

Qian, Yuting et al.

**Working Paper**

## The Growing Gap of Unmet Need: Assessing the Demand for, and Supply of, Home-Based Support for Older Adults with Disabilities in 31 Countries

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**Yuting Qian**

*Yale University*

**Shanquan Chen**

*University of Cambridge*

**Zhuoer Lin**

*Yale University*

**Zexuan Yu**

*Brown University*

**Mengxiao Wang, Xiaohui Hou**

*The World Bank*

**Xi Chen**

*Yale University and IZA*

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**IZA – Institute of Labor Economics**

Schaumburg-Lippe-Straße 5–9  
53113 Bonn, Germany

Phone: +49-228-3894-0  
Email: [publications@iza.org](mailto:publications@iza.org)

[www.iza.org](http://www.iza.org)

## ABSTRACT

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# The Growing Gap of Unmet Need: Assessing the Demand for, and Supply of, Home-Based Support for Older Adults with Disabilities in 31 Countries

Providing support to older people with disabilities will increasingly challenge care systems in all countries. Accurately gauging the unmet need is a first step in response. Disability is commonly measured by documenting people's capacity to perform Activities of Daily Living (ADLs) and Instrumental Activities of Daily Living (IADLs). This study assessed the prevalence and the extent (or severity) of ADL/IADL limitations in 31 countries from 2011 to 2018, together with the availability of support to manage them. The study identified a range of demographic, social, and policy factors that are associated with ADL/IADL limitations and the receipt of assistance among older adults. Results show substantial variation across countries in the prevalence and extent of ADL/IADL limitations and how both prevalence and extent have evolved over time. Country-level differences in socioeconomic conditions, health behaviors, chronic disease prevalence, and the strength of public safety nets are among the primary factors that may help explain these variations. Over the study period, most countries saw a decrease in the share of older adults with ADL/IADL limitations who received assistance, even as the prevalence of ADL/IADL limitations rose in many of those countries. This suggests considerable unmet need for ADL/IADL assistance among older adults in these countries. Specific groups, such as unpartnered males, were less likely to receive help. Countries may improve outcomes by targeting interventions to vulnerable groups. Comparative cross-country data on disability trends open new opportunities for countries to learn from each other's experiences in improving elder care.

**JEL Classification:** J14, J18, I11, I18

**Keywords:** global aging, disability, ADL/IADL limitations, unmet need, elder care

**Corresponding author:**

Xi Chen  
Department of Health Policy and Management  
Department of Economics  
Yale University  
60 College St, New Haven  
CT 06520  
USA  
E-mail: [xi.chen@yale.edu](mailto:xi.chen@yale.edu)

## Introduction

The World Health Organization (WHO) estimates that, as of 2011, about 15 percent of the global population suffered from disabilities (WHO 2011). Although more recent estimates are not available, the evidence strongly suggests that global population aging may be leading to greater disability. This means that although the prevalence of disability among people ages 60 and over in the 2000s was 43.4 percent and 29.5 percent in low- and middle-income countries (LMICs) and high-income countries (HICs), respectively (WHO 2011, 2012), these prevalence figures are likely to be higher today.

One of the standard ways in which health systems measure disability—in particular, the extent to which a person cannot take care of themselves and live on their own is to document the individual’s capacity to perform a range of tasks referred to as Activities of Daily Living (ADLs) and Instrumental Activities of Daily Living (IADLs) (NRS 2019; Kiyoshige et al. 2019).<sup>1</sup> ADL/IADL limitations can predict the need for nursing-home placement and healthcare utilization, leading to increased health care costs, a lower quality of life, and even a higher risk of death (Covinsky 2006; Mor et al. 1994)

The evidence shows that the impact of ADL/IADL limitations on older adults is significant. This, however, tells only half the story. The burden of ADL/IADL limitations is felt not just by individuals with disabilities but also by their families and the healthcare system as a whole. Additionally, the COVID-19 pandemic, which by all accounts is not over, has only compounded the difficulties faced by persons with ADL/IADL limitations. With increased risks for low psychological well-being, isolation, lowered access to information, and poor quality of life, the need for assistance with daily living in the COVID era has grown even more pressing (Steptoe and Di Gessa 2021).

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<sup>1</sup> ADLs, typically learned during early childhood, are basic self-care tasks that are fundamental to independent living. Examples are walking, dressing, grooming, bathing, toileting, getting in and out of bed, and eating from a plate with utensils (Katz et al. 1963). IADLs, typically learned during adolescence, are more complex tasks that build upon the basic ADLs but require more planning and thought. Examples include driving, using public transportation, housecleaning, paying bills, managing a bank account, refilling medication prescriptions, going grocery shopping, and making a meal (Koyano et al. 1991).

Low levels of physical functioning and elevated levels of disability are closely linked with various sociodemographic characteristics, health behaviors, and chronic diseases. Key factors associated with disability include older age (Lestari et al. 2019), being female (Bloomberg et al. 2021), lower levels of education (Gil-Salcedo et al. 2022), lower socioeconomic status (Choi et al. 2022), being widowed or single (Gil-Salcedo et al. 2022), narrower social networks or lack of access to social capital (Portela et al. 2020), sedentary lifestyles (Gil-Salcedo et al. 2022), obesity (Ygnatios et al. 2021), fatigue (Zaninotto et al. 2020), smoking (Al Snih et al. 2010), and having multiple chronic health conditions (Nobrega et al. 2021).

Despite these findings, there is a lack of multi-country comparative studies examining longitudinal trends in ADLs and IADLs. This constitutes a significant gap in the existing knowledge base because understanding common and divergent trends in disability and unmet care demands, and identifying the drivers of these trends, are crucial in informing public policy and designing effective interventions to prevent or mitigate disability.

The purpose of this study is to address this knowledge gap in the field of aging and disability by pursuing three objectives: (1) provide an in-depth characterization of individuals with ADL and IADL limitations and quantify their prevalence trends across multiple countries over time; (2) assess the unmet care needs of older adults with disabilities and examine changes in this gap over time; and (3) identify and analyze the factors that contribute to the gap between the demand for care from older people with ADL/IADL limitations and the supply of care to them. In big picture terms, this study aims to provide a comprehensive understanding of the challenges faced by older adults with disabilities that can inform public policy and health sector interventions to prevent or reduce disability.

The paper first describes the prevalence, characteristics, and temporal trends of ADL/IADL limitations and unmet care needs among older adults across a diverse sample of 31 countries. It also examines the socioeconomic factors that contribute to the prevalence of ADL/IADL limitations and unmet care needs, as well as the gap between the demand for care by older adults with disabilities, and the supply of care to them. The unique aspect of this study is its multi-country approach. That lens offers a comprehensive understanding of

the situation and its variability across countries and highlights potential lessons for countries with a high prevalence of ADL/IADL limitations and unmet care needs.

## Methods

### Data

We used publicly available data from four surveys that collected self-reported data from older adults in 31 countries, including the United Kingdom (UK), the United States (US), China, Israel, and 27 continental European countries. The four surveys were 1) the English Longitudinal Study of Ageing (ELSA) in the UK, 2) the Survey of Health, Ageing and Retirement in Europe (SHARE), covering 28 countries; 3) the Health and Retirement Study (HRS) in the United States; and 4) the China Health and Retirement Longitudinal Study (CHARLS) (Zhao et al. 2014). These four surveys, all of which are considered part of the “HRS family” of instruments, are biennial, nationally representative, individual surveys. Each survey participant completed a standardized questionnaire, either face-to-face or via the internet or telephone. Each survey gathers an extensive range of information from respondents. Data relevant to the present analysis include sociodemographic characteristics, ADL limitations, and receiving or giving help with ADLs.

For apples-to-apples comparison across all four surveys, the study aimed to use the same—or close to the same—time period for each survey. This was done by using wave 6 to wave 9 of ELSA (2012–2018), wave 4 to wave 7 of SHARE (2011–2017), wave 11 to wave 14 of HRS (2012–2018), and wave 1 to wave 4 of CHARLS (2011–2018). To increase the statistical power of the analysis, especially for smaller countries in Europe, the eligible subjects were restricted to those ages 50 and over, [which](#) was the minimum age across all four surveys.

