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SPECIAL ISSUE • Care, poverty and inequalities

research article

Gender inequalities in care across long-term care public spending systems in Europe: evidence from the European Health Interview Survey

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This article investigates gender inequalities in care provision across European long-term care (LTC) public spending systems using data from the European Health Interview Survey (2013–19). Women are more likely than men to provide care (OR = 1.41) and intensive care (OR = 1.50), particularly in countries with lower LTC public spending. Higher LTC expenditure appears to reduce intensive care but does not eliminate gender disparities, suggesting persistent inequalities despite greater state support. The findings highlight the need for policies addressing structural barriers to equitable care provision and expanding LTC resources to reduce gendered care burdens and promote fairness in care responsibilities across Europe.

Keywords gender inequalities in care • care intensity • long-term care public spending • European Health Interview Survey

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Introduction

The demographic ageing of most Western countries has been associated with a marked increase in the number of older people needing care due to chronic physical or

cognitive impairment and the concomitant increase in the social and economic cost of long-term care (LTC) (Colombo et al, 2011). Throughout Europe, LTC services are aimed at supporting older people with limitations in everyday activities and facilitating the care responsibilities of family members and next of kin (hereafter referred to as 'carers') through financial benefits and such services as home or residential care and in-kind products (Hoffmann and Rodrigues, 2010; Pavolini, 2021). However, the eligibility for and level of coverage of these services differ across countries depending on regulations and the normative obligations of the family and society (Saraceno and Keck, 2010; Brandt, 2013).

LTC public expenditure can be broadly described along a spectrum. At one end, low public expenditure places most care responsibilities on families, with limited or unavailable state support. Medium public expenditure provides financial support to help families manage care provision. At the other end, high public expenditure sees the government assuming substantial responsibility for care provision, offering extensive services to support families (Saraceno and Keck, 2010; Pavolini, 2021). Research on care patterns in Europe has suggested that generous LTC public spending is associated with a higher prevalence of care but a lower prevalence of intensive care – often defined as providing 20 hours or more of care per week (Hoffmann and Rodrigues, 2010; Colombo et al, 2011; Brandt, 2013; Kumagai, 2017; Verbakel, 2018). This observation is in line with the specialisation hypothesis, which proposes a functional differentiation between the state and the public, where LTC services perform frequent obligatory and demanding tasks, thus leaving the family and community to focus on voluntary practical and emotional support (Brandt, 2013; Verbakel, 2018).

As the demand for care increases and costs rise, governments have restructured their LTC systems with a general tendency to rely on the family and community for care provision (Verbeek-Oudijk et al, 2014; Spasova et al, 2018). In Europe, it has been estimated that approximately 80 per cent of all care is provided by family members and friends, who often lack adequate resources or financial support to fulfil their caring role while balancing their professional and personal lives (Hoffmann and Rodrigues, 2010; Birtha and Holm, 2017). This prioritisation of economic reproduction at the expense of support for the provision of care labour to those who need it is in line with social reproduction theory. This theory posits that economies and social systems that prioritise productive labour rely on unpaid and underpaid reproductive labour, such as care and emotional support, which develops and sustains the workforce to ensure productivity, as well as providing care for the elderly (Fraser, 2016; Backer and Cairns, 2021). Although essential for maintaining the economy, reproductive labour is systematically excluded from formal economic measures and remains largely undervalued and invisible (Fraser, 2016; Backer and Cairns, 2021).

In addition, gender inequalities persist in the distribution of care provision, with women being more likely than men to provide care, particularly intensive care (Verbakel et al, 2017; Moussa, 2018; Vergauwen and Mortelmans, 2021; Jain and Sheehan, 2023; Batur et al, 2024). On average, women spend 26 per cent of their time providing care, while men only devote 9 per cent of their time to care (European Commission, 2016). Although gender inequalities tend to decrease with age, women have been found to be more likely to be the primary care providers, to provide personal care (for example, bathing and feeding) and to care for multiple people (Hoffmann and Rodrigues, 2010; Birtha and Holm, 2017; Skinner and Sogstad, 2022). A large body of evidence has sought to explain this persistent gender inequality in care work at both the individual

