NET WORK LISER

Discussion Paper Series

IZA DP No. 19020

October 2026

Who Cares at the End of Life? Unmet Care Needs across 32 Countries

Chengxu Long
Huazhong University of Science and Technology

Zhuoer Lin
Emory University and IZA@LISER

Hazal Swearinger
Çankırı Karatekin University

Jennifer Ailshire
University of Southern California

Yuting Qian
Yale University

Wai-Kit Ming
City University of Hong Kong

Huitong Zhao
China Population and Development Research Center

Xiaohui Hou
The World Bank

Bei Wu
New York University Shanghai

Wei Yang
King's College London

Xi Chen
Yale University, IZA@LISER and NBER

Shanquan Chen
University of Hong Kong and Stellenbosch University

The IZA Discussion Paper Series (ISSN: 2365-9793) ("Series") is the primary platform for disseminating research produced within the framework of the IZA@LISER Network, an unincorporated international network of labour economists coordinated by the Luxembourg Institute of Socio-Economic Research (LISER). The Series is operated by LISER, a Luxembourg public establishment (établissement public) registered with the Luxembourg Business Registers under number J57, with its registered office at 11, Porte des Sciences, 4366 Esch-sur-Alzette, Grand Duchy of Luxembourg.

Any opinions expressed in this Series are solely those of the author(s). LISER accepts no responsibility or liability for the content of the contributions published herein. LISER adheres to the European Code of Conduct for Research Integrity. Contributions published in this Series present preliminary work intended to foster academic debate. They may be revised, are not definitive, and should be cited accordingly. Copyright remains with the author(s) unless otherwise indicated.

IZA DP No. 19020 October 2026

Who Cares at the End of Life? Unmet Care Needs across 32 Countries

Abstract

Despite the growing global demand for end-of-life care resulting from rapid social transformations, significant gaps exist in cross-national research examining unmet end-of-life care needs. Using harmonized end-of-life survey data (2010–2021) from the United States, 28 European countries, South Korea, China, and Mexico, here we show that the United States, Europe, and South Korea exhibited higher overall unmet end-of-life care needs than China and Mexico, where limited formal care provision was compensated with high levels of informal care. Death at institutions was associated with lower overall unmet end-of-life care needs in the United States and South Korea, with Mexico presenting an exception. Similarly, urban areas in Europe and South Korea exhibited lower unmet formal end-of-life care needs compared to rural areas. Among married individuals, only Mexico exhibited significantly lower unmet overall end-of-life care needs compared to unmarried individuals. Having children was consistently linked to lower unmet informal end-of-life care needs across the United States, Europe, and South Korea. Our findings highlight the complex interplay between care systems and family demographic structures in shaping end-of-life care access, and underscore the need for tailored policy approaches that strengthen both formal and informal care systems while addressing sociodemographic disparities in care access.

JEL classification

I14, I18, J14, D13, O57

Keywords

end-of-life care, unmet care needs, informal care, long-term care insurance, cross-national comparison

Corresponding author

Xi Chen
xi.chen@yale.edu

1. Introduction

End-of-life care (EOLC) represents a distinct and intensified phase of support during the final months of life, when the emphasis shifts from life-prolonging treatment to comfort, dignity, and holistic support for both patients and families.[1] Although EOLC is often reported under the umbrella of palliative care in global health statistics,[2] such aggregation can mask the specific challenges faced during the terminal stage. A focus on activity limitations, particularly difficulties with activities of daily living (ADLs) and instrumental activities of daily living (IADLs),[1] is therefore essential, as these limitations directly reflect daily care needs and highlight tangible service gaps that broader palliative metrics may fail to capture. By isolating ADL/IADL-related care at the end of life, this study addresses a critical dimension of care provision that remains underexamined despite its immediate relevance to quality of life.

Global demographic and social transformations are rapidly reshaping the landscape of EOLC. These include population aging, declining fertility, rising childlessness, increased urbanization, and weakening traditional family structures.[3,4] As more older adults age in place and spend their final stage of life at home, the demand for home-based ADL/IADL assistance is intensifying.[5] Evidence consistently shows that initiating EOLC earlier can reduce unnecessary hospitalizations and healthcare utilization,[6] while appropriate provision of EOLC improves quality of life for both older adults and their families.[3] However, substantial unmet needs for formal ADL/IADL assistance at the end of life have been identified in multiple countries, accompanied by persistent socioeconomic and structural disparities.[3,7] Moreover, wide variations in the robustness of public safety nets, family support norms, and long-term care system design contribute to pronounced global inequalities in EOLC access.[8]

Despite the critical importance of EOLC in a rapidly aging world, cross-national evidence on unmet EOLC needs and disparities remains notably limited. World Health Organization (WHO) cross-regional analyses document substantial variation in unmet long-term care needs (e.g., ~56% among adults aged ≥65 in Europe versus 2.8%–64.5% in Western Pacific Regions);[9] however, these analyses primarily address general health and long-term care rather than care at the end of life.[9,10] To date, only three studies have directly compared ADL/IADL-related care at the end of life across countries.[1,3,7] One compared unmet EOLC needs in the United States and the United Kingdom;[1] another examined the association between family caregiving and place of death in the United States and Europe;[3] and a third focused on wealth-related inequalities in care use across several nations.[7] While these studies have advanced understanding, they do not sufficiently capture how EOLC patterns vary across countries with different long-term care systems, demographic trends, or cultural caregiving norms. Nor do they fully account for emerging global shifts—such as rising childlessness, changes in household composition, migration, or the expansion of long-term care insurance (LTCI)—that influence informal and formal care availability.[3,4,11]

These knowledge gaps are particularly concerning given the increasing policy focus on developing sustainable long-term care models worldwide. WHO has identified long-term care for older people as a global health priority within universal health coverage frameworks, underscoring the urgent need for accessible systems to ensure adequate end-of-life care support.[12] Factors such as place of death, urban versus rural residence, marital status, presence of children, socioeconomic position, and LTCI coverage have been shown to influence EOLC receipt,[3,5,11] yet comprehensive cross-national comparisons across these dimensions are lacking. For example, death in institutions is associated with greater access to EOLC in many countries,[5,13] while spouses and children remain primary informal caregivers.[3] Whether these patterns hold across diverse social and policy contexts remains unclear. As family caregiving capacity declines and formal systems evolve unevenly across countries, understanding the interplay between these sociodemographic factors and care patterns is essential for building equitable and resilient EOLC systems.

To address these gaps, this study draws on harmonized data from five aging surveys, covering the United States, 28 European nations, South Korea, Mexico, and China, to examine unmet ADL/IADL-related EOLC among older adults. We focus on individuals aged ≥65 years who experienced at least one ADL or IADL limitation during their final year of life. We address two key research questions: (1) To what extent do older adults across different countries receive no assistance for their ADL/IADL limitations during the final months of life? (2) How do unmet EOLC patterns vary by place of death, urban/rural residence, marital status, childlessness, income, and LTCI coverage? Based on existing literature,[7,14] we hypothesize that formal care will be more prevalent in the United States, Europe, and South Korea, whereas informal family care will remain dominant in China and Mexico. We further anticipate that death in institutions, urban residence, marital partnership, having children, higher income, and LTCI coverage will be associated with reduced unmet EOLC needs. Given ongoing demographic shifts, such as population aging, rising childlessness, and rapid urbanization,[8,15] our findings provide timely, actionable insights for strengthening long-term care policies and designing more inclusive and resilient EOLC systems worldwide.

2. Results

2.1 Descriptive analysis

In total, 21,423 participants from 32 countries, who died between 2010 and 2021 and reported at least one ADL or IADL limitation at the end of life, were included in the study sample. Table 1 shows demographic characteristics by country/region. The average age of participants was 82.6 years, and 52.5% were female. In addition, 52.4% were neither married nor cohabiting with a partner, and 7.9% had no children. Overall, 63.7% died in nursing homes, hospices, or hospitals, and 38.6% resided in rural areas before death.

2.2 Overall patterns of unmet end-of-life care

Figure 1 demonstrates pronounced disparities in EOLC patterns across countries. The analysis indicates that the United States, Europe, and South Korea exhibit higher total rates of unmet care compared to Mexico and China (Figure 1A)—a finding primarily attributable to stark differences in the distribution of formal versus informal care provision across countries. Specifically, the United States, Europe, and South Korea demonstrate markedly higher rates of unmet informal care (approximately 24–48%), albeit with substantially lower rates of unmet formal care, whereas Mexico and China exhibit exceptionally high unmet formal care (exceeding 95%) but maintain very high informal care rates (exceeding 90%). This disparity becomes particularly evident when analyzing specific care types: ADL limitations (Figure 1B) demonstrate a clear gradient in unmet formal care across countries, with higher rates consistently observed in Mexico and China, whereas IADL limitations (Figure 1C) reveal concerning unmet care, most notably in Mexico, where approximately 60% of individuals with IADL limitations received no assistance—highlighting a critical gap in instrumental activity support. Further analysis of informal care providers (Figures 1D–F) identifies children and spouses as primary caregivers across all regions, with significant variations in distribution; notably, children in China and Mexico provide a substantially higher proportion of informal care for ADL limitations, reaching nearly 71% in Mexico (Figure 1E). Comprehensive data, including confidence intervals, are detailed in Supplementary Tables S1 and S2. Specific ADL/IADL task care receipt patterns across countries/regions are detailed in Supplementary Table S3.

2.3 Subgroup disparities and factors associated with unmet end-of-life care

Supplementary Tables S4–S6 present the factors associated with unmet care needs for activity limitations at the end of life, as identified by logistic regression models. Figure 2 further illustrates disparities in EOLC patterns between deaths at institutions (nursing homes, hospitals, or hospices) and those occurring in other locations. The group differences shown in Figure 2 were estimated using logistic regressions, with full results presented in Supplementary Tables S4–S7. Analysis of overall unmet care (Figure 2A) shows that death at institutions was predominantly associated with lower total unmet care in the United States, Central and Eastern Europe, and South Korea. In contrast, in Mexico, death at institutions corresponded with higher rates of overall unmet care—a pattern primarily attributable to poor care quality in institutions and diminished informal care (Figure 2B), which was not adequately compensated by increased formal care provision (Figure 2C). The United States exhibits the most substantial institutional advantage in addressing unmet formal care (Figure 2C; 44.1% vs. 73.6%, $p < 0.001$), with comparable patterns observed in South Korea (62.0% vs. 83.3%, $p < 0.001$) and Western Europe (38.1% vs. 52.4%, $p < 0.001$). In contrast, Mexico (95.4% vs. 95.7%) and China (94.4% vs. 98.3%) showed minimal variability in unmet formal care, with negligible differences between deaths occurring in institutions and other locations. Informal care rates (Figure 2B) exhibited a pattern of higher unmet care for deaths at institutions, particularly in the United

States and Western Europe, suggesting a potential substitution effect. While ADL-specific (Figures 2D–F) and IADL-specific care patterns (Figures 2G–I) largely mirrored overall trends—showing significantly lower unmet formal care in institutional settings in the United States, Europe, and South Korea (Figures 2F and 2I)—IADL-specific care patterns exhibited notably distinct trajectories. The institutional advantage in formal IADL care was substantially less pronounced in the United States, Western Europe, and South Korea (Figure 2I), highlighting significant gaps in institutional IADL support systems.

Figure 3 elucidates urban–rural disparities in unmet EOLC across different countries and care types. The group differences shown in Figure 3 were estimated using logistic regression models, with full results reported in Supplementary Tables S4–S6. Analysis of overall unmet care for ADL/IADL (Figure 3A) demonstrates minimal significant rural–urban differentials across most countries (e.g., United States: 10.9% vs. 11.5%, $p > 0.05$), suggesting that geographical location may not fundamentally determine overall care access. However, examination of specific care types reveals notable variations: Central and Eastern Europe and South Korea exhibited significantly higher unmet informal care among urban residents (Central and Eastern Europe: 40.7% vs. 33.4%, $p < 0.001$; South Korea: 35.8% vs. 26.8%, $p < 0.05$) (Figure 3B), coupled with correspondingly lower rates of unmet formal care among urban residents (Central and Eastern Europe: 73.0% vs. 84.2%, $p < 0.001$; South Korea: 62.7% vs. 75.2%, $p < 0.001$) (Figure 3C), indicating distinct urban–rural differences in care infrastructure and family support systems. ADL-specific (Figures 3D–F) and IADL-specific care patterns (Figures 3G–I) largely mirrored these overall trends, showing minimal rural–urban disparities in overall care but notable differences in unmet needs by care type (informal vs. formal).

Figure 4 presents unexpected patterns in end-of-life unmet care across marital status, challenging conventional assumptions about spousal care support. The group differences in Figure 4 were analyzed using logistic regression (see full results in Supplementary Tables S4–S6). Contrary to the expectation that married individuals would receive enhanced care, particularly informal care, the analysis reveals that married individuals in Europe demonstrated significantly higher overall rates of unmet care for ADL/IADL compared to their unmarried counterparts (Western Europe: 24.6% vs. 11.7%, $p < 0.001$; Central and Eastern Europe: 29.1% vs. 22.6%) (Figure 4A). Only Mexico aligned with initial expectations, showing lower rates of overall unmet care among married individuals (Mexico: 7.0% vs. 9.1%, $p < 0.01$) (Figure 4A), while South Korea and China showed no significant differences in overall unmet care. This pattern was primarily driven by significantly higher unmet formal care among married individuals (Figure 4C; Western Europe: 52.2% vs. 30.4%, $p < 0.001$; Central and Eastern Europe: 82.4% vs. 70.7%, $p < 0.001$), which was not adequately compensated by corresponding increases in informal care (Figure 4B). Similar patterns emerged in both ADL-specific care (Figures 4D–F) and IADL care (Figures 4G–I), with particularly notable findings in unmet informal care. Contrary to expectations, married individuals showed significantly higher rates of unmet informal care for IADL in Western Europe (57.2% vs. 52.1%, $p < 0.01$) (Figure 4H).

Figure 5 elucidates patterns in unmet EOLC that consistently align with expectations regarding the influence of childlessness on unmet care. The group differences in Figure 5 were examined by logistic regression (see full results in Supplementary Tables S4–S6). In contrast to the findings observed for marital status, individuals without children exhibited higher rates of overall unmet care for ADL/IADL in Europe (Figure 5A) and higher rates of unmet informal care in the United States, Europe, and South Korea (Figure 5B). Similar patterns persisted across both ADL-specific care (Figures 5D–F) and IADL care (Figures 5G–I).

Supplementary Figure S2 and Supplementary Tables S4–S6 present the association between income level and unmet EOLC needs. The analysis indicates that in Central and Eastern Europe and South Korea, lower-income individuals experienced higher rates of unmet informal care for ADL limitations (Central and Eastern Europe: 55.2% vs. 50.3%, $p < 0.05$; South Korea: 41.0% vs. 30.4%, $p < 0.05$) (Figure S2E). In contrast, a different pattern was observed in Western Europe, where higher-income individuals had higher rates of overall unmet care for ADL/IADL limitations (20.5% vs. 15.3%, $p < 0.05$) (Figure S2A).

Supplementary Figure S3 and Supplementary Tables S4–S6 demonstrate the association between LTCI coverage and unmet end-of-life care. The analysis reveals that insured individuals had significantly lower rates of overall unmet formal care for ADL/IADL limitations in Central and Eastern Europe (70.5% vs. 77.1%, $p < 0.01$) (Figure S3A) and lower rates of unmet care for IADL limitations in Western Europe (22.4% vs. 26.9%, $p < 0.05$) (Figure S3C), while this association was not significant in the United States.

3. Discussion

This comprehensive analysis of EOLC patterns across 32 countries revealed several associations between social development levels and care coverage that are worth discussing. While developed countries or regions such as the United States, Europe, and South Korea demonstrated higher formal care rates (24–58%), they showed higher overall unmet care compared to developing countries such as China and Mexico, which exhibited limited formal care provision (<5%) but maintained remarkably high informal care rates (>90%). Significant sociodemographic disparities emerged across regions: death at institutions was associated with substantially lower unmet formal care in the United States (44% vs. 74%), Western Europe (38% vs. 52%), Central and Eastern Europe (72% vs. 85%), and South Korea (62% vs. 83%), with minimal impact in China and Mexico; urban–rural differences were particularly pronounced in Western Europe (39% vs. 48%), Central and Eastern Europe (73% vs. 84%), and South Korea (63% vs. 75%), with urban areas showing significantly lower rates of unmet formal care; and, contrary to expectations, married individuals in Europe demonstrated significantly higher rates of overall unmet care compared to their unmarried counterparts (Western Europe: 25% vs. 12%; Central and Eastern Europe: 29% vs. 23%), while only Mexico showed the expected pattern of lower rates of overall unmet care among married individuals (7% vs. 9%). Across the United States, Europe, and South Korea, having children was

consistently associated with lower rates of unmet informal care. Higher-income groups in Western Europe reported more unmet ADL/IADL care, whereas lower-income households in South Korea and Central and Eastern Europe faced greater unmet informal care. LTCI was significantly associated with lower unmet formal care in Central and Eastern Europe (71% vs. 77%) and lower unmet care for IADL limitations in Western Europe (22% vs. 27%). These findings highlight the complex interplay between care systems and social structures in determining EOLC patterns.

The higher overall unmet care rates in the United States and Europe compared to China and Mexico could be attributed to the reduced informal care availability identified in our study. Previous research from the United States and Europe has highlighted that factors such as reduced intergenerational living and higher workforce participation among family members contribute to lower informal care provision.[1,16] In contrast, despite the potential absence of robust formal care systems in China and Mexico, traditional cultural norms that prioritize family caregiving may determine the dominant position of informal care.[17,18] Cultural norms around family caregiving may contribute to high informal care reliance in China and Mexico, but may also conceal unmet needs due to social desirability bias or caregiver burnout.[17] Formal care in the United States and Europe can partially fill, or is expected to fill, the gap created by the transfer from informal to formal care; nevertheless, as indicated by our findings, it cannot fully compensate for the shortfall in informal care. This could explain why overall unmet care tends to be lower in China but higher in the United States and Europe. In addition, our findings highlighted the significant lack of care for IADL limitations, particularly in regions such as Mexico and urban China. This gap may be attributed to a prioritization of assistance for ADL needs at the end of life. ADLs are related to basic self-care activities, such as eating and dressing, which are essential for survival.[19] In contrast, IADLs involve more complex tasks, such as shopping for groceries and managing money, which enable individuals to live independently within a community.[20] At the end of life, the focus often shifts to ADLs, as these are more critical for immediate well-being, while IADLs, though important for independence, may become less prioritized. Beyond the perceived end of care for individuals with ADL limitations, there is a need to raise greater awareness of end-of-life support—especially financial management—for those with IADL limitations, whether provided by family members or trained social workers.