### Outcomes of interest

The first set of outcome variables are ADL/IADL limitations in relation to six basic ADLs and five IADLs. The six ADLs were dressing, walking across a room, bathing, eating, getting in and out of bed, and toileting. The five IADLs were preparing a hot meal, shopping for groceries, making phone calls, taking medications, and managing money (Jang, Ko, and Han 2021; Bousquet et al. 2020; Edwards et al. 2020). These limitations were assessed with yes/no

questions and used to calculate two measures of limitation status: "presence of ADL/IADL limitation" (binary) and "extent of ADL/IADL limitation" (sum of scores ranging from 0 to 11). (**Table 1**).

The second set of outcome variables are the receipt of assistance with ADL/IADL. The questions used in the surveys varied slightly across cohorts/waves but covered the same domains as the ADL/IADL questions. It should be noted that the questions in HRS, CHARLS and ELSA did not distinguish between formal and informal care, while the questions in SHARE did so and covered formal care only. We used a binary indicator (yes/no) for receipt of ADL/IADL assistance. Some of the questions we listed are:

- In HRS and CHARLS, help received for each ADL was assessed with a question such as: "Because of a health or memory problem, did anyone help you with dressing, including putting on shoes and socks in the last three months of your life?" with two possible responses: yes or no.
- In ELSA, help received for each ADL (except preparing a hot meal) was assessed with a question such as: "Have you received help from anyone with dressing, including putting on shoes and socks, in the last month?" (yes and no). Help with meals was assessed with the question: "Did your family, friend or neighbor bring you ready-prepared meals?" (yes or no).
- In SHARE, help received for ADLs was assessed with the question: "During the last twelve months, did you receive in your own home any professional or paid services listed on this card due to a physical, mental, emotional or memory problem?" (yes or no). Services listed included personal care (for example, getting in and out of bed, dressing, bathing, and showering), domestic tasks (for example, cleaning, ironing, and cooking), meals-on-wheels (that is, ready-made meals provided by a municipality or a private provider), and other activities (for example, filling a pill dispenser).

### Potential sociodemographic predictors

To shed light on factors that may influence disability and vulnerable older adults' receipt of help, we investigated the following sociodemographic variables: age (in years), sex (male



versus female), level or years of education, marital status (married, cohabiting, or in a civil partnership versus not), number of children, income quintile, and retirement status (fully retired or semi-retired versus not). Education in HRS and SHARE was measured in years, while in CHARLS and ELAS, responses were grouped into three categories based on the simplified International Standard Classification of Education 1997 (ISCED-97): (i) less than secondary, (ii) upper secondary and vocational training, and (iii) tertiary education (UNESCO 2021). Number of children in HRS, SHARE, and CHARLS was measured by the total number of children, while in ELSA it was measured by the number of children with whom the respondent has a close relationship. Retirement status was directly collected in HRS and CHARLS, while in SHARE and ELSA it was indirectly measured by whether the reported retirement age was below the respondent's age in the interview year.

Interview year and interview month are controlled, which may affect estimates of trends within countries.

### Statistical analysis

Survey weights were used to account for sampling design (including the unequal probability of selection, clustering, and stratification) and for study attrition. The weighted values were provided directly in the datasets. To estimate the unadjusted annual percent change of reporting disability or receipt of help, we conducted country-specific, weighted logistic regression with "interview year" as the key predictor. The unadjusted annual percent change was calculated as  $100 \times \ln(\text{odds ratio of "interview year"}) / \text{spanning years of data}$ . To estimate the unadjusted annual increase rate of extent of disability, we conducted country-specific, weighted Poisson regression with "interview year" as the key predictor. The unadjusted annual increase rate was calculated as  $100 \times \ln(\text{rate ratio of "interview year"}) / \text{spanning years of data}$ .

Analyses used R version 3.6.0. We report two-tailed P values and 95 percent confidence intervals (CIs) throughout.  $P < 0.05$  was considered statistically significant.

### Study limitations

Several limitations should be borne in mind when considering the results of this study. First, because the measures of disability and assistance used in the analysis were self-reported, there could be recall bias, which would affect the robustness of the estimates. Second, even though the survey questions related to our outcome of interest were comparable among the four longitudinal studies used in the analysis, slight connotational differences in the way they were worded may have induced variations in estimates. Third, since SHARE has low participation rates and a relatively small sample size in some countries, it may not be nationally representative for each country, which could create some potential for selection bias. However, the weights in SHARE may to some extent reduce such bias.

### Ethical approvals

The data were all publicly available. The use of public, secondary, de-identified data made the present study exempt from review by an institutional review board.

## Results

The longitudinal samples of the four waves across all countries include a total of 470,057 person waves. The sample size, mean age, and female distribution by country in each wave are presented in **Table 1**. Of the overall sample, Lithuania was the country with the highest proportion of women (64.1 percent) across the study period, on average, while China had the lowest share of women respondents (52.4 percent). The mean age of surveyed adults was highest in Sweden (69.7 years) and lowest in China (59.6 years).

On average, all the European Union (EU) countries had a lower prevalence of ADL/IADL limitation over the period—14.7 percent in 2011/2012 and 15.8 percent in 2017/2018—than China (25.8 percent and 30.5 percent), the US (25 percent and 26.7 percent), or the UK (20.3 percent and 21.4 percent) (**Table 1**).

**Table 1** shows that the average extent of ADL/IADL limitation in the EU was higher than in the UK or China but lower than in the US. The average extent of ADL/IADL limitation in the EU was recorded at 2.94 in 2011 and 3.19 in 2017, while it was 2.92 and 3.13 in the UK and 2.75 and 3.09 in China, and 3.22 and 3.43 in the US.

### Trends in the prevalence of ADL/IADL limitations

**Figure 1** depict country-specific trends in the prevalence of ADL/IADL limitation during the period 2011–2018, using the binary variable of having any ADL/IADL limitations.

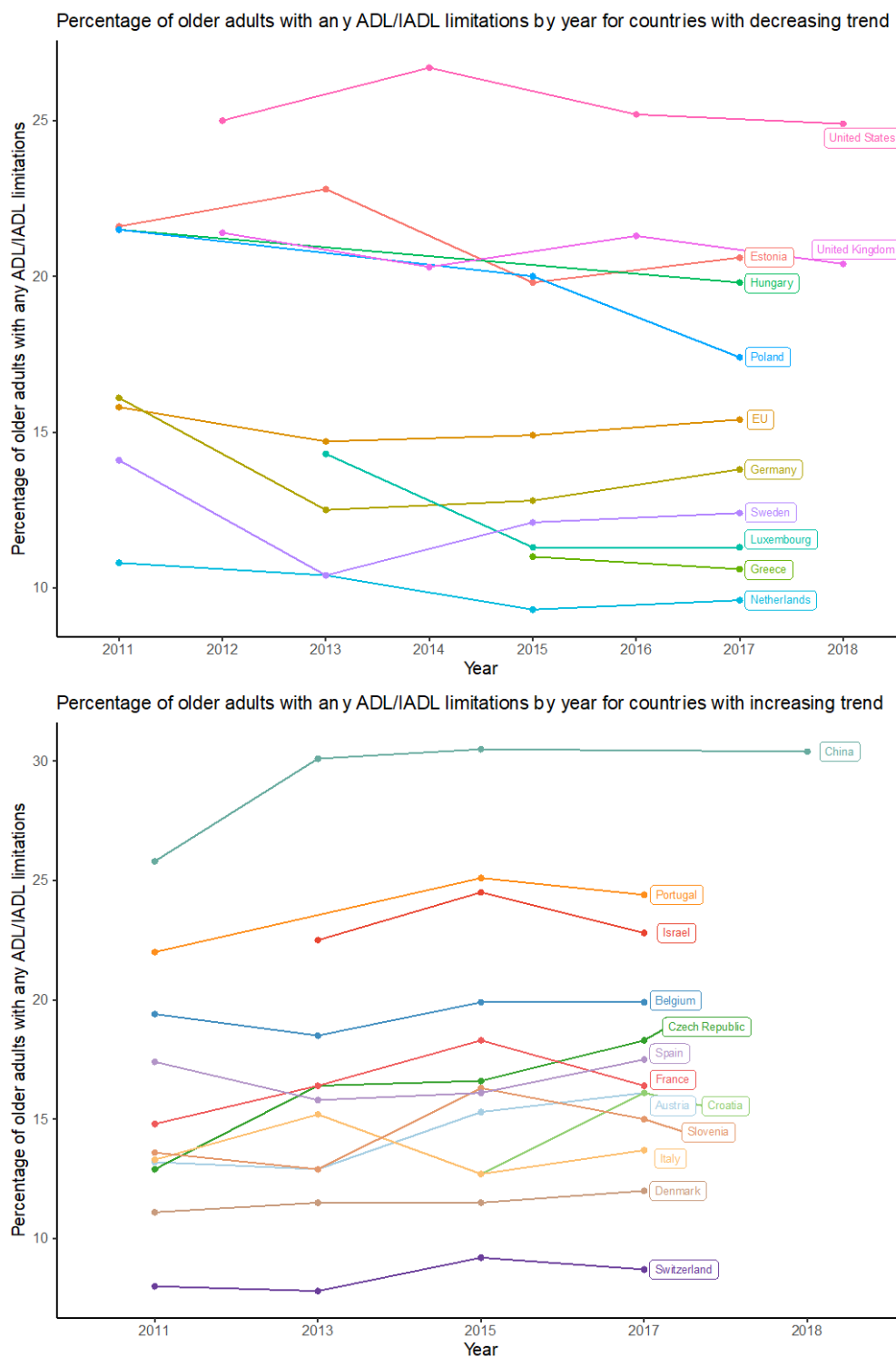
In-country trends in prevalence in ADL/IADL limitations were not consistent throughout the study period but instead experienced some fluctuations. By comparing the prevalence in ADL/IADL limitation in the first and last years of the study period, we found a generally decreasing trend in prevalence in ADL/IADL limitation in 10 countries: Estonia, Germany, Greece, Hungary, Luxembourg, the Netherlands, Poland, Sweden, the UK, and the US. Thirteen other countries (Austria, Belgium, China, Croatia, the Czech Republic, Denmark, France, Israel, Italy, Portugal, Slovenia, Spain, and Switzerland) showed an overall increase in ADL/IADL limitation prevalence (**Figure 1**). In addition, in some cases, there was heterogeneity in time trends between ADL and IADL limitations. For example, Greece experienced a decrease in ADL limitation prevalence but an increase in IADL limitation prevalence.

