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ORIGINAL ARTICLE

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Long-term care insurance in Germany: analyzing its progress from the perspective of economic indicators

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Abstract Germany enabled public long-term care insurance (LTCI), a social insurance system, in 1995. This study focuses on the LTCI program in Germany, analyzes progress of LTCI in view of economic indicators in the inland 16 states ("Länder" in Germany), categorizes 16 states, and describes problems concerning the LTCI program. Statistical analysis was conducted using 24 variables of LTCI and the economic index. The 16 states were categorized in five clusters. The results revealed gaps in adoption rates of LTCI care services among 16 states, suggesting that each of the states developed its own service system of LTCI dependent on regional variables such as economic power and size of population. All former East German states tended to have lower economic resources of care. States with many requests for cash benefits tended to offer lower amounts of care services. The characteristics of these 16 states provide useful information for developing LTCI policies in Germany and offer an informative guide to other countries.

Keywords Germany · Long-term care insurance · Aging · Economic indicators · Component principal analysis · Cluster analysis

Introduction

Significant aging of populations is a common phenomenon across all developed countries in the twentieth century (Uhlenberg 1992). The changing of age structure has social, economic, and political implications (Kinderknecht 1989; Cohen et al. 1992). Their aging societies force developed countries to take some action (Grupp et al. 1992). Scandinavian countries, the United Kingdom, the Netherlands, Germany, the US, Japan, and other countries now have versions of long-term care insurance programs. In Germany, public long-term care insurance (LTCI) has been operational since 1995. LTCI was adopted as the fifth social insurance system in Germany (Schmähl and Rothgang 1996).

Before LTCI, people who needed long-term care made individual contracts with home-care services or nursing homes and paid for the care they received (Garms–Homolova 1994). When they were unable to pay the fees, they had to depend on social assistance as a matter of unpleasant necessity (Evers 1998). Traditionally in Germany, aged people with care needs have been cared for by family members in their homes (Scharf 2001). But in recent years, the social situation has changed; German people have recognized the limitations of home care by families (Bartholomeyczik and Hunstein 2004). The number of aged people in need of care has increased while the number of young people serving as caregivers has decreased (Statistisches Bundesamt 2003). The number of one-person households among the elderly has also increased. Currently, about one third of all households in Germany consist of only one person (Scheiwe, 1997) although 91% of aged people have a child living within 2 hours traveling distance (Kohli et al. 2000). Moreover, women—who are main caregivers for aged people with disability—desire to advance into the workplace (Halsig 1995). These dramatic changes of social situations surrounding aging led to rising social assistance expenditure and, finally, to political action in Germany.

The main goal of LTCI is to improve conditions for home care (German law: §3, SGB XI). Giving priority to outpatient over inpatient care, supporting family care, and inducing competition among care providers were included (Evers 1998). The system of LTCI mainly consists of two components, one of which is home care and the other nursing-home care. In home care, people who need care have the choice of professional home-care services or cash benefits. In the latter case, cash benefits are generally paid to family members who are caregivers. Before people who need care receive benefits, they are divided into three care

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Table 1 Conditions of 16 states. Source: Stastistische Landesämter 2001, Stastistisches Bundesamt Deutschland 2002