Furthermore, this study emphasized the benefits of institutional care in the United States, Europe, and South Korea, compared to the minimal differences in unmet care across settings in Mexico and China. This finding echoes the evidence that in developed countries, older adults are more likely to die in care institutions.[3] In the United States and many European countries, institutional care (e.g., nursing homes or hospitals) often provides more structured and higher-quality support,[21] which may explain the higher proportion of care recipients in these settings. For instance, evidence from Europe suggests that formal caregivers in institutional settings are better able than informal caregivers to recognize, diagnose, and treat individuals' needs, which

is associated with improved quality of life and health outcomes.[22] Similarly, a study from South Korea indicates that receiving institutional care is associated with better cognitive and physical health outcomes compared to home care.[23] In contrast, the limited differences in care receipt between institutional and non-institutional settings in Mexico and China may reflect challenges in institutional care facilities and quality. For instance, research from China indicates that even in urban areas, the quality of formal EOLC remains inadequate.[24] Nevertheless, in rural areas of China, substantial gaps in professional training, staffing, and EOLC resource availability are even greater.[25] Our findings highlight that access to high-quality EOLC services varies widely across countries and institutional settings: developed countries benefit from higher levels of funding, infrastructure, and coverage, enabling institutional care to meet a greater share of care needs;[7] in contrast, developing countries often face resource constraints, resulting in limited access to high-quality institutional care. Therefore, individuals in developing countries such as Mexico and China frequently rely on informal care, which may not adequately meet their needs.[26]

In addition, our findings show pronounced urban–rural differences in unmet formal care in Europe and South Korea, while this gap is minimal in China and Mexico. This may be attributed to the inadequate levels and low quality of formal care in China and Mexico,[24] and the complex role of urbanization. In Europe and South Korea, long-established urbanization has concentrated populations and formal care services in cities, making care more accessible, whereas rural areas remain relatively underserved,[27,28] contributing to lower unmet needs in cities. In contrast, in China and Mexico, urban and rural unmet needs are similarly high, suggesting care challenges in both settings. Evidence shows that in rural areas, the migration of younger family members to cities reduces the availability of family (informal) care.[29] Even in urban China, limited formal care provision and high living costs restrict access, and the aforementioned quality issues keep unmet needs high.[24] These urban–rural disparities and country-level variation highlight that urbanization influences both the supply of and demand for EOLC by reshaping family structures, concentrating services, and affecting care use.

Moreover, the higher rates of unmet EOLC among married individuals in Europe, but not in Mexico, may be partly explained by family structure and patterns of care utilization. As our data show, children and spouses are the primary sources of informal care across countries and regions, with children providing a particularly dominant share of informal support in both Mexico and Western Europe. However, caregiving potential in Europe is more constrained: the average number of children is substantially lower than in Mexico (2.3 vs. 5.6), limiting the availability of family caregivers, and spouses, who are often older themselves, may have reduced physical capacity to provide intensive care at the end of life.[3] Our findings also indicate that married individuals in Europe are less likely to use institutional care before death, suggesting a heavier reliance on informal care precisely when household caregiving resources are weakest. This combination of reduced informal care availability and lower uptake of institutional care may contribute to the higher unmet care needs observed among married

Europeans. Economic and cultural factors may further intensify this pattern: high out-of-pocket costs for institutional care limit access to formal services,[30] while strong cultural norms emphasizing family caregiving responsibilities discourage institutional use even when needs escalate. These norms, alongside workforce shortages and financial constraints in the care sector, increase both the financial and non-financial burdens on families, ultimately elevating the risk of unmet EOLC among married individuals in Europe.[31]

In addition to the structural and economic barriers, the finding that higher-income individuals in Western Europe reported greater overall unmet ADL/IADL care needs—contrary to the pattern in South Korea and Central and Eastern Europe, where unmet informal care clustered in lower-income households—warrants further explanation. One plausible mechanism is that unmet care in high-income groups may reflect an expectation–service mismatch rather than an absolute lack of services. Recent cross-national evidence shows that even when formal systems are well developed, substantial proportions of older adults with dementia and activity limitations receive no assistance for essential ADL/IADL tasks, indicating persistent gaps in personalized or appropriate care across countries.[17] Similarly, a study of older adults living alone with cognitive impairment found widening disparities in social support, with unmet needs emerging even in settings with robust welfare systems.[15] A multi-country analysis during the COVID-19 period further demonstrated that assistance with daily activities did not consistently favor wealthier individuals, suggesting that service coverage does not necessarily align with individual expectations or preferences.[4] Taken together, these studies suggest that in Western Europe, higher-income older adults may have care needs or expectations—such as timely, tailored, or socially acceptable forms of assistance—that are not met by available formal or informal support, resulting in higher reported unmet care despite greater financial resources.

Lastly, we found that LTCI coverage was significantly associated with lower levels of unmet formal EOLC and unmet care for IADL limitations in Europe, consistent with previous studies showing that LTCI can increase formal care utilization.[21,32] However, no such significant association was found in the United States, which may be due to the distinct characteristics of long-term care systems across these countries. Previous research on long-term care typologies identified the United States as an evolving private need-based system, with no publicly funded LTCI and private insurance as the primary option.[33] Our findings show that only 12% of individuals in the U.S. have LTCI coverage. Previous research also indicates that the availability and use of LTCI are limited in the United States.[1] In Europe, some countries (e.g., Germany) provide publicly funded long-term care, while others do not (e.g., Poland). A study in Europe demonstrated that three types of long-term care policies coexist in European countries with publicly funded long-term care: supported familialism (which assists caregivers in providing care), supported defamilialization through the market (e.g., cash benefits for care recipients to purchase care), and supported defamilialization through public provision (e.g., residential care beds).[34] Because the economic burden of care tends to be heavier for lower-income people, the existence of public LTCI (or universal long-term care) can reduce financial

barriers and promote more equitable access to EOLC in Europe. By contrast, the absence of such mechanisms in the United States makes formal care use more contingent on private wealth or the ability to self-finance.

Our findings carry important implications for strengthening equitable and sustainable EOLC systems. The consistent pattern of higher overall unmet care in the United States, Europe, and South Korea—despite markedly greater formal care provision—demonstrates that expanding formal services alone does not ensure that population-level needs are met. Formal and informal care operate as complementary rather than substitutable systems; where family-based care declines due to demographic ageing, rising childlessness, and smaller households, formal care has not fully compensated. Countries with robust informal care traditions, such as China and Mexico, experienced far lower overall unmet care despite near-universal unmet formal care, reflecting how strong intergenerational ties and cultural norms can sustain extensive family support even in the absence of formal infrastructure. This highlights the need for policies that simultaneously reinforce formal service capacity and protect the viability of family caregiving—through financial incentives, respite care, and caregiver training—to prevent widening gaps in care. The study also reveals multiple structural and economic obstacles. Economic disadvantage significantly increased unmet informal care in Central and Eastern Europe and South Korea, underscoring that affordability and financial protection shape both informal caregiving capacity and access to paid assistance. By contrast, higher-income individuals in Western Europe reported greater overall unmet care, likely reflecting an expectation–service mismatch in contexts where high-income groups anticipate personalized or timely care unavailable within existing systems. These findings underscore the importance of robust financial protection mechanisms, including means-tested subsidies, reductions in out-of-pocket payments, and expansion of income-sensitive LTCI. Our results showing reduced unmet formal care among LTCI enrollees in Europe further support policies aimed at increasing LTCI coverage, particularly in middle-income settings. Geographic and normative factors also require attention. The benefits of institutional care in reducing unmet formal care were evident in the United States, Europe, and South Korea, but minimal in China and Mexico, where institutional care quality remains limited and norms strongly favor home-based care. Policies aimed at expanding institutional care must therefore address both quality deficits and cultural acceptability, for example by developing hybrid models that integrate family involvement or community-based transitional care services. Governments should also safeguard older adults' preferences by providing flexible care options (e.g., home, institutional, or hospice) that align with local cultural norms. Urban–rural disparities in Europe and South Korea highlight the need for targeted investments in rural EOLC infrastructure and workforce development, while the pervasive unmet IADL care needs across countries suggest that EOLC planning must address both basic ADL needs and the more complex but essential instrumental tasks that support autonomy and household functioning. Collectively, these findings show that effective EOLC policy must integrate formal system development, financial protection, workforce and

geographic equity, and cultural norms. Tailoring reforms to these structural and social realities will be essential to reducing unmet care and promoting more resilient EOLC systems globally.

This study presents the most comprehensive analysis to date of unmet EOLC among older adults with activity limitations, utilizing data from 32 countries with diverse care systems and social structures. The harmonized end-of-life data, featuring standardized measures across participating countries, explicitly enable cross-country comparisons. Our findings demand a fundamental rethinking of EOLC strategies globally. The finding that formal care expansion in the United States, Europe, and South Korea has not fully compensated for declining informal care challenges conventional thinking about care quality, revealing how robust informal care networks in China and Mexico effectively compensate for formal care deficiencies. Furthermore, our study extends prior research by examining disparities in unmet EOLC across underexplored dimensions of particular relevance to policymakers and society, including urbanization, childlessness, and long-term care insurance—dimensions that have been largely overlooked in previous cross-national studies. Our analysis systematically examines how these dimensions create distinct care landscapes, highlighting that solutions effective in one setting may fail in others. These findings provide crucial evidence for tailoring EOLC approaches across diverse socioeconomic environments.

Several limitations should be acknowledged. This study is based on correlational evidence, and unmeasured factors may have influenced the observed associations. For instance, the disparities in unmet EOLC needs between insured and uninsured groups may reflect underlying income differences. Although further stratifying the insured and uninsured groups by income would help clarify these relationships, the sample sizes were insufficient to support such analyses. The same limitation applied to comparisons within Europe: splitting the region by individual countries would have created small cell sizes. Sample size constraints also shaped our categorization of place of death; therefore, we used a dichotomous measure comparing deaths in institutions and elsewhere. Another limitation relates to the representativeness of the deceased sample. Although the HRS-family surveys are designed to be nationally representative of community-dwelling older adults, the subsample of respondents who died during the observation period may not fully represent all older adults who die in each country. Individuals included in end-of-life interviews depend on survey participation, follow-up, and proxy reporting, and therefore may differ from the broader population of deaths. Furthermore, because our analysis was restricted to deaths occurring in or after 2010 to ensure harmonized end-of-life data across surveys, the resulting sample may not perfectly reflect the overall distribution of deaths within each country. Consequently, the findings should be interpreted as reflecting patterns among decedents captured within these longitudinal surveys rather than the entire population of deaths. Countries with earlier or later adoption of harmonized end-of-life modules could be differentially represented, potentially limiting comparability with earlier cohorts and underestimating long-term trends in care provision. Our sample also contains a limited representation of low-income countries, restricting our ability to compare unmet EOLC

needs across different income settings. In addition, only individuals with reported activity limitations were included, and because these limitations and help received were proxy-reported, they may be underreported, which could lead to an underestimation of unmet needs. Other potential confounders, such as health literacy or caregiver availability, may also shape unmet EOLC needs but were not available in the datasets. Moreover, ADL and IADL questions were not originally developed for strict international comparability, and contextual differences in their measurement should be considered when interpreting cross-country differences.[35] In addition, variations in end-of-life time frames across datasets (e.g., the last 3 months in HRS vs. twelve months in SHARE) further limit direct comparability. It should also be noted that definitions of LTCI vary by country; for example, LTCI questions in HRS mainly relate to Medicaid rather than a dedicated LTCI scheme. Finally, our data cannot capture situations where individuals receive care at home for most of the final months but spend their final days in institutional settings.

Future research should address several empirical and methodological gaps highlighted by this study. A major priority is the development of harmonized cross-national microdata capturing care quality, care intensity, caregiver capacity, and cultural caregiving norms, as the absence of such information currently limits the ability to identify mechanisms underlying unmet EOLC. In particular, integrating measures of cultural acceptability, preferences for home versus institutional care, and intra-household caregiving dynamics would clarify how social norms shape the balance between formal and informal care. Longitudinal work is also needed to examine how the relative importance of IADL and ADL support evolves over the end-of-life trajectory; phase-specific analyses following individuals from early IADL limitations to later-stage ADL dependence could reveal critical intervention points for preventing downstream unmet needs. More comparable data on LTCI, especially in middle-income countries, are essential to evaluate the effects of financing models on care utilization, unmet needs, and financial hardship; quasi-experimental assessments of recent LTCI reforms in Asia and Latin America would be particularly informative.[36,37] Geographic disparities identified in this study call for deeper investigation into the structural drivers of urban–rural differences, including variations in workforce distribution, service availability, migration-related reductions in family caregiving, and local welfare resources; linking end-of-life survey data with geospatial information on facility density and staffing could illuminate these mechanisms. Mixed-methods research is also needed to understand why institutional care substantially reduces unmet formal care in the United States, Europe, and South Korea but provides minimal benefit in China and Mexico, and whether improving institutional quality, expanding community-based transitional care, or strengthening hybrid care models offers the greatest promise. Finally, methodological innovations—such as developing appropriate weighting strategies for proxy-reported end-of-life interviews, harmonizing retrospective observation windows across surveys, and integrating administrative or clinical datasets—will be crucial for improving causal inference, enabling more robust cross-national comparisons, and advancing evidence to guide global strategies for reducing unmet EOLC needs.

In conclusion, this study reveals striking differences in unmet EOLC across 32 countries. In the United States, Europe, and South Korea, although formal care is more accessible, overall unmet care remains high due to the reduced availability of informal care. In contrast, China and Mexico experience high rates of unmet formal care, yet informal care serves as a crucial safety net, compensating for gaps in the care system. The benefits of institutional care and urban residence in reducing unmet EOLC are more pronounced in Europe and South Korea, whereas these associations are minimal in China and Mexico. In addition, long-term care insurance appears to facilitate better access to end-of-life care in Europe, while the presence of children helps mitigate unmet informal care across multiple regions. These findings highlight the interplay between care systems and social structures in shaping EOLC patterns, underscoring the need for tailored policy approaches that account for both formal and informal care.

4. Methods

4.1 Study design and population

This study complies with all relevant ethical regulations. Ethical approval for the data used was obtained from the following institutions:[17,38–43] Health and Retirement Study (HRS, approved by the University of Michigan Institutional Review Board), Survey of Health, Ageing and Retirement in Europe (SHARE, approved by the Ethics Council of the Max Planck Society), Mexican Health and Aging Study (MHAS, approved by the Institutional Review Boards and Ethics Committees of the University of Texas Medical Branch in the USA, the National Institute of Statistics and Geography (INEGI), and the National Institute of Public Health (INSP) in Mexico), Korean Longitudinal Study of Aging (KLoSA, approved by the National Statistical Office of Korea), and China Health and Retirement Longitudinal Study (CHARLS, approved by the Biomedical Ethics Review Committee of Peking University, IRB00001052-11015). No additional approvals were required. All participants provided written informed consent.

This investigation employed data from the HRS in the United States; SHARE, encompassing 28 European countries; KLoSA in South Korea; MHAS in Mexico; and CHARLS in China. These datasets underwent rigorous standardization procedures to ensure optimal cross-study comparability. Their harmonized surveys systematically collect extensive data on activity limitations and care support for deceased participants, providing comprehensive metrics that align precisely with this study's research objectives. A notable methodological strength lies in the nationally representative nature of all five surveys, which were developed following consistent research protocols and structural frameworks to facilitate robust international comparisons.[41,44]

To ensure methodological rigor and maintain temporal consistency in cross-survey comparisons, we restricted the analytical sample to decedents who died in or after 2010. This

restriction was necessary because harmonized end-of-life data across the five contributing surveys are only consistently available from 2010 onward.[44] For example, CHARLS provides end-of-life information only for 2013 and 2020.[44] Limiting the sample to post-2010 deaths allowed us to focus on contemporary EOLC patterns, ensure comparability across surveys, and provide a sufficiently long observation window (≥10 years) for robust analysis.

Eligible participants, therefore, were deceased individuals aged 65 years or older who had at least one ADL or IADL limitation during the final year of life and died between 2010 and 2021. We excluded individuals who (1) had no reported ADL/IADL limitations, (2) were younger than 65 years at death, or (3) died before 2010. After applying these criteria, the final analytical sample included 21,423 respondents: 5,295 from the HRS, 11,711 from SHARE (covering 28 European countries), 1,435 from KLoSA, 2,366 from MHAS, and 616 from CHARLS. Detailed descriptions of the survey timelines and harmonization procedures are provided in the Supplementary Materials (pp. 2 and 5), and the sample selection process is depicted in Supplementary Figure S1.

4.2 Outcomes of interest

Proxy respondents reported whether the deceased required assistance to perform five ADL domains (dressing, bathing, eating, ambulation across rooms, and toilet use) and four IADL domains (meal preparation, shopping, telephonic communication, and medication management). These domains were selected because they were consistently assessed across all study waves in the constituent datasets,[29,45] and are widely used indicators of activity limitations in aging research.[3,17] Individuals were classified as having ADL/IADL limitations if they required help with at least one ADL or IADL task.[17] In parallel, those needing assistance with at least one ADL were categorized as having ADL limitations, whereas those requiring help with at least one IADL task were categorized as having IADL limitations.[17]

The analysis incorporated three primary dichotomous outcome variables (yes/no) measuring unmet EOLC. The first outcome was a dichotomous variable capturing overall unmet EOLC for ADL/IADL limitations. It was coded as 1 if the deceased did not receive any assistance for one of their ADL or IADL limitations during the final three months of life (extending to one year in SHARE data).[17] Similarly, the second outcome, unmet ADL care needs, was coded as 1 if the deceased did not receive any assistance for one of their ADL limitations during the final stage of life. The third outcome, unmet IADL care needs, was coded as 1 if the deceased did not receive any assistance for one of their IADL limitations during the final stage of life. In addition, we examined unmet care for each domain of their ADL and IADL limitations, with the notable exception of SHARE. While SHARE collected comprehensive information on overall ADL/IADL assistance, it did not disaggregate the data by each domain.[45] However, this limitation does not affect comparability with other datasets, as all regressions were based on unmet care needs for overall ADL and/or IADL limitations (also captured in SHARE), not for domain-specific items.

Furthermore, the classification of formal and informal care was consistently based on the identity and payment status of the care provider across all harmonized surveys. Informal care was defined as assistance provided by unpaid individuals such as family members, friends, or neighbors, whereas formal care was defined as assistance provided by paid helpers, professionals, or organizations.[40]

4.3 Variables of interest

This study examined six independent variables—place of death, urban/rural residence, marital status, childlessness, income level, and LTCI coverage—that have been shown to influence EOLC receipt and are highly relevant to policymakers and society.[3,5,11] These variables reflect key demographic and structural factors that shape access to both formal and informal care, and each is hypothesized to contribute to disparities in unmet EOLC. Place of death was operationalized consistently across all five surveys as a dichotomous variable distinguishing deaths occurring in institutions (nursing homes, hospitals, or inpatient hospices) from deaths occurring in other locations. Following established methodological precedents,[5] deaths outside institutions served as the reference category; 94% of these occurred at home. Details of the harmonization procedures used to align these categories across surveys are provided in the Supplementary Materials (p. 5). Urban/rural residence was measured based on the respondent's place of residence during the three months prior to death. This variable was coded dichotomously, with urban residence contrasted against rural residence, which served as the reference group. Marital or cohabitation status was measured three months before death and categorized as living with a spouse or cohabiting partner versus not having a partner. Individuals who were unmarried, widowed, separated, or divorced constituted the reference category. Consistent with prior research,[1] having children was defined as a dichotomous measure indicating whether the deceased had any living children, regardless of where the children resided. Individuals without children (childlessness) formed the reference category. Income level was measured using the total value of respondents' assets. To facilitate subgroup comparisons, participants were categorized into two groups: the bottom 40% of the asset distribution (classified as low income) versus the remaining 60% (higher income). Finally, LTCI coverage was coded dichotomously, with individuals lacking coverage serving as the reference group.

4.4 Statistical analyses

The data analysis was conducted separately for each country/region to ensure that within-country comparisons remained robust. This approach mitigates the impact of any differences in survey methods between countries or across different surveys, as the survey methods used were consistent within each country over the examined period.[40] Sampling weights were not applied in our analysis. End-of-life modules in these surveys do not provide weights for deceased respondents, as existing weighting schemes were constructed for longitudinal analyses of surviving participants rather than proxy-reported interviews after death. Applying

survivor-based weights to end-of-life data would therefore violate the assumptions of the original survey design and is likely to introduce bias instead of correcting it. In line with established practice in studies using harmonized end-of-life data, we therefore conducted unweighted analyses.

To characterize overall patterns of care, we estimated the prevalence of unmet care needs for individuals with ADL or IADL limitations, for those with ADL limitations alone, and for those with IADL limitations alone, and calculated corresponding 95% Wald confidence intervals. We additionally examined unmet care for each ADL and IADL domain, except in SHARE, which provides only aggregate ADL/IADL assistance rather than domain-specific information.