The results showed that China had the highest prevalence of ADL/IADL limitation in both the baseline year of the study (2011/2012) and the final year (2017/2018). Switzerland had the lowest ADL/IADL limitation during the study period.

There was substantial variation in the rankings of ADL/IADL limitation prevalence among countries over the years, with some countries changing their rankings. For example, Germany had a lower prevalence of ADL/IADL limitation than Luxembourg in 2013, but a higher prevalence in 2017.

The rankings of ADL and IADL limitation prevalence across 31 countries over the years did not show a strong correlation. China had the highest prevalence of IADL limitation, while the US and Portugal had the highest prevalence of ADL limitation. Except for China, Israel, and Hungary, most countries had a lower prevalence of IADL limitation than ADL limitation.

**Figure 1: Country-specific trends in the prevalence of ADL/IADL limitations 2011–2018**



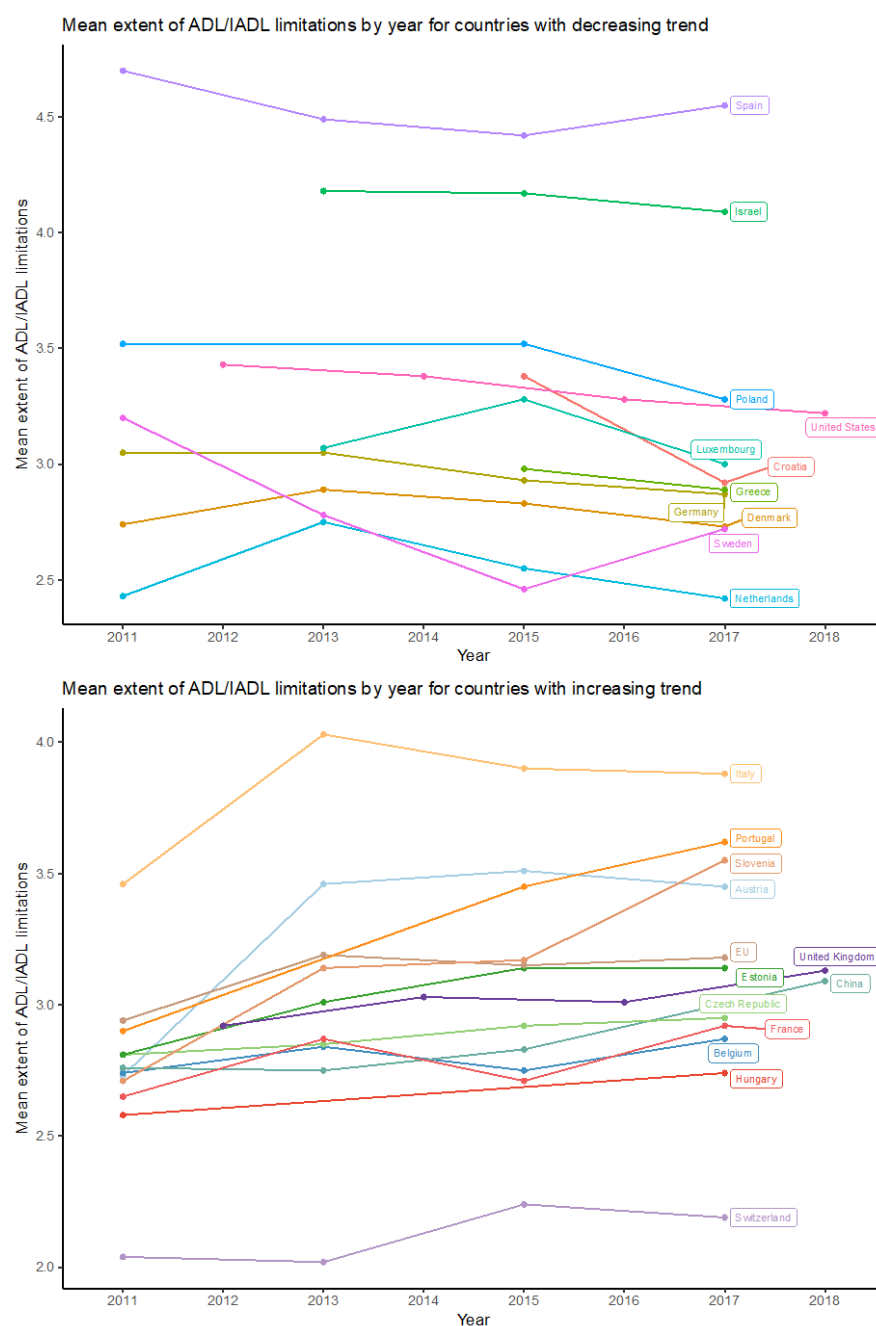
### Trends in the extent of ADL/IADL limitation

To get an accurate sense of older people's quality of life in order to better address their care needs, decision makers and policy/program implementers need to know not just whether

older adults have disabilities, but how severe they are. The analysis here sheds light on the issue of severity.

**Figure 2** depict country-specific trends in the average extent of ADL and IADL over the period 2011–2018. Switzerland recorded the lowest average extent of ADL/IADL limitation in both 2011/2012 (2.04) and 2017/2018 (2.19). On the other hand, Spain had the highest average extent of ADL/IADL limitation in both years (4.7 in 2011 and 4.55 in 2017).