State[a]	Population 1,000	Area (km^2)	Revenue million Euro	Unemployment %	Population 65 years %	Nursing homes	Home-care services	Needing care (persons)	In nursing home %	At home %	Home-care services %[b]	Cash benefits %
1.Baden–Württemberg	10,475.9	35,751.64	41,422	4.9	15.5	956	845	210,837	31.1	68.9	20.1	48.8
2.Byern	12,155.0	70,549.32	49,071	5.3	16.0	1,262	1,591	294,294	28.0	72.0	19.3	52.7
3.Berlin[c]	3,386.7	891.75	11,378	16.1	14.2	316	310	80,871	29.2	70.8	22.8	48.0
4.Brandenburg[d]	2,601.2	29,476.67	26,962	17.4	14.9	261	516	64,340	24.4	75.6	24.0	51.6
5.Bremen	663.1	404.28	7,931	12.4	18.1	71	126	17,143	27.2	72.8	26.5	46.3
6.Hamburg	1,704.7	755.26	27,170	8.3	16.7	164	343	42,001	32.2	67.8	27.3	40.0
7.Hessen	6,052.0	21,114.88	67,149	6.6	16.2	614	860	145,445	25.7	74.3	20.3	54.0
8.Mecklenburg–Vorpommern[d]	1,789.3	23,173.46	14,413	18.3	14.5	181	398	45,531	28.1	71.9	19.7	52.2
9.Nirdersachsen	7,898.8	47,617.97	4,190	9.1	16.6	1,163	926	209,257	29.3	70.7	19.3	51.4
10.Nordrhein–Westfalen	17,999.8	34,082.76	18,775	8.8	16.6	1,872	2,205	465,850	28.6	71.4	20.2	51.2
11.Rheinland–Pfalz	4,030.8	19,846.91	11,198	6.8	17.0	390	411	92,340	27.4	72.6	19.0	53.5
12.Saarland	1,071.5	2,568.53	10,442	9.0	17.8	110	153	27,194	27.4	72.6	19.3	53.3
13.Sachsen[d]	4,459.7	18,413.29	10,412	17.5	18.0	439	845	118,124	26.0	74.0	25.4	48.6
14.Sachsen–Anhalt [d]	2,648.7	20,445.72	17,339	19.7	16.9	260	481	66,616	26.4	73.6	21.3	52.3
15.Schleswig–Holstein	2,777.3	15,762.90	3,883	8.4	16.4	579	439	75,991	36.2	63.8	18.9	44.9
16.Thüringen[d]	2,449.1	16,172.21	8,141	15.3	16.3	219	371	60,257	23.6	76.4	20.2	56.1
	82,163.6 Sum	–	–	9.4 Average	16.2 Average	554 Average	676 Average	2,016,091 Sum	28.4 Average	71.6 Average	20.6 Average	51.0 Average

[a]States are in alphabetical order
[b]Home cares include day care, night care, etc.
[c]Berlin is classified as the former West Germany
[d]Former East Germany

levels (care level 1 is substantial, care level 2 is severe, and care level 3 is very severe) for receiving benefits according to their disability (Wegner 2001). LTCI takes on an important role in the handling of aging problems. The surrounding circumstances of LTCI have changed significantly since it was launched (Tsuchida 1997). The present study considers each state in Germany with authorization to develop the LTCI basis, analyzes the progress of LTCI in the view of economic indicators, categorizes the 16 states, describes the present condition of LTCI, and discusses some problems of LTCI in Germany.

Methods

Data

The present study used 24 data items collected from Statistische Landesämter (2001), Statistisches Bundesamt Deutschland (2002), and AOK–Bundesverband 9/(1999) (Table 1 and 2). All LTCI referral data were categorized by the following three indices for each state (Table 2). In order to compare the 16 states in Germany, this study basically calculated each population for indicators in each state.

1. Index A. Socioeconomic conditions of each state: population, budget, population 65 years and older, population of unemployed, population of employed male, population of employed female. For more details, see Index A of Table 2.
2. Index B. Economic power per person of each state: average monthly income on blue-collar workers and average monthly income on white-collar workers. See Index B of Table 2 for details.
3. Index C. Nursing-home and home-care service of each state: male population needing care, female population needing care, population using cash benefits, population using nursing-home care level 1, population using nursing-home care level 2, population using nursing-home care level 3, population using home-care service care level 1, population using home-care service care level 2, population using home-care service care level 3, total number of nursing homes, total number of nursing-home staff, total number of home-care service facilities, total number of home-care service staff, average nursing-home cost for care level 1, average nursing-home cost for care level 2, average nursing-home cost for care level 3. For more details, see Index C of Table 2.

Analysis

For the purpose of this research, a principal component analysis was conducted using 24 collected LTCI variables (Table 2) and the economic index. Next, a cluster analysis was examined using principal component scores. Finally, these results were projected on a map of Germany. This study used SPSS Ver.11 for data management and statistical analysis.