To investigate subgroup disparities, we assessed how unmet EOLC varied across six variables of interest: place of death, urban/rural residence, marital or cohabitation status, having children, income level, and LTCI coverage. Subgroup comparisons were evaluated using country- or region-specific logistic regression models. Logistic regression was selected because the outcomes of interest (unmet overall ADL and/or IADL care) are dichotomous (yes/no) variables, and this method allows estimation of adjusted odds ratios while controlling for potential confounders. Each model included a single key explanatory variable, such as dying in an institution versus dying elsewhere, and adjusted for age, sex, education, the number of chronic diseases, and year of death. This study used "sex," categorized as female or male, as collected consistently across the five cohorts. This variable likely reflects sex assigned at birth based on standard cohort enrollment procedures; data on gender identity were not collected. Sex was included in the study design only as a covariate in the regression analyses. Analyses involving income were limited to SHARE, KLoSA, and CHARLS, the surveys that collected asset-based income data; likewise, analyses involving LTCI were restricted to the HRS and SHARE datasets, where LTCI information is available.

Because the extent of activity limitations may influence the likelihood of unmet care needs,[17] and item-level ADL/IADL data are only available in HRS and CHARLS, we conducted a sensitivity analysis for the HRS and CHARLS datasets (Supplementary Tables S7–S12), and the results were consistent with the main findings. In these additional models, we further adjusted for the severity of activity limitations using three indicators: the total number of ADL and IADL limitations combined (range 0–11), the number of ADL limitations (range 0–6), and the number of IADL limitations (range 0–5).[17]

The data are generally complete, with only 1,120 missing records (5.2% of the total) for the dependent variable and the covariate (education). To address this, multiple imputation with chained equations was used to impute the missing values.[46] Details of the imputations and analyses assessing potential systematic differences related to missingness are provided in the Supplementary Materials (p. 6). All analyses were conducted using Stata 18, with two-sided statistical tests. A significance level of $P < 0.05$ was considered statistically significant, and 95% confidence intervals (CIs) are reported throughout the results.

Acknowledgments

X.C. discloses support for the research of this work from the U.S. National Institutes of Health (grant numbers R01AG077529 and R33AG058926). The funder of the study had no role in the study design, data collection, data analysis, data interpretation, manuscript writing, or decision to submit the manuscript for publication. The IZA Discussion Paper Series serves as a preprint server to deposit latest research for early feedback.

Author contributions

S.C. designed the study, with input from C.L., Z.L., H.S., J.A., Y.Q., W.M., H.Z., X.H., B.W., W.Y., and X.C. S.C. and C.L. developed the methodology. C.L. and S.C. were responsible for data curation. C.L. conducted the formal analysis. C.L. and S.C. accessed and verified the underlying data. C.L. was responsible for visualization. C.L. wrote the first draft. C.L., Z.L., H.S., J.A., Y.Q., W.M., H.Z., X.H., B.W., W.Y., X.C., and S.C. contributed to interpreting the results and critically revising the draft.

Competing interests

The authors declare no competing interests.

Corresponding authors

Wei Yang. Department of Global Health and Social Medicine, King's College London, London WC2R 2LS, UK. Email: wei.yang@kcl.ac.uk

Xi Chen. Department of Health Policy and Management, Department of Economics, Yale University, New Haven, CT 06520, USA; National Bureau of Economic Research, Cambridge, MA, USA Email: xi.chen@yale.edu

Shanquan Chen. School of Public Health, LKS Faculty of Medicine, University of Hong Kong, Hong Kong, China; Department of Health and Rehabilitation Sciences, Faculty of Medicine and Health Sciences, Stellenbosch University, Cape Town, South Africa, 7505. Email: shanquan.chen@hku.hk

Data availability

The raw data used in this study have been deposited in the HRS, SHARE, MHAS, KLoSA, and CHARLS databases under no accession code (https://hrsdata.isr.umich.edu/data-products; https://share-eric.eu/data/data-access; https://www.mhasweb.org/DataProducts/Home.aspx; http://survey.keis.or.kr/eng/klosa/klosa01.jsp; https://charls.charlsdata.com/pages/data/111/en.html). The data are available under restricted access due to data use agreements and privacy regulations; access can be obtained by registration or application via the respective websites. The raw data are protected and are not available due to data privacy laws. The processed harmonized end-of-life data used in this

study are available in the Gateway to Global Aging Data repository under no accession code (https://eol.g2aging.org/health-and-retirement-studies/get-data).[44] The data generated in this study are provided in the Supplementary Information/Source Data file. Source data are provided with this paper.

Code availability

The code to replicate the results in this article is publicly available for download from GitHub at https://github.com/chengxulong9/EOL and from Zenodo at https://zenodo.org/records/19750751 (DOI: 10.5281/zenodo.19750750).[47]

Consent Statement

This study was approved by the institutional review board of Yale University, which waived informed consent based on the minimal risk involved and the impracticality of obtaining consent from participants.

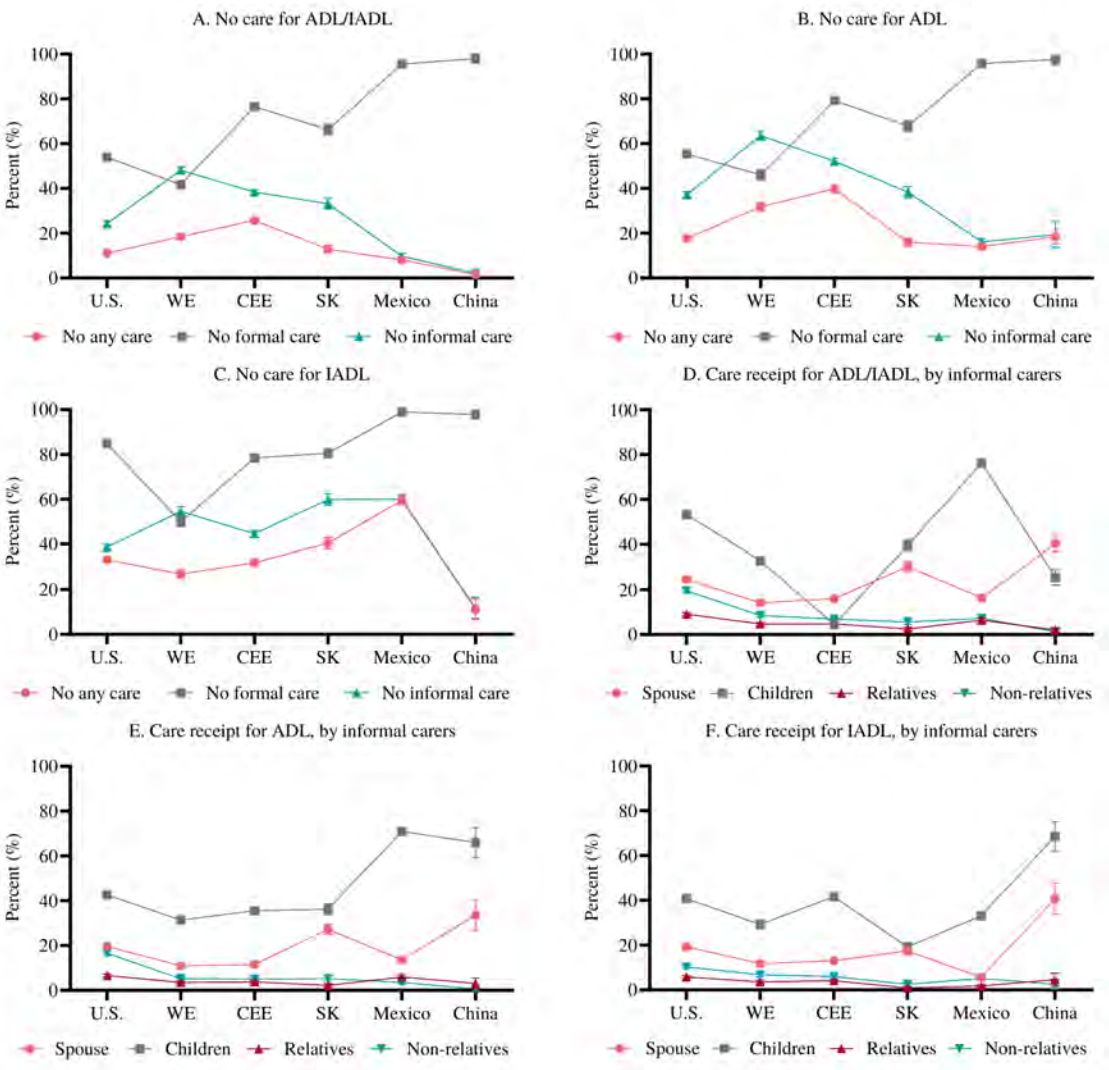


Figure 1. Proportion of older adults receiving no care and the rate of informal care receipt for ADL/IADL limitations at the end of life, categorized by country/region and type of care.

The upper panels display dotted points representing the estimated proportions of individuals who did not receive care (Panels A–C), while the lower panels show the estimated proportions of individuals who received informal care, categorized by the type of informal caregiver (Panels D–F). Data are presented as proportions ± 1.96 × standard error (SE), with the proportion as the measure of center. As some confidence intervals are too narrow to be clearly visible, detailed values for the proportions and the corresponding upper and lower bounds of the error bars are provided in Supplementary Tables S1 and S2. ADL, activities of daily living; IADL, instrumental activities of daily living; U.S., the United States; WE, Western Europe; CEE, Central and Eastern Europe; SK, South Korea. In Panels A and D, outcomes are defined for individuals with at least one ADL/IADL limitation; in Panels B and E, for those with at least one ADL limitation; and in Panels C and F, for those with at least one IADL limitation. Source data are provided as a Source Data file. The sample sizes were n = 5,295 in the U.S., 4,170 in Western Europe, 7,541 in Central and Eastern Europe, 1,435 in South Korea, 2,366 in Mexico, and 616 in China.

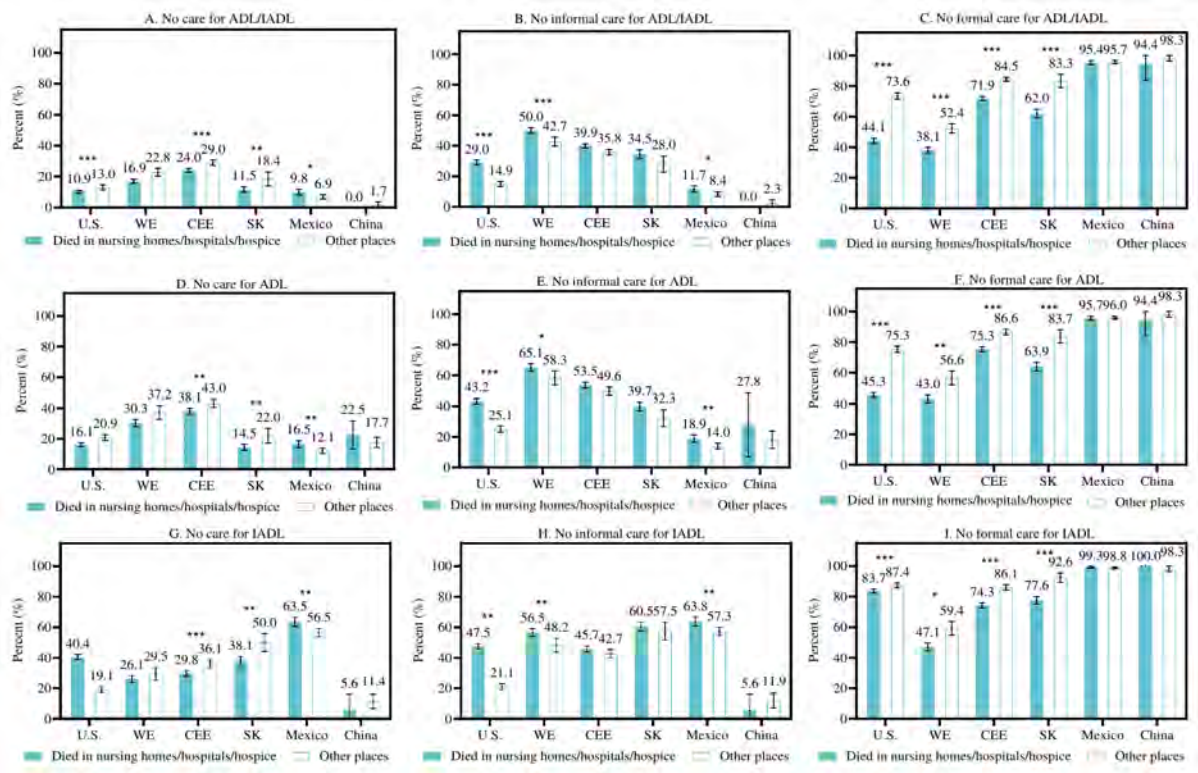


Figure 2. Subgroup analyses: the proportion of older adults receiving no care for ADL/IADL limitations at the end of life, stratified by place of death.

Each panel displays dotted points representing the estimated proportions of individuals who did not receive any care (Panels A, D, G), those who did not receive formal care (Panels B, E, H), and those who did not receive informal care (Panels C, F, I). Data are presented as proportions ± 1.96 × standard error (SE). The central measure (proportion) is shown at the top of each bar. Group differences across these categories were evaluated using binary logistic regressions with two-sided statistical tests. Asterisks above each bar (if present) indicate the significance level of group differences by place of death: ***$p < 0.001$, **$p < 0.01$, *$p < 0.05$. The model controlled for age, sex, education level, marital status, urban/rural residence, having children, place of death, number of chronic diseases, and year of death. For the U.S. and European samples, we further controlled for having long-term care insurance; this variable was not included for other countries due to data unavailability. For the U.S. and China samples, we further controlled for the extent of activity limitations; similarly, this variable was not included for other countries due to data unavailability. Source data are provided as a Source Data file. The *P* values can be found in the Source Data file. ADL, activities of daily living; IADL, instrumental activities of daily living; U.S., the United States; WE, Western Europe; CEE, Central and Eastern Europe; SK, South Korea. In Panels A–C, outcomes are defined for individuals with at least one ADL/IADL limitation; in Panels D–F, for those with at least one ADL limitation; and in Panels G–I, for those with at least one IADL limitation. The sample sizes were $n = 5{,}295$ in the U.S., 4,170 in Western Europe, 7,541 in Central and Eastern Europe, 1,435 in South Korea, 2,366 in Mexico, and 616 in China.

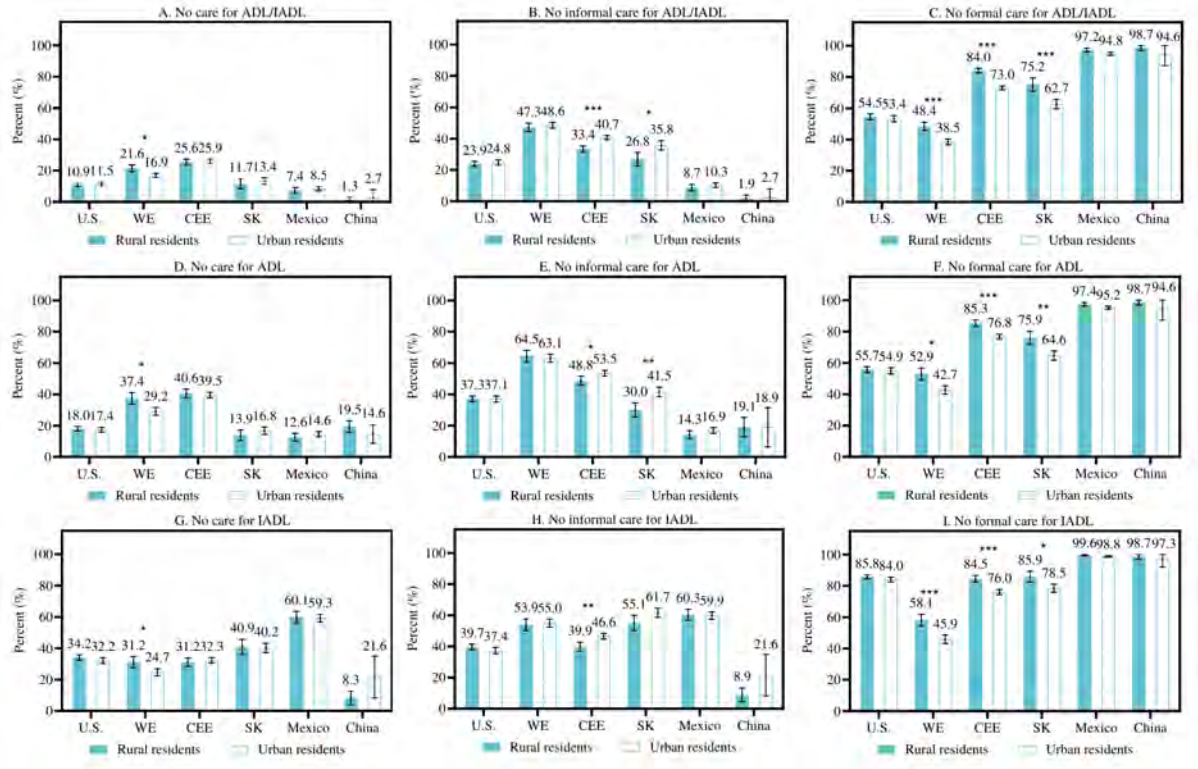


Figure 3. Subgroup analyses: the proportion of older adults receiving no care for ADL/IADL limitations at the end of life, stratified by urban/rural residence before death.

Each panel displays dotted points representing the estimated proportions of individuals who did not receive any care (Panels A, D, G), those who did not receive formal care (Panels B, E, H), and those who did not receive informal care (Panels C, F, I). Data are presented as proportions ± 1.96 × standard error (SE). The central measure (proportion) is shown at the top of each bar. Group differences across these categories were evaluated using binary logistic regressions with two-sided statistical tests. Asterisks above each bar (if present) indicate the significance level of group differences by urban/rural residence: ***$p < 0.001$, **$p < 0.01$, *$p < 0.05$. The model controlled for age, sex, education level, marital status, urban/rural residence, having children, place of death, number of chronic diseases, and year of death. For the U.S. and European samples, we further controlled for having long-term care insurance; this variable was not included for other countries due to data unavailability. For the U.S. and China samples, we further controlled for the extent of activity limitations; similarly, this variable was not included for other countries due to data unavailability. Source data are provided as a Source Data file. The *P* values can be found in the Source Data file. ADL, activities of daily living; IADL, instrumental activities of daily living; U.S., the United States; WE, Western Europe; CEE, Central and Eastern Europe; SK, South Korea. In Panels A–C, outcomes are defined for individuals with at least one ADL/IADL limitation; in Panels D–F, for those with at least one ADL limitation; and in Panels G–I, for those with at least one IADL limitation. The sample sizes were $n = 5,295$ in the U.S., 4,170 in Western Europe, 7,541 in Central and Eastern Europe, 1,435 in South Korea, 2,366 in Mexico, and 616 in China.

