# Title:

**Worlds of Long-term-care: A Typology of OECD countries**

## Author names and affiliations:

Mareike Ariaans a,b \*, Philipp Linden c, Claus Wendt d

a University of Mannheim, Mannheim Centre for European Social Research, Germany A5, 6, 68159  Mannheim, Phone: +49-621-1812813, Mareike.Ariaans@mzes.uni-mannheim.de

b University of Siegen, Department of Social Sciences, Germany, Adolf-Reichwein-Str. 2, 57068 Siegen, Germany; Phone: +49-271-740-5288, [ariaans@soziologie.uni-siegen.de](mailto:ariaans@soziologie.uni-siegen.de)

c University of Siegen, Department of Social Sciences, Germany, Adolf-Reichwein-Str. 2, 57068 Siegen, Germany; Phone: +49-271-740-5288, [linden@soziologie.uni-siegen.de](mailto:linden@soziologie.uni-siegen.de)

d University of Siegen, Department of Social Sciences, Adolf-Reichwein-Str. 2, 57068 Siegen, Germany; Phone: +49-271-740-3182, wendt@soziologie.uni-siegen.de

\* Corresponding author

## Acknowledgments

This article is part of the project “Comparing the Coordination of Elderly are Services in European Welfare States: How Organizational Actors Respond to Marketization Policies” funded by the Deutsche Forschungsgemeinschaft (DFG) grant number: [INSERT PROJECT NUMBER]

We would like to thank Orna Bar, Karen Christensen, Masa Filipovic Hrast, Robin Gauld, Sophie Gerkens, Stella Golinowska, Bent Greve, Candace Howes, Naoki Ikegami, Teppo Kröger, Madelon Kronemann, Blanche Le Bihan, Juliette Malley, Jane Mears, Liz Mestheneos, Eamon O’Shea, August Österle, Luz María Peña-Longobardo, Feliciana Rajevska, Constazo Ranci, Ave Roots, Lydie Schoder, Agnieszka Sowa-Kofta, Marta Szebehely, Birigit Trukeschitz, Petr Wija, Laimutė Žalimienė, Franziska Zuniga for their contribution to the expert survey. All mistakes, however, remain ours.

**Declaration of Interest**

None

# Cover Letter

Dear Editorial Board,

we are pleased to send you our manuscript entitled “Worlds of Long-term-care: A Typology of OECD countries” that we consider of high relevance for Health Policy since it combines long-term care and social policy. This paper is one major output from our three-years research project “Comparing the Coordination of Elderly are Services in European Welfare States: How Organizational Actors Respond to Marketization Policies”.

We are confident to reach a wide readership and that it will be well received in the scientific community due to:

- offering a new typology of long-term care system through new data (particularly institutional indicators), a new method, and the inclusion of more countries compared to earlier typologies.

- a new and flexible methodological approach to construct long-term care system types (or typologies more generally),

- a comparable approach in data and methods to the healthcare typology in your journal (Reibling, N., Ariaans, M. and Wendt, C. (2019) ‘Worlds of Healthcare: A Healthcare System Typology of OECD Countries’, Health Policy 123(7): 611–20.)

We look forward to your response and the reviews.

This work has not been published before and is currently not being considered for publication elsewhere.

We look forward to your response.

Yours sincerely,

Mareike Ariaans, Philipp Linden, and Claus Wendt

Potential Reviewers

Viola Burau, Aarhus University, [viola@ph.au.dk](mailto:viola@ph.au.dk)

Christopher Grages, University of Hamburg, [Christopher.Grages@uni-hamburg.de](mailto:Christopher.Grages@uni-hamburg.de)

Gabrielle Meagher, Macquarie University Sydney, gabrielle.meagher@mq.edu.au

Hildegard Theobald, University of Vechta, [hildegard.theobald@uni-vechta.de](mailto:hildegard.theobald@uni-vechta.de)

Franca van Hooren, University of Amsterdam, [F.J.vanHooren@uva.nl](mailto:F.J.vanHooren@uva.nl)

# Abstract

Providing long-term care (LTC) to the elderly is a major challenge for all welfare states. LTC systems differ widely among countries. Due to recent maturation, economization, and marketization processes, earlier LTC comparisons and typologies do not provide a sufficient overview of LTC systems and their major characteristics. In this paper we provide a new typology of LTC systems in the OECD world. This typology will help to make LTC systems more comparable to welfare state and healthcare system typologies and thereby help to understand how long-term care is embedded in the wider welfare state and is related to other welfare state institutions. We use most recent OECD data and a unique set of institutional indicators. Based on 24 cluster analyses we identify six, respectively nine LCT types with flexible use in future studies. In the six types-solution we suggest a “public supply type” (e.g., Sweden), a “private supply type” (e.g., Germany), a “residual public type” (e.g., Poland), an “evolving public supply type” (e.g., Korea), a “private need-based supply type” (e.g., Switzerland), and an “evolving need-based type” (e.g., United States).

# Highlights

* compare and classify 25 OECD long-term care systems
* adopt most recent quantitative and institutional indicators on long-term care
* use a new, innovative clustering approach
* provide an updated and adjustable long-term care typology

**Keywords:** OECD countries, comparative analysis, long-term care, elderly, typology, classification

# Introduction

It is a major challenge of developed welfare states to provide long-term care (LTC) for the elderly. Increasing longevity and the ageing of the baby-boom generation have a huge impact on the provision of LTC [1]. The rising number of elderly people in need of LTC increases the financial pressure on LTC systems [2]. At the same time, claims of better access and higher quality services become louder [3]. To cope with these pressures, many countries have started to reform their LTC systems, often by adopting marketization, economization, and corporatization measures. These measures altered the scope and functioning of many established LTC systems [4,5]. As a consequence, it has become increasingly difficult to describe and categorize existing long-term care systems which is essential to analyze their effects with respect to coverage, access, social security, quality, and other factors.

This paper aims to provide a new and updated LTC typology that takes into account recent LTC reforms. Besides the update, compared to earlier typologies, we make two methodological advancements. First, earlier typologies used either quantitative data [6,7] or standardized information on institutional and regulatory aspects of LTC systems [8,9]. We integrate both approaches by analyzing quantitative data on supply, public-private mix, performance as well as institutional information on accessibility of systems. Second, most LTC typologies selected one cluster analysis to categorize countries [6,7,9]. For our LCT typology we have used cluster technique as well. However, we calculate numerous cluster analyses to incorporate the internal consistency of clusters. This method, that has been used to classify healthcare systems (10 [10], has so far not been applied in earlier LTC typologies.