Table 2 Twenty-four variables used in principal component analysis. *M* male, *F* female

	Calculation
Index A. Socioeconomic conditions of each state[a]	
1. Population	Population ——A
2. Budget per person	Budget (revenue)/A(divided by population)
3. % population 65+	Population 65 years and older/A
4. % unemployment	Population of unemployed/A
5. % employment: M	Population of employed males/A
6. % employment: F	Population of employed females/A
Index B. Economic power per person of each state	
7. Monthly income: blue collar	Average monthly income of blue-collar workers. Euro
8. Monthly income: white collar	Average monthly income of white-collar workers. Euro
Index C: Nursing-home and home-care services of each state	
9. % needing care: M	Male population needing care/ population 65 years and older
10. % needing care: F	Female population needing care/ population 65 years and older
11. % using cash benefits	Population using cash benefits/ male and female population needing care ——B
12. % using nursing home: care level 1	Population using nursing-home care level 1/B (divided by male and female population needing care)
13. % using nursing home: care level 2	Population using nursing-home care level 2/B
14. % using nursing home: care level 3	Population using nursing-home care level 3/B
15. % using home-care service: care level 1	Population using home-care service care level 1/B
16. % using home-care service: care level 2	Population using home-care service care level 2/B
17. % using home-care service: care level 3	Population using home-care service care level 3/B
18. % nursing home	Total number of nursing homes/B
19. % nursing-home staff	Total number of nursing-home staff/B
20. % home-care service facility	Total number of home-care service facilities/B
21. % home-care service staff	Total number of home-care service staff/B
22. Average nursing-home cost: care level 1. DM	
23. Average nursing-home cost: care level 2. DM	
24. Average nursing-home cost: care level 3. DM	

[a]Sources for 1, 3, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21: Statistische Landesämter 2001; for 2, 4, 5, 6, 7, 8: Statistisches Bundesamt Deutschland 2002; for 22, 23, 24: AOK–Bundesverband 9/1999

Results

Principal component analysis

A principal component analysis with a varimax rotation was conducted, and three interpretable significant principal components were found. The components were based upon eigenvalue criterions greater than 1.00 (Table 3). These cumulative contributing ratios accounted for 68.4% of the variance in the initial 24-variable data set.

Component I accounted for 34.6% of the variance in the initial data set. High positive loadings of the variables were "monthly income of white-collar workers" (.952), "monthly income of blue-collar workers" (.904), "percentage of nursing-home staff" (.885), "nursing-home cost for care level 1" (.876), "nursing-home cost for care level 2" (.836), "nursing-home cost for care level 3" (.759), "percent employment of males" (.752), and "percent using nursing homes at care level 3" (.683). Moderate positive loadings of the variables were "population" (.478) and "percent employment of females" (.429). However, "percent unemployment" (−.908) and "percent home-care service facilities" (−.607) carried highly negative loadings of the variables. Additionally, "percent using home-care service at care level 3" (.424) and "percent using nursing home at care level 2" (.464) had moderately positive crossloadings of the variables. Thus, this component showed a strong relationship between economic power and care in each state. This component may be interpreted as an economics for care component.

Component II contributed a 20.3% ratio in the data set. High positive loadings included "percent using home care service at care level 1" (.904), "percent home-care service staff" (.863), "percent using home-care service at care level 2" (.856), and "budget per person" (.651). A high negative loading of the variables was "percent using cash benefits" (−.780). Moreover, the components "percent home-care service facilities" (.497) and "percent using nursing home at care level 2" (.498) carried moderate positive crossloadings. Finally, "population" (−.468) carried a moder-