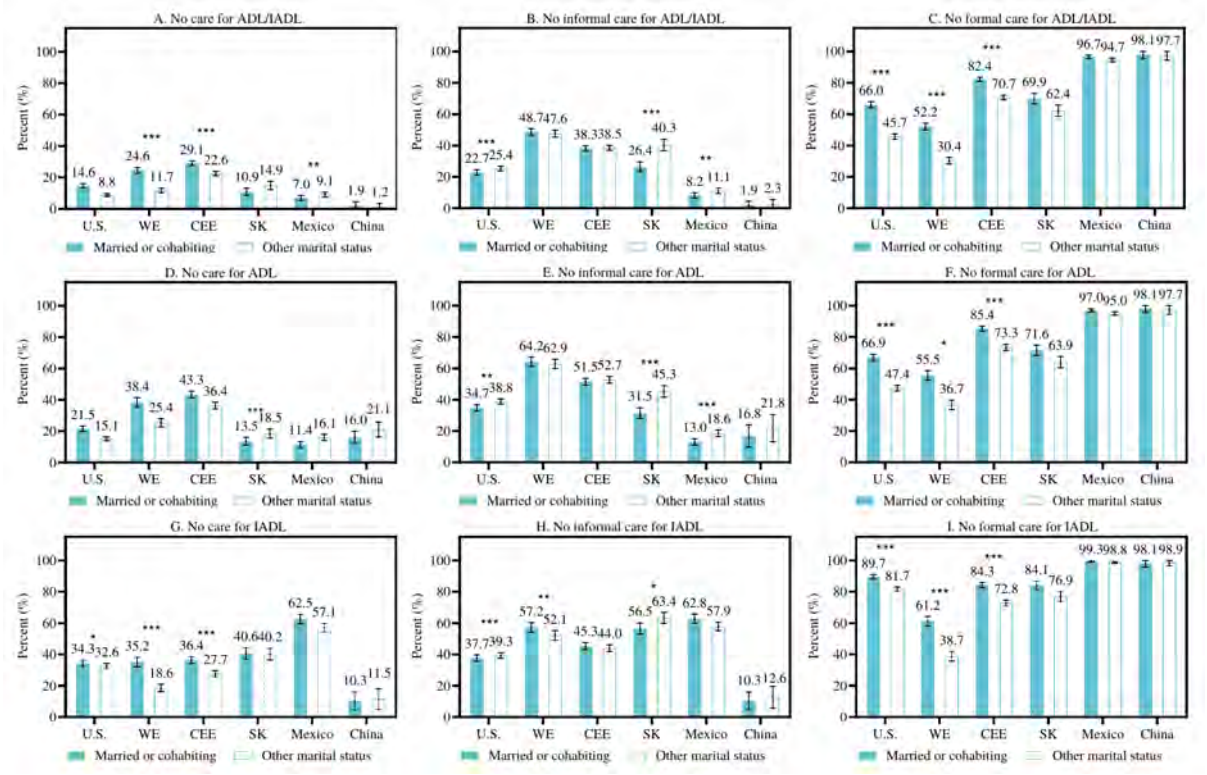


Figure 4. Subgroup analyses: the proportion of older adults receiving no care for ADL/IADL limitations at the end of life, stratified by marital status.

Each panel displays dotted points representing the estimated proportions of individuals who did not receive any care (Panels A, D, G), those who did not receive formal care (Panels B, E, H), and those who did not receive informal care (Panels C, F, I). Data are presented as proportions ± 1.96 × standard error (SE). The central measure (proportion) is shown at the top of each bar. Group differences across these categories were evaluated using binary logistic regressions with two-sided statistical tests. Asterisks above each bar (if present) indicate the significance level of group differences by marital status: ***$p < 0.001$, **$p < 0.01$, *$p < 0.05$. The model controlled for age, sex, education level, marital status, urban/rural residence, having children, place of death, number of chronic diseases, and year of death. For the U.S. and European samples, we further controlled for having long-term care insurance; this variable was not included for other countries due to data unavailability. For the U.S. and China samples, we further controlled for the extent of activity limitations; similarly, this variable was not included for other countries due to data unavailability. Source data are provided as a Source Data file. The *P* values can be found in the Source Data file. ADL, activities of daily living; IADL, instrumental activities of daily living; U.S., the United States; WE, Western Europe; CEE, Central and Eastern Europe; SK, South Korea. In Panels A–C, outcomes are defined for individuals with at least one ADL/IADL limitation; in Panels D–F, for those with at least one ADL limitation; and in Panels G–I, for those with at least one IADL limitation. The sample sizes were $n = 5{,}295$ in the U.S., 4,170 in Western Europe, 7,541 in Central and Eastern Europe, 1,435 in South Korea, 2,366 in Mexico, and 616 in China.

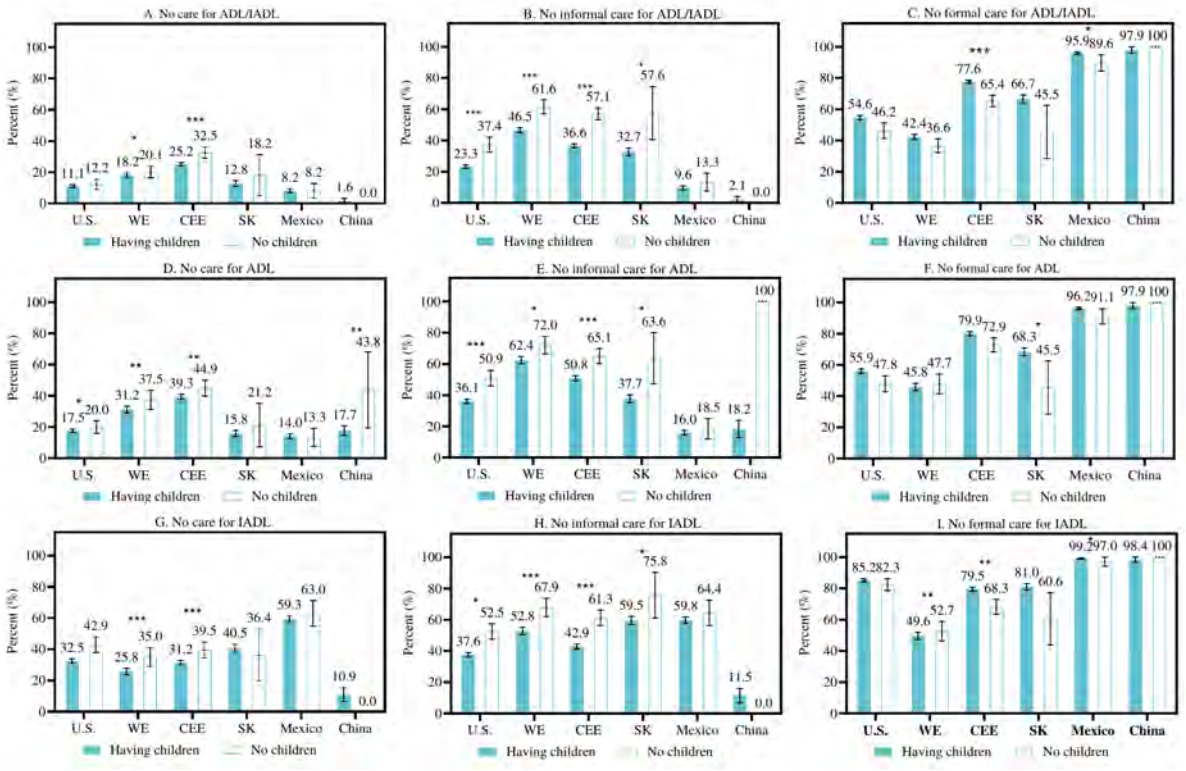


Figure 5. Subgroup analyses: the proportion of older adults receiving no care for ADL/IADL limitations at the end of life, stratified by having children.

Each panel displays dotted points representing the estimated proportions of individuals who did not receive any care (Panels A, D, G), those who did not receive formal care (Panels B, E, H), and those who did not receive informal care (Panels C, F, I). Data are presented as proportions ± 1.96 × standard error (SE). The central measure (proportion) is shown at the top of each bar. Group differences across these categories were evaluated using binary logistic regressions with two-sided statistical tests. Asterisks above each bar (if present) indicate the significance level of group differences by childlessness: ***$p < 0.001$, **$p < 0.01$, *$p < 0.05$. The model controlled for age, sex, education level, marital status, urban/rural residence, having children, place of death, number of chronic diseases, and year of death. For the U.S. and European samples, we further controlled for having long-term care insurance; this variable was not included for other countries due to data unavailability. For the U.S. and China samples, we further controlled for the extent of activity limitations; similarly, this variable was not included for other countries due to data unavailability. Source data are provided as a Source Data file. The *P* values can be found in the Source Data file. ADL, activities of daily living; IADL, instrumental activities of daily living; U.S., the United States; WE, Western Europe; CEE, Central and Eastern Europe; SK, South Korea. In Panels A–C, outcomes are defined for individuals with at least one ADL/IADL limitation; in Panels D–F, for those with at least one ADL limitation; and in Panels G–I, for those with at least one IADL limitation. The confidence interval for Chinese individuals without children is too narrow to be shown in Panels C, F, and I, specifically 100 (100, 100), due to the small sample size. The sample sizes were n = 5,295 in the U.S., 4,170 in Western Europe, 7,541 in Central and Eastern Europe, 1,435 in South Korea, 2,366 in Mexico, and 616 in China.

Table 1. Demographic characteristics of included participants: older adults who died between 2010 and 2021 and reported activity limitations, by country/region.

Characteristic	Total	United States	Western Europe	CEE	South Korea	Mexico	China
Age (years), mean (SD)	82.6 (8.4)	83.0 (8.6)	83.4 (8.3)	82.8 (8.1)	82.1 (7.8)	81.8 (9.3)	77.8 (7.6)
Female, n (%)	11,258 (52.6)	2,905 (54.9)	2,069 (49.6)	3,939 (52.2)	775 (54.0)	1,288 (54.4)	282 (45.8)
Education, n (%)							
Less than secondary	12,814 (59.8)	1,556 (29.4)	2,188 (52.5)	5,063 (67.1)	1,202 (83.8)	2,213 (93.5)	592 (96.1)
Upper secondary and vocational	6,328 (29.5)	2,950 (55.7)	1,322 (31.7)	1,821 (24.2)	160 (11.2)	58 (2.5)	17 (2.8)
Tertiary	2,281 (10.7)	789 (14.9)	660 (15.8)	657 (8.7)	73 (5.1)	95 (4.0)	7 (1.1)
Married or cohabiting, n (%)	10,202 (47.6)	2,159 (40.8)	2,168 (52.0)	3,762 (49.9)	731 (50.9)	1,051 (44.4)	331 (53.7)
Having children, n (%)	19,728 (92.1)	4,910 (92.7)	3,717 (89.1)	6,868 (91.1)	1,402 (97.7)	2,231 (94.3)	600 (97.4)
Living in rural area before death, n (%)	8,269 (38.6)	2,891 (54.6)	1,363 (32.7)	2,419 (32.1)	403 (28.1)	721 (30.5)	472 (76.6)
Died in nursing home, hospice, or hospital, n (%)	13,637 (63.7)	3,524 (66.6)	3,107 (74.5)	4,757 (63.1)	1,153 (80.4)	1,016 (42.9)	80 (13.0)
Number of chronic diseases, mean (SD)	1.6 (1.2)	1.9 (1.2)	1.6 (1.2)	1.5 (1.2)	1.4 (1.0)	1.0 (0.8)	1.5 (1.2)
Covered by long-term care insurance, n (%)	–	639 (12.1)	770 (18.5)	1,239 (16.4)	–	–	–
N	21,423	5,295	4,170	7,541	1,435	2,366	616

Notes: CEE, Central and Eastern Europe; SD, standard deviation. Values are mean (SD) for continuous variables and n (%) for categorical variables. '–' indicates not applicable. The long-term care insurance variable is available only in the US dataset (Health and Retirement Study, HRS) and the European dataset (Survey of Health, Ageing and Retirement in Europe, SHARE).

References

1. Swearinger, H., Lapham, J. L., Martinson, M. L. & Berridge, C. Older adults' unmet needs at the end of life: a cross-country comparison of the United States and England. *J. Aging Health* 37, 292–304 (2024).
2. World Health Organization. Palliative care. https://www.who.int/news-room/fact-sheets/detail/palliative-care (2020). Accessed 28 August 2024.
3. Ailshire, J., Osuna, M., Wilkens, J. & Lee, J. Family caregiving and place of death: insights from cross-national analysis of the Harmonized End-of-Life Data. *J. Gerontol. B Psychol. Sci. Soc. Sci.* 76, S76–S85 (2021).
4. Chen, S. Q., Jones, L. A., Jiang, S. et al. Difficulty and help with activities of daily living among older adults living alone during the COVID-19 pandemic: a multi-country population-based study. *BMC Geriatr.* 22, 181 (2022).
5. Kim, H., Duberstein, P. R., Zafar, A., Wu, B., Lin, H. Q. & Jarrin, O. F. Home health care and place of death in Medicare beneficiaries with and without dementia. *Gerontologist* 64, gnae131 (2024).
6. Khandelwal, N., Brumback, L. C., Halpern, S. D., Coe, N. B., Brumback, B. & Curtis, J. R. Evaluating the economic impact of palliative and end-of-life care interventions on intensive care unit utilization and costs from the hospital and healthcare system perspective. *J. Palliat. Med.* 20, 1314–1320 (2017).
7. Ailshire, J. A., Herrera, C. A., Choi, E., Osuna, M. & Suzuki, E. Cross-national differences in wealth inequality in health services and caregiving used near the end of life. *EClinicalMedicine* 58, 101911 (2023).
8. Reid, E., Ghoshal, A., Khalil, A. et al. Out-of-pocket costs near end of life in low- and middle-income countries: a systematic review. *PLoS Glob. Public Health* 2, e0000005 (2022).
9. World Health Organization. *Cross-Regional Study of Evidence Gaps on Unmet Needs for Health and Social Care: Executive Summary* (World Health Organization, 2025).
10. Murphy, A., Kowal, P., Albertini, M., Rechel, B., Chatterji, S. & Hanson, K. Family transfers and long-term care: an analysis of the WHO Study on global AGEing and adult health (SAGE). *J. Econ. Ageing* 12, 195–201 (2018).
11. Kashiwagi, M., Kashiwagi, K., Morioka, N. & Abe, K. Last year of life care transitions between long-term care insurance services in Japan: analysis of long-term care insurance claims data. *Geriatr. Gerontol. Int.* 24, 883–890 (2024).
12. World Health Organization. *Long-Term Care for Older People: Package for Universal Health Coverage* (World Health Organization, 2024).
13. Wachterman, M. W. & Sommers, B. D. Dying poor in the US—disparities in end-of-life care. *JAMA* 325, 423–424 (2021).
14. Beach, S. R., Schulz, R., Friedman, E. M., Rodakowski, J., Martsolf, R. G. & James, A. E. Adverse consequences of unmet needs for care in high-need/high-cost older adults. *J. Gerontol. B Psychol. Sci. Soc. Sci.* 75, 459–470 (2020).

15. Chen, S. Q., Zhang, H. Y., Underwood, B. R., Wang, D., Chen, X. & Cardinal, R. N. Trends in gender and racial/ethnic disparities in physical disability and social support among US older adults with cognitive impairment living alone, 2000–2018. *Innov. Aging* 7, 1–12 (2023).
16. Van Groenou, M. I. B. & De Boer, A. Providing informal care in a changing society. *Eur. J. Ageing* 13, 271–279 (2016).
17. Lin, Z., Qian, Y., Gill, T. M. et al. Absence of care among community-dwelling older adults with dementia and functional limitations. *Nat. Aging* 5, 548–557 (2025).
18. Soto-Perez-de-Celis, E., Chavarri-Guerra, Y., Pastrana, T., Ruiz-Mendoza, R., Bukowski, A. & Goss, P. E. End-of-life care in Latin America. *J. Glob. Oncol.* 3, 261–270 (2016).
19. Dale, B., Sævareid, H., Kirkevold, M. & Söderhamn, O. Formal and informal care in relation to activities of daily living and self-perceived health among older care-dependent individuals in Norway. *Int. J. Older People Nurs.* 3, 194–203 (2018).
20. Hopp, F. P. Patterns and predictors of formal and informal care among elderly persons living in board and care homes. *Gerontologist* 39, 167–176 (1999).
21. Kim, H., Kwon, S., Yoon, N. H. & Hyun, K. R. Utilization of long-term care services under the public long-term care insurance program in Korea: implications of a subsidy policy. *Health Policy* 111, 166–174 (2013).
22. Miguel, S., Alvira, M., Farré, M., Risco, E., Cabrera, E. & Zabalegui, A. Quality of life and associated factors in older people with dementia living in long-term institutional care and home care. *Eur. Geriatr. Med.* 7, 346–351 (2016).
23. Lee, T. W., Yim, E. S., Choi, H. S. & Chung, J. Day care vs home care: effects on functional health outcomes among long-term care beneficiaries with dementia in Korea. *Int. J. Geriatr. Psychiatry* 34, 97–105 (2019).
24. Xie, Y., Xu, Y., Yang, S., Yan, J., Jin, X. & Liu, C. Investigation of the awareness of and demand for hospice care and attitudes towards life-sustaining treatment at the end of life among community residents in Hangzhou. *BMC Palliat. Care* 19, 128 (2010).
25. Song, C., Feng, M. & Xie, H. End-of-life care in rural China: the crucial role and challenges of village doctors. *BMC Palliat. Care* 24, 115 (2025).
26. López-Ortega, M. Long-term care in Mexico: identifying challenges and future strategies. *Public Policy Aging Rep.* 34, 22–26 (2024).
27. Kinsella, K. Urban and rural dimensions of global population aging: an overview. *J. Rural Health* 17, 314–322 (2001).
28. Jang, S. N., Avendano, M. & Kawachi, I. Informal caregiving patterns in Korea and European countries: a cross-national comparison. *Asian Nurs. Res.* 6, 19–26 (2012).
29. Gong, J., Wang, G., Wang, Y. et al. Nowcasting and forecasting the care needs of the older population in China: analysis of data from the China Health and Retirement Longitudinal Study (CHARLS). *Lancet Public Health* 7, e1005–e1013 (2022).
30. OECD. *Health at a Glance 2023: OECD Indicators* (OECD Publishing, Paris, 2023).
31. 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 2018* (European Commission, 2018).
32. Lei, X., Bai, C., Hong, J. & Liu, H. Long-term care insurance and the well-being of older adults and their families: evidence from China. *Soc. Sci. Med.* 296, 114745 (2022).
33. Ariaans, M., Linden, P. & Wendt, C. Worlds of long-term care: a typology of OECD countries. *Health Policy* 125, 609–617 (2021).

34. Verbakel, E., Glaser, K., Amzour, Y., Brandt, M. & van Groenou, M. B. Indicators of familialism and defamilialization in long-term care: a theoretical overview and introduction of macro-level indicators. *J. Eur. Soc. Policy* 33, 34–51 (2023).

35. Mitra, S., Chen, W., Hervé, J., Pirozzi, S. & Yap, J. Invisible or mainstream? Disability in surveys and censuses in low- and middle-income countries. *Soc. Indic. Res.* 163, 219–249 (2022).

36. Kim, H. & Mitra, S. The economic and health effects of Long-Term Care Insurance: new evidence from Korea. *J. Econ. Ageing* 23, 100412 (2022).

37. Lin, L., He, M. & Zai, X. Evaluating the impact of long-term care insurance reform on health-related quality of life and inequality among older adults in China: a quasi-experimental analysis. *Econ. Hum. Biol.* 58, 101495 (2025).

38. Chen, S., Chen, X., Hou, X., Fang, H., Liu, G. & Yan, L. Temporal trends and disparities of population attributable fractions of modifiable risk factors for dementia in China: a time-series study of the China Health and Retirement Longitudinal Study. *Lancet Reg. Health West. Pac.* 47, 101106 (2024).

39. English Longitudinal Study of Ageing. Ethical approval. https://www.elsa-project.ac.uk/ethical-approval (2024). Accessed 15 October 2025.

40. Chen, S., Ford, T. J., Jones, P. B. & Cardinal, R. N. Prevalence, progress, and subgroup disparities in pharmacological antidepressant treatment of those who screen positive for depressive symptoms: a repetitive cross-sectional study in 19 European countries. *Lancet Reg. Health Eur.* 17, 100368 (2022).

