the people with DAT in the study were allowed fewer care services despite the fact that the severity of their dementia was the same as for VD patients.

Caregivers' attitudes towards caregiving

The LTC scheme has demonstrably changed the attitudes of caregivers. More caregivers came to believe that society must look after the elderly after only one year under the new program.[18] In the short space of a year, there was an obvious shift from the idea that the care of old folks falls to the family to the virtually unheard-of notion that society must shoulder the problems of the world's fastest-graying population.[19]

Development of short Japanese version of Zarit Caregiver Burden Interview: its reliability and validity

Under the new LTC insurance system, it became even more important to monitor the wellbeing of not only the impaired elderly but also the family caregivers. To facilitate the assessment of family caregiver burden in clinical settings, Arai *et al.* proposed a short version of the J-ZBI, consisting of the following two factors: personal strain (five items) and role strain (three items).[20] These eight items are presented in Table 1. It was demonstrated that the newly proposed short version, J-ZBI_8, had high reliability, concurrent validity and construct validity. Subsequently, Kumamoto *et al.* conducted a cross validation study.[21,22] Overall, the J-ZBI_8 produced results comparable to those of the full version, i.e., the J-ZBI. The shorter yet no less reliable and valid eight-item version would thus mean easier administration of the instrument for assessing family caregiver burden in clinical settings.

Effectiveness of service use on reducing caregiver burden

Since relatively few observational studies had been conducted on the impact of home-care services on burden or other aspects of the caregiver's experience, a new study by Kumamoto *et al.*[23] then sought to examine whether the use of care services reduces the feelings of burden among family caregivers in Japan. The specific aims were to test three hypotheses: (i) that severity of impairment and dementia among the disabled elderly increases the feelings of burden among family caregivers and that support from family members decreases burden; (ii) that the amount of services used by older people and their caregivers is affected by the severity of dementia and ADL deficiencies among the disabled elderly and the amount of support from family members; and (iii) that controlling for severity, the use of care services under the LTC insurance program serves to reduce feelings of burden among family caregivers.

A structural equation model was developed using the data obtained from 82 pairs of community-dwelling disabled elderly and their principal family caregivers. The model included the following variables: age of the disabled elderly; the severity of ADL deficiency and behavioral disturbances; use of formal (public) care services; support from family members; and feelings of burden among family caregivers.[23] The structural equation model revealed that, after controlling for the effects of severity on service use, home-care services effectively reduce feelings of burden among family caregivers.

These findings suggested that care services provided under the LTC insurance scheme had been successfully reducing burden among family caregivers. The next issue was whether the quality of home care is related to caregiver burden. However, there was no objective tool for assessing quality of home care. Thus, Arai *et al.* launched a study with the specific aim to develop an assessment tool for home care.[24,25]

Development of a Home Care Quality Assessment Index (HCQAI)

The aim of this study was to develop a Home Care Quality Assessment Index (HCQAI) that may be used for overall assessment of home care in three areas: (i) conditions of the impaired elderly (outcome); (ii) caregiver and caregiving situation (process); and (iii) the home care environment (input).

To develop the HCQAI, a list of items for assessment was drawn up, and the reliability of each item was verified using (a) test–retest reliability; and (b) inter-rater reliability. Impaired elderly and their family caregivers who used the visiting nurse station of the Okazaki Medical Association were surveyed. A κ coefficient of 0.4 or greater generally served as the inclusion criteria for test–retest and inter-rater reliability of each item. A factor analysis was then conducted for items satisfying the above criteria, using 10 scales.

As a result, Cronbach's α showing internal consistency (reliability) for these scales was 0.6–0.9. Two scales corresponded to care within the home: the 'barrier-free' and 'improvement of water facilities'; three to the caregiver situation: 'dressing appropriately for the season', 'mistreatment towards the elderly' and 'hygiene and assistance'; and five involved conditions of the impaired elderly: 'cognition', 'paralysis', 'vision and hearing', 'ADL' and 'gross motor.' The HCQAI developed in the study, consisted of 41 items, and could assess the quality of home care both objectively and comprehensively, based on professional staff observation (Fig. 3).[24,25] Few indexes of this kind exist worldwide to scientifically assess input, process and outcome in the delivery of quality home care for the impaired elderly.