We first describe dimensions and indicators of earlier LTC typologies and summarize their results. Second, we explain indicators and the sample composition of our study. In the results section, third, we provide a detailed method-driven cluster solution. On this basis, we develop a condensed content-based clustering solution with six distinct system types.

# Theory

## Long-term Care Classifications

Typologizing welfare states and welfare state systems is a common endeavor in welfare state research since 11's [11] seminal study. His work and the following adaptions and discussions [12–14] still provide a basic template for case selection and evaluation in all areas of welfare state research [15]. Since then a vast amount of issue and area-specific typologies have been developed, not least in healthcare [10,16–18] a field that is particularly close to the field of long-term care (LTC).

LTC is defined as:

“Range of services required by persons with a reduced degree of functional capacity, physical or cognitive, and who are consequently dependent for an extended period of time on help with basic activities of daily living (ADL). This “personal care” component is frequently provided in combination with help with basic medical services such as “nursing care” (help with wound dressing, pain management, medication, health monitoring), as well as prevention, rehabilitation or services of palliative care. Long-term care services can also be combined with lower-level care related to “domestic help” or help with instrumental activities of daily living (IADL).” [1].

This definition does not consider LTC recipients’ age. However, most recipients are older than 65 years.

Typologies that capture the institutional structure of LTC systems or facets of LTC systems can be divided into three major groups. A first group focuses on social services in general where LTC is just one part of a larger social service picture [19–23]. A second group concentrates on LTC for the elderly, although they often include disability as well due to data reasons [6–9,24–26]. A third group focuses on special aspects of LTC and zoom in on migration in the context of LTC [26–29,29], cash for care schemes in LTC [30], and informal care by families [22,29,31,32].

Our focus lies on building a typology of LTC system types. We therefore have identified the second group of typologies as most relevant for our analysis. These typologies include a huge variety in the (number of) included country cases, data, methods, and results. Regarding dimensions and indicators, most studies repeatedly analyze four central dimensions and thereby have created a certain standardization and comparability.

I. Supply:

Most typologies under analysis, incorporate the dimension of supply. Indicators in this dimension include financial resources [6–9,24], staff and staffing levels [24], and bed density in institutional LTC [6,24]. Furthermore, the type of provision is often included in the supply dimension and operationalized via the percentage of people in ambulatory or residential care settings [6,7,24].

II. Public-Private Mix:

The second dimension, the public-private-mix that is often part of healthcare typologies [10,18], operationalizes the role of the state and private actors. Only LTC typologies that specialize on specific aspects or take a broader view on social services, have integrated this dimension so far [27] by focusing on the intensity of informal care [20], the reach of public funds [26], the proportion of for-profit-providers [28,29], and the expenditure on or use of uncontrolled cash benefit schemes [28,29].

III. Access regulation:

Restrictions in LTC systems may pose barriers especially for lower social status groups to access care. Common barriers are means-testing of benefits and limitations of choice [1,33]. The access dimension has been highly relevant in the development of healthcare typologies [10,34] and is in LTC operationalized via means-testing for benefits, entitlement to residential care, home-care benefits, cash benefits, and choice restrictions [9].

IV. Performance:

The performance of LTC systems has so far hardly been studied in international comparisons. Indicators for measuring the quality of LTC service provision such as the share of institutional and home-based LTC patients with pressure ulcers or unintended weight loss are not available in many countries [35]. Hence, only few typologies include performance or quality indicators. 6 [6] for example use the share of people over 80 reporting good or very good health and the perceived limitations in activities in daily living (ADLs) for people aged 65 or older. 9 [9] take institutional indicators of mandatory quality assurance systems and the degree and functioning of integrated services into account.

When summarizing existing LTC typologies we see that most are solely based on quantitative (usually OECD and Eurostat) indictors (Alber, 1995; Colombo, 2012; Damiani et al., 2011; Kraus et al., 2010). Sometimes, also micro-data (Share data) are used [25]. Only 9 [9] adopts both quantitative andqualitative data on institutional setting and rules for access to the system based on an own primary data collection. The results of these typologies are influenced by their focus and aim but also by the (number of) included countries. Some studies include only about ten European/OECD country cases [7,24,25] while others analyze about 20 and more European [6,9] or OECD cases [8].

Despite the large variety in the number of clusters and the composition of those clusters in the different typologies some similarities and parallels can be depicted. The most robust system type is a Scandinavian or Northern European cluster that mostly includes Sweden, Norway, Denmark, Finland, and often also the Netherlands [6,8,9,24,25]. Clusters which include only Eastern European countries can be found in the typologies by 6 [6], 7 [7] and 9 [9]. Often Bulgaria, Hungary, Czech Republic, Estonia, and Slovakia are included, while other Eastern European countries such as Slovenia, Romania, and Lithuania only sometimes join this cluster. In some studies, a cluster which incorporates Eastern and Southern European countries is identified [1,6,9] including Poland, Italy, Spain, and Greece. The three latter countries are also depicted in a genuine Southern European cluster by 25 [25]. Continental European countries such as Germany, France, Austria, Belgium, and Luxemburg can be found in many typologies together in one system type, however mostly together with some Eastern or Northern European countries [6,7,9,24,25]. Non-European countries are rarely included in LTC typologies. The typology by 8 [8] categorizes countries based on financing indicators and include Japan and South Korea in a cluster with Germany, Luxemburg, and the Netherlands due to their common social insurance approach. New Zealand and Canada are clustered together with Greece, Spain, and Switzerland due to their universal but means-tested financing approach [8]. The study by 7 [7] identifies a cluster with Australia and South Korea.

This overview demonstrates that LTC typologies need to be advanced. First, many typologies have a European focus or only use a small sample of countries. Thus, in this contribution we extend these typologies by using an OECD sample with a large number of countries. Second, most typologies only use quantitative indicators in particular with financing data. We also include institutional indicators focusing on access to long-term care and therefore combined both quantitative and qualitative approaches.