and the macro level (Sullivan et al, 2018). At the macro level, social reproduction theory emphasises gender norms based on traditional gender-based stereotypes that position women as the primary carers, a role devalued in capitalist economies, while recognising and formalising economic production as men's labour (Shahrashoub, 2015; Fraser, 2016; Backer and Cairns, 2021). Therefore, in contexts that emphasise production and limit the availability of formal care services, caring is seen as a private family obligation, reinforcing the expectation that women must compensate for gaps in welfare provision (Fraser, 2016). In contrast, countries with high LTC public spending, which are often those with more egalitarian gender norms, provide services that help redistribute care responsibilities, potentially reducing disparities in care work (Brandt, 2013; Pavolini, 2021). Thus, according to social reproduction theory, LTC public spending is expected to be a key determinant of gender differences in caring.

While previous research has suggested that generous LTC public spending is associated with a lower prevalence of intensive care (Verbakel, 2018), it remains unclear whether this pattern applies equally to men and women. Previous studies have explored gendered caring in the context of different cultural expectations qualitatively (Zygouri et al, 2021) or have investigated the moderating effect of egalitarian contexts on the work–family conflict experienced by working carers (Bainbridge and Townsend, 2020); however, to our knowledge, no previous study has explicitly examined whether gender differences in caring vary by LTC public spending. Thus, the aim of this article is to investigate gender inequalities in care and intensive care across various LTC public spending systems in Europe. Based on social reproduction theory, it is hypothesised that women are more likely to care and to provide intensive care than men due to the societal expectations that women should fulfil care roles. However, in countries with higher LTC public spending, the gender gap will be less pronounced due to the redistribution of care responsibilities facilitated by state intervention. This article will address the following research questions: are there gender inequalities in the provision of care and intensive care across European countries, and, if so, does this differ by LTC public spending?

Methods

Data and study sample

The data for this study were drawn from the European Health Interview Survey, which is a cross-sectional observational study developed to assess the health status, health determinants and healthcare service usage of European Union (EU) citizens (Eurostat, 2024). Information on the provision of informal care or assistance is only available from the second wave of data collection; therefore, the present study used data from Waves 2 (2013–15) and 3 (2019). The prevalence of care across both waves of data collection was relatively stable, representing 15 per cent in 2013–15 and 16 per cent in 2019, showing only a very slight increase (OR = 1.07, 95 per cent CI = 1.04 to 1.09). Furthermore, there was no change in the prevalence of intensive care, which was 20 per cent in both years (OR = 1.01, 95 per cent CI = 0.96 to 1.06). Therefore, for this analysis, the data for both waves were pooled. The study included data from the following 28 countries: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal,

Romania, Slovak Republic, Slovenia, Spain, Sweden and Norway. There was a total of 578,650 participants in the data set, of which approximately 3 per cent had missing data on care and 6 per cent had missing data on household income. The analytical sample comprised 530,521 participants with complete data.

Measures

The outcomes of interest for this analysis were care status and intensity of care. Provision of care was assessed with a positive or negative answer to the question, 'Do you provide care or assistance to one or more persons suffering from some age problem, chronic health condition or infirmity, at least once a week? (exclude professional activities)', coded as a binary variable (yes/no). For the subsample of participants who answered 'yes' to this first question, care intensity was assessed through the question, 'For how many hours per week do you provide care or assistance?', for which participants could choose between the following options: (1) less than ten hours per week; (2) at least ten but less than 20 hours per week; and (3) 20 hours or more per week. For this analysis, care intensity was coded into a binary variable representing care above and below 20 hours per week, with the former category reflecting intensive care. This decision was based on previous evidence suggesting that individuals who indicate caring for 15 hours per week or more provide, on average, 30 hours of care, equivalent to a full-time job (Di Gessa et al, 2016).