It is hoped that this review briefly outlining recent studies relating to family care burden and home care quality under the LTC insurance scheme will familiarize the reader with some of the present and past issues in this fast-changing field.

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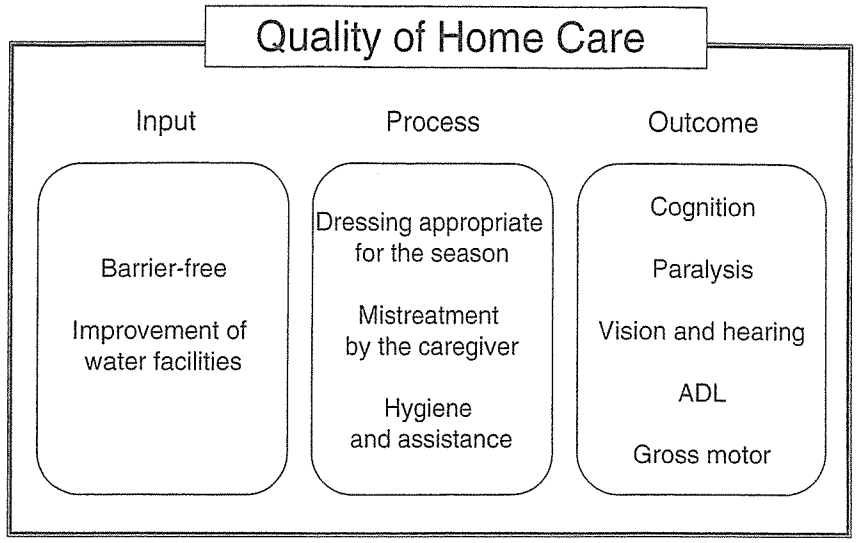

Figure 3 Subscales of Home Care Quality Assessment Index (HCQAI).

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Use of home care services effectively reduces feelings of burden among family caregivers of disabled elderly in Japan: preliminary results

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SUMMARY

Background Relatively few observational studies have been conducted on the impact of home care services on burden or other aspects of the caregiver's experience.
Objectives To examine whether the use of care services reduces the feelings of burden among family caregivers in Japan. Specifically, the study was aimed at testing the following three hypotheses: (1) The severity of impairment and the dementia among the disabled elderly increases the feelings of burden among family caregivers and the support from family members decreases burden: (2) the amount of services used by older people and their caregivers is affected by the severity of dementia and ADL deficiencies among the disabled elderly and the amount of support from family members: and (3) controlling for severity, the use of care services under the LTC insurance program serves to reduce the feelings of burden among family caregivers.
Methods A structural equation model using the data obtained from 82 pairs of community-dwelling disabled elderly and their principal family caregivers. The model included the following variables: age of the disabled elderly; the severity of ADL deficiency and behavioral disturbances; use of formal (public) care services; support from family members; and feelings of burden among family caregivers.
Results The structural equation model revealed that, after controlling for the effects of severity on service use, home care services effectively reduce feelings of burden among family caregivers.
Conclusions The findings suggest that care services provided under the LTC insurance have been successfully reducing burden among family caregivers in the study area. Copyright © 2006 John Wiley & Sons, Ltd.

KEY WORDS — caregiving; long term care; service use; caregiver burden; community setting

INTRODUCTION

It is well-documented that informal care for the disabled elderly is a heavy burden for family caregivers (Montgomery *et al.*, 1985; Zarit *et al.*, 1986; Vitaliano *et al.*, 1991; Arai *et al.*, 2002) and that informal instrumental support is effective in alleviating caregiver burden (Pearlin *et al.*, 1995; Miller *et al.*, 2001).

A variety of formal supports and interventions have been found to have an impact on feelings of burden. Psycho-educational interventions can reduce the feelings of burden among family caregivers (Schulz *et al.*, 2002; Sörensen *et al.*, 2002), and use of respite care can delay institutionalization of the disabled elderly (Lawton *et al.*, 1989; Kosloski and Montgomery, 1995). However, these are experimental interventions in which the elderly and family use only one or a few kinds of services and/or specialized interventions such as counseling.