**Figure 2: Country-specific trends in the mean extent of ADL/IADL limitations 2011–2018**

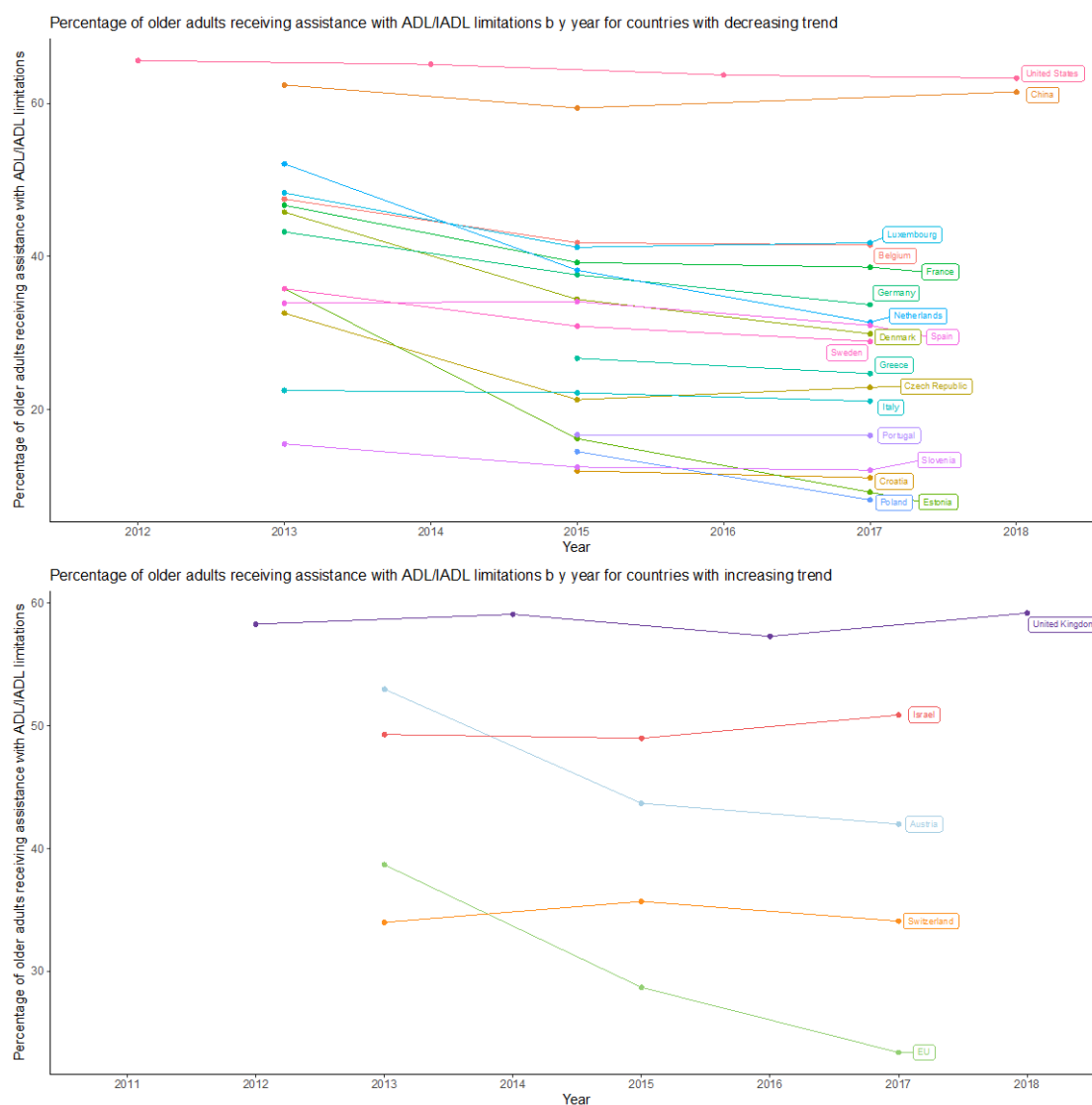


The study found that the trends in the extent of limitations in ADL and IADL were similarly inconsistent across the countries. The mean extent of ADL/IADL limitation underwent fluctuations and changes in every country. Seven countries—Germany, Greece, Luxembourg, the Netherlands, Poland, Sweden, and the US—showed a decrease in both the prevalence and mean extent of ADL/IADL limitation. On the other hand, nine countries—Austria, Belgium, China, the Czech Republic, France, Italy, Portugal, Slovenia, and Switzerland—recorded an overall increase in both the prevalence and mean extent of ADL/IADL limitation. In some countries, such as the UK, the prevalence of ADL/IADL limitation showed a decreasing trend but the mean extent of ADL/IADL limitation increased, indicating that older adults reported fewer disabilities but the disabilities they experienced were more severe.

#### Cross-country trends in receipt of help for ADL/IADL limitations

The trend in the proportion of older adults with ADL/IADL limitations who received help is analyzed in **Figure 3**. The majority of countries, except Israel, Switzerland, and the UK, showed a decrease in the percentage of older adults receiving assistance for ADL/IADL limitations during the study period. On average, the EU had a lower proportion of individuals with ADL/IADL limitations receiving assistance than China, the US, and the UK (as shown in **Table 1**). The percentage of individuals with ADL/IADL limitations receiving assistance in the EU was 23.4 percent in 2011/2012 and 38.7 percent in 2017/2018, while in China it was 59.4 percent and 62.4 percent, in the US 63.3 percent and 65.6 percent, and in the UK 57.3 percent and 59.2 percent.

**Figure 3: Percentage of older adults with ADL/IADL limitations receiving assistance**

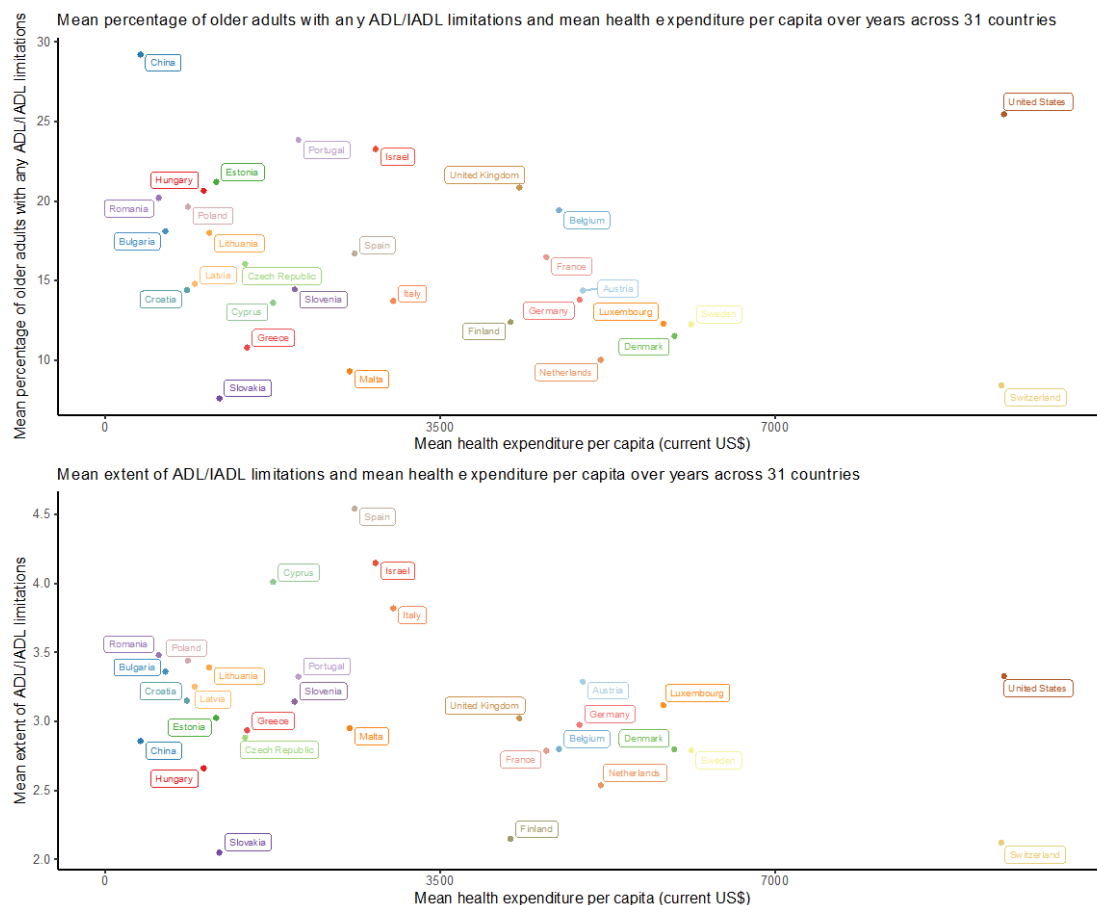


### Health expenditure and ADL/IADL limitation

The correlation between increased health expenditure per capita and reduced prevalence and severity of ADL/IADL limitations among older adults is not a straightforward relationship. Our study found that the disability profiles of older adults in countries with similar per capita health expenditure differ significantly. As shown in **Figure 4**, the mean prevalence and extent of ADL/IADL limitations among 19 countries with a mean health expenditure per capita below \$3,500 varied widely. China had the highest mean ADL/IADL limitation prevalence at 29.2 percent, while Spain had the highest mean extent of ADL/IADL limitation at 4.5. On the other hand, Slovakia had both the lowest mean prevalence and lowest extent at 7.6 percent and 2.0, respectively. These findings suggest that although

health expenditure per capita is a contributing factor, it is not the only factor that affects the prevalence and severity of ADL/IADL limitations among older adults.