Table 3 Scores of principal component analysis[a]. *M* male, *F* female

Variable	I. Economics of care	II. Tendency to use home-care services	III. Tendency to use nursing homes	Communality
Monthly income: white collar	***.952***	.180	−.212	.983
% unemployment	***−.908***	.216	.136	.890
Monthly income: blue collar	***.904***	.231	−.138	.889
% nursing home staff	***.885***	−.055	.231	.840
Nursing-home cost: care level 1	***.876***	−.036	.159	.795
Nursing-home cost: care level 2	***.836***	.256	−.066	.769
Nursing-home cost: care level 3	***.759***	.361	−.181	.740
% employment: M	***.752***	−.341	−.039	.683
% using nursing home: care level 3	***.683***	−.253	.117	.545
% home-care service facility	***−.607***	***.497***	.048	.618
Population	***.478***	***−.468***	−.058	.450
% employment: F	***.429***	.058	.157	.212
% using home-care service: care level 1	−.137	***.904***	.124	.851
% home-care service staff	.366	***.863***	.036	.880
% using home-care service: care level 2	−.280	***.856***	−.298	.900
% using cash benefits	−.362	***−.780***	***−.465***	.956
Budget per person	−.047	***.651***	−.293	.512
% using nursing home: care level 1	.158	.070	***.757***	.602
% nursing home	.364	−.255	***.649***	.619
% using home-care service: care level 3	***.424***	−.261	***−.589***	.595
% needing care: F	−.365	.033	***.583***	.474
% needing care: M	−.265	−.351	***.582***	.532
% using nursing-home: care level 2	***.464***	***.498***	***.576***	.796
% population 65+	.061	.220	***−.483***	.285
Eigenvalue	8.313	4.686	3.236	
Contributing ratio %	34.6	20.3	13.5	
Cumulative contributing ratio %	34.6	54.9	68.4	

[a]Bold italic represents high and moderate positive and high negative variables

ately negative crossloading of the variables. Component II clearly was associated with the availability of home-care services. This component will be labeled as a tendency to use home-care services.

Component III, accounting for 13.5% of the variance in the original data set, was characterized by high positive loadings of the variables "percent using nursing home at care level 1" (.757), "percent nursing home" (.649), "percent females needing care" (.583), "percent males needing care" (.582), and "percent using nursing home at care level 2" (.576). A high negative loading was "percent using home-care service at care level 3" (−.589), and a moderate negative loading was present for the variable "percent population 65 years and older" (−.483). Also "percent using cash benefits" (−.465) carried a moderate negative crossloading of the variable. Component III was more likely to express factors related to use of nursing homes. Therefore, it may be interpreted as a tendency to use nursing homes component.

Cluster analysis

In the next step, principal component scores for three significant principal components were compiled by the 16 states. A complete linkage cluster algorithm with a squared-Euclidean distance measure was used. It generated a five-cluster solution for this study (Table 4). Referral data were aggregated on this basis, and component scores were calculated for each state (mean=0, standard deviation=1). A dendrogram of hierarchical cluster analysis with the Ward method was performed to characterize the 16 states in Germany (Fig. 1), which were pointed on a map based on the results of the cluster analysis (Fig. 2).

Cluster 1 was characterized by very high negative scores in *economics of care* component (<−1.0). Brandenburg, Sachsen–Anhalt, Sachsen, and Thüringen, which ranked among the lowest in the *economics of care* component comprised one common cluster. Cluster 1 indicated a lack of economic power. These four neighboring states belonged to the former East Germany (Fig. 2). Brandenburg, Sachsen–Anhalt, and Sachsen were close to the mean negative scores in the *tendency to use nursing homes* component (−0.000~−0.185) and made up a common cluster. However, Thüringen showed high negative scores among the *tendency to use home care* services (−0.902) and *tendency to use nursing homes* component (−0.711) and so showed a different tendency from Brandenburg, Sachsen–Anhalt, and Sachsen.

Cluster 2 was comprised of Berlin, Mecklenburg–Vorpommern, and Schleswig–Holstein. Three states topped the list in the *tendency to use nursing homes* component. However, bigger differences occurred in scores among these states (0.791, 1.396, 2.584). This result may suggest that interrelations within Cluster 2 were weak compared with Cluster 1. These states were also geographically close (Fig. 2). Mecklenburg–Vorpommern showed a very high negative score in the *economics of care* component (−1.496) and demonstrated a different pattern from Berlin (0.321) and Schleswig–Holstein (0.639). This finding on Mecklenburg–Vorpommern was the same as the four states of Cluster 1. Consequently, all former East German states gave indications of quite high negative scores in the *economics of care* component. Berlin showed a high positive score in the *tendency to use home-care services* (0.637) and developed a different trend from Mecklenburg–Vorpommern (−0.214) and Schleswig–Holstein (−0.403).