41. Lee, J., Phillips, D., Wilkens, J. & Gateway to Global Aging Data Team. Gateway to Global Aging Data: resources for cross-national comparisons of family, social environment, and healthy aging. *J. Gerontol. B Psychol. Sci. Soc. Sci.* 76, S5–S16 (2021).

42. Sonnega, A., Faul, J. D., Ofstedal, M. B., Langa, K. M., Phillips, J. W. & Weir, D. R. Cohort profile: the Health and Retirement Study (HRS). *Int. J. Epidemiol.* 43, 576–585 (2014).

43. Long, C., Yang, W. & Glaser, K. Can long-term care insurance reduce catastrophic health and long-term care expenditures among older adults? A quasi-experimental study in China. *Eur. J. Ageing* 22, 25 (2025).

44. Gateway to Global Aging Data. Get end of life survey data. https://eol.g2aging.org/survey/get_data/ (2024). Accessed 2 November 2024.

45. Meijer, E., Casanova, M., Kim, H., Llena-Nozal, A. & Lee, J. Economic costs of dementia in 11 countries in Europe: estimates from nationally representative cohorts of a panel study. *Lancet Reg. Health Eur.* 20, 100445 (2022).

46. Long, C., Yao, Y., Tang, D. et al. Inequalities in the association between lifestyles and disability: prospective cohort studies in South Korea and China. *Am. J. Epidemiol.* kwaf177 (2025).

47. Long, C., Lin, Z., Swearinger, H., Ailshire, J., Qian, Y., Ming, W., Zhao, H., Hou, X., Wu, B., Yang, W., Chen, X. & Chen, S. Unmet Care Needs at the End-of-Life among Older Adults with Activity Limitations: A Study across 32 Countries. GitHub repository, https://doi.org/10.5281/zenodo.19750750 (2026).

Supplementary materials

Contents

Details on the five datasets 2
Figure S1. Flow chart of the sample of this study. 3
Harmonization process 4
Imputation of missing values 5
Table S1. Percentage of individuals receiving no help with ADL/IADL at end-of-life, by the type of carers. 6
Table S2. Percentage of individuals receiving informal help with ADL/IADL at end-of-life, by the type of carers. 7
Table S3. Proportion of older adults receiving no help with each activity of daily living and instrumental activity of daily living at the end of life, by country/area. 8
Table S4. Factors associated with unmet care needs for ADL/IADL limitations at the end of life, by country/region. 9
Table S5. Factors associated with unmet care needs for ADL limitations at the end of life, by country/region. 10
Table S6. Factors associated with unmet care needs for IADL limitations at the end of life, by country/region. 11
Table S7. The association between death at institutions and unmet care for activity limitations at the end of life. 13
Table S8. The association between urban residence before death and unmet care for activity limitations at the end of life. 14
Table S9. The association between being married or cohabitating before death and unmet care for activity limitations at the end of life. 15
Table S10. The association between having children and unmet care for activity limitations at the end of life. 16
Figure S2. Subgroup analyses: the proportion of older adults without care for activity limitations at end-of-life, stratified by income level. 17
Table S11. The association between higher income and unmet care for ADL/IADL limitations at the end of life. 18
Figure S3. Subgroup analyses: the proportion of older adults without care for activity limitations at end-of-life, stratified by having long-term care insurance. 19
Table S12. The association between having long-term care insurance and the unmet care for ADL/IADL limitations at the end of life. 20

Details on the five datasets

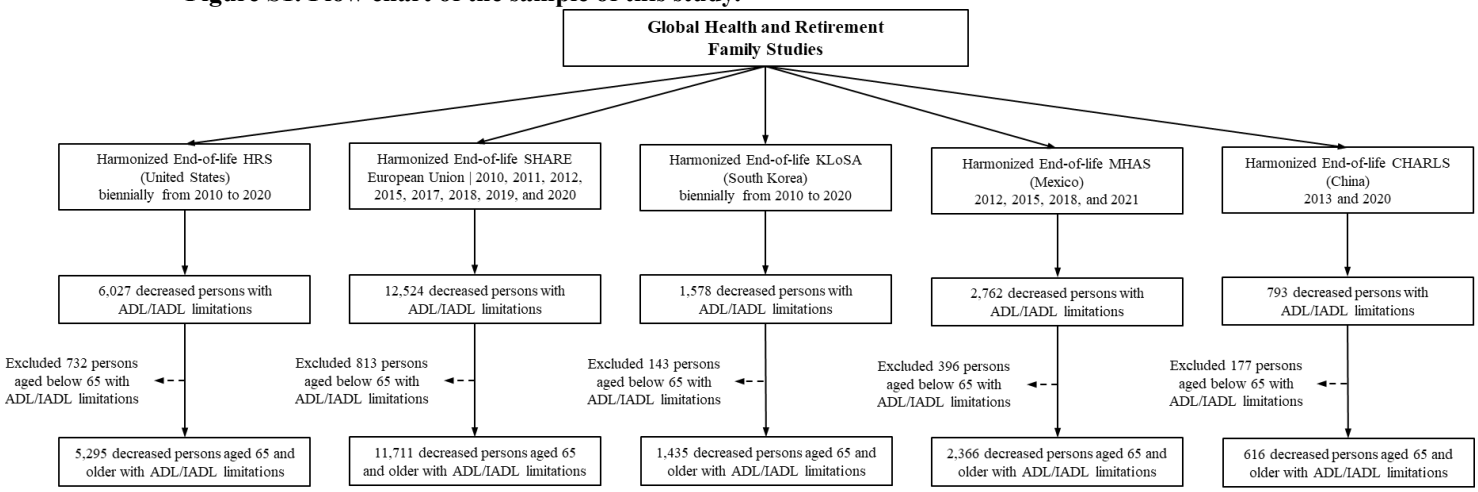
We utilized data from the Health and Retirement Study (HRS) in the United States; the Survey of Health, Ageing and Retirement in Europe (SHARE), encompassing 28 countries; the Korean Longitudinal Study of Aging (KLoSA); the Mexican Health and Aging Study (MHAS); and the China Health and Retirement Longitudinal Study (CHARLS) [1]. Their harmonized datasets were standardized to enhance cross-study comparability. These surveys gather comprehensive information on activity limitations and care support for deceased individuals, aligning well with the objectives of our study[1]. Notably, all five surveys are nationally representative and have been developed with consistent research protocols and structures to facilitate international comparisons[1,2]. The use of publicly available, de-identified secondary data rendered this study exempt from ethical approval. Each original study received approval from the relevant ethics committee, and all participants provided informed consent[3-8].

Specifically, the HRS includes individuals in the U.S. aged 50 and older, and it has been conducted biennially since 1992[8]. The SHARE covers Europeans aged 50 and above and has been conducted since 2004[9]. KLoSA surveys South Koreans aged 50 and older and has been conducted biennially since 2006[11]. MHAS focuses on individuals aged 50 and older in Mexico and was initiated in 2001[12]. Finally, CHARLS targets Chinese adults aged 45 and older and was initiated in 2011/2012[13]. In all these datasets, participants completed standardized questionnaires administered either in person or via the Internet/telephone[2,8-13]. Since only de-identified data were used, this study was exempt from institutional review board review.

It should be noted that harmonized end-of-life data are not available in all waves of these datasets[1]. For example, CHARLS only includes two waves (2013 and 2020)[1]. Therefore, to enhance the comparability of measures across surveys, we restricted our sample to those who died in 2010 or later. The post-2010 criterion was chosen to focus on more recent data, better reflect contemporary end-of-life care patterns, provide a sufficient span of years (≥10) for longitudinal analysis, and align with the availability of harmonized data across the included surveys. Our analysis focused on data from waves 10-15 (2010, 2012, 2014, 2016, 2018, and 2020) of HRS; waves 4-9 (2010-2011, 2013, 2015, 2017, 2019-2020, and 2021-2022) of SHARE; waves 3-8 (2010, 2012, 2014, 2016, 2018) of KLoSA; waves 3-6 (2012, 2015, 2018, and 2021) of MHAS; and waves 2 and 5 (2013 and 2020) of CHARLS.

We restricted the sample to deceased individuals aged 65 years and older who reported at least one difficulty performing activities of daily living (ADLs) or instrumental activities of daily living (IADLs) and died in or after 2010. The final sample included 21,423 respondents after excluding: (1) absence of ADL/IADL limitations, (2) age below 65 years, (3) pre-2010 mortality—the final analytical sample included 21,423 respondents: 5,295 from the HRS, 11,711 from the SHARE (covering 28 European countries), 1,435 from the KLoSA, 2,366 from the Mexico, and 616 from the CHARLS.

Figure S1. Flow chart of the sample of this study.



Note. ADL, activities of daily living. IADL, instrumental activities of daily living. The sample size was n = 5,295 from the Health and Retirement Study (HRS), 11,711 from the Survey of Health, Ageing and Retirement in Europe (SHARE), 1,435 from the Korean Longitudinal Study of Aging (KLoSA), 2,366 from the Mexican Health and Aging Study (MHAS), and 616 from the China Health and Retirement Longitudinal Study (CHARLS, 2013).

Harmonization process

The variables used in our analyses—such as the dependent variable (overall unmet care needs) and independent or control variables (e.g., marital status, having children, age, sex, number of chronic diseases, and year of death)—were measured using equivalent question options across surveys, ensuring strong cross-national comparability, and therefore did not require harmonization. Only two variables (place of death and education level) showed differences in questionnaire wording across datasets, and these were harmonized accordingly.

For place of death, each survey used slightly different response categories. Following established methodological precedents in the literature[17], we recorded these into two categories: (1) deaths at institutions and (2) deaths at other locations. For example, in the HRS, "death in hospital," "death in nursing home," "death in hospice," and "death in assisted living facility/rest home/retirement home/senior care home" were classified as deaths in institutions, while "death at home" and "other (including at work, outside, accident, or relative's home)" were grouped as deaths at other locations. As noted in the limitation section, death experiences may differ among nursing homes, hospitals, hospices, and homes. However, using a four-category variable would lead to smaller sample sizes for certain subgroups in datasets. Therefore, we used a dichotomous variable to compare deaths in institutions and elsewhere.

For education level, we used the harmonized variables (e.g., raeducl in harmonized KLoSA End of Life) from the Harmonized Datasets.[1,2] These variables were developed by the Gateway to Global Aging team to enable cross-national comparison using a three-tier classification: (1) less than lower secondary education, (2) upper secondary education, and (3) tertiary education. Specifically, raeducl was coded as 1 if the respondent had no education (illiterate or reading only) or completed elementary or middle school; 2 if the respondent completed high school; and 3 if the respondent completed a two-year college, college, or postgraduate degree (master's or PhD).

Imputation of missing values

The data are generally complete, with only 1,120 missing records (5.2% of the total) from the dependent variable (unmet care for ADL/IADL limitations at the end of life) and the covariate (education). To address missing data, we applied multiple imputations with chained equations to impute the missing values[18]. Five samples were generated and combined following standard procedures. The predictors included in the imputation model were the variables of interest (place of death, urban/rural residence, marital or cohabitation status, having children, and long-term care insurance coverage) along with control variables (age, sex, and the number of chronic diseases). To examine whether missingness was systematically associated with the outcome, we compared individuals with complete outcome data to those with imputed values using chi-square tests. No statistically significant difference was observed in overall unmet care ($\chi^2 = 1.04$, $P > 0.05$), suggesting no evidence of systematic differences related to missingness. In addition, please note that there are instances where we did not impute the missing values for long-term care insurance coverage: (1) in countries where long-term care insurance was not implemented, and (2) in countries where it was implemented, there were study waves prior to its introduction, during which insurance coverage data were not applicable.

Table S1. Percentage of individuals receiving no help with ADL/IADL at end-of-life, by the type of carers.

	No care for any care	No care for formal care	No care for informal care
ADL/IADL			
United States	11.14	53.98	24.29
	(10.30, 11.99)	(52.63, 55.32)	(23.13, 25.44)
Western Europe	18.42	41.73	48.15
	(17.24, 19.59)	(40.23, 43.22)	(46.63, 49.67)
Central and	25.82	76.52	38.38
Eastern Europe	(24.83, 26.81)	(75.56, 77.47)	(37.28, 39.47)
South Korea	12.89	66.21	33.24
	(11.16, 14.63)	(63.75, 68.65)	(30.80, 35.68)
Mexico	8.16	95.56	9.81
	(7.05, 9.26)	(94.73, 96.39)	(8.61, 11.00)
China	1.55	97.94	2.06
	(0, 3.28)	(95.94, 99.94)	(0.06, 4.06)
ADL			
United States	17.71	55.34	37.17
	(16.70, 18.77)	(53.98, 56.68)	(35.86, 38.48)
Western Europe	31.90	46.06	63.55
	(29.87, 33.92)	(43.89, 48.22)	(61.46, 65.64)
Central and	39.82	79.25	52.12
Eastern Europe	(38.31, 41.33)	(77.99, 80.50)	(50.58, 53.66)
South Korea	15.96	67.80	38.26
	(14.10, 17.96)	(65.32, 70.22)	(35.73, 40.83)
Mexico	13.99	95.86	16.10
	(12.62, 15.45)	(94.98, 96.62)	(14.64, 17.65)
China	18.34	97.94	19.07
	(15.37, 21.63)	(94.81, 99.44)	(13.80, 25.32)
IADL			
United States	33.28	84.97	38.66
	(32.01, 34.56)	(83.98, 85.68)	(37.34, 39.99)
Western Europe	26.85	49.93	54.63
	(24.93, 28.77)	(47.76, 52.10)	(52.47, 56.79)
Central and	31.99	78.45	44.63
Eastern Europe	(30.55, 33.43)	(77.18, 79.72)	(43.10, 46.17)
South Korea	40.42	80.56	59.86
	(37.87, 43.01)	(78.41, 82.58)	(57.27, 62.41)
Mexico	59.51	99.03	60.06
	(57.50, 61.50)	(98.54, 99.38)	(58.05, 62.04)
China	10.82	98.45	11.34
	(6.83, 16.07)	(95.55, 99.68)	(7.24, 16.67)

Notes: The cells show the percentage of individuals receiving no help with ADL/IADL at the end of life, by type of carer. Corresponding 95% confidence intervals are presented in parentheses. ADL, activities of daily living. IADL, instrumental activities of daily living. No care for ADL/IADL indicates the rate of receiving no assistance with any ADL or IADL tasks among those who reported at least one ADL or IADL limitation. No care for ADL specifically refers to the rate of receiving no help with any ADL tasks among those who reported at least one ADL limitation. Similarly, no care for IADL refers to the rate of receiving no help with any IADL tasks among those who reported at least one IADL limitation. Data from the Health and Retirement Study (HRS, 2010-2020, n =5,295) in the U.S., the Survey of Health, Ageing and Retirement in Europe (SHARE, 2010-2021, n=11,711) in Europe, the Korean Longitudinal Study of Aging (KLoSA, 2010-2018, n=1,435) in South Korea, Mexican Health and Aging Study (MHAS, 2012-2021, n=2,366) in Mexico, and the China Health and Retirement Longitudinal Study (CHARLS, 2013 and 2020, n=616) were used to construct the estimates. "–" denotes not applicable.

Table S2. Percentage of individuals receiving informal help with ADL/IADL at end-of-life, by the type of carers.

Country	Informal care receipt for ADL/IADL	Type of informal carers			
		Spouse	Children	Relatives	Non-relatives
United States	75.71	24.65	53.31	9.16	19.51
	(74.56, 76.87)	(23.49, 25.81)	(51.97, 54.66)	(8.38, 9.94)	(18.44, 20.58)
Western Europe	51.85	14.20	32.85	4.77	8.56
	(50.33, 53.37)	(13.14, 15.26)	(31.43, 34.28)	(4.13, 5.42)	(7.71, 9.41)
Central and	61.62	16.06	4.58	4.80	6.99
Eastern Europe	(60.53, 62.72)	(15.23, 16.89)	(4.46, 4.69)	(4.32, 5.28)	(6.41, 7.56)
South Korea	66.76	30.31	39.65	2.58	5.64
	(64.32, 69.20)	(27.94, 32.69)	(37.12, 42.18)	(1.76, 3.34)	(4.45, 6.84)
Mexico	90.19	16.36	76.33	6.47	7.27
	(89, 91.39)	(14.87, 17.85)	(74.62, 78.04)	(5.48, 7.46)	(6.22, 8.32)
China	97.94	40.42	25.49	2.11	1.30
	(95.94, 99.94)	(36.55, 44.30)	(22.05, 28.93)	(0.98, 3.25)	(0.40, 2.19)
	Informal care receipt for ADL				
United States	62.83	19.60	42.63	6.59	16.56
	(61.52, 64.14)	(18.53, 20.67)	(41.29, 43.96)	(5.92, 7.26)	(15.56, 17.56)
Western Europe	44.04	10.93	31.40	3.52	5.20
	(42.79, 45.30)	(10.15, 11.72)	(30.23, 32.56)	(3.06, 3.99)	(4.64, 5.76)
Central and	47.88	11.51	35.58	3.77	5.03
Eastern Europe	(46.34, 49.42)	(10.52, 12.49)	(34.10, 37.06)	(3.18, 4.36)	(4.36, 5.71)
South Korea	61.74	27.25	36.24	2.23	5.30
	(59.17, 64.27)	(24.94, 29.55)	(33.75, 38.72)	(1.47, 3.00)	(4.14, 6.45)
Mexico	83.90	13.65	70.92	5.96	3.51
	(82.35, 85.36)	(12.27, 15.04)	(69.09, 72.75)	(5.01, 6.91)	(2.77, 4.25)
China	80.93	33.51	65.98	3.09	1.55
	(74.68, 86.20)	(26.86, 40.15)	(58.31, 72.65)	(0.66, 5.53)	(0, 0.33)
	Informal care receipt for IADL				
United States	61.34	19.32	40.79	5.80	10.25
	(60.01, 62.66)	(18.26, 20.38)	(39.47, 42.12)	(5.17, 6.43)	(9.44, 11.07)
Western Europe	45.37	11.76	29.25	3.63	6.81
	(47.53, 43.21)	(10.36, 13.16)	(27.28, 31.22)	(2.81, 4.44)	(5.72, 7.90)
Central and	55.37	13.07	41.66	4.09	6.00
Eastern Europe	(53.83, 56.90)	(12.03, 14.11)	(40.13, 43.18)	(3.48, 4.70)	(5.27, 6.73)
South Korea	40.14	17.42	19.23	0.98	2.51
	(37.59, 42.73)	(15.46, 19.38)	(17.19, 21.27)	(0.47, 1.48)	(1.70, 3.32)
Mexico	39.94	5.67	33.14	1.82	5.20
	(37.96, 41.95)	(4.73, 6.59)	(31.24, 35.03)	(1.28, 2.36)	(4.30, 6.09)
China	88.66	40.72	68.56	4.64	2.58
	(83.33, 92.76)	(33.81, 47.64)	(62.02, 75.09)	(1.68, 7.60)	(0.35, 4.81)

Notes: The cells show the percentage of individuals receiving informal help with ADL/IADL at end-of-life, by the type of carers. Corresponding 95% confidence intervals are presented in parentheses. ADL, activities of daily living. IADL, instrumental activities of daily living. Informal care receipt for ADL/IADL indicates the rate of receiving assistance with any ADL or IADL tasks from informal caregivers among those who reported at least one ADL or IADL limitation. Informal care receipt for ADL specifically refers to the rate of receiving help with any ADL tasks from informal caregivers among those who reported at least one ADL limitation. Similarly, informal care receipt for IADL refers to the rate of receiving help with any IADL tasks from informal caregivers among those who reported at least one IADL limitation. Data from the Health and Retirement Study (HRS, 2010-2020, n =5,295) in the U.S., the Survey of Health, Ageing and Retirement in Europe (SHARE, 2010-2021, n=11,711) in Europe, the Korean Longitudinal Study of Aging (KLoSA, 2010-2018, n=1,435) in South Korea, Mexican Health and Aging Study (MHAS, 2012-2021, n=2,366) in Mexico, and the China Health and Retirement Longitudinal Study (CHARLS, 2013 and 2020, n=616) were used to construct the estimates. "–" denotes not applicable.