**Figure 4: Mean prevalence and extent of ADL/IADL limitations in relation to mean health expenditure per capita**



Among the 10 countries with mean health expenditure per capita between \$3,500 and \$7,000, Belgium had the highest mean prevalence of ADL/IADL limitations at 19.4 percent, and Austria had the highest mean extent at 3.3. Conversely, the Netherlands had the lowest mean prevalence of ADL/IADL limitations at 10.0 percent, and Finland had the lowest mean extent at 2.2. These findings indicate that even within the same range of health expenditure per capita, there can be substantial differences in the prevalence and severity of ADL/IADL limitations among older adults.

Only two countries, Switzerland and the US, had a mean health expenditure per capita greater than \$7,000. Of the two, Switzerland had the lower mean prevalence (8.4 percent)



and extent (2.1) of ADL/IADL limitations, versus a mean prevalence of 25.5 percent and extent of 3.3 in the US.

To evaluate the association between health expenditure and ADL/IADL limitations across countries, the Spearman's rank correlation coefficient was calculated. The results showed a small negative correlation of -0.367 ( $p = 0.043$ ) between the mean prevalence of ADL/IADL limitations and mean health expenditure per capita, and a non-significant negative correlation of -0.289 ( $p = 0.12$ ) between the mean extent of ADL/IADL limitations and mean health expenditure per capita. These findings suggest a weak negative relationship between health expenditure per capita and both the prevalence and extent of ADL/IADL limitations among older adults.

#### Unadjusted annual percent change in ADL/IADL limitation and the receipt of assistance

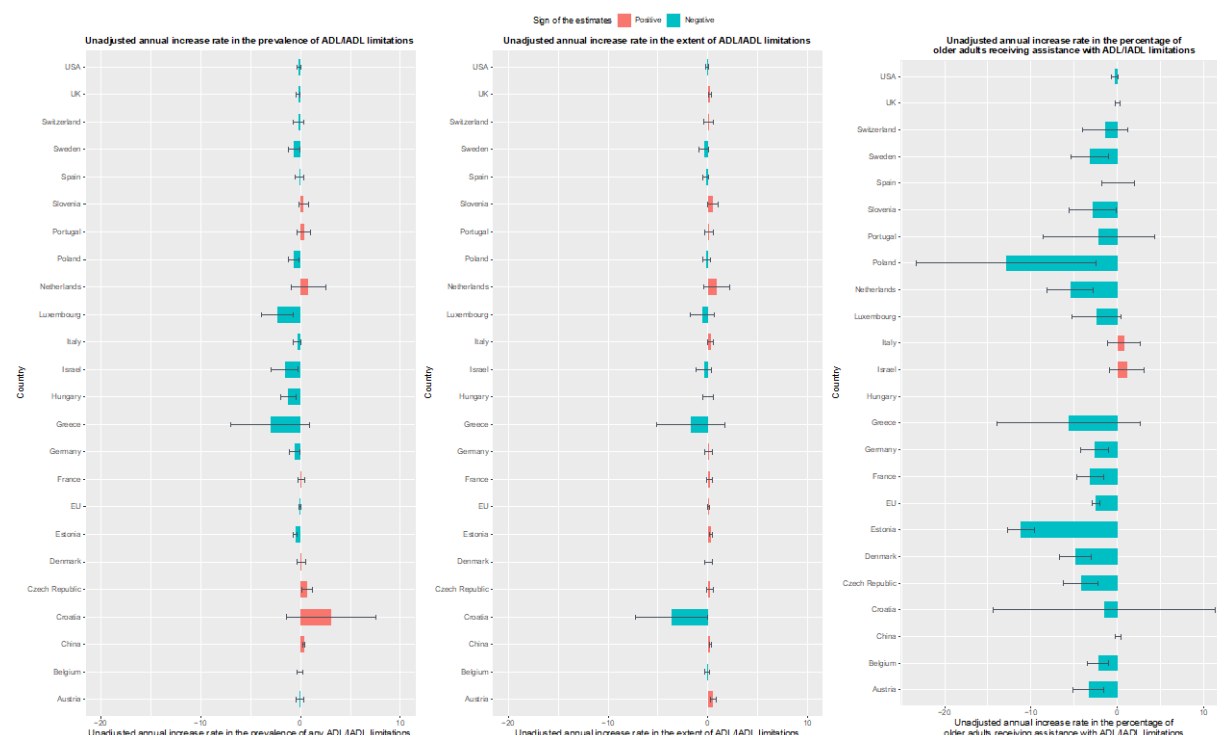
**Figure 5** present the unadjusted annual percent change (APC) in the prevalence, mean extent, and receipt of help with ADL/IADL limitations, by country. The results indicate that 15 countries experienced a decrease in the prevalence of ADL/IADL limitations, with eight experiencing an increase.

Among the countries that experienced a decline in the prevalence of ADL/IADL limitations, Luxembourg, Israel, Hungary, and Greece had particularly steep declines—with APCs of -2.32 (95% CI: -3.89 to -0.74), -1.58 (95% CI: -2.96 to -0.20), -1.24 (95% CI: -2.00 to -0.47), and -3.02 (95% CI: -6.95 to 0.91), respectively. On the other hand, Croatia had a significant increase in ADL/IADL limitation prevalence, with an APC of 3.09 (95% CI: -1.36 to 7.54).

The extent of ADL/IADL limitation showed varying trends across countries. In China, the UK, and 11 EU countries—Switzerland, Slovenia, Portugal, the Netherlands, Italy, Germany, France, Estonia, Denmark, the Czech Republic, and Austria—the extent of ADL/IADL limitation increased with positive APCs ranging from 0.03 (95% CI: -0.34 to 0.41) in Denmark to 0.89 (95% CI: -0.39 to 2.17) in the Netherlands. However, some EU countries, such as Greece and Croatia, showed a decreasing trend with negative APCs of -1.76 and -3.66, respectively. Other EU countries had APCs ranging from -0.02 (95% CI: -0.55 to 0.50) in

Hungary to -0.57 (95% CI: -1.78 to 0.64) in Luxembourg. The US also had a slight decrease, with a negative APC of -0.13 (95% CI: -0.27 to 0.02).

**Figure 5: Unadjusted APC in ADL/IADL limitations and receipt of assistance**



The majority of countries experienced a decrease in the number of older adults receiving such assistance, with the exception of Italy, Israel, China, Spain, and the UK. The APC in the receipt of assistance with ADL/IADL limitations was found to range from -10 to 0 for most countries, with negative APC values. A few countries, such as Poland and Estonia, experienced a substantial decline in the receipt of assistance, with APC values of -16.2 and -12.48, respectively.

Additionally, the study identified five countries (Estonia, the Netherlands, Poland, Portugal, and Slovenia) where the demand for assistance with ADL/IADL limitations among older adults was either stable or increasing, as indicated by positive or slightly negative APC in ADL/IADL limitation. However, the supply of such assistance is declining, as evidenced by high levels of negative APC in the receipt of assistance. This highlights a growing gap in these countries between the need for, and the provision of, assistance with daily life tasks

among older adults. The results suggest that current systems for delivering such help are inadequate and struggling to meet growing demand.

### Predictors of ADL/IADL limitation

A wide range of demographic, socioeconomic, epidemiologic, and policy factors may influence the prevalence and severity of disabilities in aging populations. This analysis uses regression techniques to probe these factors and examines their correlation with dependent variables in the observed countries. Regression results for ADL/IADL limitation outcomes by country are set out in **Supplementary Tables 3–8**. The main results are summarized below.

In all 31 countries except Cyprus, Finland, and France, older age was significantly associated with an increased risk of the incidence of ADL/IADL limitations over the study period. In 20 countries, older age was also significantly associated with an increased risk of more extensive ADL/IADL limitations.<sup>2</sup>

The study found that, in nearly half of the countries, having a partner and a higher income were associated with a reduced risk of the onset of ADL/IADL limitations. However, in some countries, the relationships between these factors and the severity of ADL/IADL limitations were inconsistent. For example, in the UK, individuals in the highest-income quintile had a lower average severity of ADL/IADL limitations, while in Cyprus, they had a higher average severity.<sup>3</sup>

Education was found to have a consistent and significant negative relationship with the incidence of ADL/IADL limitations in 20 countries. This indicates that a higher level of education is associated with a lower risk of disability in later life. In 10 countries, education was also found to have a significant negative relationship with the extent of ADL/IADL limitations, meaning that better-educated individuals experienced less severe disability in

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<sup>2</sup> Odds ratios (ORs) for the association of older age with increased prevalence of ADL/IADL limitation ranged between 1.03 [95 percent confidence interval (CI): 1.02 to 1.03] in the US and 1.11 [95% CI: 1.10 to 1.13] in Greece. For the association with extent of limitations, ORs were around 1.02.