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By contrast, in a typical community setting the disabled elderly use various kinds of care services provided in their community, taking account of the degree of their own disability, the capacity of available informal care, and their financial status. These types of services are widely available in Western countries and Japan, yet have rarely been evaluated for their effects on caregivers. One problem is that a true experimental design is usually not possible for practical and political reasons—namely that services are widely available and so control groups cannot be restricted in their access. One alternative is to conduct a controlled observational study that allows for estimation of benefits associated with community-based services such as respite care (e.g. Shadish *et al.*, 2001). Although not providing the same type of control as an experimental design, these quasi-experimental approaches may actually improve internal validity compared to a field experiment and allow for adequate examination of the impact of the intervention on participants (Zarit *et al.*, 2003). Given the central role of community-based respite services in the care of elders and their families, there is considerable need for evaluations of effectiveness, yet relatively few observational studies have been conducted on the impact of these services on burden or other aspects of the caregiver's experience (Bass *et al.*, 1996; Arai *et al.*, 1998).

The paucity of observational (cross-sectional) studies derives from the methodological difficulties in elucidating the relationship between the use of care services by the disabled elderly and the feelings of burden among family caregivers in a real setting. First, in a community setting, the degree of impairment of the elderly will be positively correlated with the amount of services they use (Arai *et al.*, 2000). In other words, people use more services when their relative has more impairment. Indeed, under most public care systems, including the LTC insurance system in Japan, the severity of one's impairment determines the amount of care services which the elderly are eligible to use (Arai, 2001; Arai *et al.*, 2003). Second, the feelings of burden among family caregivers are known to be positively correlated with the degree of impairment of the elderly, in particular the degree of behavioral disturbances (Zarit *et al.*, 1986; Harper and Lund, 1990; Draper *et al.*, 1992; Donaldson *et al.*, 1997). Taken together, these findings suggest that service users would be caring for people with greater impairment and would feel more burdened as a result than non-users. A comparison of users and non-users that did not take into account the effects of severity on burden might mistakenly conclude that service use was associated with increased burden. Overall, it is difficult to show whether the use of such care services is effective in reducing caregiver burden because of the complex relationship between use of care services and caregiver burden (Pot *et al.*, 2005).

The aim of the present study was to examine whether the use of care services reduces the feelings of burden among family caregivers. Using a cross-sectional (observational) design, we tested the following three hypotheses: (1) The severity of impairment, including ADL deficiencies and severity of dementia among the disabled elderly, increases feelings of burden among family caregivers and the support from family members decreases burden: (2) the amount of services used among the elderly and caregivers is affected by the severity of impairment (ADL deficiencies and severity of dementia) among the disabled elderly and the amount of support from family members, and (3) once severity is taken into account, the use of care services under the LTC insurance program is associated with lower feelings of burden among family caregivers.

METHODS

Subjects

The design of the Matsuyama Caregiver Study was described in detail elsewhere (Arai *et al.*, 2000; Arai *et al.*, 2002). Briefly, Subjects in the present study were drawn from a list of 143 community-dwelling 'registered disabled elderly' from Matsuyama Town (population: 7,239) in northern Japan; all of these 'registered disabled elderly' had applied for services under the LTC insurance system. Moreover, those 143 elderly and their caregivers were invited to participate by a letter explaining the study, which has also been fully endorsed by the ethical committees of both Matsuyama Town and the National Institute of Longevity Sciences. Consequently, 95 elderly agreed to take part in the present study. These 95 elderly were comprised of seven elderly residing in their home alone, and 88 residing with caregivers. Thus, these 88 elderly persons residing with caregivers and their respective caregivers were identified as the eligible subjects. Among them, 82 (93%) elderly and their caregivers returned the completed questionnaire.

MEASURES

Each caregiver was asked to complete a self-report questionnaire, which included: (1) the Japanese

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version of the Zarit Burden Interview (J-ZBI); (2) questions regarding their demographic characteristics and that of the disabled elder they cared for; (3) questions about the type and severity of the elder's disabilities; and (4) utilization of public care services.