Table S3 presents the proportion of older adults receiving assistance with each task related to ADL and IADL at the end of life. As SHARE, KLoSA, and MHAS did not inquire about care received for specific ADL/IADL tasks, the proportions for each task in Table S1 are presented only for the United States and China. In the United States and China, unmet care across different ADL domains followed a relatively similar pattern. Across all three regions, bathing had the lowest rate of unmet care, whereas eating had the highest. However, cross-country differences were observed in the IADL domains. The United States showed consistently high levels of unmet care across all IADL tasks (over 60%), whereas in China, unmet care for tasks such as preparing a hot meal and grocery shopping was relatively lower (29–32%). Based on these findings, we hypothesize that in European countries, South Korea, and Mexico, unmet care for each ADL domain may follow a similar pattern to that observed in other study regions, while disparities in IADL domains may be less pronounced. Nevertheless, the absence of domain-specific data in SHARE, KLoSA, and MHAS could limit our ability to identify variations in unmet care for IADL tasks when comparing findings across datasets, which warrants further verification using datasets that include domain-specific measures.

Table S3. Proportion of older adults receiving no help with each activity of daily living and instrumental activity of daily living at the end of life, by country/area.

	Activities of daily living				
Region	**Dressing**	**Bathing**	**Eating**	**Getting in and out of bed**	**Using the toilet**
U.S.A	52.84	50.80	67.72	58.36	60.17
	(51.50, 54.19)	(49.46, 52.15)	(66.46, 68.98)	(57.03, 59.68)	(58.85, 61.49)
China	44.64	29.55	52.27	43.51	41.23
	(40.72, 48.57)	(25.94, 33.15)	(48.33, 56.22)	(39.59, 47.42)	(37.35, 45.12)
	Instrumental activities of daily living				
	Preparing a hot meal	**Grocery shopping**	**Using the phone**	**Taking medications**	
U.S.A	69.20	70.42	67.01	62.66	
	(67.95, 70.44)	(69.20, 71.65)	(65.74, 68.27)	(61.36, 63.97)	
China	29.22	32.31	62.66	64.12	
	(25.63, 32.81)	(28.61, 36.00)	(58.84, 66.48)	(60.34, 67.91)	

Notes: Data from the Health and Retirement Study (HRS, 2010-2020, n =5,295) in the U.S. and the China Health and Retirement Longitudinal Study (CHARLS, 2013 and 2020, n=616) were used to construct the estimates. SHARE, KLoSA, and MHAS did not ask for the care receipt for each domain of their ADL and IADL limitations.

Table S4. Factors associated with unmet care needs for ADL/IADL limitations at the end of life, by country/region.

	United States	Western Europe	CEE	South Korea	Mexico	China
	OR (95%CI)					
Any care						
Place of death (Ref: other locations)						
Died in nursing homes/hospice/hospital	0.27***	0.81	0.73***	0.58**	1.42*	0.85
	(0.18 - 0.38)	(0.65 - 1.01)	(0.64 - 0.83)	(0.40 - 0.84)	(1.03 - 1.94)	(0.23, 3.18)
Urban/rural residence before death (Ref: urban areas)						
Rural areas	1.21	0.77*	1.03	1.16	1.19	1.23
	(0.92 - 1.59)	(0.63 - 0.95)	(0.90 - 1.18)	(0.79 - 1.69)	(0.84 - 1.69)	(0.48, 3.17)
Marital status (Ref: not having a partner)						
Married or cohabiting	1.26	1.84***	1.32***	0.69	0.62**	1.00
	(0.92 - 1.72)	(1.45 - 2.32)	(1.15 - 1.53)	(0.45 - 1.05)	(0.44 - 0.87)	(0.42, 2.39)
Having children (Ref: no)						
Yes	0.89	0.69*	0.60***	0.61	1.17	0.30
	(0.54 - 1.46)	(0.50 - 0.94)	(0.49 - 0.73)	(0.24 - 1.57)	(0.61 - 2.27)	(0.05, 1.93)
Income level (Ref: lower income)						
Higher income	-	1.32*	0.94	0.71	-	1.22
		(1.07 - 1.63)	(0.83 - 1.07)	(0.47, 1.10)		(0.56, 2.67)
Covered by long-term care insurance (Ref: no)						
Yes	1.03	0.81	1.02	-	-	-
	(0.68 - 1.56)	(0.64 - 1.03)	(0.87 - 1.19)			
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Informal care						
Place of death (Ref: other locations						
Died in nursing homes/hospice/hospital	1.94***	1.37***	1.11	1.30	1.45*	-
	(1.63 - 2.31)	(1.15 - 1.63)	(0.99 - 1.24)	(0.96 - 1.76)	(1.08 - 1.94)	
Urban/rural residence before death (Ref: urban areas)						
Rural areas	1.06	1.04	1.29***	1.35*	1.18	1.79
	(0.91 - 1.23)	(0.89 - 1.22)	(1.14 - 1.46)	(1.03 - 1.76)	(0.85 - 1.63)	(0.07 - 45.98)
Marital status (Ref: not having a partner)						
Married or cohabiting	0.70***	1.18	1.09	0.55***	0.65**	1.81
	(0.59 - 0.83)	(0.995 - 1.40)	(0.95 - 1.24)	(0.41 - 0.75)	(0.47 - 0.88)	(0.07 - 44.24)
Having children (Ref: no)						
Yes	0.56***	0.54***	0.41***	0.42*	0.81	-
	(0.43 - 0.73)	(0.42 - 0.69)	(0.34 - 0.49)	(0.20 - 0.86)	(0.47 - 1.41)	
Income level (Ref: lower income)						
Higher income	-	1.08	0.84**	0.76	-	0.95
		(0.93 - 1.26)	(0.75 - 0.94)	(0.56, 1.02)		(0.67, 1.36)
Covered by long-term care insurance (Ref: no)						
Yes	1.01	0.85	1.13	-	-	-
	(0.80 - 1.26)	(0.71 - 1.01)	(0.99 - 1.29)			
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Formal care						
Place of death (Ref: other locations						
Died in nursing homes/hospice/hospital	0.27***	0.66***	0.48***	0.34***	0.94	0.21
	(0.24 - 0.31)	(0.55 - 0.79)	(0.42 - 0.55)	(0.24 - 0.49)	(0.62 - 1.42)	(0.02 - 2.79)
Urban/rural residence before death (Ref: urban areas						
Rural areas	1.03	0.69***	0.60***	0.61***	0.63	0.22
	(0.91 - 1.17)	(0.59 - 0.82)	(0.51 - 0.70)	(0.46 - 0.80)	(0.38 - 1.05)	(0.02 - 2.08)
Marital status (Ref: not having a partner)						
Married or cohabiting	1.62***	1.69***	1.52***	1.25	1.18	0.46
	(1.41 - 1.87)	(1.42 - 2.02)	(1.31 - 1.77)	(0.93 - 1.69)	(0.75 - 1.88)	(0.03 - 6.75)
Having children (Ref: no)						
Yes	1.09	0.99	1.58***	2.06	2.14*	-
	(0.86 - 1.38)	(0.77 - 1.28)	(1.28 - 1.95)	(0.98 - 4.35)	(1.15 - 4.00)	
Income level (Ref: lower income)						
Higher income	-	0.99	1.04	0.83	-	0.95
		(0.84 - 1.16)	(0.91 - 1.19)	(0.62, 1.10)		(0.67, 1.36)
Covered by long-term care insurance (Ref: no)						
Yes	0.91	1.05	0.82**	-	-	-
	(0.76 - 1.10)	(0.88 - 1.26)	(0.70 - 0.95)			
Controls	Yes	Yes	Yes	Yes	Yes	Yes

Notes: ADL, activities of daily living. IADL, instrumental activities of daily living. Odds ratios (ORs) and their 95% confidence intervals (CIs) were estimated using logistic regression. Three dichotomized outcomes were examined: receiving no care for ADL/IADL limitations (upper panel), receiving no formal care for ADL/IADL limitations (middle panel), and receiving no informal care for ADL/IADL limitations (lower panel). The 'income' variable is only available in the European, South Korean, and Chinese samples. The variable "having long-term care insurance" was available only in the U.S. and European samples. The model controlled for age, sex, education level, marital status, urban/rural residence, having children, place of death, number of chronic diseases, and year of death. For the U.S.

and China samples, we further controlled for the extent of activity limitations; similarly, this variable was not included for other countries due to data unavailability. P values are reported in the Source Data File. *** p < 0.001; **p < 0.01; * p < 0.05. Data from the Health and Retirement Study (HRS, 2010-2020, n =5,295) in the U.S., the Survey of Health, Ageing and Retirement in Europe (SHARE, 2010-2021, n=11,711) in Europe, the Korean Longitudinal Study of Aging (KLoSA, 2010-2018, n=1,435) in South Korea, Mexican Health and Aging Study (MHAS, 2012-2021, n=2,366) in Mexico, and the China Health and Retirement Longitudinal Study (CHARLS, 2013 and 2020, n=616) were used to construct the estimates. For each country/region, deceased individuals (age 65+) were included if they had reported at least one ADL or IADL limitation and died between 2010 and 2021. "-" means not applicable. Owing to the relatively small sample size in the Chinese sample, some odds ratio estimates for certain factors could not be calculated.

Table S5. Factors associated with unmet care needs for ADL limitations at the end of life, by country/region.

	United States	Western Europe	CEE	South Korea	Mexico	China
	OR (95%CI)					
Any care						
Place of death (Ref: other locations)						
Died in nursing homes/hospice/hospital	0.87 (0.72 – 1.04)	0.84 (0.65 - 1.09)	0.78** (0.68 - 0.90)	0.59** (0.42 - 0.83)	1.50** (1.17 - 1.91)	1.75 (0.91, 3.38)
Urban/rural residence before death (Ref: urban areas)						
Rural areas	0.92 (0.77 - 1.10)	0.76* (0.60 - 0.96)	1.05 (0.90 - 1.23)	1.28 (0.90 - 1.81)	1.14 (0.87 - 1.49)	0.60 (0.33, 1.11)
Marital status (Ref: not having a partner)						
Married or cohabiting	1.16 (0.95- 1.42)	1.24 (0.96 - 1.62)	1.16 (0.98 - 1.36)	0.72 (0.49 - 1.05)	0.60*** (0.46 - 0.78)	0.83 (0.51, 1.36)
Having children (Ref: no)						
Yes	0.68* (0.48 - 0.97)	0.60** (0.43 - 0.84)	0.71** (0.56 - 0.90)	0.76 (0.31 - 1.82)	1.22 (0.72 - 2.06)	0.19** (0.07, 0.61)
Income level (Ref: lower income)						
Higher income	-	1.14 (0.90 - 1.44)	0.96 (0.83 - 1.11)	0.68 (0.46, 1.00)	-	1.50 (0.95, 2.36)
Covered by long-term care insurance (Ref: no)						
Yes	0.85 (0.64 - 1.12)	0.85 (0.64 - 1.12)	0.96 (0.81 - 1.14)	-	-	-
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Informal care						
Place of death (Ref: other locations						
Died in nursing homes/hospice/hospital	2.60*** (2.26 - 3.00)	1.39* (1.08 - 1.78)	1.11 (0.96 - 1.28)	1.33 (0.998 - 1.79)	1.50** (1.19 - 1.89)	0.62 (0.12 - 3.26)
Urban/rural residence before death (Ref: urban areas)						
Rural areas	0.98 (0.86 - 1.11)	0.96 (0.76 - 1.20)	1.20* (1.03 - 1.40)	1.52** (1.17 - 1.97)	1.14 (0.88 - 1.47)	1.25 (0.34 - 4.56)
Marital status (Ref: not having a partner)						
Married or cohabiting	0.78** (0.68 - 0.91)	1.12 (0.87 - 1.43)	0.93 (0.80 - 1.09)	0.59*** (0.45 - 0.79)	0.62*** (0.48 - 0.80)	1.09 (0.34 - 3.54)
Having children (Ref: no)						
Yes	0.56*** (0.44 - 0.71)	0.64* (0.45 - 0.90)	0.56*** (0.43 - 0.71)	0.42* (0.20 - 0.89)	0.98 (0.62 - 1.55)	-
Income level (Ref: lower income)						
Higher income	-	0.94 (0.75 - 1.17)	0.84* (0.73 - 0.97)	0.74* (0.56, 0.98)	-	0.95 (0.67, 1.36)
Covered by long-term care insurance (Ref: no)						
Yes	0.97 (0.80 - 1.18)	0.78 (0.60 - 1.01)	1.07 (0.90 - 1.26)	-	-	-
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Formal care						
Place of death (Ref: other locations						
Died in nursing homes/hospice/hospital	0.27*** (0.23 - 0.31)	0.64** (0.50 - 0.83)	0.45*** (0.37 - 0.54)	0.37*** (0.26 - 0.52)	0.93 (0.60 - 1.42)	0.16 (0.01 - 2.64)
Urban/rural residence before death (Ref: urban areas						
Rural areas	1.01 (0.89 - 1.15)	0.74* (0.59 - 0.93)	0.68*** (0.55 - 0.84)	0.64** (0.48 - 0.84)	0.65 (0.38 - 1.10)	0.29 (0.03 - 2.90)
Marital status (Ref: not having a partner)						
Married or cohabiting	1.53*** (1.32 - 1.76)	1.34* (1.04 - 1.71)	1.63*** (1.33 - 2.00)	1.29 (0.95 - 1.74)	1.24 (0.77 - 2.01)	0.40 (0.02 - 6.81)
Having children (Ref: no)						
Yes	1.09 (0.85 - 1.38)	0.75 (0.53 - 1.04)	1.24 (0.94 - 1.64)	2.22* (1.06 - 4.68)	1.86 (0.95 - 3.62)	-
Income level (Ref: lower income)						
Higher income	-	1.14	1.13	0.85	-	0.95

		(0.91 - 1.42)	(0.94 - 1.35)	(0.64, 1.14)		(0.67, 1.36)
Covered by long-term care insurance (Ref: no)						
Yes	0.91	1.01	0.81*	-	-	-
	(0.75 - 1.10)	(0.77 - 1.32)	(0.66 - 0.99)			
Controls	Yes	Yes	Yes	Yes	Yes	Yes

Notes: ADL, activities of daily living. Odds ratios (ORs) and their 95% confidence intervals (CIs) were estimated using logistic regression. Three dichotomized outcomes were examined: receiving no care for ADL limitations (upper panel), receiving no formal care for ADL limitations (middle panel), and receiving no informal care for ADL limitations (lower panel). The 'income' variable is only available in the European, South Korean, and Chinese samples. The variable "having long-term care insurance" was available only in the U.S. and European samples. The model controlled for age, sex, education level, marital status, urban/rural residence, having children, place of death, number of chronic diseases, and year of death. For the U.S. and China samples, we further controlled for the extent of activity limitations; similarly, this variable was not included for other countries due to data unavailability. P values are reported in the Source Data File. *** $p < 0.001$; **$p < 0.01$; * $p < 0.05$. Data from the Health and Retirement Study (HRS, 2010-2020, n =5,295) in the U.S., the Survey of Health, Ageing and Retirement in Europe (SHARE, 2010-2021, n=11,711) in Europe, the Korean Longitudinal Study of Aging (KLoSA, 2010-2018, n=1,435) in South Korea, Mexican Health and Aging Study (MHAS, 2012-2021, n=2,366) in Mexico, and the China Health and Retirement Longitudinal Study (CHARLS, 2013 and 2020, n=616) were used to construct the estimates. For each country/region, deceased individuals (age 65+) were included if they had reported at least one ADL or IADL limitation and died between 2010 and 2021. "-" means not applicable. Owing to the relatively small sample size in the Chinese sample, some odds ratio estimates for certain factors could not be calculated.

Table S6. Factors associated with unmet care needs for IADL limitations at the end of life, by country/region.

	United States	**Western Europe**	**CEE**	**South Korea**	**Mexico**	**China**
	OR (95%CI)					
Any care						
Place of death (Ref: other locations)						
Died in nursing homes/hospice/hospital	1.06	1.04	0.72***	0.61**	1.86**	1.27
	(0.79 - 1.41)	(0.78 - 1.38)	(0.62 - 0.84)	(0.46 - 0.81)	(1.25 - 2.76)	(0.64, 2.55)
Urban/rural residence before death (Ref: urban areas)						
Rural areas	1.02	0.77*	1.17	1.00	0.82	1.04
	(0.82 - 1.26)	(0.60 - 0.99)	(0.99 - 1.37)	(0.78 - 1.29)	(0.54 - 1.24)	(0.58, 1.89)
Marital status (Ref: not having a partner)						
Married or cohabiting	0.73*	2.01***	1.37***	0.77	1.49	1.30
	(0.57 - 0.94)	(1.52 - 2.68)	(1.15 - 1.62)	(0.57 - 1.03)	(0.98 - 2.26)	(0.76, 2.22)
Having children (Ref: no)						
Yes	0.95	0.46***	0.57***	0.95	0.96	0.67
	(0.65 - 1.41)	(0.32 - 0.66)	(0.44 - 0.72)	(0.44 - 2.05)	(0.43 - 2.15)	(0.17, 2.72)
Income level (Ref: lower income)						
Higher income	-	1.05	1.03	0.97	-	1.11
		(0.81 - 1.35)	(0.89 - 1.20)	(0.74, 1.28)		(0.69, 1.79)
Covered by long-term care insurance (Ref: no)						
Yes	0.92	0.73*	1.03	-	-	-
	(0.67 - 1.26)	(0.53 - 0.997)	(0.86 - 1.24)			
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Informal care						
Place of death (Ref: other locations						
Died in nursing homes/hospice/hospital	1.32**	1.42**	1.07	1.11	1.66**	0.01
	(1.07 - 1.63)	(1.11 - 1.82)	(0.93 - 1.23)	(0.84 - 1.47)	(1.14 - 2.43)	(0.00003 - 1.52)
Urban/rural residence before death (Ref: urban areas)						
Rural areas	1.01	1.04	1.31**	1.24	0.91	1.98
	(0.85 - 1.20)	(0.83 - 1.30)	(1.12 - 1.52)	(0.97 - 1.58)	(0.61 - 1.37)	(0.05 - 79.96)
Marital status (Ref: not having a partner)						
Married or cohabiting	0.68***	1.52**	1.14	0.71*	1.37	1.71
	(0.56 - 0.82)	(1.19 - 1.94)	(0.97 - 1.33)	(0.53 - 0.94)	(0.92 - 2.06)	(0.04 - 72.69)
Having children (Ref: no)						
Yes	0.72*	0.49***	0.45***	0.42*	0.82	-
	(0.53 - 0.99)	(0.35 - 0.69)	(0.35 - 0.57)	(0.18 - 0.97)	(0.38 - 1.77)	
Income level (Ref: lower income)						
Higher income	-	0.89	0.85*	1.00	-	0.97
		(0.71 - 1.10)	(0.74 - 0.98)	(0.76, 1.31)		(0.74, 1.28)
Covered by long-term care insurance (Ref: no)						
Yes	1.03	0.77*	1.15	-	-	-
	(0.80 - 1.33)	(0.60 - 0.996)	(0.97 - 1.36)			
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Formal care						