<sup>3</sup> ORs for “with partner” ranged from 0.77 [95% CI: 0.67 to 0.90] in Greece to 1.12 [95% CI: 1.03 to 1.22] in France. ORs for comparing the highest-income quintile to the lowest ranged from 0.68 [95% CI: 0.62 to 0.73] in the UK to 2.01 [95 percent CI: 1.28 to 3.17] in Cyprus.

old age. However, in one country (Cyprus), the relationship between education and the extent of ADL/IADL limitations was positive, with an odds ratio of 1.06 (95% CI: 1.02 to 1.11). Overall, the results suggest that higher levels of education are associated with a reduced risk and severity of disability in old age.

In a limited number of countries, the incidence and extent of ADL/IADL limitations were also influenced by various other factors such as gender, number of children, and retirement status. The relationship between these factors and the incidence or extent of limitations was inconsistent, with both positive and negative associations observed across the countries.

### **Predictors of older adults receiving assistance with ADL/IADL limitations**

In several countries, gender, number of children, and retirement status were also found to influence the likelihood of receiving assistance for ADL/IADL limitation. However, these associations varied between countries and were not consistent. Education was positively associated with the receipt of assistance in most countries, but in Poland, Slovenia, and the US, better-educated individuals were less likely to receive help. The findings from this study emphasize the need to consider both demand-side and supply-side factors when addressing the needs of older adults with ADL/IADL limitations.

## **Discussion**

Overall, these findings have important implications for healthcare services and indicate the need to support and assist older adults with ADL/IADL limitations. The rising trend of ADL/IADL limitations in several countries highlights the need to begin paying more attention to the increasing future burden of later-life disabilities and the increasing demand for formal and informal care, and the need to make preparations to address impending developments.

The results also show that there is a decreasing trend in the share of disabled older adults receiving assistance. A recent study (Chen et al. 2022) has suggested that the provision of ADL assistance is positively associated with the level of national welfare support. However, the reason for the decreasing trend is not clear. The significant decline in assistance

received for ADL/IADL limitations, especially compared to the increasing ADL/IADL limitations trends in some countries, highlights the unmet need for ADL/IADL assistance among older adults.

In Greece and Croatia, the decrease in assistance received for ADL/IADL limitations may be linked to the success of programmatic interventions that have resulted in a high decline in the prevalence and extent of ADL/IADL limitations. However, in 12 other EU countries where the declines in ADL/IADL limitations were not significant—Poland, Estonia, Austria, Belgium, the Czech Republic, Denmark, France, Germany, Netherlands, Luxembourg, Slovenia, and Sweden—there are substantial unmet needs for disabled older people. These countries may benefit from expanding their social care services and creating a more integrated health and social care system. This would provide better care services and reduce unmet needs among older people with disabilities.

Many of this study's findings—such as that, in multiple countries, factors such as age, partner status, income, and education significantly impact the prevalence and extent of ADL/IADL limitations—are in line with prior research that suggests that socioeconomic status plays a significant role in the prevalence, extent, and receipt of assistance for disability among older adults (Liu and Wang 2022). The study also found that in Belgium, France, Israel, Italy, the Netherlands, the UK, and the US, older seniors and women were more likely to receive help with ADL/IADL limitations. These patterns suggest that these countries may improve outcomes for older adults with disabilities by targeting support to particularly vulnerable groups, including comparatively younger seniors and men. Improving the availability and uptake of both informal care and formal services among these vulnerable groups may help to reduce the unmet needs of older adults.

Demographic and socioeconomic factors, such as age, partner status, income, and education, are significant predictors of ADL/IADL limitations and the receipt of help. However, the association between these factors and the receipt of assistance tends to be country-specific. For example, in China, older adults without partners are less likely to receive assistance with ADL/IADL limitations, but this association was not statistically significant in several EU countries—Bulgaria, Croatia, the Czech Republic, Poland, Slovakia,

and Slovenia. This may be due to differences between the care provision models employed in China and those in these EU countries. In China, spouses are the most common caregiver for disabled older adults who need care. By contrast, in Europe, there are typically various forms of long-term care facilities, along with a greater provision of public services and formal care, which likely weakens the role of partners in predicting the probability of receiving care with ADL/IADL limitation (Sole-Auro and Crimmins 2014; Li and Dai 2019).

Some of the country-to-country variations in unmet needs may be attributable to differences in the number and type of services and welfare models used. The availability and quality of long-term care services also vary greatly between countries and can have a significant impact not only on the prevalence of ADL/IADL limitations but also on the receipt of care—and hence the unmet needs—among those with limitations. It is important to consider the interplay between health and social care services in addressing unmet care needs among disabled older people (Arnaert, Van Den Heuvel, and Windey 2005; Anderson and Knickman 2001; Bien et al. 2013). In the United States in recent decades, many social and economic inequalities have widened sharply, while publicly funded health care and social welfare programs remain more limited there than in other high-income countries (Banks et al. 2006; Case and Deaton 2020; Schneider et al. 2021). Cultural norms and beliefs surrounding aging and caregiving also play a role in explaining cross-country variations in ADL/IADL limitations and the availability of care for older adults. The study points to the need for further research to better understand the factors driving these cross-country differences and to develop targeted, evidence-based interventions to address the growing burden of ADL/IADL limitations and care needs for older adults.

Overall, these findings underscore the significant gap that exists in many country settings between the current demand by older adults with ADL/IADL limitations for support, and the insufficient availability of care for these adults. Yet the results also point to opportunities for cross-country learning in order to develop policy actions that could improve outcomes. The observed country-to-country variations, together with the contributing demographic and socioeconomic factors identified in each country, could help guide countries where older adults are experiencing a high prevalence and/or extent of ADL/IADL limitation, together with a high level of unmet need for disability support, to launch or expand interventions

targeted toward high-risk older adults. Opportunities and best practices exist for countries to learn from comparable peer nations that have faced similar challenges and successfully improved their care results for older citizens with disabilities.

## Conclusions

The study evaluated the prevalence and extent of ADL/IADL limitations among older adults in 31 countries, and the supply of care to them, from 2011 to 2018. The factors associated with ADL/IADL limitation, and the receipt of help varied by country, but age, significant-other status, income level, and education background were consistently significant. The study found substantial cross-country variations in both the prevalence and the extent of ADL/IADL limitations, together with varying trends over time. These variations reflected a wide range of country-to-country differences—in socioeconomic conditions, level of socioeconomic equality, health behaviors, chronic disease prevalence, the strength of public safety nets, per capita health expenditure, the level of integration of their health and social care systems, differences in their welfare models and level of national welfare support, the availability and quality of long-term care services, and differences in caregiving practices and the cultural assumptions that surround them.

Although there was country-specific heterogeneity in levels, time trends, and the prevalence of ADL/IADL limitations and the extent of these limitations, most countries showed a decreasing trend in the share of disabled older adults receiving assistance. This indicates a significant and possibly growing gap of unmet needs for ADL/IADL assistance among older people, which in turn suggests that, in many countries, the current systems for delivering such assistance are struggling to meet the growing demand. The study highlights the need to (i) take account of both demand-side and supply-side factors—as well as both informal care and formal services—when addressing the needs of older adults with ADL/IADL limitations, and (ii) target evidence-based support especially to the most vulnerable groups, including younger seniors and single men. But significantly, it also points to opportunities for governments and health systems to learn from comparable peer countries, and to adopt best practices from those that have successfully improved health and caregiving outcomes for older adults with disabilities.