The main predictor for this analysis was gender. Based on the data available, gender was assessed using a binary variable (men/women). Furthermore, to assess the theorised moderating variable of LTC public spending, the countries were classified into four different LTC systems. This classification was based on a previously derived typology of LTC social protection for the EU based on 2018 and 2021 LTC public expenditure and LTC cash benefit expenditure (Pavolini, 2021). The resulting typology is generally consistent with previous classifications of long-term systems, broadly grouping countries into Central-Eastern, Southern, Western and Nordic clusters (Saraceno and Keck, 2010; Brandt, 2013; Pavolini, 2021). The groups include the following: a low LTC public spending group (limited state intervention representing ≤ 0.6 per cent of gross domestic product [GDP]), which includes Bulgaria, Croatia, Cyprus, Estonia, Greece, Hungary, Latvia, Portugal and Romania; a medium to low LTC public spending group (mild state intervention through cash benefits or services representing 0.7 per cent to 1.3 per cent of GDP), which includes Ireland, Lithuania, Luxembourg, Malta, Poland, Slovak Republic, Slovenia and Spain; a medium to high LTC public spending group (strong state intervention through cash or services representing 1.5 per cent to 2.2 per cent of GDP), which included Austria, Belgium, Czech Republic, Finland, Germany and Italy; and a very strong LTC public spending group (very strong state intervention through services representing > 3 per cent of GDP), which includes Denmark, Netherlands and Sweden (Pavolini, 2021). Although Iceland and Norway were not included in Pavolini's original cluster analysis, they were grouped within the medium to high and very strong LTC public spending groups, respectively, based on their total LTC expenditure as a percentage of the GDP (Iceland = 1.79 per cent; Norway = 3.25 per cent) (Neubert et al, 2019).

Age and income were included as covariates. Age ranged from 15 to 85 and over and was categorised into four distinct age bands: 15–29, 30–49, 50–64 and 65+. Additionally, net income was calculated based on household income (work, property, investment, benefits [unemployment, pension, survivor, sickness and disability] and allowances [education, family, children and housing]) received by each household member available for spending or saving after tax or other deductions. The result was then divided by equalised household size according to the modified Organisation for Economic Co-operation and Development equivalence scale, and participants were categorised into income quintiles based on their ranking in each country (Eurostat, 2013).

Analysis

To test for the association between gender and care or intensive care, descriptive methods as well as unadjusted and adjusted (age, household income and LTC public spending) logistic regressions were carried out. Additionally, the moderating role of LTC public spending in the association between gender and care or intensive care was assessed by including interactions between gender and LTC public spending. For all regression models, survey weights were included in the model specification to ensure the representativeness of the population and robust standard errors were used to account for heteroscedasticity.

Results

Table 1 presents the descriptive characteristics of the sample stratified by care status. The results suggest that 15 per cent of the sample were carers, that women (see Figure 1) were more likely to be carers and that the proportion of care increased with age. Care appeared to be evenly distributed across income quintiles, and there was a higher proportion of carers in medium to high LTC public spending countries (see Figure 2). Furthermore, around 20 per cent of the carers provide intensive care. Among carers, intensive carers were more likely to be women and older individuals (see Table 2). Furthermore, individuals providing intensive care were more likely to live in countries with medium to low LTC public spending and to have lower household income. For the distribution of care and intensive care by gender in all 28 countries, see Figure A1 in the Online Appendix (https://doi.org/10.6084/m9.figshare.29618375).

Association between gender and care or intensive care

The unadjusted regression results indicated that women had higher odds than men of being carers (OR = 1.40, 95 per cent CI = 1.37 to 1.44) and providing intensive care (OR = 1.55, 95 per cent CI = 1.47 to 1.63). These findings remained consistent after adjustment, with similar odds for being carers (OR = 1.41, 95 per cent CI = 1.38 to 1.45) and providing intensive care (OR = 1.50, 95 per cent CI = 1.42 to 1.58) (see Table 3).