Table 4 Principal component score of each state by cluster (16 states)[a]

Cluster	State	I. Economic of care	II. Tendency to use home care services	III. Tendency to use nursing homes
1	4. Brandenburg[b]	***−1.242***	0.152	***−0.000***
	14. Sachsen–Anhalt[b]	***−1.493***	0.025	***−0.166***
	13. Sachsen[b]	***−1.249***	0.791	***−0.185***
	16. Thüringen[b]	***−1.385***	−0.902	−0.711
2	3. Berlin[c]	0.321	0.637	0.791
	8. Mecklenburg–Vorpommern[b]	−1.486	−0.214	1.396
	15. Schleswig–Holstein	0.639	−0.403	2.584
3	5. Bremen	0.388	***1.803***	−1.111
	6. Hamburg	0.847	***2.478***	0.315
4	7. Hessen	***0.782***	***−0.602***	***−1.330***
	11. Rheinland–Pfalz	***0.541***	***−0.654***	***−0.896***
	12. Saarland	−0.100	−0.142	***−0.918***
5	2. Bayern	***0.920***	***−1.115***	−0.280
	10. Nordrhein–Westfalen	***0.721***	***−0.609***	−0.243
	9. Niedersachsen	***0.535***	***−1.029***	0.302
	1. Baden–Württemberg	***1.264***	−0.216	0.453

[a]Bold italic represents highly similar scores of principal component of each cluster. Underline represents scores that had different trends of principal component of each cluster
[b]Former East Germany
[c]Berlin is classified as the former West Germany

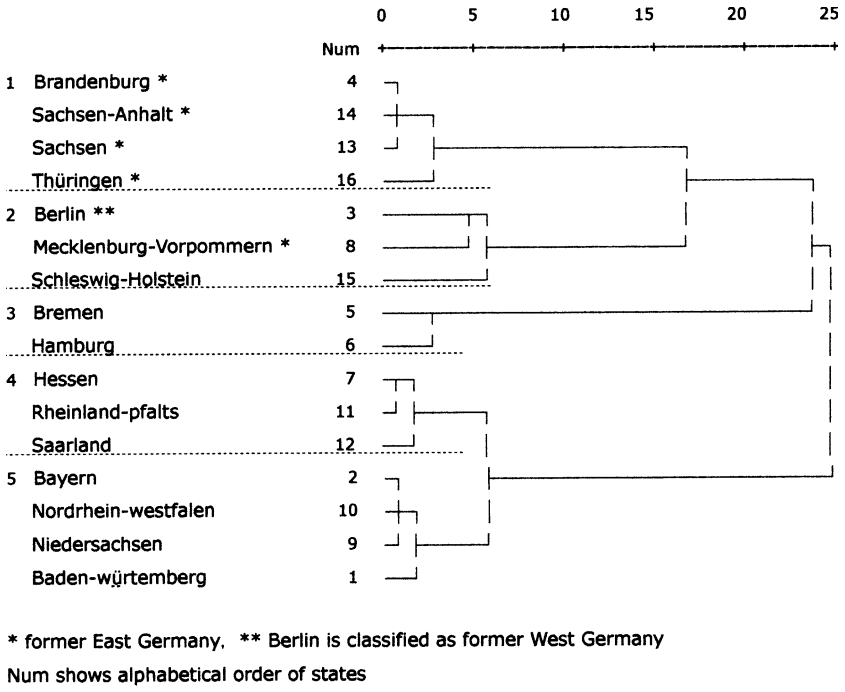

Fig. 1 Dendogram of hierachical cluster analysis (Ward method)

Cluster 3 was represented by Bremen and Hamburg. Both states were overwhelmingly smaller in area than other states in Germany and belonged to former West Germany (Fig. 2). They presented very high positive scores in the *tendency to use home-care services* component (1.803, 2.378). Their scores ranked in the top two for all. A dif-