# Methodology

## Quantitative and institutional indicators

Indicators for our typology of LTC systems come from two data sources (Table 1). First, six quantitative measures are taken from OECD health data [36]. Five institutional indicators are taken from the Missoc database (MISSOC, 2018), the Health in Transition reports (European Observatory on Health Systems and Policies, 2018), and the ESPN reports of the European Union [37]. All values of the institutional indicators refer to the national rules or the dominant rules in place since in some countries regional or municipal rules prevail. To double-check our values, we contacted national LTC policy experts with a questionnaire containing the description of indicators and values including our country-specific assessment. Based on the questionnaires we received answers and comments to our coding between May and July 2019 for all countries in the sample (see Table 5 in the Appendix).

As a measure of financial input into the system we use LTC (health) expenditure per capita in US$ of purchasing power parities (expenditure). It includes all expenditure on bodily related LTC, mainly on “(basic) Activities of daily living (ADLs)” like bathing, dressing or eating. We would also have included LTC (social) expenditure covering “instrumental activities of daily living (IADLs) to give LTC system expenditure a broader scope [7], but data were extremely limited in this dimension. Institutional supply of services is measured by the number of LTC beds per 1,000 population aged 65 and older (beds) while the actual supply of spots in these facilities is reflected by the number of LTC recipients in institutions measured as the percentage of all people aged 65 years and older (recipients).

To capture the public-private-mix of LTC systems we use two indicators. First, private (voluntary and out-of-pocket) expenditure as a percentage of total expenditure (private expenditure) to measure public and private involvement in payments for care. Second, we include the availability of cash benefits (cash benefit) as an approximation of formal and informal care provision. Research has shown that the availability as well as the unrestricted usage of cash benefits fosters family and migrant care [28,30]. In our setting, the cash benefit indicators may take the value 0, describing a system where only in-kind-benefits are available. If the use of cash benefits is bound to specific services and aids, the indicator is coded 1, while unbound benefits, where the use of the benefit is at the beneficiary’s own discretion, are coded 2.

To capture access to LTC systems we use three choice indicators and one means-testing indicator. Limitations in choice are defined as restrictions in the kind of benefit or provider that can be chosen and can relate to regional restriction or to insurance or benefit plans. The indicators are choice of homes-care provider (choice homecare), choice of institutional care provider (choice institutional care), and choice between cash and in-kind benefits (choice cash). We constructed a cumulative index from these three choice indicators since cluster analysis improves when a small number of variables is included while multicollinearity might weight individual variables too strong biasing the derivation of meaningful clusters [38]. Moreover, this prevents findings from being biased by a strong overweighting of choice within the cluster analysis. This index (choice index) may take values between 0-4, with 0 representing absolute freedom of choice and 4 strong restrictions. Furthermore, we use means-testing for any benefit (means-testing) that includes cash benefits, in-kind benefits, and other care related benefits. If a country system applies no means-testing in LTC systems at all, it was coded 0 and 1 if means-testing takes place.

For the performance dimension, we use data that indicate the quality of LTC services. We include life expectancy of people aged 65 and older (life expectancy) and the percentage of the population who are 65 years and older and perceive their health as good or very good (self-rated health).

--- TABLE 1 ABOUT HERE ---

Table 1: Overview of LTC typology indicators1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Abbreviation | Mean | SD | Min. | Max. |
| *I: Supply* |  |  |  |  |  |
| Expenditure per capita in US$, PPP | Expenditure | 709.89 | 524.81 | 9.48 | 1745.09 |
| Number of beds per 1000 inhabitants | Beds | 47.73 | 18.27 | 12.2 | 85 |
| Number of recipients in institutions,  % of all people aged 65+ | Recipients | 3.88 | 1.66 | 0.43 | 7.17 |
| *II: Public-Private-Mix* |  |  |  |  |  |
| Share of private expenditure,  % of total expenditure | Private expenditure | 15.84 | 11.09 | 0.19 | 34.56 |
| Availability of cash benefits  (only in kind, Bound, Unbound) | Cash benefit | 1.08 | 0.81 | 0 | 2 |
| *III: Access regulation* |  |  |  |  |  |
| Choice Index (Unlimited - Limited) | Choice Index | 1.64 | 0.5 | 0 | 4 |
| Choice of homecare provider | Choice homecare | 0.4 | 0.49 | 0 | 1 |
| Choice of institutional care provider | Choice institutional care | 0.36 | 0.83 | 0 | 1 |
| Choice between cash vs in kind-benefits | Choice cash | 0.88 | 1.25 | 0 | 2 |
| Means-testing for any benefit (No/Yes) | Means-testing | 0.56 | 0.51 | 0 | 1 |
| *IV: Performance* |  |  |  |  |  |
| Life expectancy 65+ | Life expectancy | 19.77 | 1.35 | 16.48 | 21.85 |
| Self-perceived health status (very) good,  % of the population 65+ | Self-perceived health | 46.11 | 21.83 | 8.6 | 86.9 |

1Sources: OECD health data (extracted on 10.12.2018) & MISSOC 2018 (European observatory on health systems and policies 2018), European commission 2018; Own Coding Scheme

## Data

After extraction, we excluded 11 countries from the total OECD sample, because data was missing on single indicators for the whole observation period (Austria, Canada, Chile, Greece, Hungary, Iceland, Italy, Lithuania, Mexico, Portugal, and Turkey) leading to an analysis sample of *N*=25 countries. To handle missing values within quantitative indicators we conducted a three-step process: First, we estimated a multiple imputed chained equation (MICE) regression model using predictive mean matching (PMM) for 20 cycles. Following the findings and recommendations of 39 [39] and 40 [40], we imputed missing mean values of indicators by predictive mean matching of the next neighbor, here the next year. If for example the value was missing for 2105 for a specific country, we estimated the model with the full information from 2014 and aggregated the values of 20 cycles to yearly mean. Second, we aggregated imputed data to the yearly-mean of the specific indicator if the true value was missing. Finally, we calculated an overall mean of the observation period between 2014-2016 for our analysis (see Table 5 in the Appendix).