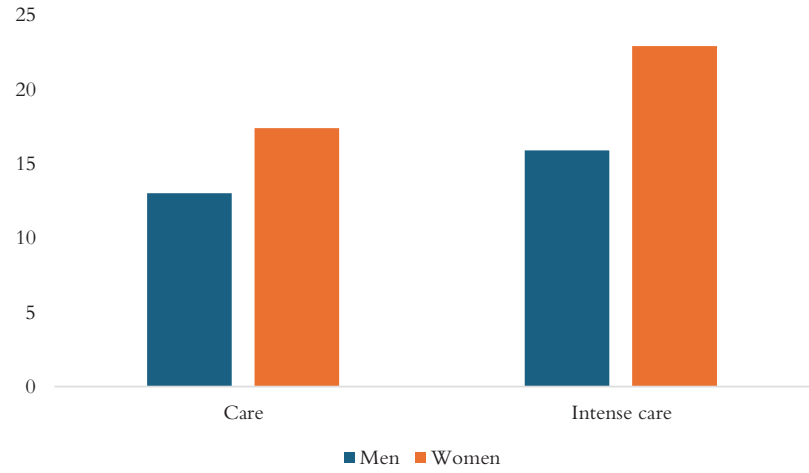
Table 1: Descriptive characteristics of the sample stratified by care status

	Non-carer *N* = 448,659 (84.71%)		Carer *N* = 81,862 (15.29%)	
	N	%	*N*	%
Gender				
Men	211,555	49.62	31,913	41.25
Women	237,104	50.38	49,949	58.75
LTC public spending				
Low	124,491	18.11	18,221	14.67
Medium to low	114,296	23.10	18,296	18.71
Medium to high	162,715	48.86	35,367	55.86
Very high	47,157	9.93	9,978	10.76
Age				
15–29	74,487	20.46	7,690	11.33
30–49	137,618	33.54	23,089	29.88
50–64	108,204	22.44	31,951	37.89
65+	128,350	23.56	19,132	20.89
Household income				
1 (lowest quintile)	84,669	19.20	14,589	18.60
2	89,481	19.36	16,028	20.03
3	91,798	19.97	16,828	20.21
4	92,031	20.69	17,460	20.83
5 (highest quintile)	90,680	20.79	16,957	20.33
Care intensity				
< 20 hours per week	–	–	64,006	78.51
≥ 20 hours per week	–	–	16,083	19.61
Missing	–	–	1,773	1.88

Notes: All percentages are weighted. Percentages are calculated as *N*/total *N* = 530,521.

The covariates also suggest that for all carers, the odds of providing care increased with increased LTC public spending (medium to high OR = 1.41, 95 per cent CI = 1.37 to 1.45; very high OR = 1.38, 95 per cent CI = 1.33 to 1.43), but the odds of providing intense care decreased with increased LTC public spending (medium-high OR= 0.73, 95 per cent CI 0.68 to 0.78; very high OR= 0.38, 95 per cent CI 0.34 to 0.41). Additionally, the odds of care and intensive care increase with age, with individuals in the 50–64 age group having three times higher odds of caring than the youngest group (OR = 3.08, 95 per cent CI = 2.94 to 3.21) and individuals in the 65+ age group having four times higher odds of providing intensive care than the youngest group (OR = 4.03, 95 per cent CI = 3.53 to 4.61). The odds of care did not seem to vary across household income quintiles; however, higher household income was associated with lower odds of providing intensive care (Quintile [Q] 2 OR = 0.90, 95 per cent CI = 0.82 to 0.98; Q3 OR = 0.85, 95 per cent CI = 0.78 to 0.93; Q4 OR = 0.70, 95 per cent CI = 64 to 0.76; Q5 OR = 0.57, 95 per cent CI = 0.52 to 0.62).