Caregiver burden

Caregiver Burden was assessed by the Japanese version of the Zarit Burden Interview (J-ZBI), a 22-item self-report inventory that examines the burden associated with functional/behavioral impairments in the home care situation (Arai *et al.*, 1997). The Zarit Burden Interview (ZBI) is one of the most commonly-used scales for assessing the burden of caregiving (Zarit *et al.*, 1980; Zarit and Zarit, 1990).

Demographic variables

Caregivers provided demographic information about themselves and the disabled elderly, including: (1) age and sex: (2) relationship between caregiver and disabled elderly, and (3) number of family members living with them. Caregivers were also asked whether they were receiving any kind of assistance from family members in caring for their disabled elderly.

Disabilities

The elder's disabilities were assessed for problems in Activities of Daily Living (ADL), cognitive impairment and the presence of behavioral disturbances. ADL were measured using the Barthel Index (BI), the widely used ten-item ADL scale, scored from 0–20 (Wade and Collins, 1988; Eto, 2002). Cognitive impairment of the elderly was rated by caregivers using the Short Memory Questionnaire (SMQ). SMQ is a screening test for dementia designed for use in questionnaires by ordinary people. It measures overall cognitive function, with scores ranging from 0–46 (Koss *et al.*, 1993; Maki *et al.*, 1998). The cut-off point for cognitive impairment is less than 40.

In order to determine whether the disabled elderly had behavioral disturbances associated with dementia, we asked the caregivers to fill out the Troublesome Behavior Scale (TBS) (Asada *et al.*, 1994; Asada *et al.*, 1999). The TBS is comprised of 14 questions to assess the types and frequency of behavioral disturbances associated with dementia observed by primary caregivers of the elderly, scored from 0 to 56. Similar in types of behaviors measured to other scales such as the Neuropsychiatric Inventory, the TBS was developed using terminology that could readily be understood by Japanese respondents. The scores on the TBS in this study were highly skewed with many caregivers reporting no behavior disturbances. As a result, we recoded the TBS as a dichotomous variable, with 0 indicating no behavior disturbances and 1 indicating some disturbances. Caregivers were also asked how many hours they spent in caregiving per day, using a five-point scale ranging from 1 (less than 1 h) to 5 (more than 10 h).

Service utilization

Caregivers were also asked questions about their use of care services, including: (1) the number of care services they had used; and (2) to what extent (the percentage) they used up the amount of services available to them. In Matsuyama Town, the following six public services were available for those in need of care under the LTC insurance scheme: home-help (housekeeping), home nurse visits, overnight respite care, bathing service, adult day services and day care center. Thus, the number of services they had used could range from 0–6. We investigated to what extent the disabled elderly actually used care services against the maximum amount of care services available to them under the LTC insurance; specifically, we used a five-point scale ranging from 1 (less than 30%) to 5 (more than 100%). 'More than 100%' means that they had been using some additional care services at their own expense. Although use of medical services might also contribute to caregivers' outcomes, those services are not covered under the LTC and so that was not included in the study. Given the medical care system in Japan, older patients in need of medical care would likely be receiving it.

ANALYSES

First, demographic variables were explored as possible covariates in the model. Since the sample size was very small, it was necessary to reduce the number of covariates include in the model. To select potential covariates, bivariate correlations were computed between the demographic variables and the other measures in the model. Demographic variables that were significantly correlated with other variables in the model were included in subsequent analyses.

Second, a model was tested to examine if the use of home care services effectively reduces feelings of burden among family caregivers. The model included the following five latent variables: 'ADL deficits'; 'severity of dementia'; 'support from caregiver family members'; 'utilization of care services'; and

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'caregiver burden'. 'ADL deficits' was derived from two measured variables, the BI score and hours of caregiving/day. 'Severity of dementia' was derived from two measured variables, the SMQ score and behavioral disturbances. 'Support from caregiver family members' was also derived from two measured variables, the number of family members living with the elderly and their caregiver, and the availability of assistance from the family members. 'Utilization of care services' was derived from two measured variables, the number of services used and the proportion of services utilized in relation to the monthly coverage. 'Caregiver burden' was derived from the J-ZBI score.