## Cluster analysis

Cluster analysis is the standard method in welfare state typologies [41–43] and healthcare typologies [16,34,44] and LTC typologies [7,9,21,23] to classify and develop system types. The innovative approach with multiple cluster analyses within the same methodological framework [10] has several advantages compared to classical approaches that often lack accepted standards and statistical rules [45]. Since researchers must make technical decisions that potentially shift findings in different ways of interpretation, a single cluster analysis is not appropriate for classifying complex long-term care systems. The flexibility of the multi-cluster-analysis allows to combine results from different specifications “using the variability across those results as measure of confidence about the membership of two observations in one cluster” [10] increasing reliability of the method itself.

Following the proposed framework we specified cluster analysis in Stata 16 with either z- and range-standardized variables, used Gower and squared Euclidian distance as measures of dissimilarity in both, a k-means partitioning analysis as well as a agglomerative cluster analysis with average and Wards algorithms as linkage methods and selected the first and second-best result determined by stopping rules of Calinski-Harabasz and Duda/Hart and Dendrograms for each of the 24 separate cluster analysis.

Findings from 8 k-means and 16 hierarchical cluster analysis results went equally in the calculation on how often each country was in the same cluster with every other country. To classify as full membership within this network of long-term-care systems, a connection between two countries must show up in ≥ 66% of all cluster analyses and a country needs to have such strong ties with at least half of all countries in the cluster.

# Analysis

Based on 24 cluster analyses and by applying the full membership rule, nine clusters can be separated (see Table 2):

--- TABLE 2 ABOUT HERE ---

Table 2: Clustering based on benchmark percentages of same cluster solutions

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| ≥ 0.66 and ≥ 0.5 cluster ties | CZ, LV, PL | DE, FI | DK, IE, NO, SE | JP, KR | AU, BE, CH, LU, NL | SI, SK | FR, IL, ES, UK, US | EE | NZ |
| ≥ 0.5 cluster ties |  |  | JP, KR | DK, IE, NO, SE | FR, UK, IL, SI, SK |  | AU, BE  CH, EE, LU, NL, NZ, SK, SI |  | FR, UK, US |
| Strongest tie  in full cluster | LV\_PL  (1,0) | FI\_DE  (0.94) | DK\_IE (1,0)  DK\_NO (1,0)  DK\_SE (1,0)  IE\_NO (1,0)  IE\_SE (1,0)  NO\_SE (1,0) | JP\_KR  (0.94) | LU\_NL (1,0) | SI\_SK  (0.72) | ES\_US  (0.94) |  |  |
| ≥ 0.9 cluster ties | CZ\_LV  CZ\_PL LV\_PL | FI\_DE | DK\_IE  DK\_NO  DK\_SE  IE\_NO  IE\_SE  NO\_SE | JP\_KR | BE\_LU  BE\_NL  LU\_CH  LU\_NL  NL\_CH |  | ES\_US |  |  |
| # of ties in  full cluster | 3/3 | 1/1 | 6/6 | 1/1 | 10/10 | 1/1 | 9/10 |  |  |

The nine clusters consist of one to five countries:

1. The first cluster consist of Czech Republic, Latvia, and Poland who form a distinct and highly consistent cluster, with all ties between these countries ≥ 90%. No other country has a partial membership in this cluster.
2. Finland and Germany form another distinct cluster with a strong tie (94%). Both countries do not have any partial membership in other clusters.
3. Denmark, Ireland, Norway, and Sweden show a high internal consistency. All countries can be found in the same cluster in all performed cluster analysis.
4. Japan and Korea have a strong tie among them (94%) and join the previous cluster as partial members.
5. Australia, Belgium, Luxemburg, the Netherlands, and Switzerland form a dense cluster in which each country shares strong ties to all other included countries.
6. Slovenia and Slovakia have a strong tie, yet with 72% less strong than the other two-country clusters. The countries have strong and weak ties to clusters 5 and 7.
7. France, Israel, Spain, the United Kingdom, and the United States constitute a cluster in which the tie between the US and France is the only weak one.
8. Estonia and 9) New Zealand are one-country clusters. Estonia has weak ties to France and the US and is hence considered a partial member of cluster four. New Zealand has three weak ties to cluster four and is hence considered a partial member in this cluster, too.

Although from a methodological point of view, nine clusters can be clearly distinguished, such a solution with clusters covering only one or two countries is not suitable for most purposes. Our typology, however, allows to go beyond this interpretation. Based on their partial memberships, the clusters can be condensed. A partial membership is defined as a connection of two countries in ≥ 50% of cluster analyses. As a result, we identify four distinct clusters. These clusters have no ties ≥ 50% to countries from other clusters and within the four clusters all countries have ties ≥ 50%. We map this condensed cluster solution by a network graph modelled by UNICNET6/Netdraw. The graph visualizes groups of countries and how likely it is that two countries belong to a similar LTC system type. Furthermore, it displays the internal consistency of LTC systems allowing for an in-depth analysis of the composition of clusters (Figure 1).

--- FIGURE 1 ABOUT HERE ---

Figure 1: Network of OECD LTC systems.



Light grey: ≥ 50%; Full grey: ≥ 66%; Black: ≥ 90%.

The graphic representation shows four distinct cluster of which two (bottom right and bottom left in) could be each split up into two further clusters leading to a total of six clusters. Based on their tie strength Cluster 1 (CZ, LV, PL), 2 (DE, FI), 3 (DK, IE, NO, SE), and 4 (JP, KR) remain as types. In addition, Cluster 5 (AU, BE, CH, LU, NL) and 6 (SI, SK) are joined as well as cluster 7 (FR, IL, ES, UK, US), 8 (EE), and 9 (NZ).

# Results

Based on our findings outlined above, we propose an LTC typology of six system types that can be characterized as follows (see Table 3):

**The residual public system**

First, the residual public system, that includes the Czech Republic, Latvia, and Poland, is marked by low levels of supply. It has by far the lowest overall expenditure, beds, and recipients in comparison to all other system-types. Although access barriers are low by applying no means-testing and a low level of choice restrictions, bound cash benefits hint at a high level of informal care provision. However, the share of public LTC expenditure is the highest of all system types. Performance of these systems measured by life expectancy and subjective health status are by far the lowest compared to all other systems.

**The private supply system**

Second, the private supply system, that consists of Germany and Finland, has a medium to high level of supply. Yet, this system shows one of the lowest shares of public expenditure and the availability of unbound cash benefits, indicating a high level of informal care provision. Access restrictions are among the lowest of all systems with no means-testing and limited choice restrictions. Performance levels are medium.