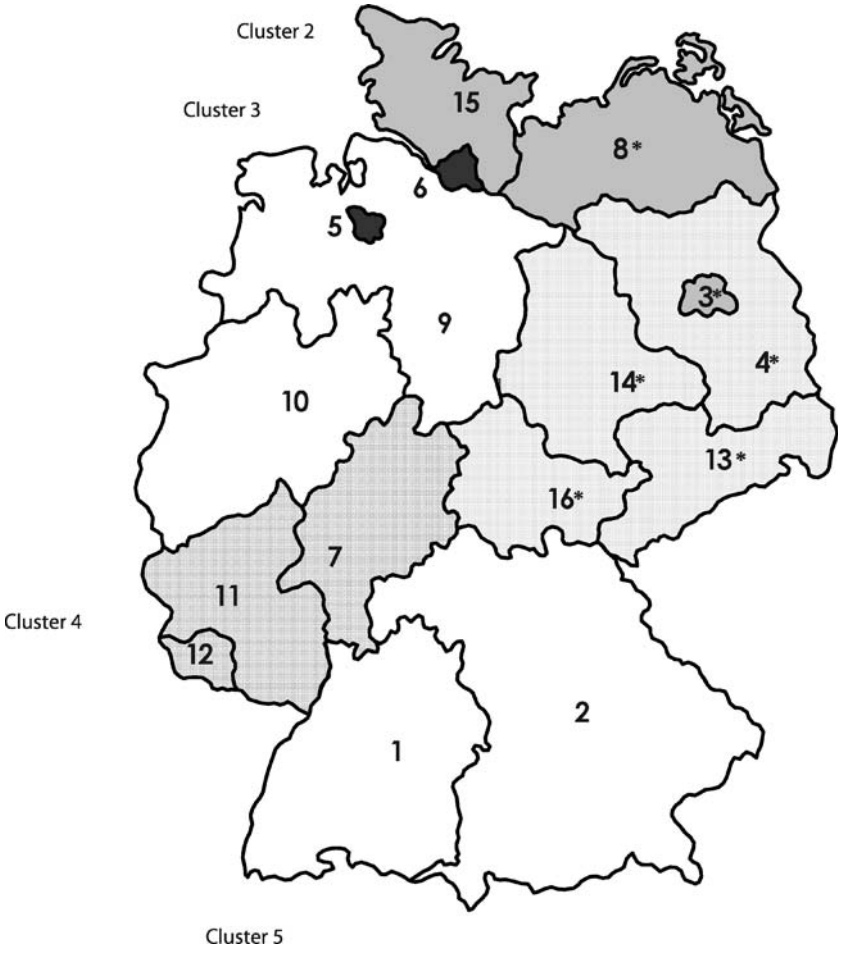

Fig. 2 Sixteen states in Germany classified into cluster

ference between Bremen and Hamburg was that Bremen showed a very high negative score (−1.111) in the *tendency to use nursing homes* component. By contrast, Hamburg showed a positive score (0.315). Cluster 3 as well as Cluster 2 had weaker interrelations compared with Cluster 1.

Cluster 4 was represented by the neighboring states of Hessen, Rheinland–Pfalz, and Saarland, all formerly in West Germany (Fig. 2). These states occupied the lowest ranking in the *tendency to use nursing homes*. Hessen and Rheinland–Pfalz showed especially strong associations because Hessen (0.782) and Rheinland–Pfalz (0.541) showed high positive scores in the *economics of care* and also negative scores in the *tendency to use home-care services* component (−0.602, −0.654). On the other hand, Saarland presented near mean negative scores in the *economics of care* (−0.100) and in the *tendency to use home-care services* components (−0.142). For this reason, Saarland had a rather different pattern compared with Hessen and Rheinland–Pfalz.