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**Table 1a: Descriptive analysis**

Country	Year	N	Age Mean(SE)	Female %
Austria	2011	5,134	65.14(10.23)	58.1
Austria	2013	4,279	66.68(10.02)	57.6
Austria	2015	3,323	68.73(9.77)	58.4
Austria	2017	3,176	70.25(9.47)	59.2
Belgium	2011	5,322	64.45(10.98)	55.4
Belgium	2013	5,635	65.33(10.88)	55.4
Belgium	2015	5,814	65.78(11.01)	55.8
Belgium	2017	4,900	67.54(10.44)	55.7
Bulgaria	2017	1,998	65.9(10.01)	58.2
China	2011	17,708	58.5(10.17)	52.1
China	2013	18,612	59.41(10.29)	52.3
China	2015	21,097	59.09(10.75)	52.3
China	2018	19,816	61.44(10.41)	52.9
Croatia	2015	2,495	64.71(9.61)	56.0
Croatia	2017	2,408	65.88(9.27)	55.8
Cyprus	2017	1,233	68.58(10.88)	59.9
Czech Republic	2011	5,523	64.89(9.75)	58.5
Czech Republic	2013	5,635	66.2(9.43)	58.9
Czech Republic	2015	4,851	67.66(9.09)	59.8
Czech Republic	2017	4,212	69.65(8.76)	60.1
Denmark	2011	2,287	64.15(10.88)	54.5
Denmark	2013	4,146	64.67(10.39)	54.1
Denmark	2015	3,733	65.05(10.32)	54.0
Denmark	2017	3,246	66.48(9.83)	54.4
Estonia	2011	6,863	65.84(10.28)	59.7
Estonia	2013	5,751	67.69(9.94)	60.4
Estonia	2015	5,638	67.64(10.71)	60.8
Estonia	2017	5,115	69.13(10.37)	61.4
Finland	2017	2,007	65.62(9.86)	54.1
France	2011	5,850	65.22(11.23)	57.3
France	2013	4,505	66.98(10.68)	57.4
France	2015	3,947	67.29(11.08)	57.4
France	2017	3,331	68.84(10.5)	58.3
Germany	2011	1,619	67.75(8.91)	53.3
Germany	2013	5,750	64(10.33)	53.2
Germany	2015	4,411	65.81(9.89)	52.9
Germany	2017	3,820	67.37(9.47)	53.2
Greece	2015	4,924	66.5(10.56)	56.9
Greece	2017	3,070	69.14(9.58)	57.8
Hungary	2011	3,072	64.17(9.81)	57.1
Hungary	2017	1,538	68.58(8.24)	60.5
Israel	2013	2,599	67.36(10.42)	56.3

Israel	2015	2,035	69.64(10.15)	57.8
Israel	2017	2,131	70.26(9.65)	57.5
Italy	2011	3,568	66.19(9.86)	55.2
Italy	2013	4,739	66.4(10.22)	55.1
Italy	2015	5,305	66.56(10.2)	54.9
Italy	2017	4,568	68.4(9.88)	55.1
Latvia	2017	1,734	66.28(10.85)	13.6
Lithuania	2017	2,035	65.77(10.83)	64.1
Luxembourg	2013	1,607	64.34(9.96)	53.1
Luxembourg	2015	1,563	64.55(9.66)	54.7
Luxembourg	2017	1,250	66.16(9.22)	54.2
Malta	2017	1,261	66.46(9.29)	56.2
Netherlands	2011	2,788	65.32(9.79)	55.9
Netherlands	2013	4,165	65.7(9.87)	55.4
Netherlands	2015	4,575	65.66(8.89)	52.2
Netherlands	2017	4,090	66.95(8.28)	51.9
Poland	2011	1,733	66.63(9.27)	56.4
Poland	2015	1,826	66.01(10.02)	56.6
Poland	2017	4,703	65.49(10.05)	55.5
Portugal	2011	2,013	64.28(10.02)	57.2
Portugal	2015	1,674	67.04(9.15)	55.1
Portugal	2017	1,282	69.69(8.75)	55.9
Romania	2017	2,114	64.89(9.77)	57.5
Slovakia	2017	2,077	61.43(8.55)	54.2
Slovenia	2011	2,748	64.96(10.22)	56.6
Slovenia	2013	2,958	66.19(10.2)	57.1
Slovenia	2015	4,223	67.04(9.82)	57.1
Slovenia	2017	3,691	68.71(9.46)	58.1
Spain	2011	3,727	67.3(11.19)	55.3
Spain	2013	6,693	67.75(11.24)	54.3
Spain	2015	5,615	69.52(10.83)	55.4
Spain	2017	4,704	70.93(10.51)	56.0
Sweden	2011	1,969	69.46(9.21)	54.3
Sweden	2013	4,555	68(9.54)	53.5
Sweden	2015	3,905	69.78(9.38)	54.3
Sweden	2017	3,196	71.55(9)	54.0
Switzerland	2011	3,784	64.5(10.51)	55.2
Switzerland	2013	3,048	66.03(10.04)	55.2
Switzerland	2015	2,803	67.91(9.85)	55.1
Switzerland	2017	2,402	69.53(9.58)	54.8
EU	2011	58,000	65.45(10.38)	56.7
EU	2013	63,466	66.27(10.33)	55.9
EU	2015	70,625	66.99(10.22)	56.1
EU	2017	79,161	67.89(9.94)	56.8
UK	2012	10,601	66.48(10.2)	55.2
UK	2014	9,666	67.3(10.15)	55.5
UK	2016	8,445	68.85(9.58)	55.6
UK	2018	8,736	67.82(10.68)	55.9



USA	2012	20,554	66.85(11.59)	58.5
USA	2014	18,747	67.9(11.26)	58.9
USA	2016	20,912	65.7(11.79)	58.6
USA	2018	17,146	67(11.4)	59.0

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**Table 1b: Descriptive analysis of difficulties with ADL and IADL and assistance received**

Country	Year	ADL limitation		IADL Limitation		Report any I/ADLs limitations		
		Prevalence (%)	Extent of ADL limitations Mean (SE)	Prevalence (%)	Extent of IADL limitations Mean (SE)	Prevalence (%)	Extent of I/ADL Limitation Mean (SE)	Assistance received (%)
Austria	2011	10	2.07(1.51)	8.1	1.9(1.23)	13.2	2.73(2.5)	NA
Austria	2013	10.2	2.33(1.65)	8.9	2.34(1.46)	12.9	3.46(3)	53
Austria	2015	11.3	2.46(1.77)	11.1	2.34(1.46)	15.3	3.51(3.16)	43.7
Austria	2017	12.1	2.39(1.79)	11.3	2.34(1.46)	16.1	3.45(3.09)	42
Belgium	2011	15.7	1.95(1.42)	11.2	2.01(1.34)	19.4	2.74(2.51)	NA
Belgium	2013	15.4	1.99(1.43)	10.7	2.05(1.31)	18.5	2.84(2.55)	47.5
Belgium	2015	15.8	1.97(1.42)	11.6	2.02(1.29)	19.9	2.75(2.47)	41.8
Belgium	2017	15.5	2.07(1.52)	12.1	2.05(1.3)	19.9	2.87(2.59)	41.5
Bulgaria	2017	13.8	2.47(1.71)	12.8	2.1(1.35)	18.1	3.36(2.89)	12.7
China	2011	15.7	2.12(1.4)	19.9	1.9(1.06)	25.8	2.76(2.26)	NA
China	2013	17.8	2.11(1.47)	23.4	1.93(1.22)	30.1	2.75(2.42)	62.4
China	2015	19.6	2.15(1.49)	22.8	1.94(1.23)	30.5	2.83(2.47)	59.4
China	2018	19.7	2.28(1.58)	23.8	2.06(1.31)	30.4	3.09(2.64)	61.5
Croatia	2015	10.2	2.34(1.7)	7.8	2.44(1.42)	12.7	3.38(2.96)	12
Croatia	2017	12.3	2.1(1.51)	9.4	2.24(1.38)	16.1	2.92(2.63)	11.1
Cyprus	2017	8.3	2.97(1.91)	12	2.5(1.58)	13.6	4.01(3.48)	54.2
Czech Republic	2011	9.7	2.06(1.42)	8	2.03(1.36)	12.9	2.81(2.46)	NA
Czech Republic	2013	13	2.09(1.46)	9.4	2.09(1.35)	16.4	2.85(2.53)	32.6
Czech Republic	2015	13.6	2.14(1.44)	9.3	2.09(1.35)	16.6	2.92(2.54)	21.3
Czech Republic	2017	14.6	2.1(1.56)	10.8	2.17(1.38)	18.3	2.95(2.72)	22.9
Denmark	2011	7.7	1.91(1.43)	7.4	2.1(1.34)	11.1	2.74(2.41)	NA
Denmark	2013	8.6	2.03(1.44)	7.2	2.18(1.38)	11.5	2.89(2.59)	45.8
Denmark	2015	8.2	2.11(1.51)	7.5	2.05(1.36)	11.5	2.83(2.57)	34.4
Denmark	2017	8.4	2.1(1.61)	7.6	1.97(1.3)	12	2.73(2.62)	29.9
Estonia	2011	16.7	2.1(1.44)	13	1.97(1.2)	21.6	2.81(2.4)	NA
Estonia	2013	17.5	2.21(1.46)	14.6	2.06(1.28)	22.8	3.01(2.52)	35.8
Estonia	2015	15	2.24(1.53)	13	2.19(1.32)	19.8	3.14(2.63)	16.2
Estonia	2017	15.4	2.25(1.48)	14	2.13(1.3)	20.6	3.14(2.55)	9.2
Finland	2017	9.6	1.7(1.11)	5.7	1.82(1.18)	12.4	2.15(1.94)	21
France	2011	11.7	1.94(1.43)	8.5	1.97(1.36)	14.8	2.65(2.49)	NA
France	2013	13	2.01(1.49)	10.1	2.09(1.42)	16.4	2.87(2.66)	46.7
France	2015	14.5	1.95(1.47)	10.7	1.99(1.38)	18.3	2.71(2.62)	39.2
France	2017	12.5	2.1(1.61)	10	2.17(1.48)	16.4	2.92(2.82)	38.6
Germany	2011	13.8	2.26(1.63)	8.9	2.01(1.32)	16.1	3.05(2.79)	NA
Germany	2013	10.3	2.18(1.5)	7	2.19(1.38)	12.5	3.05(2.67)	43.2
Germany	2015	10.7	2.11(1.5)	7.1	2.07(1.37)	12.8	2.93(2.6)	37.6
Germany	2017	11.7	2.04(1.47)	7.5	2.09(1.38)	13.8	2.87(2.6)	33.7