**The public supply system**

Third, the public supply system includes the countries Denmark, Ireland, Norway, and Sweden, and is defined by high supply and above average public expenditure. Benefits are mainly only available in-kind, which hints at a low level of informal care provision. Furthermore, choice is limited in these systems, yet no means-tests apply. The performance indicators of this system are above average.

**The evolving public supply system**

Fourth, Japan and Korea can be defined as evolving public supply systems, marked by medium to low supply and public financing and provision. Expenditure and the number of recipients in institutions are at a medium level, the supply of residential beds is below average. Public expenditure is medium and benefits only provided in-kind. Access to the system is provided without means-testing but medium to high choice restrictions apply. Performance is the highest concerning life expectancy but among the lowest concerning self-perceived health. Our study indicates that the two countries share a number of characteristics of the North European public supply type.

**The private need-based supply system**

A fifth LTC system type can be defined as a private need-based supply system that includes Australia, Belgium, Switzerland, Luxembourg, the Netherlands, Slovakia, and Slovenia with the latter two, however, only having weak ties to the other countries. This type can be depicted as oriented towards private provision and financing as public expenditure is below average and cash benefits are available in almost all countries and often unbound. On the other hand, however, supply is high. In contrast to the private supply type, access is restricted by a high level of means-testing. Like in the private supply countries, choice restrictions rarely apply. Performance is above average.

**The evolving private need-based system**

A sixth LTC type is labeled as evolving private need-based system that shares important characteristics of the private need-based supply type. France, Israel, Spain, the United Kingdom, and the United States belong to this type, and Estonia and New Zealand have weak ties as well. The public-private mix is oriented towards private financing. Performance is high. Access is restricted by both means-testing and high choice restrictions. The main difference to the prior system type is low supply, especially low expenditure, but also the provision of beds in residential care and the number of recipients of residential care is at a lower level.

--- TABLE 3 ABOUT HERE ---

Table 3: Means of quantitative indicators of six LTC types

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Residual public system | Private supply system | Public supply system | Evolving Public Supply system | Private need-based supply system | Evolving private need-based system |
| Cluster composition | CZ, LV, PL | DE, FI | DK, IE, NO, SE | JP, KR | AU, BE, CH, LU, NL, SK, SI | EE, ES, FR, IL, NZ, UK, US |
| Cluster size | 3 | 2 | 4 | 2 | 7 | 7 |
| Expenditure | 161.82 | 811.33 | 1369.15 | 603.97 | 819.81 | 459.42 |
| Beds | 21.76 | 56.33 | 53.21 | 24.28 | 64.28 | 43.43 |
| Recipients | 1.18 | 4.4 | 4.16 | 2.63 | 5.51 | 3.46 |
| Private expenditure | 5.77 | 23.94 | 10.49 | 18.17 | 11.81 | 24.25 |
| Cash | 1.67 | 2 | 0.25 | 0 | 1.57 | 0.86 |
| Choice restrictions | 1 | 1 | 3 | 2 | 0.57 | 2.29 |
| Means-testing | 0 | 0 | 0 | 0 | 1 | 1 |
| Life expectancy | 17.49 | 19.84 | 19.93 | 21.06 | 19.90 | 20.15 |
| Self-perceived health | 16.08 | 42.73 | 63.43 | 22.68 | 49.99 | 52.88 |

--- TABLE 4 ABOUT HERE ---

Table 4: Overview of cluster labels and characteristics of 6 LTC types

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Residual Public system | Private Supply system | Public supply system | Evolving Public supply system | Private need-Based supply system | Evolving Private Need-Based system |
| Cluster composition | CZ, LV, PL | DE, FI | DK, IE, NO, SE | JP, KR | AU, BE, CH, LU, NL, SK, SI | EE, ES, FR, IL, NZ, UK, US |
| Supply  Expenditure  Beds  Recipients | Low  Low  Low | Medium  High  High | High  High  High | Medium  Low  Medium | Medium  High  High | Low  Medium  Medium |
| Public-Private Mix  Private expenditure  Cash | Low  Medium | High  Medium | Medium  Low | Medium  Low | Medium  High | High  Medium |
| Access Regulation  Choice restrictions  Means-testing | Low  Low | Low  Low | High  Low | High  Low | Low  High | High  High |
| Performance  Life expectancy  Self-perceived health | Low  Low | Medium  Medium | Medium  High | High  Low | Medium  High | High  High |

# Discussion

Focusing on the countries in the six systems, we find expected patterns based on earlier studies, but also unanticipated patterns and countries joining these types. The high-supply, public-oriented, system is led by the Nordic countries of Sweden, Norway, and Denmark. This group of countries is found in several studies [6,8,24], but mostly also includes Finland and the Netherlands [6,8,9,25]. According to our analysis, Ireland joins this group. Furthermore, the low-supply, low-performance system is built by Poland, Latvia, and the Czech Republic – three Eastern European countries [6]. Other Eastern European countries such as Slovenia, Slovakia join the high supply, private oriented type , and Estonia the low supply, private oriented system (all three, however, with weak ties). As from the Southern European countries we could only incorporate Spain into the typology, the results cannot confirm or negate the existence of a Southern European cluster of LTC systems. Continental European countries are mainly included in the high supply, private-oriented types. While Japan and Korea have been attached to Germany and the Netherlands in earlier typologies due to their social insurance model in LTC [8] our results show that these two Asian countries have a distinct type of LTC system, which is closer to those of Northern European LTC systems. Earlier studies with Finland and Germany in one cluster are rare. Only one typology finds both countries in one cluster [6]. However, Austria might also be grouped in this group, a country that was not included due to data limitations.

Despite many reforms of LCT systems in OECD countries in recent years, our results underline certain patterns of LTC system types. We find a low-supply system of Eastern European countries and a high-supply, public system of Northern European countries. However, the membership of Eastern European countries in other system types, the inclusion of Ireland in the Northern type, and the fact that Finland and Germany form a distinct system indicate that privatization and marketization reforms in OECD LTC systems (Ranci and Pavolini, 2013; Farris and Marchetti, 2017) have led to a convergence of countries with similar LTC reforms.