Figure 1: Prevalence of care and intensive care (≥ 20 hours per week) among carers by gender



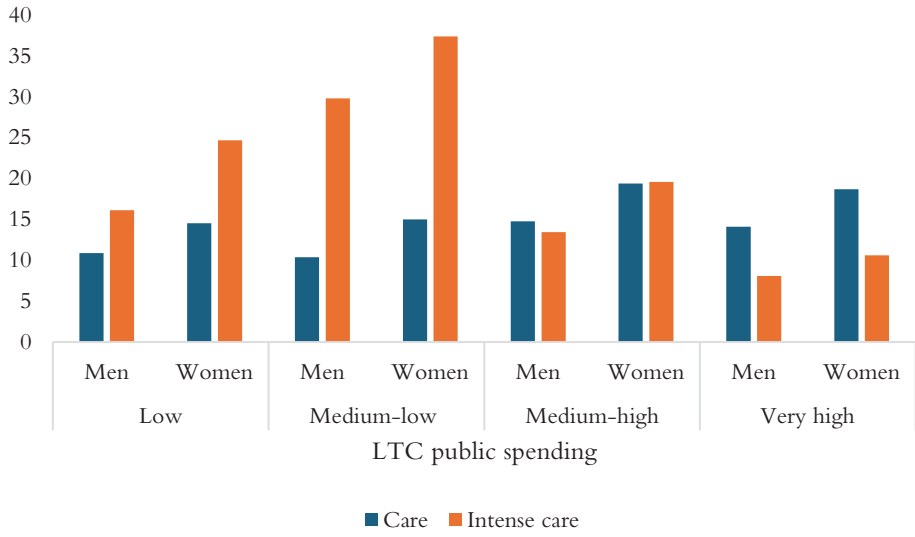
Interaction between gender and LTC public spending

The inclusion of an interaction term between gender and LTC public spending suggested that LTC public spending moderates the associations between gender and care ($p < 0.01$) and between gender and intensive care ($p = 0.01$). Table 4 presents the results for the association between gender and care or intensive care stratified by LTC public spending. The results show that women were more likely to provide care and intensive care than men across all LTC public spending groups, with a slight suggestion of a greater gender difference in the medium to low LTC public spending countries (OR = 1.55, 95 per cent CI = 1.48 to 1.63). Additionally, there was a suggestion of a greater gender difference in intensive caring in the lowest LTC public spending countries (OR = 1.64, 95 per cent CI = 1.47 to 1.82) compared with higher public spending countries (OR = 1.34, 95 per cent CI = 1.13 to 1.60), albeit with overlapping confidence intervals.

Discussion

This article has investigated gender inequalities in care and intensive care across LTC public spending systems in Europe using data from 28 countries from the European Health Interview Survey. The article hypothesised that women are more likely than men to provide care, including intensive care, but that this inequality would be less evident in countries with high LTC public spending. Consistent with the first hypothesis, the results suggest that women provide more care and more intensive care than men across all LTC spending levels, which is in line with the social reproduction theory tenet that care is embedded within gendered expectations regarding labour divisions. The second hypothesis, which addressed differences in gender inequalities in care by the amount that countries spend on LTC, was partly fulfilled. The article has found that gender inequalities in care persist across all levels of LTC public spending

Figure 2: Prevalence of care and intensive care (≥20 hours per week) among carers by gender and LTC public spending groups



and that these inequalities may be somewhat weaker in countries with higher LTC spending. Thus, while higher LTC public spending may alleviate some of the care burden on women, it does not seem to disrupt the societal norms around gender roles.

In line with the findings of this study, evidence from up to 33 European countries contributing to various large-scale population health surveys, including the European Social Survey, European Quality of Life Survey, Survey of Health Ageing and Retirement in Europe, and English Longitudinal Study of Ageing, have consistently found that women are more likely to care than men (Verbakel et al, 2017; Zigante, 2018; Tur-Sinai et al, 2020; Peña-Longobardo and Oliva-Moreno, 2022; Quashie et al, 2022). Estimates vary depending on the methods used to identify carers, but across individual countries and even among the egalitarian Nordic countries, women generally report a higher prevalence of care, with one study suggesting that approximately 61 per cent of European carers are women (Peña-Longobardo and Oliva-Moreno, 2022). Similarly, survey data from Europe have also suggested that the gender imbalance in care is particularly evident when personal or intensive care is involved (Glendinning et al, 2009; Quashie et al, 2022; Labbas and Stanfors, 2023). The persistence of gender inequalities in care suggests that despite social and policy changes, the economic and social structures that underlie the devaluation of care, as stated by social reproduction theory, remain firmly in place. This is in line with evidence on other forms of unpaid care. For example, while the gender gap in employment participation is reduced in countries with policies supporting working parents (Boeckmann et al, 2015; Ferragina, 2020), women continue to do more childcare than men even in countries with high levels of support for gender equality (Craig and Mullan, 2011).