Structural equation modeling (SEM) was used to test the model. Maximum likelihood estimation was used to estimate the standardized parameters of the model. The fit of the model to the observed data was assessed with the chi-square statistic, the adjusted goodness of fit index (AGFI) (Arbuckle, 1995), the comparative fit index (CFI) (Bentler, 1990), and the root mean square error of approximation (RMSEA) (Browne and Cudeck, 1993). A chi-square that is not significant ($p > 0.05$) indicates the model does not significantly differ from the data, i.e. a good fit. An AGFI and CFI with a value above 0.90 indicate a very good fit, and an RMSEA of less than 0.05 represents a very good fit.

The Statistical Package for Social Science (SPSS, version 11.5.1, SPSS Inc.) and Amos 5 (SPSS Inc.) were used for the statistical analyses.

RESULTS

Characteristics of subjects

Table 1 shows the characteristics of the disabled elderly. The mean age was 80.2 (SD 8.8) years old, and 73.2% were female. The mean BI score was 9.5 (SD 6.2), and the SMQ mean score was 18.1 (SD 13.5). Seventy-four out of the 82 disabled elderly who scored less than 39 on the SMQ were regarded as having some memory difficulties. Forty-six disabled elderly who scored 0 on the TBS were regarded as having no behavioral disturbance.

Table 1. Characteristics of the impaired elderly

	Mean	SD
Age	80.2	8.8
BI score	9.5	6.2
SMQ score	18.1	13.5
	n	%
Sex		
Male	22	26.8
Female	60	73.2
Behavioral disturbances		
−	46	56.1
+	36	43.9

BI = Barthel Index; SMQ = Short Memory Questionnaire.

Table 2 shows the characteristics of the caregivers. The mean age was 60.5 (SD 13.2) years old, and 76.8% were female. Of the 82 caregivers, 33 were daughters-in-law of the disabled elderly (the normative caregiver in traditional Japanese culture), 16 were wives, and 12 were husbands. The mean number of family members dwelling with subjects was 4.4 (SD 2.0). The mean duration of caregiving was

Table 2. Characteristics of the caregivers

	Mean	SD
Age	60.5	13.2
Number of family members	4.4	2.0
Duration of caregiving (month)	49.7	49.1
J-ZBI score	30.9	17.3
	n	%
Sex:		
Male	19	23.2
Female	63	76.8
Relationship of the caregiver to the impaired elderly		
Wife	16	19.5
Husband	12	14.6
Daughter	9	11.0
Son	6	7.3
Daughter-in-law	33	40.2
Other	6	7.3
Hours of caregiving/day		
1. Less than 1 h	21	25.6
2. 1–3 h	30	36.6
3. 3–6 h	16	19.5
4. 6–9 h	4	4.9
5. More than 10 h	11	13.4
Assistance from the family members		
None	25	30.5
Some	57	69.5
Number of services used		
0	16	19.5
1	31	37.8
2	25	30.5
3	9	11.0
4	1	1.2
Proportion of the utilization of the services to maximum monthly coverage		
1. Less than 30%	48	58.5
2. 30–50%	22	26.8
3. 50–80%	5	6.1
4. 80–100%	4	4.9
5. More than 100%	3	3.7

J-ZBI = Japanese version of the Zarit Burden Interview.

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Table 3. Correlations between demographic variables and other variables

	Variable	1	2	3	4	5
1.	Age of the impaired elderly	1				
2.	Sex of the impaired elderly	0.18	1			
3.	Age of the caregivers	−0.03	−0.14	1		
4.	Sex of the caregivers	0.33**	−0.33**	−0.32**	1	
5.	Duration of caregiving (months)	−0.19	−0.05	0.15	0.03	1
6.	Number of family members	0.11	−0.03	−0.15	0.15	−0.10
7.	Assistance from the family members	0.15	0.14	−0.05	−0.05	−0.08
8.	BI score	0.13	0.01	−0.04	0.15	−0.03
9.	SMQ score	−0.03	0.07	0.07	−0.13	−0.16
10.	Behavioral disturbances	0.10	−0.02	−0.21	0.14	0.07
11.	Hours of caregiving/ day	−0.26*	−0.07	−0.04	−0.06	0.15
12.	No. of services used	−0.07	0.09	−0.01	−0.15	0.17
13.	Proportion of the utilization of the services to the monthly coverage	−0.24*	−0.11	0.03	−0.03	0.20
14.	J-ZBI score	−0.13	−0.12	0.07	0.07	−0.01