# Conclusion

In the last century, marketization, commodification, and corporatization of care changed LTC systems all over the world [4], which makes a new and updated LTC typology necessary. In this study, we provide an updated and flexible LTC typology. Updated, since we used the latest available data from the OECD database as well as a unique institutional dataset. Furthermore, earlier typologies rely mainly on quantitative indicators, especially when a larger country sample is included [6–8]. Only in cases of smaller country samples, which use more often qualitative comparisons, institutional indicators are considered. A larger country sample as well as a mix of quantitative and institutional indicators has only been adopted by 9 [9]. Compared to 9 [9] the advantage of the six LTC types proposed in our study are, first, the newer data and second the methodological innovation with multiple cluster analyses resulting in a flexible use of the typology.

On methodological grounds we identified nine LTC clusters. These nine clusters will be a basis for future studies that require information on groups with countries that are highly similar (see Table 2, and the visualization in Figure 1). Such comparative studies might exclude countries such as New Zealand, Estonia, Slovenia, and Slovakia that have only weak ties to other (groups of) countries from the analysis. They may also take into consideration that the US and France, despite being in the same cluster, are only weakly related. Other studies could make use of the six LTC types proposed in our study and, with coming data, analyze, for instance, whether the “evolving” systems approach the “public supply” respectively the “private need-based” type. A third group of comparative studies might use the alternative four-type-solution shown in Figure 1. Such studies might be more interested in the question of private vs. public supply and less in characteristics such as the level of expenditure and choice restrictions that distinguishes countries like Belgium, Switzerland, Luxembourg, and the Netherlands from Spain, the United Kingdom, and the United States.

Interpreting the six LTC types as regards to earlier typologies and clusters, certain developments can be inferred. First, earlier typologies often show a regional component of types, such as a Northern European [6,8,24] or Eastern European type [6]. We can show that regional clustering exists, such as in the case of the public supply system and the residual public supply system. The former includes three Northern European countries Denmark, Sweden and Norway. However, Ireland belongs to the public supply type as well and the type shows similarities to the evolving public supply type including Japan and Korea. The residual public supply system includes only Eastern European countries (Poland, Latvia, and Czech Republic).Yet, the three other Eastern European countries in the sample do not join this type. Slovenia and Slovakia have weak ties in the private need-based supply type and Estonia weak ties in the evolving private need-based type. These cluster compositions show that regional proximity is no definite indication of similarity of LTC system. Especially, with focus on Eastern European countries, Slovenia, Slovakia, and Estonia show that they reform and invest in their LTC systems, which moves them further away from the residual public supply system. A further point concerns public financing mechanisms (social insurance contributions, tax-financing), which are often used to differentiate system types [8]. In LTC only few countries adopted social insurance (Germany, the Netherlands, Japan, Korea). These four countries belong to three different kinds of system types. Hence, how LTC is financed, does not seem to influence other dimensions of the LTC system.

Typologies always imply generalizations. For example, in many countries LTC service provision and access have a high regional fragmentation [46], which cannot be displayed on a broad basis in an internationally comparative typology. Furthermore, LTC systems have not that clear boundaries as other welfare state systems such as healthcare, unemployment, or pensions systems do. LTC can be provided via a separate LTC system or it can be partially integrated in healthcare, social assistance, or pension systems, where different access and provision rules apply [47]. Finally, in many countries LTC is still a new welfare state issue, because the provision was traditionally devolved to families [1,30]. Now, such services are increasingly provided by migrant care workers [28]. Indicators on informal care, however, are not available respectively not reliable. As an approximation we have included cash benefits (especially unbound) that can be taken as an institutional measure to increase informal family and migrant care [28,30].

Despite these limitations, this article provides an innovative and updated LTC typology, which can extend our understanding of the composition and design of different LTC systems. Lastly, this flexible typology can be of use by welfare state and LTC scholars and is of relevance for LTC policy officials who face the challenges of aging societies.

# References

References

[1] Colombo F, Llena-Nozal A, Mercier J, Tjadens F. Help wanted?: Providing and paying for long-term care. Paris: OECD; 2011.

[2] Ranci C, Pavolini E (eds.). Reforms in Long-Term Care Policies in Europe: Investigating Institutional Change and Social Impacts. New York, NY: Springer; 2013.

[3] OECD, European Commission. A Good Life in Old Age? OECD Publishing; 2013.

[4] Farris SR, Marchetti S. From the Commodification to the Corporatization of Care: European Perspectives and Debates. Social Politics: International Studies in Gender, State & Society 2017;24(2):109–31. https://doi.org/10.1093/sp/jxx003.

[5] Ungerson C. Social Politics and the Commodification of Care. Social Politics: International Studies in Gender, State & Society 1997;4(3):362–81. https://doi.org/10.1093/sp/4.3.362.

[6] Damiani G, Farelli V, Anselmi A, Sicuro L, Solipaca A, Burgio A et al. Patterns of Long Term Care in 29 European countries: evidence from an exploratory study. BMC Health Serv Res 2011;11:316. https://doi.org/10.1186/1472-6963-11-316.

[7] Halásková R, Bednář P, Halásková M. Forms of Providing and Financing Long-Term Care in OECD Countries. Review of Economic Perspectives 2017;17(2):159–78. https://doi.org/10.1515/revecp-2017-0008.

[8] Colombo F. Typology of Public Coverage for Long-Term Care in OECD Countries. In: Costa-Font J, Courbage C, editors. Financing Long-Term Care in Europe: Institutions, Markets and Models. London, s.l.: Palgrave Macmillan UK; 2012, p. 17–40.

[9] Kraus M, Riedel M, Mot ES, Willemé P, Röhrling G. A typology of long-term care systems in Europe. Brussels: ENEPRI; 2010.

[10] Reibling N, Ariaans M, Wendt C. Worlds of Healthcare: A Healthcare System Typology of OECD Countries. Health Policy 2019;123(7):611–20. https://doi.org/10.1016/j.healthpol.2019.05.001.

[11] Esping-Andersen G. The three worlds of welfare capitalism. Princeton, N.J.: Princeton University Press; 1990.

[12] Ferrera M. The 'Southern Model' of Welfare in Social Europe. Journal of European Social Policy 1996;6(1):17–37. https://doi.org/10.1177/095892879600600102.

[13] Arts W, Gelissen J. Three worlds of welfare capitalism or more?: A state-of-the-art report. Journal of European Social Policy 2002;12(2):137–58.