Regarding the distribution of care across Europe, evidence from the Survey of Health, Ageing and Retirement, EUROFAMCARE, and the European Social Survey consistently shows that care is more frequent but less intensive in countries with generous LTC provision, such as the Nordic countries. In contrast, care is

Table 2: Descriptive characteristics for carers stratified by care intensity

	< 20 hours per week *N* = 64,006 (80.02%)		≥ 20 hours per week *N* = 16,083 (19.89%)	
	N	%	*N*	%
Gender				
Men	26,080	43.27	5,050	33.03
Women	37,926	56.73	11,033	66.97
LTC public spending				
Low	14,081	14.38	3,825	15.49
Medium to low	12,571	15.15	5,222	31.78
Medium to high	28,646	58.42	6,185	47.72
Very high	8,708	12.06	851	5.01
Age				
15–29	6,728	12.69	719	5.87
30–49	18,854	31.08	3,787	25.46
50–64	25,242	38.01	6,200	38.27
65+	13,182	18.22	5,377	30.41
Household income				
1 (lowest quintile)	10,855	17.89	3,355	21.16
2	11,925	19.36	3,696	22.57
3	12,903	19.85	3,546	21.68
4	14,097	21.34	3,031	18.99
5 (highest quintile)	14,226	21.56	2,455	15.60

Notes: All percentages are weighted. *N* = 80,089 is the total number of carers without missing data on care intensity.

less prevalent but more intensive, particularly for women, in Southern and Eastern European countries, where LTC spending is less generous (Hoffmann and Rodrigues, 2010; Brandt, 2013; Verbakel, 2018; Quashie et al, 2022). Women, who are traditionally expected to provide care, often take the bulk of these intensive care responsibilities in countries with low state support, spending significantly more time on care tasks compared to men in similar contexts (The Eurocare Team, 2024a; 2024b). This is in line with the specialisation hypothesis, which argues that the state and family complement each other by fulfilling care tasks appropriate to their competencies (Brandt, 2013). Hence, if publicly funded LTC services take over specialised and demanding tasks, such as regular medical and personal care, the family can be relieved of these obligations and limit their care responsibilities to less challenging tasks, such as practical and emotional support (Brandt, 2013; Verbakel, 2018).

The present article has found that while LTC public spending may alleviate care burdens, gender inequalities persist. Thus, even though higher LTC public spending redistributes reproductive labour like care, this redistribution seems incomplete. Cultural and institutional barriers continue to uphold the expectation that women should assume care responsibilities, even when formal services might be available. From a social reproduction theory perspective, barriers to accessing available LTC resources and support are not merely administrative but structural, reflecting a

Table 3: Unadjusted and adjusted associations between gender and care (among carers and non-carers) or intensive care (among carers)

	Care (versus no care) *N* = 530,521			Intensive care (versus care < 20 hours per week) *N* = 80,089		
	OR	95% CI	*p*-value	OR	95% CI	*p*-value
Unadjusted						
Gender						
Men	Reference					
Women	1.40	1.37 to 1.44	< 0.001	1.55	1.47 to 1.63	< 0.001
Adjusted*						
Gender						
Men	Reference					
Women	1.41	1.38 to 1.45	< 0.001	1.50	1.42 to 1.58	< 0.001
LTC public spending						
Low	Reference					
Medium to low	0.99	0.96 to 1.03	0.74	2.03	1.89 to 2.17	< 0.001
Medium to high	1.41	1.37 to 1.45	< 0.001	0.73	0.68 to 0.78	< 0.001
Very high	1.38	1.33 to 1.43	< 0.001	0.38	0.34 to 0.41	< 0.001
Age						
15–29	Reference					
30–49	1.64	1.56 to 1.71	< 0.001	1.72	1.50 to 1.97	< 0.001
50–64	3.08	2.94 to 3.21	< 0.001	2.28	2.01 to 2.60	< 0.001
65+	1.55	1.48 to 1.63	< 0.001	4.03	3.53 to 4.61	< 0.001
Household income						
1 (lowest quintile)	Reference					
2	1.04	0.99 to 1.08	0.07	0.90	0.82 to 0.98	0.02
3	1.01	0.97 to 1.05	0.74	0.85	0.78 to 0.93	< 0.001
4	0.98	0.94 to 1.02	0.30	0.70	0.64 to 0.76	< 0.001
5 (highest quintile)	0.93	0.89 to 0.96	< 0.001	0.57	0.52 to 0.62	< 0.001