Place of death (Ref: other locations)						
Died in nursing homes/hospice/hospital	0.55***	0.74*	0.45***	0.29***	1.62	-
	(0.45 - 0.67)	(0.57 - 0.95)	(0.37 - 0.55)	(0.18 - 0.47)	(0.64 - 4.10)	
Urban/rural residence before death (Ref: urban areas)						
Rural areas	0.97	0.66***	0.69***	0.68*	0.33	0.53
	(0.83 - 1.14)	(0.53 - 0.84)	(0.56 - 0.84)	(0.49 - 0.96)	(0.09 - 1.11)	(0.03 - 10.92)
Marital status (Ref: not having a partner)						
Married or cohabiting	1.60***	1.70***	1.50***	1.19	1.16	0.20
	(1.31 - 1.95)	(1.33 - 2.17)	(1.23 - 1.84)	(0.83 - 1.69)	(0.41 - 3.23)	(0.01 - 7.45)
Having children (Ref: no)						
Yes	1.12	0.62**	1.44**	2.13	3.47*	-
	(0.83 - 1.51)	(0.44 - 0.86)	(0.10 - 1.89)	(0.98 - 4.63)	(1.07 - 11.25)	
Income level (Ref: lower income)						
Higher income	-	1.14	1.17	0.95	-	0.95
		(0.91 - 1.43)	(0.98 - 1.40)	(0.67, 1.36)		(0.67, 1.36)
Covered by long-term care insurance (Ref: no)						
Yes	0.90	0.88	0.81*	-	-	-
	(0.71 - 1.13)	(0.68 - 1.16)	(0.67 - 0.99)			
Controls	Yes	Yes	Yes	Yes	Yes	Yes

Notes: IADL, instrumental activities of daily living. Odds ratios (ORs) and their 95% confidence intervals (CIs) were estimated using logistic regression. Three dichotomized outcomes were examined: receiving no care for IADL limitations (upper panel), receiving no formal care for IADL limitations (middle panel), and receiving no informal care for IADL limitations (lower panel). The 'income' variable is only available in the European, South Korean, and Chinese samples. The variable "having long-term care insurance" was available only in the U.S. and European samples. The model controlled for age, sex, education level, marital status, urban/rural residence, having children, place of death, number of chronic diseases, and year of death. For the U.S. and China samples, we further controlled for the extent of activity limitations; similarly, this variable was not included for other countries due to data unavailability. P values are reported in the Source Data File. *** $p < 0.001$; **$p < 0.01$; * $p < 0.05$. Data from the Health and Retirement Study (HRS, 2010-2020, n =5,295) in the U.S., the Survey of Health, Ageing and Retirement in Europe (SHARE, 2010-2021, n=11,711) in Europe, the Korean Longitudinal Study of Aging (KLoSA, 2010-2018, n=1,435) in South Korea, Mexican Health and Aging Study (MHAS, 2012-2021, n=2,366) in Mexico, and the China Health and Retirement Longitudinal Study (CHARLS, 2013 and 2020, n=616) were used to construct the estimates. For each country/region, deceased individuals (age 65+) were included if they had reported at least one ADL or IADL limitation and died between 2010 and 2021. "-" means not applicable. Owing to the relatively small sample size in the Chinese sample, some odds ratio estimates for certain factors could not be calculated.

Table S7 presents the results examining the association between place of death and unmet care for ADL/IADL limitations at the end of life. Death at institutions was associated with a lower likelihood of overall unmet care for ADL/IADL in Central and Eastern Europe and South Korea, but a lower likelihood of receiving such care in Mexico.

Table S7. The association between death at institutions and unmet care for activity limitations at the end of life.

	No care for ADL/IADL			No care for ADL			No care for IADL		
	Any care	Informal care	Formal care	Any care	Informal care	Formal care	Any care	Informal care	Formal care
Region	OR (95%CI, Ref: death at other locations)								
U.S.	0.27***	1.94***	0.27***	0.87	2.60***	0.27***	1.06	1.32**	0.55***
	(0.18 - 0.38)	(1.63 - 2.31)	(0.24 - 0.31)	(0.72 – 1.04)	(2.26 - 3.00)	(0.23 - 0.31)	(0.79 - 1.41)	(1.07 - 1.63)	(0.45 - 0.67)
Western Europe	0.81	1.37***	0.66***	0.84	1.39*	0.64**	1.04	1.42**	0.74*
	(0.65 - 1.01)	(1.15 - 1.63)	(0.55 - 0.79)	(0.65 - 1.09)	(1.08 - 1.78)	(0.50 - 0.83)	(0.78 - 1.38)	(1.11 - 1.82)	(0.57 - 0.95)
Central and	0.73***	1.11	0.48***	0.78**	1.11	0.45***	0.72***	1.07	0.45***
Eastern Europe	(0.64 - 0.83)	(0.99 - 1.24)	(0.42 - 0.55)	(0.68 - 0.90)	(0.96 - 1.28)	(0.37 - 0.54)	(0.62 - 0.84)	(0.93 - 1.23)	(0.37 - 0.55)
South Korea	0.58**	1.30	0.34***	0.59**	1.33	0.37***	0.61**	1.11	0.29***
	(0.40 - 0.84)	(0.96 - 1.76)	(0.24 - 0.49)	(0.42 - 0.83)	(0.998 - 1.79)	(0.26 - 0.52)	(0.46 - 0.81)	(0.84 - 1.47)	(0.18 - 0.47)
Mexico	1.42*	1.45*	0.94	1.50**	1.50**	0.93	1.86**	1.66**	1.62
	(1.03 - 1.94)	(1.08 - 1.94)	(0.62 - 1.42)	(1.17 - 1.91)	(1.19 - 1.89)	(0.60 - 1.42)	(1.25 - 2.76)	(1.14 - 2.43)	(0.64 - 4.10)
China	0.85	-	0.21	1.75	0.62	0.16	1.27	0.01	-
	(0.23, 3.18)		(0.02 - 2.79)	(0.91, 3.38)	(0.12 - 3.26)	(0.01 - 2.64)	(0.64, 2.55)	(0.00003 - 1.52)	

Notes: ADL, activities of daily living. IADL, instrumental activities of daily living. The odds ratios (ORs) and their 95% confidence intervals (CIs) were estimated from logistic regression, with and the place of death as the predictor and nine dichotomized variables (receiving no care for ADL/IADL, receiving no formal care for ADL/IADL, receiving no informal care for ADL/IADL; receiving no care for ADL, receiving no formal care for ADL, receiving no informal care for ADL; receiving no care for IADL, receiving no formal care for IADL, receiving no informal care for IADL) as the dependent variable. The model controlled for age, sex, education level, marital status, urban/rural residence, having children, place of death, number of chronic diseases, and year of death. For the logistic regression of the U.S. and European sample, we further controlled for 'having long-term care insurance'. However, we did not control for this variable in other countries, as it is not available in their datasets. For the logistic regression of the U.S. and China sample, we further controlled for 'the extent of activity limitations'. However, we did not control for this variable in other countries, as it is not available in their datasets. *** $p < 0.001$; **$p < 0.01$; * $p < 0.05$. Data from the Health and Retirement Study (HRS, 2010-2020, n =5,295) in the U.S., the Survey of Health, Ageing and Retirement in Europe (SHARE, 2010-2021, n=11,711) in Europe, the Korean Longitudinal Study of Aging (KLoSA, 2010-2018, n=1,435) in South Korea, Mexican Health and Aging Study (MHAS, 2012-2021, n=2,366) in Mexico, and the China Health and Retirement Longitudinal Study (CHARLS, 2013 and 2020, n=616) were used to construct the estimates. For each country/region, deceased individuals (age 65+) were included if they had reported at least one ADL or IADL limitation and died between 2010 and 2021. "-" means not applicable.

Table S8 presents the results examining the association between urban residence before death and unmet care for ADL/IADL limitations at the end of life. Consistent with the findings in **Figure 3**, **Table S9** indicates that in Central and Eastern Europe and South Korea, rural residence before death was associated with a higher likelihood of receiving overall informal care for ADL/IADL limitations but a lower likelihood of receiving formal care for ADL/IADL limitations. In China, rural residence before death was linked to higher rates of overall unmet care for IADL.

Table S8. The association between urban residence before death and unmet care for activity limitations at the end of life.

	No care for ADL/IADL			No care for ADL			No care for IADL		
	Any care	Informal care	Formal care	Any care	Informal care	Formal care	Any care	Informal care	Formal care
Region	OR (95%CI, Ref: rural residence before death)								
U.S.	1.21	1.06	1.03	0.92	0.98	1.01	1.02	1.01	0.97
	(0.92 - 1.59)	(0.91 - 1.23)	(0.91 - 1.17)	(0.77 - 1.10)	(0.86 - 1.11)	(0.89 - 1.15)	(0.82 - 1.26)	(0.85 - 1.20)	(0.83 - 1.14)
Western Europe	0.77*	1.04	0.69***	0.76*	0.96	0.74*	0.77*	1.04	0.66***
	(0.63 - 0.95)	(0.89 - 1.22)	(0.59 - 0.82)	(0.60 - 0.96)	(0.76 - 1.20)	(0.59 - 0.93)	(0.60 - 0.99)	(0.83 - 1.30)	(0.53 - 0.84)
Central and	1.03	1.29***	0.60***	1.05	1.20*	0.68***	1.17	1.31**	0.69***
Eastern Europe	(0.90 - 1.18)	(1.14 - 1.46)	(0.51 - 0.70)	(0.90 - 1.23)	(1.03 - 1.40)	(0.55 - 0.84)	(0.99 - 1.37)	(1.12 - 1.52)	(0.56 - 0.84)
South Korea	1.16	1.35*	0.61***	1.28	1.52**	0.64**	1.00	1.24	0.68*
	(0.79 - 1.69)	(1.03 - 1.76)	(0.46 - 0.80)	(0.90 - 1.81)	(1.17 - 1.97)	(0.48 - 0.84)	(0.78 - 1.29)	(0.97 - 1.58)	(0.49 - 0.96)
Mexico	1.19	1.18	0.63	1.14	1.14	0.65	0.82	0.91	0.33
	(0.84 - 1.69)	(0.85 - 1.63)	(0.38 - 1.05)	(0.87 - 1.49)	(0.88 - 1.47)	(0.38 - 1.10)	(0.54 - 1.24)	(0.61 - 1.37)	(0.09 - 1.11)
China	1.23	1.79	0.22	0.60	1.25	0.29	1.04	1.98	0.53
	(0.48, 3.17)	(0.07 - 45.98)	(0.02 - 2.08)	(0.33, 1.11)	(0.34 - 4.56)	(0.03 - 2.90)	(0.58, 1.89)	(0.05 - 79.96)	(0.03 - 10.92)

Notes: The odds ratios (ORs) and their 95% confidence intervals (CIs) were estimated from logistic regression, with urban/rural residence as the predictor and nine dichotomized variables (receiving no care for ADL/IADL, receiving no formal care for ADL/IADL, receiving no informal care for ADL/IADL; receiving no care for ADL, receiving no formal care for ADL, receiving no informal care for ADL; receiving no care for IADL, receiving no formal care for IADL, receiving no informal care for IADL) as the dependent variable. The model controlled for age, sex, education level, marital status, urban/rural residence, having children, place of death, number of chronic diseases, and year of death. For the logistic regression of the U.S. and European sample, we further controlled for 'having long-term care insurance'. However, we did not control this variable in other countries, as it is not available in their datasets. For the logistic regression of the U.S. and China sample, we further controlled for 'the extent of activity limitations'. However, we did not control for this variable in other countries, as it is not available in their datasets. *** $p < 0.001$; **$p < 0.01$; * $p < 0.05$. ADL, activities of daily living. IADL, instrumental activities of daily living. Data from the Health and Retirement Study (HRS, 2010-2020, n =5,295) in the U.S., the Survey of Health, Ageing and Retirement in Europe (SHARE, 2010-2021, n=11,711) in Europe, the Korean Longitudinal Study of Aging (KLoSA, 2010-2018, n=1,435) in South Korea, Mexican Health and Aging Study (MHAS, 2012-2021, n=2,366) in Mexico, and the China Health and Retirement Longitudinal Study (CHARLS, 2013 and 2020, n=616) were used to construct the estimates. For each country/region, deceased individuals (age 65+) were included if they had reported at least one ADL or IADL limitation and died between 2010 and 2021. "-" means not applicable.

Table S9 shows the results of the association between marital status and end-of-life care received. Being married or cohabiting was associated with a lower likelihood of receiving overall ADL/IADL care in the United States and Europe but a higher likelihood of receiving informal care in South Korea.

Table S9. The association between being married or cohabitating before death and unmet care for activity limitations at the end of life.

	No care for ADL/IADL			No care for ADL			No care for IADL		
	Any care	Informal care	Formal care	Any care	Informal care	Formal care	Any care	Informal care	Formal care
Region	OR (95%CI, Ref: other marital status)								
U.S.	1.26	0.70***	1.62***	1.16	0.78**	1.53***	0.73*	0.68***	1.60***
	(0.92 - 1.72)	(0.59 - 0.83)	(1.41 - 1.87)	(0.95- 1.42)	(0.68 - 0.91)	(1.32 - 1.76)	(0.57 - 0.94)	(0.56 - 0.82)	(1.31 - 1.95)
Western Europe	1.84***	1.18	1.69***	1.24	1.12	1.34*	2.01***	1.52**	1.70***
	(1.45 - 2.32)	(0.995 - 1.40)	(1.42 - 2.02)	(0.96 - 1.62)	(0.87 - 1.43)	(1.04 - 1.71)	(1.52 - 2.68)	(1.19 - 1.94)	(1.33 - 2.17)
Central and	1.32***	1.09	1.52***	1.16	0.93	1.63***	1.37***	1.14	1.50***
Eastern Europe	(1.15 - 1.53)	(0.95 - 1.24)	(1.31 - 1.77)	(0.98 - 1.36)	(0.80 - 1.09)	(1.33 - 2.00)	(1.15 - 1.62)	(0.97 - 1.33)	(1.23 - 1.84)
South Korea	0.69	0.55***	1.25	0.72	0.59***	1.29	0.77	0.71*	1.19
	(0.45 - 1.05)	(0.41 - 0.75)	(0.93 - 1.69)	(0.49 - 1.05)	(0.45 - 0.79)	(0.95 - 1.74)	(0.57 - 1.03)	(0.53 - 0.94)	(0.83 - 1.69)
Mexico	0.62**	0.65**	1.18	0.60***	0.62***	1.24	1.49	1.37	1.16
	(0.44 - 0.87)	(0.47 - 0.88)	(0.75 - 1.88)	(0.46 - 0.78)	(0.48 - 0.80)	(0.77 - 2.01)	(0.98 - 2.26)	(0.92 - 2.06)	(0.41 - 3.23)
China	1.00	1.81	0.46	0.83	1.09	0.40	1.30	1.71	0.20
	(0.42, 2.39)	(0.07 - 44.24)	(0.03 - 6.75)	(0.51, 1.36)	(0.34 - 3.54)	(0.02 - 6.81)	(0.76, 2.22)	(0.04 - 72.69)	(0.01 - 7.45)

Notes: ADL, activities of daily living. IADL, instrumental activities of daily living. The odds ratios (ORs) and their 95% confidence intervals (CIs) were estimated from logistic regression, with marital status as the predictor and nine dichotomized variables (receiving no care for ADL/IADL, receiving no formal care for ADL/IADL, receiving no informal care for ADL/IADL; receiving no care for ADL, receiving no formal care for ADL, receiving no informal care for ADL; receiving no care for IADL, receiving no formal care for IADL, receiving no informal care for IADL) as the dependent variable. The model controlled for age, sex, education level, marital status, urban/rural residence, having children, place of death, number of chronic diseases, and year of death. For the logistic regression of the U.S. and European sample, we further controlled for 'having long-term care insurance'. However, we did not control this variable in other countries, as it is not available in their datasets. For the logistic regression of the U.S. and China sample, we further controlled for 'the extent of activity limitations'. However, we did not control for this variable in other countries, as it is not available in their datasets. *** $p < 0.001$; **$p < 0.01$; * $p < 0.05$. Data from the Health and Retirement Study (HRS, 2010-2020, n =5,295) in the U.S., the Survey of Health, Ageing and Retirement in Europe (SHARE, 2010-2021, n=11,711) in Europe, the Korean Longitudinal Study of Aging (KLoSA, 2010-2018, n=1,435) in South Korea, Mexican Health and Aging Study (MHAS, 2012-2021, n=2,366) in Mexico, and the China Health and Retirement Longitudinal Study (CHARLS, 2013 and 2020, n=616) were used to construct the estimates. For each country/region, deceased individuals (age 65+) were included if they had reported at least one ADL or IADL limitation and died between 2010 and 2021. "-" means not applicable.

Table S10 shows the results on the association between having children and unmet end-of-life care. Having children was associated with a higher likelihood of receiving overall ADL/IADL care in Europe.

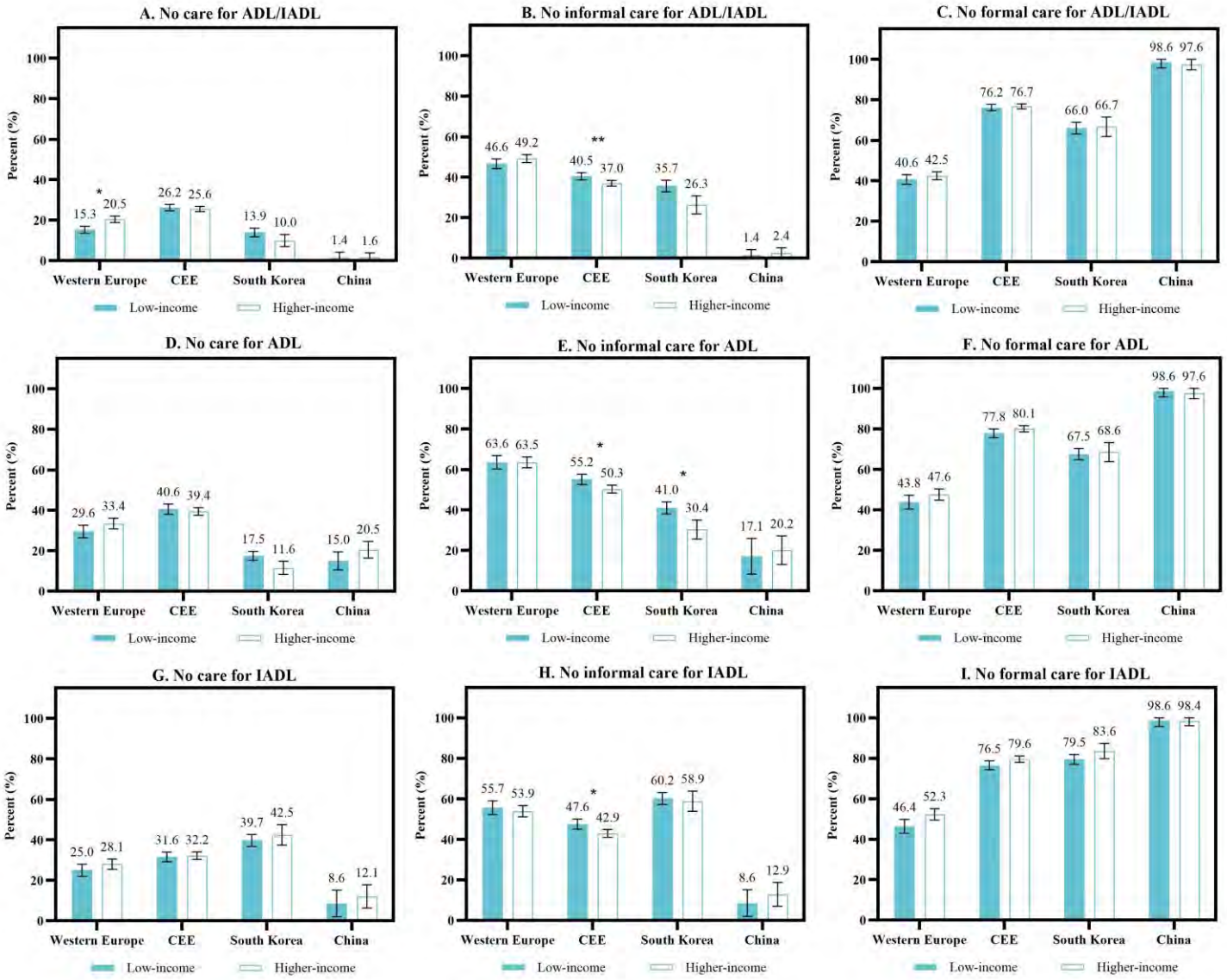
Table S10. The association between having children and unmet care for activity limitations at the end of life.