[14] Castles FG, Mitchell D. Worlds of Welfare and Families of Nations. In: Castles FG, editor. Families of nations: Patterns of public policy in Western democracies. Aldershot: Ashgate; 1993.

[15] Rostgaard T. Caring for Children and Older People in Europe - A Comparison of European Policies and Practice. Policy Studies 2002;23(1):51–68. https://doi.org/10.1080/0144287022000000082.

[16] Wendt C. Changing Healthcare System Types. Social Policy & Administration 2014;48(7):864–82. https://doi.org/10.1111/spol.12061.

[17] Schieber GJ. Financing and delivering health care: A comparative analysis of OECD countries. Paris: OECD; 1987.

[18] Böhm K, Schmid A, Götze R, Landwehr C, Rothgang H. Five types of OECD healthcare systems: empirical results of a deductive classification. Health Policy 2013;113(3):258–69. https://doi.org/10.1016/j.healthpol.2013.09.003.

[19] Anttonen A, Sipilä J. European Social Care Services: Is it possible to identify models? Journal of European Social Policy 1996;6(2):87–100.

[20] Bettio F, Plantenga J. Comparing Care Regimes in Europe. Feminist Economics 2004;10(1):85–113. https://doi.org/10.1080/1354570042000198245.

[21] Kautto M. Investing in Services in West European welfare states. Journal of European Social Policy 2002;12(1):53–65.

[22] Leitner S. Varieties of familialism: The caring function of the family in comparative perspective. European Societies 2003;5(4):353–75. https://doi.org/10.1080/1461669032000127642.

[23] Saraceno C, Keck W. Can we identify intergenerational policy regimes in Europe? European Societies 2010;12(5):675–96. https://doi.org/10.1080/14616696.2010.483006.

[24] Alber J. A Framework for the Comparative Study of Social Services. Journal of European Social Policy 1995;5(2):131–49.

[25] Pommer E, Woittiez I, Stevens J. Comparing care: The care for elderly in ten EU-countries. Amsterdam: Aksant Acad. Publ; 2009.

[26] van Hooren FJ. Varieties of migrant care work: Comparing patterns of migrant labour in social care. Journal of European Social Policy 2012;22(2):133–47. https://doi.org/10.1177/0958928711433654.

[27] Anderson A. Europe's Care Regimes and the Role of Migrant Care Workers Within Them. J Popul Ageing 2012;5(2):135–46. https://doi.org/10.1007/s12062-012-9063-y.

[28] Da Roit B, Weicht B. Migrant care work and care, migration and employment regimes: A fuzzy-set analysis. Journal of European Social Policy 2013;23(5):469–86. https://doi.org/10.1177/0958928713499175.

[29] Simonazzi A. Care regimes and national employment models. Cambridge Journal of Economics 2008;33(2):211–32. https://doi.org/10.1093/cje/ben043.

[30] Da Roit B, Le Bihan B. Similar and Yet So Different: Cash-for-Care in Six European Countries’ Long-Term Care Policies. The Milbank Quarterly 2010;88(3):286–309.

[31] Di Rosa M, Kofahl C, McKee K, Bień B, Lamura G, Prouskas C et al. A Typology of Caregiving Situations and Service Use in Family Carers of Older People in Six European Countries. GeroPsych 2011;24(1):5–18. https://doi.org/10.1024/1662-9647/a000031.

[32] Pfau-Effinger B. New policies for caring family members in European welfare states. Cuad. Relac. Lab. 2014;32(1). https://doi.org/10.5209/rev\_CRLA.2014.v32.n1.44712.

[33] Bakx P, Chernichovsky D, Paolucci F, Schokkaert E, Trottmann M, Wasem J et al. Demand-side strategies to deal with moral hazard in public insurance for long-term care. J Health Serv Res Policy 2015;20(3):170–6. https://doi.org/10.1177/1355819615575080.

[34] Reibling N. Healthcare systems in Europe: towards an incorporation of patient access. Journal of European Social Policy 2010;20(1):5–18. https://doi.org/10.1177/0958928709352406.

[35] Halfens RJG, Meesterberends E, van Nie-Visser NC, Lohrmann C, Schönherr S, Meijers JMM et al. International prevalence measurement of care problems: results. J Adv Nurs 2013;69(9):e5-17. https://doi.org/10.1111/jan.12189.

[36] OECD. OECD Health Statistics 2018; Available from: http://www.oecd.org/els/health-systems/health-data.htm.

[37] European Commission. ESPN thematic report on Challenges in long-term care; Available from: https://ec.europa.eu/social/main.jsp?advSearchKey=espnltc\_2018&mode=advancedSubmit&catId=22&policyArea=0&policyAreaSub=0&country=0&year=0.

[38] Milligan GW, Cooper MC. Methodology Review: Clustering Methods. Applied Psychological Measurement 1987;11(4):329–54. https://doi.org/10.1177/014662168701100401.

[39] White IR, Royston P, Wood AM. Multiple imputation using chained equations: Issues and guidance for practice. Stat Med 2011;30(4):377–99. https://doi.org/10.1002/sim.4067.

[40] Kleinke K, Stemmler M, Reinecke J, Lösel F. Efficient ways to impute incomplete panel data. AStA Adv Stat Anal 2011;95(4):351–73. https://doi.org/10.1007/s10182-011-0179-9.

[41] Bambra C. Defamilisation and welfare state regimes: a cluster analysis. International Journal of Social Welfare 2007;16(4):326–38. https://doi.org/10.1111/j.1468-2397.2007.00486.x.

[42] Jensen C. Worlds of welfare services and transfers. Journal of European Social Policy 2008;18(2):151–62. https://doi.org/10.1177/0958928707087591.

[43] Kammer A, Niehues J, Peichl A. Welfare regimes and welfare state outcomes in Europe. Journal of European Social Policy 2012;22(5):455–71. https://doi.org/10.1177/0958928712456572.

[44] Wendt C. Mapping European healthcare systems: a comparative analysis of financing, service provision and access to healthcare. Journal of European Social Policy 2009;19(5):432–45. https://doi.org/10.1177/0958928709344247.

[45] Fonseca JRS. Clustering in the field of social sciences: that is your choice. International Journal of Social Research Methodology 2013;16(5):403–28. https://doi.org/10.1080/13645579.2012.716973.