Note:**: $p < 0.01$; *: $p < 0.05$; sex: male = 0, female = 1; BI = Barthel Index; SMQ = Short Memory Questionnaire; Behavioral disturbances: none = 0, some = 1; Assistance from the family members: none = 0, some = 1; Proportion of the utilization of the services: less than 30% = 1, 30–50% = 2, 50–80% = 3, 80–100% = 4, more than 100% = 5; and J-ZBI = Japanese version of the Zarit Burden Interview.

49.7 months (SD 49.1). Thirty caregivers (36.6%) spent 1–3 h in caregiving per day. Approximately 70% of the subjects had used 1 or 2 of the public care services. Most subjects (84%) had used less than 50% of the monthly amount of services available to them. The mean score of the J-ZBI was 30.9 (SD 17.3).

Correlational analyses

Table 3 shows the correlation coefficients between the demographic variables and other variables. As noted, demographic variables were explored as possible covariates for inclusion in the model. Specifically, the age of the disabled elderly was significantly correlated with the sex of caregivers ($r = 0.33$), the hours of caregiving ($r = -0.26$) and the proportion of the services utilized under the monthly coverage ($r = -0.24$). In contrast, the sex of the disabled elderly and the age of the caregivers were significantly correlated only with the sex of the caregivers. Taken together, three demographic variables, the sex of the disabled elderly, and the age and sex of the caregivers, had no relation to the other variables in the model and so were not included in subsequent analyses. Only age of the disabled elderly had a significant relation with the other variables in the model, and so it has been retained.

Structural equation modeling

The results of the structural equation modeling of the model are shown in Figure 1. The model included five latent variables: 'ADL deficits', 'severity of dementia', 'support from caregiver family members', 'utilization of care services', and 'caregiver burden'. The age of the disabled elderly was treated as a control variable for three exogenous latent variables (support from caregiver family members, ADL deficits of the disabled elderly, cognitive deficits of the disabled elderly). This model showed a good fit with the data: chi-square ($df = 26$) = 34.46, $p = 0.12$; AGFI = 0.85; CFI = 0.92; RMSEA = 0.06.

First, the direct effects of three latent variables on 'caregiver burden' are shown respectively as a path coefficient from the latent variable to the 'caregiver burden'. A positive value indicates that the latent variable is associated with higher burden. 'ADL deficits' and 'severity of dementia' both had positive relationships with 'caregiver burden', indicating that caregivers of people with greater deficits had higher burden. By contrast, receiving more support from family members was associated with lower burden.

Second, each of these constructs had a similar direct relation with 'utilization of care services.' Caregivers assisting people with greater ADL deficits and greater dementia severity used more care services, while those who received more support from their families used fewer care services.

Third, 'utilization of care services' had a negative relation to 'caregiver burden', indicating that people using more services had lower burden.

DISCUSSION

The present study examined the relationship between the utilization of the care services and caregiver