	No care for ADL/IADL			No care for ADL			No care for IADL		
	Any care	Informal care	Formal care	Any care	Informal care	Formal care	Any care	Informal care	Formal care
Region	OR (95%CI, Ref: childlessness)								
U.S.	0.89	0.56***	1.09	0.68*	0.56***	1.09	0.95	0.72*	1.12
	(0.54 - 1.46)	(0.43 - 0.73)	(0.86 - 1.38)	(0.48 - 0.97)	(0.44 - 0.71)	(0.85 - 1.38)	(0.65 - 1.41)	(0.53 - 0.99)	(0.83 - 1.51)
Western Europe	0.69*	0.54***	0.99	0.60**	0.64*	0.75	0.46***	0.49***	0.62**
	(0.50 - 0.94)	(0.42 - 0.69)	(0.77 - 1.28)	(0.43 - 0.84)	(0.45 - 0.90)	(0.53 - 1.04)	(0.32 - 0.66)	(0.35 - 0.69)	(0.44 - 0.86)
Central and	0.60***	0.41***	1.58***	0.71**	0.56***	1.24	0.57***	0.45***	1.44**
Eastern Europe	(0.49 - 0.73)	(0.34 - 0.49)	(1.28 - 1.95)	(0.56 - 0.90)	(0.43 - 0.71)	(0.94 - 1.64)	(0.44 - 0.72)	(0.35 - 0.57)	(0.10 - 1.89)
South Korea	0.61	0.42*	2.06	0.76	0.42*	2.22*	0.95	0.42*	2.13
	(0.24 - 1.57)	(0.20 - 0.86)	(0.98 - 4.35)	(0.31 - 1.82)	(0.20 - 0.89)	(1.06 - 4.68)	(0.44 - 2.05)	(0.18 - 0.97)	(0.98 - 4.63)
Mexico	1.17	0.81	2.14*	0.19**	0.98	1.86	0.96	0.82	3.47*
	(0.61 - 2.27)	(0.47 - 1.41)	(1.15 - 4.00)	(0.07, 0.61)	(0.62 - 1.55)	(0.95 - 3.62)	(0.43 - 2.15)	(0.38 - 1.77)	(1.07 - 11.25)
China	0.30	-	-	-	-	-	0.67	-	-
	(0.05, 1.93)						(0.17, 2.72)		

Notes: ADL, activities of daily living. IADL, instrumental activities of daily living. The odds ratios (ORs) and their 95% confidence intervals (CIs) were estimated from logistic regression, with having children as the predictor and nine dichotomized variables (receiving no care for ADL/IADL, receiving no formal care for ADL/IADL, receiving no informal care for ADL/IADL; receiving no care for ADL, receiving no formal care for ADL, receiving no informal care for ADL; receiving no care for IADL, receiving no formal care for IADL, receiving no informal care for IADL) as the dependent variable. The model controlled for age, sex, education level, marital status, urban/rural residence, having children, place of death, number of chronic diseases, and year of death. For the logistic regression of the U.S. and European sample, we further controlled for 'having long-term care insurance'. However, we did not control this variable in other countries, as it is not available in their datasets. For the logistic regression of the U.S. and China sample, we further controlled for 'the extent of activity limitations'. However, we did not control for this variable in other countries, as it is not available in their datasets. *** $p < 0.001$; **$p < 0.01$; * $p < 0.05$. Data from the Health and Retirement Study (HRS, 2010-2020, n =5,295) in the U.S., the Survey of Health, Ageing and Retirement in Europe (SHARE, 2010-2021, n=11,711) in Europe, the Korean Longitudinal Study of Aging (KLoSA, 2010-2018, n=1,435) in South Korea, Mexican Health and Aging Study (MHAS, 2012-2021, n=2,366) in Mexico, and the China Health and Retirement Longitudinal Study (CHARLS, 2013 and 2020, n=616) were used to construct the estimates. For each country/region, deceased individuals (age 65+) were included if they had reported at least one ADL or IADL limitation and died between 2010 and 2021. "-" means not applicable.

Figure S2 presents the association between income level and unmet end-of-life care. The analysis indicates that in Central and Eastern Europe and South Korea, lower-income individuals experienced higher rates of unmet informal care for ADL limitations (Central and Eastern Europe: 55.2% vs. 50.3%, p<0.05; South Korea: 41.0% vs. 30.4%, p<0.05) (**Figure S2.E**). In contrast, a different pattern was observed in Western Europe, where higher-income individuals had higher rates of overall unmet care for ADL/IADL limitations (20.5% vs. 15.3%, p<0.05) (**Figure S2.A**).

Figure S2. Subgroup analyses: the proportion of older adults without care for activity limitations at end-of-life, stratified by income level.



Notes: Each panel displays dotted points representing the estimated proportions of individuals who did not receive any care, those who received no formal care, and those who received no informal care. Data are presented as proportions ± 1.96 × standard error (SE). The central measure (proportion) is shown at the top of each bar across Figure S2a-i. Group differences across these categories were evaluated using binary logistic regressions with two-sided statistical test. Asterisks above each bar (if present) indicate the significance level of income group differences: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$. Income level was determined based on the total value of respondents' assets, with individuals in the bottom 40% classified as the low-income group and the remainder as the higher-income group. WE, Western Europe. CEE, Central and Eastern Europe. ADL, activities of daily living. IADL, instrumental activities of daily living. The 'income' variable is only available in the Survey of Health, Ageing and Retirement in Europe (SHARE), Korean Longitudinal Study of Aging (KLoSA) in South Korea, and the China Health and Retirement Longitudinal Study (CHALRS). The sample sizes were n = 4,170 in Western Europe, 7,541 in Central and Eastern Europe, 1,435 in South Korea, and 616 in China.

Table S11 shows the relationship between income level and no care for ADL/IADL limitations.

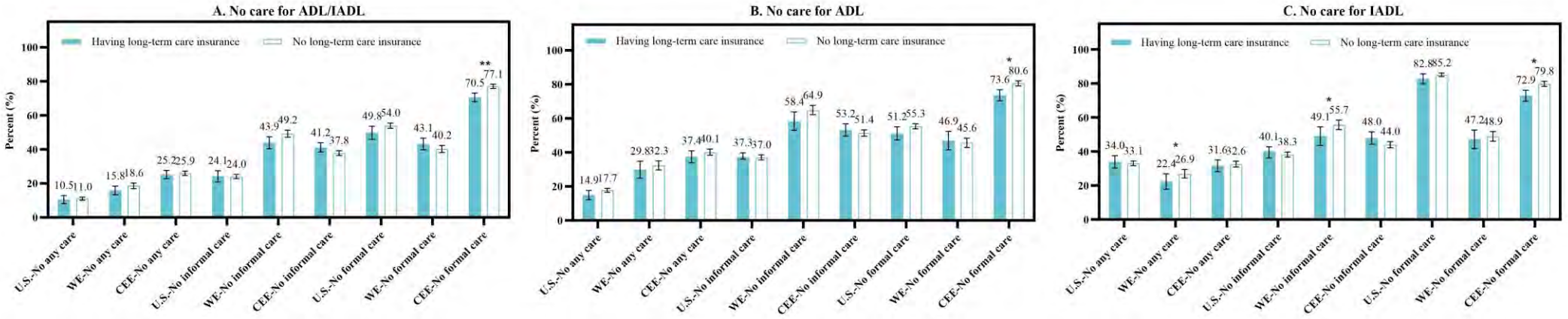
Table S11. The association between higher income and unmet care for ADL/IADL limitations at the end of life.

	No care for ADL/IADL			No care for ADL			No care for IADL		
	Any care	Informal care	Formal care	Any care	Informal care	Formal care	Any care	Informal care	Formal care
Region	OR (95%CI, Ref: lower income)								
Western Europe	1.32*	1.08	0.99	1.14	0.94	1.14	1.05	0.89	1.14
	(1.07 - 1.63)	(0.93 - 1.26)	(0.84 - 1.16)	(0.90 - 1.44)	(0.75 - 1.17)	(0.91 - 1.42)	(0.81 - 1.35)	(0.71 - 1.10)	(0.91 - 1.43)
Central and	0.94	0.84**	1.04	0.96	0.84*	1.13	1.03	0.85	1.17
Eastern Europe	(0.83 - 1.07)	(0.75 - 0.94)	(0.91 - 1.19)	(0.83 - 1.11)	(0.73 - 0.97)	(0.94 - 1.35)	(0.89 - 1.20)	(0.74 - 0.98)	(0.98 - 1.40)
South Korea	0.71	0.76	0.83	0.68	0.74*	0.85	0.97	1.00	0.95
	(0.47, 1.10)	(0.56, 1.02)	(0.62, 1.10)	(0.46, 1.00)	(0.56, 0.98)	(0.64, 1.14)	(0.74, 1.28)	(0.76, 1.31)	(0.67, 1.36)
China	1.22	0.95	0.95	1.50	0.95	0.95	1.11	0.97	0.95
	(0.56, 2.67)	(0.67, 1.36)	(0.67, 1.36)	(0.95, 2.36)	(0.67, 1.36)	(0.67, 1.36)	(0.69, 1.79)	(0.74, 1.28)	(0.67, 1.36)

Notes: ADL, activities of daily living. IADL, instrumental activities of daily living. The odds ratios (ORs) and their 95% confidence intervals (CIs) were estimated using logistic regression, with income level as the predictor and nine dichotomized variables (receiving no care for ADL/IADL, receiving no formal care for ADL/IADL, receiving no informal care for ADL/IADL; receiving no care for ADL, receiving no formal care for ADL, receiving no informal care for ADL; receiving no care for IADL, receiving no formal care for IADL, receiving no informal care for IADL) as the dependent variable. The model controlled for age, sex, education level, marital status, urban/rural residence, having children, place of death, number of chronic diseases, and year of death. *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$. ADL, activities of daily living. IADL, instrumental activities of daily living. The 'income' variable is only available in the Survey of Health, Ageing and Retirement in Europe (SHARE), Korean Longitudinal Study of Aging (KLoSA) in South Korea, and the China Health and Retirement Longitudinal Study (CHALRS). Therefore, the data in Table S9 were from SHARE (2010-2021, n=11,711) in Europe, KLoSA (2010-2018, n=1,435) in South Korea, and CHARLS (2013 and 2020, n=616) in China. For each country/region, deceased individuals (age 65+) were included if they had reported at least one ADL or IADL limitation and died between 2010 and 2021. For the logistic regression of the China sample, we further controlled for 'the extent of activity limitations'. However, we did not control for this variable in European countries, as it is not available in their datasets.

Figure S3 highlights the disparities in the unmet care based on whether participants had long-term care insurance. The group differences in **Figure S2** were analyzed using logistic regression, with full results available in **Table S13**. Participants with long-term care insurance were more likely to receive formal care for ADL and/or IADL limitations in Central and Eastern Europe (**Figures S3.A, S3.B, S3.C**) and more likely to receive care for IADL limitations in Western Europe (**Figures S2.C**), but no such trend was observed in the United States.

Figure S3. Subgroup analyses: the proportion of older adults without care for activity limitations at end-of-life, stratified by having long-term care insurance.



Notes: Each panel displays dotted points representing the estimated proportions of individuals who did not receive any care, those who received no formal care, and those who received no informal care. Data are presented as proportions ± 1.96 × standard error (SE). The central measure (proportion) is shown at the top of each bar across Figure 3a-i. Group differences across these categories were evaluated using binary logistic regressions with two-sided statistical test. Asterisks above each bar (if present) indicate the significance level of group differences by long-term care insurance coverage: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$. WE, Western Europe. CEE, Central and Eastern Europe. ADL, activities of daily living. IADL, instrumental activities of daily living. The 'long-term care insurance' variable is only available in the U.S. dataset (Health and Retirement Study, HRS) and the European dataset (Survey of Health, Ageing and Retirement in Europe, SHARE). The sample sizes were n = 5,295 in the U.S., 4,170 in Western Europe, and 7,541 in Central and Eastern Europe.

Table S12 shows the relationship between having long-term care insurance and receiving no care for ADL/IADL limitations.

Table S12. The association between having long-term care insurance and the unmet care for ADL/IADL limitations at the end of life.

	No care for ADL/IADL			No care for ADL			No care for IADL		
	Any care	Informal care	Formal care	Any care	Informal care	Formal care	Any care	Informal care	Formal care
Region	OR (95%CI, Ref: no long-term care insurance)								
U.S.	1.03	1.01	0.91	0.85	0.97	0.91	0.92	1.03	0.90
	(0.68 - 1.56)	(0.80 - 1.26)	(0.76 - 1.10)	(0.64 - 1.12)	(0.80 - 1.18)	(0.75 - 1.10)	(0.67 - 1.26)	(0.80 - 1.33)	(0.71 - 1.13)
Western Europe	0.81	0.85	1.05	0.85	0.78	1.01	0.73*	0.77*	0.88
	(0.64 - 1.03)	(0.71 - 1.01)	(0.88 - 1.26)	(0.64 - 1.12)	(0.60 - 1.01)	(0.77 - 1.32)	(0.53 - 0.997)	(0.60 - 0.996)	(0.68 - 1.16)
Central and	1.02	1.13	0.82**	0.96	1.07	0.81*	1.03	1.15	0.81*
Eastern Europe	(0.87 - 1.19)	(0.99 - 1.29)	(0.70 - 0.95)	(0.81 - 1.14)	(0.90 - 1.26)	(0.66 - 0.99)	(0.86 - 1.24)	(0.97 - 1.36)	(0.67 - 0.99)

Notes: ADL, activities of daily living. IADL, instrumental activities of daily living. The odds ratios (ORs) and their 95% confidence intervals (CIs) were estimated using logistic regression, with long-term care insurance coverage as the predictor and nine dichotomized variables (receiving no care for ADL/IADL, receiving no formal care for ADL/IADL, receiving no informal care for ADL/IADL; receiving no care for ADL, receiving no formal care for ADL, receiving no informal care for ADL; receiving no care for IADL, receiving no formal care for IADL, receiving no informal care for IADL) as the dependent variable. The model controlled for age, sex, education level, marital status, urban/rural residence, having children, place of death, number of chronic diseases, and year of death. *** $p < 0.001$; **$p < 0.01$; * $p < 0.05$. ADL, activities of daily living. IADL, instrumental activities of daily living. The 'long-term care insurance' variable is only available in the U.S. dataset (Health and Retirement Study, HRS, n=1,435) and the European dataset (Survey of Health, Ageing and Retirement in Europe, SHARE, n =5,295). Therefore, the data in this table were from the HRS (2010-2020) in the U.S. and the SHARE (2010-2021) in Europe. For each country/region, deceased individuals (age 65+) were included if they had reported at least one ADL or IADL limitation and died between 2010 and 2021. For the logistic regression of the U.S. sample, we further controlled for 'the extent of activity limitations'. However, we did not control for this variable in European countries, as it is not available in their datasets.

References:

1. Gateway to Global Aging Data. Get end of life survey data. 2024. https://eol.g2aging.org/survey/get_data/ (accessed 2024-11-02 2024).
2. Lee, J., Phillips, D., Wilkens, J. Gateway to Global Aging Data: Resources for cross-national comparisons of family, social environment, and healthy aging. *J Gerontol B Psychol Sci Soc Sci*. **76**, S5-S16 (2021).
3. Chen, S., Chen, X., Hou, X., Fang, H., Liu, G, Yan, L. Temporal trends and disparities of population attributable fractions of modifiable risk factors for dementia in China: a time-series study of the China health and retirement longitudinal study. *Lancet Reg Health West Pac*. **47**, 101106 (2024).
4. English Longitudinal Study of Ageing. Ethical approval. 2024. https://www.elsa-project.ac.uk/ethical-approval (accessed 2025-10-15 2025).
5. Chen, S., Ford, TJ., Jones, PB., Cardinal, RN. Prevalence, progress, and subgroup disparities in pharmacological antidepressant treatment of those who screen positive for depressive symptoms: a repetitive cross-sectional study in 19 European countries. *Lancet Reg Health Eur*. **17**, 100368 (2022).
6. Lee, J., Phillips, D., Wilkens, J., Gateway to Global Aging Data Team. Gateway to global aging data: resources for cross-national comparisons of family, social environment, and healthy aging. *J Gerontol B Psychol Sci Soc Sci*. **76**, S5-S16 (2021).
7. Lin, Z., Qian, Y., Gill, TM., et al. Absence of care among community-dwelling older adults with dementia and functional limitations. *Nat Aging*. **5**, 548-557 (2025).
8. Sonnega, A., Faul, JD., Ofstedal, MB., Langa, KM., Phillips, JW., Weir, DR. Cohort Profile: the Health and Retirement Study (HRS). *Int J Epidemiol*. **43**, 576-585 (2014).
9. Börsch-Supan, A., Brandt, M., Hunkler, C., et al. Data resource profile: the Survey of Health, Ageing and Retirement in Europe (SHARE). *Int J Epidemiol*. **42**, 992-1001 (2013).
10. Steptoe, A., Breeze, E., Banks, J., Nazroo, J. Cohort profile: The English longitudinal study of ageing. *Int J Epidemiol*. **42**, 1640-1648 (2013).
11. Ko, PC., Hank, K. Grandparents caring for grandchildren in China and Korea: Findings from CHARLS and KLoSA. *J Gerontol B Psychol Sci Soc Sci*. **69**, 646-651 (2014).
12. Wong, R., Michaels-Obregon, A., Palloni, A. Cohort Profile: The Mexican Health and Aging Study (MHAS). *Int J Epidemiol*. **46**, e2 (2017).
13. Zhao, Y., Hu, Y., Smith, JP., Strauss. J., Yang. G. Cohort profile: the China Health and Retirement Longitudinal Study (CHARLS). *Int J Epidemiol*. **43**, 61-68 (2014).
14. Kaye HS, Harrington C, LaPlante MP. Long-term care: who gets it, who provides it, who pays, and how much? *Health Aff*. **29**, 11-21 (2010).
15. García-Gómez, P., Hernández-Quevedo, C., Jiménez-Rubio, D., Oliva-Moreno, J. Inequity in long-term care use and unmet need: Two sides of the same coin. *J Health Econ*. **39**, 147-158 (2015).
16. Choi, H., Schoeni, RF., Steptoe, A., Cho, T-C., Langa, KM. Differential trends in disability among rich and poor adults in the United States and England from 2002 to 2016. *J Gerontol B Psychol Sci Soc Sci*. **77**, S189-S98 (2022).
17. Kim, H., Duberstein, PR., Zafar, A., Wu, B., Lin, HQ., Jarrin, OF. Home health care and place of death in Medicare beneficiaries with and without dementia. *Gerontologist.* **64**, gnae131 (2024).
18. Chen, S., Ford, TJ., Jones, PB., Cardinal, RN. Prevalence, progress, and subgroup disparities in pharmacological antidepressant treatment of those who screen positive for depressive symptoms: a repetitive cross-sectional study in 19 European countries. *Lancet Reg Health Eur*. **17**, 100368 (2022)