[46] Spasova S, Baeten R, Coster S, Ghailani D, Peña-Casas R, Vanhercke B. Challenges in long-term care in Europe: A study of national policies. Brussels; 2018.

[47] Nies H, Leichsenring K, Mak S. The Emerging Identity of Long- Term Care Systems in Europe. In: Leichsenring, Kai, Billings, Jenny, Nies H, editors. Long term care in Europe: Improving policy and practice. Basingstoke: Palgrave Macmillan; 2013, p. 19–41.

Online Appendix

Table 5: Means LTC typology indicators over countries (N=25) and years (2014-2016)

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Quantitative indicators | | | | | | Institutional indicators | | |
| ID | EXPND | BEDS | RCPTIN | PEXPND | LEX | SPH | CASH | CIDX | MTAB |
| AU | 99.86 | 52.53 | 6.40 | 5.87 | 20.88 | 76.40 | Unbound | 0 | Yes |
| BE | 1037.03 | 68.10 | 7.16 | 9.43 | 20.05 | 52.30 | Unbound | 2 | Yes |
| CZ | 314.19 | 38.87 | 2.24 | 0.19 | 17.90 | 23.57 | Unbound | 0 | No |
| DK | 1223.61 | 45.95 | 3.97 | 8.25 | 19.43 | 58.57 | In-kind | 3 | No |
| EE | 106.22 | 45.60 | 5.00 | 34.56 | 18.05 | 15.87 | In-kind | 4 | Yes |
| FI | 763.24 | 59.30 | 4.70 | 17.21 | 20.03 | 44.87 | Unbound | 2 | No |
| FR | 696.76 | 53.07 | 4.20 | 22.47 | 21.77 | 41.03 | Bound | 1 | Yes |
| DE | 859.42 | 53.35 | 4.10 | 30.67 | 19.65 | 40.60 | Unbound | 0 | No |
| IE | 1126.68 | 49.20 | 3.53 | 17.79 | 19.76 | 65.43 | In-kind | 2 | No |
| IL | 244.61 | 21.00 | 1.90 | 28.29 | 20.37 | 55.47 | Unbound | 1 | Yes |
| JP | 796.31 | 24.10 | 2.70 | 8.39 | 21.85 | 24.00 | In-kind | 2 | No |
| KR | 411.63 | 24.47 | 2.57 | 27.95 | 20.30 | 21.37 | In-kind | 2 | No |
| LV | 73.42 | 14.20 | 0.43 | 13.10 | 16.48 | 8.60 | Bound | 2 | No |
| LU | 1503.52 | 85.00 | 5.47 | 20.19 | 20.57 | 47.10 | Bound | 0 | Yes |
| NL | 1360.82 | 75.70 | 4.80 | 8.39 | 19.85 | 60.47 | Bound | 0 | Yes |
| NZ | 635.47 | 56.43 | 4.60 | 6.13 | 20.37 | 86.90 | In-kind | 2 | Yes |
| NO | 1745.09 | 52.17 | 4.63 | 8.63 | 20.27 | 66.37 | Bound | 3 | No |
| PL | 97.86 | 12.20 | 0.87 | 4.03 | 18.10 | 16.07 | Unbound | 1 | No |
| SK | 9.48 | 52.07 | 3.93 | 1.17 | 17.08 | 18.77 | Bound | 0 | Yes |
| SI | 266.88 | 50.67 | 4.93 | 4.11 | 19.67 | 31.03 | Unbound | 1 | Yes |
| ES | 294.38 | 44.47 | 1.83 | 18.54 | 21.30 | 40.03 | Bound | 3 | Yes |
| SE | 1381.24 | 65.53 | 4.50 | 7.29 | 20.25 | 63.33 | In-kind | 4 | No |
| CH | 1461.08 | 65.90 | 5.90 | 33.53 | 21.17 | 63.83 | Unbound | 1 | Yes |
| UK | 747.22 | 47.60 | 4.22 | 33.42 | 19.90 | 52.70 | Bound | 2 | Yes |
| US | 491.26 | 35.83 | 2.50 | 26.36 | 19.28 | 78.16 | Bound | 3 | Yes |
| *TM* | 709.89 | 47.73 | 3.88 | 15.84 | 19.77 | 46.11 | - | 1.64 | - |

Sources: OECD health data (extracted on 10.12.2018) &MISSOC 2018 (European observatory on health systems and policies 2018), European commission 2018; Own Coding Scheme; TM = Total mean

Table 6: Means of quantitative indicators in LTC typology over (N=9) methodological clusters

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| Cluster composition | AU, BE, CH, LU, NL | CZ, LV, PL | DK, IE, NO, SE | EE | DE, FI | ES, FR, IL, UK, US | JP, KR | NZ | SI, IK |
| Cluster Size | 5 | 3 | 4 | 1 | 2 | 5 | 2 | 1 | 2 |
| EXPND | 1092.46 | 161.82 | 1369.15 | 106.22 | 811.33 | 494.85 | 603.97 | 635.46 | 138.18 |
| BEDS | 69.45 | 21.76 | 53.21 | 45.6 | 56.33 | 40.39 | 24.28 | 56.43 | 51.37 |
| RCPTIN | 5.95 | 1.18 | 4.16 | 5 | 4.4 | 2.93 | 2.63 | 4.6 | 4.43 |
| PEXPND | 15.48 | 5.77 | 10.49 | 34.56 | 23.94 | 25.82 | 18.17 | 6.13 | 2.64 |
| CASH | 1.6 | 1.67 | 0.25 | 0 | 2 | 1.2 | 0 | 0 | 1.5 |
| LEX 65+ | 20.50 | 17.49 | 19.93 | 18.05 | 19.84 | 20.52 | 21.08 | 20.37 | 18.38 |
| SPH | 60.02 | 16.08 | 63.43 | 15.87 | 42.73 | 53.48 | 22.68 | 86.9 | 24.9 |
| CIDX | 0.6 | 1 | 3 | 4 | 1 | 2 | 2 | 2 | 0.5 |
| MTAB | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 |

Sources: OECD health data (extracted on 10.12.2018) & MISSOC 2018 (European observatory on health systems and policies 2018), European commission 2018; Own Coding Scheme