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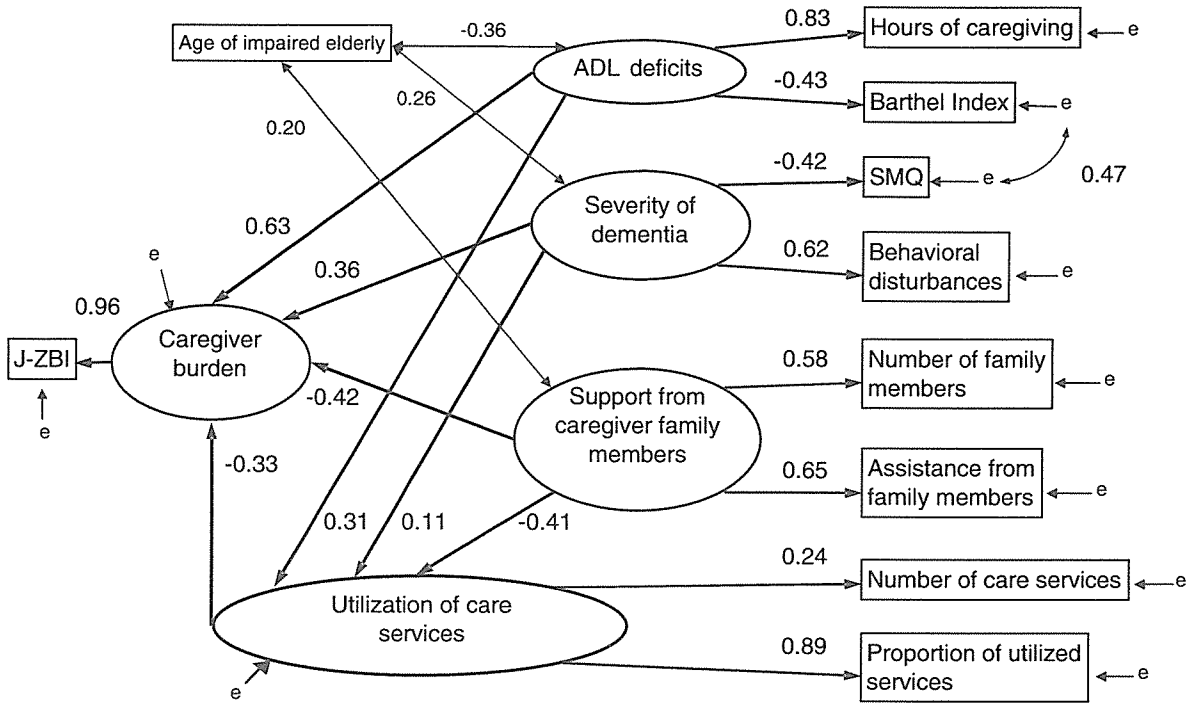

Figure 1. Structural equation model of caregiver burden of family caregivers. J-ZBI = Japanese version of the Zarit Burden Interview, SMQ = Short Memory Questionnaire. Chi-square (df = 26) = 34.46, $p = 0.12$; AGFI = 0.85; CFI = 0.92; RMSEA = 0.06.

burden under the LTC insurance system in Japan. The results of a structural equation model revealed that the use of home care services is associated with lower feelings of burden among family caregivers.

The model also indicated that ADL deficits and severity of dementia of the disabled elderly are related to higher caregiver burden. This result is consistent with the previous findings that the degree of impairment among the elderly is positively correlated with the feelings of burden among family caregivers (Zarit *et al.*, 1986; Harper and Lund, 1990; Draper *et al.*, 1992; Donaldson *et al.*, 1997; Arai *et al.*, 2000). Also, the present study has shown that the availability of instrumental support from other family members is associated with lower burden among the family caregivers, which is also consistent with previous studies (Pearlin *et al.*, 1995; Miller *et al.*, 2001).

An examination of the model suggests that service use affects the relation of severity to burden and may mediate the impact. The path coefficient from 'ADL deficits' and 'severity of dementia' to 'utilization of care services' is positive, indicating that the severity of ADL deficits and severity of dementia are associated with greater use of care services. Taken together, these findings suggest that caregivers of people with more severe impairment used more services, which resulted in lower feelings of burden. One of the goals of the LTC insurance system is to reduce caregiver burden (Ministry of Health and Welfare, 1996). The present study has shown that the LTC insurance system in Japan has been fulfilling its objectives; care services provided under the LTC insurance system have been successful in reducing the burden of family caregivers.

On the other hand, the path coefficient from 'support from caregiver family members' to 'utilization of care services' was found to be negative, indicating that the amount of informal support from the co-residing family members was negatively related to the amount of care services used. These results suggest that when caregivers receive more family help, they also receive less formal help and get less benefit from it. Previous studies have shown that family caregivers are hesitant to use public care services (LoGiudice *et al.*, 1995; Caserta *et al.*, 1987; Collins *et al.*, 1991; Office of Management and Coordination Agency, 1997; Watts, 1988; Arai *et al.*, 1998). The present study shows, however, that service use can be effective in helping caregivers with the demands placed on them.

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