Cluster 5 was characterized by high positive scores in the *economics of care* component (>0.5). Cluster 5 was comprised of Bayern, Nordrhein–Westfalen, Niedersachsen, and Baden–Württemberg. Bayern (0.920) and Baden–Württemberg (1.264) ranked in the top two of all in the *economics of care* component. Additionally, Bayern (−1.115), Nordrhein–Westfalen (−0.609), and Niedersachsen (−1.029) showed quite high negative scores in the *tendency to use home-care services*, forming a strong interrelated cluster. These four states were separated into north and south neighboring parts (Fig. 2). Population and area of these states ranked in the top four for all of Germany. However, only Baden–Württemberg of the four states showed a negative score in the *tendency to use home-care services* (−0.216) and showed a rather different pattern from Bayern, Nordrhein–Westfalen, and Niedersachsen in Cluster 5.

Discussion

The purpose of this study was to examine differences in variables related to conditions of LTCI among German states by means of a principal component analysis and a hierarchical cluster analysis. The results revealed the following:

- Some gaps in adoption rates of services for care of LTCI were shown among 16 states (Table 4).
- Each of the 16 states developed its own service system of LTCI dependent on regional variables such as economic power and size of population (Table 3).
- All former East German states tended to have lower economic resources of care (Table 4).
- States with many requests for cash benefits tended to offer lower amounts of care services (Table 3).

As mentioned in Table 1, utilization rates of care at home were higher than those of care in nursing homes in all of the states. This result indicated that all states were giving priority to outpatient over inpatient care according to German law (§3 SGB XI). An average ratio of utilization for nursing homes was 28.4% while an average ratio of home care was 71.6%. Among those cared for at home (71.6%), an average percentage opting for cash benefits was 51.0% and for home-care service was 20.6%. Thus, many people who needed care chose cash benefits (Hamburg 40.0%~Thüringen 56.1%) rather than home-care services. Furthermore, the percentage choosing home-care services (Schleswig–Holstein 18.9%~Hamburg 27.3%) was lower than the percentage choosing nursing-home care (Thüringen 23.6%~Schleswig–Holstein 36.2%). As the tendency to use the home-care services component of Table 3 revealed, the greater the supply of home-care services available, the smaller the choice of cash benefits. The inverse relation in this study suggests that the supply of home-care services may not meet the demand for these services.

In consequence, the choice between cash benefits or alternatives seems to be a significant factor in LTCI. From the start of LTCI, the choice of cash benefits meant that a woman could give up her wage-earning job and devote herself to home and domestic work (Evers 1998). Cash benefits also appear to be connected with qualitative problems of home care by families (Bartholomeyczik and Hunstein 2004). Demand for cash benefits is likely to decrease little by little because the care of aged people gradually becomes difficult for family members (Rürup, B., personal communication, May 13, 2003).

In the future, changing population dynamics such as an increased aged population will prompt more need for care services (Statistisches Bundesamt 2003). Care provided by experts in nursing homes may be preferred by the elderly and by family members. In this case, trained specialists and comfortable nursing homes are important factors (Wagner 2002). However, choosing professional care is more costly than choosing cash benefits. Growing needs for professional care causes a significant cost increase that may threaten the whole system of LTCI (Rürup, B., personal communication, May 13, 2003). The balance between home-care services, including cash benefits and nursing-home care services, and the resultant financing conditions are important issues for LTCI in Germany (Cuellar and Wiener 2000).

Before LTCI started, social assistance programs only covered required long-term care. When aged people needed care but had no other income, they fell back on social assistance as a last resort (Götting et al. 1994). After the launch of LTCI, the number of home-care services, nursing homes, and people utilizing LTCI has increased (PV–Statistik (PG 1) 2000). As this study shows, LTCI has gradually become a fixture of German society.

Conclusion

This study showed gaps in adoption rates of LTCI care services among 16 states, suggesting that each of the states developed its own service system of LTCI dependent on regional variables such as economic power and size of population. One concern is the gaps in adoption rates of

LTCI among the inland states although each of the inland states is authorized to provide LTCI. It should be noted that economic variables seem to influence policy, as this study suggests.

The increasing aging population will continue to have a significant impact on LTCI in Germany (Schulz and König, 2004). The characteristics of these 16 states may provide useful information for developing LTCI policies in other countries where there is a need for political action aimed at aging problems.

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