Greece	2015	7.8	2.25(1.65)	7.8	1.97(1.35)	11	2.98(2.75)	26.7
Greece	2017	6.6	2.36(1.67)	8	1.86(1.29)	10.6	2.89(2.79)	24.7
Hungary	2011	13	2.08(1.37)	16.2	1.77(1.14)	21.5	2.58(2.2)	NA
Hungary	2017	11.1	2.39(1.71)	16.6	1.67(1.11)	19.8	2.74(2.5)	21.3
Israel	2013	13.6	3.26(1.89)	20	2.47(1.44)	22.5	4.18(3.34)	49.3
Israel	2015	15.8	3.16(1.91)	21.6	2.41(1.38)	24.5	4.17(3.29)	49
Israel	2017	12.7	3.28(1.93)	21.3	2.43(1.36)	22.8	4.09(3.29)	50.9
Italy	2011	10.8	2.33(1.69)	9	2.31(1.53)	13.3	3.46(3.06)	NA
Italy	2013	12.9	2.66(1.93)	9.8	2.76(1.63)	15.2	4.03(3.56)	22.5
Italy	2015	10.4	2.61(1.81)	8.5	2.61(1.63)	12.7	3.9(3.37)	22.2
Italy	2017	10.1	2.73(1.88)	10.1	2.56(1.58)	13.7	3.88(3.38)	21.1
Latvia	2017	11.4	2.64(1.74)	9.8	1.85(1.2)	14.8	3.25(2.72)	17.9
Lithuania	2017	15	2.46(1.67)	11.2	2.16(1.3)	18	3.39(2.89)	7.7
Luxembourg	2013	11.7	2.11(1.48)	8.6	2.24(1.42)	14.3	3.07(2.7)	48.3
Luxembourg	2015	9.4	2.24(1.65)	7.1	2.25(1.46)	11.3	3.28(2.99)	41.2
Luxembourg	2017	8.2	2.25(1.62)	7.3	2.1(1.37)	11.3	3(2.82)	41.8
Malta	2017	6.5	2.24(1.86)	6.2	2.06(1.41)	9.3	2.95(2.99)	14.5
Netherlands	2011	7.2	1.87(1.28)	7.2	1.75(1.1)	10.8	2.43(2.14)	NA
Netherlands	2013	7.5	2.02(1.54)	6.7	2.01(1.34)	10.4	2.75(2.6)	52.1
Netherlands	2015	6.6	2.06(1.4)	6	1.67(1.07)	9.3	2.55(2.19)	38.2
Netherlands	2017	6.3	2.09(1.56)	6.1	1.65(1.1)	9.6	2.42(2.28)	31.4
Poland	2011	17.7	2.52(1.71)	13.6	2.27(1.48)	21.5	3.52(3.05)	NA
Poland	2015	15.6	2.45(1.74)	13.4	2.41(1.55)	20	3.52(3.15)	14.5
Poland	2017	13.5	2.34(1.65)	11.2	2.25(1.51)	17.4	3.28(2.95)	8.2
Portugal	2011	16.8	2.36(1.64)	12.4	1.94(1.41)	22	2.9(2.78)	NA
Portugal	2015	20.8	2.5(1.74)	13.7	2.53(1.47)	25.1	3.45(3.03)	16.7
Portugal	2017	21.1	2.58(1.77)	13	2.6(1.59)	24.4	3.62(3.12)	16.6
Romania	2017	17	2.49(1.72)	12.3	2.28(1.49)	20.2	3.48(3)	3.5
Slovakia	2017	4.7	1.72(1.16)	4.9	1.5(0.9)	7.6	2.05(1.68)	14
Slovenia	2011	10.2	2.09(1.41)	7.6	2.07(1.23)	13.6	2.71(2.37)	NA
Slovenia	2013	9.4	2.3(1.61)	8	2.34(1.4)	12.9	3.14(2.78)	15.5
Slovenia	2015	12.6	2.28(1.59)	9.9	2.33(1.42)	16.3	3.17(2.81)	12.5
Slovenia	2017	10.8	2.45(1.81)	10.2	2.64(1.54)	15	3.55(3.14)	12.1
Spain	2011	14.7	3.06(1.91)	12.3	2.99(1.66)	17.4	4.7(3.62)	NA
Spain	2013	12.6	2.95(1.92)	11.6	2.92(1.63)	15.8	4.49(3.58)	33.9
Spain	2015	12.9	2.84(1.87)	11.9	2.92(1.6)	16.1	4.42(3.47)	34.1
Spain	2017	13.8	2.95(1.88)	13.5	2.88(1.58)	17.5	4.55(3.51)	31
Sweden	2011	11.5	2.12(1.75)	7.9	2.62(1.65)	14.1	3.2(3.2)	NA
Sweden	2013	8.1	2.04(1.55)	5.8	2.14(1.45)	10.4	2.78(2.69)	35.8
Sweden	2015	9.5	1.78(1.37)	6.5	1.99(1.28)	12.1	2.46(2.36)	30.9
Sweden	2017	9.6	2.05(1.52)	6.9	2.02(1.39)	12.4	2.72(2.57)	28.9
Switzerland	2011	6.1	1.53(1.09)	4.1	1.69(1.11)	8	2.04(1.92)	NA
Switzerland	2013	5.8	1.62(1.21)	4	1.6(0.94)	7.8	2.02(1.89)	34
Switzerland	2015	7	1.73(1.21)	4.9	1.75(1.15)	9.2	2.24(2.05)	35.7
Switzerland	2017	6.6	1.7(1.22)	4.3	1.79(1.17)	8.7	2.19(2.08)	34.1
EU	2011	12.1	2.15(1.55)	9.7	2.08(1.38)	15.8	2.94(2.68)	NA
EU	2013	11.6	2.25(1.62)	9.1	2.28(1.45)	14.7	3.19(2.88)	38.7
EU	2015	11.7	2.24(1.61)	9.4	2.24(1.44)	14.9	3.15(2.84)	28.7

EU	2017	11.6	2.31(1.66)	10	2.21(1.43)	15.4	3.18(2.88)	23.4
UK	2012	18	2.14(1.47)	12.1	2(1.34)	21.4	2.92(2.52)	58.3
UK	2014	17.3	2.19(1.48)	11.6	2.04(1.34)	20.3	3.03(2.54)	59.1
UK	2016	17.8	2.18(1.51)	12.4	2.05(1.32)	21.3	3.01(2.56)	57.3
UK	2018	17.2	2.24(1.53)	12	2.11(1.36)	20.4	3.13(2.64)	59.2
USA	2012	19.2	2.47(1.67)	17.2	2.22(1.42)	25	3.43(2.9)	65.6
USA	2014	20.5	2.46(1.65)	18.3	2.18(1.41)	26.7	3.38(2.86)	65.1
USA	2016	19.1	2.43(1.61)	17.3	2.09(1.35)	25.2	3.28(2.78)	63.7
USA	2018	19	2.4(1.6)	16.8	2.05(1.32)	24.9	3.22(2.68)	63.3