Note: Mutually adjusted for all variables shown.

broader societal tendency to externalise care onto women (Fraser, 2016). Evidence from a survey carried out by COFACE Families Europe, which included data from 16 European countries, suggested that carers across Europe face similar challenges, including access to community-based services and financial constraints, and that although some countries provide better access to support (for example, social, financial, insurance and respite care), only 50 per cent of carers access these benefits (Birtha and Holm, 2017). Furthermore, evidence from a survey carried out in the UK by Carers Trust found that among carers, the percentage of women receiving such benefits as Carer's Allowance, Universal Credit, Disability Living Allowance and other benefits was lower than that for men (Neale, 2023). Future research should focus on the barriers to accessing LTC resources among women across Europe and assess whether contextual factors, as well as awareness and eligibility, contribute to the unequal utilisation of these services by men and women.

Table 4: Associations between gender and care or intensive care stratified by LTC public spending

	Care (versus no care) *N* = 530,521					Intensive care (versus care < 20 hours per week) *N* = 80,089				
	N	Gender	OR	95% CI	*p*-value	*N*	Gender	OR	95% CI	*p*-value
LTC public spending										
Low	142,660	Men	Reference			17,901	Men	Reference		
		Women	1.40	1.34 to 1.46	< 0.001		Women	1.64	1.47 to 1.82	< 0.001
Medium to low	132,535	Men	Reference			17,777	Men	Reference		
		Women	1.55	1.48 to 1.63	< 0.001		Women	1.35	1.22 to 1.49	< 0.001
Medium to high	197,811	Men	Reference			34,784	Men	Reference		
		Women	1.38	1.33 to 1.44	< 0.001		Women	1.56	1.42 to 1.70	< 0.001
Very high	49,180	Men	Reference			8,331	Men	Reference		
		Women	1.40	1.33 to 1.48	< 0.001		Women	1.34	1.13 to 1.60	0.001

Note: Models adjusted for age and household income.

This article has benefited from a large and representative sample, comprising data from two years (2014 and 2019) and including 28 European countries and four different LTC spending groups. Furthermore, the European Health Interview Survey has relatively detailed care and socio-demographic information, including information on care intensity, a wide age range and household income. However, there are limitations that must be considered. The data for the article are cross-sectional, limiting the ability to establish causal relationships. The care question used for this article is self-reported, which might lead to recall or social desirability bias. The care question also limits the responses to specific needs (that is, age problem or chronic health condition), which might underestimate the number of carers. Additionally, the LTC classification does not account for changes in spending patterns and, thus, does not reflect any potential policy shifts during the study period.

In conclusion, this article contributes to the evidence supporting the presence of gender inequalities in care and intensive care across European countries, where care responsibilities fall more heavily on women than on men across all LTC public spending systems. While higher LTC expenditure is associated with reduced care intensity, it does not fully eliminate gender disparities, suggesting that structural and cultural factors continue to shape care inequalities. This article highlights the need for policies that not only increase LTC public spending but also address structural and cultural barriers to equitable care. Future policy efforts should focus on expanding support systems, improving awareness of and access to formal care services, and promoting gender equality in care responsibilities to ensure fairer outcomes for all carers.

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Research ethics statement
The 2014 European Health Interview Survey data are official, public and available at the institutional level from Eurostat. This study involved the secondary analysis of a public data set that had obtained ethics approval. No ethical approval is needed to access the data used in this study.

Conflict of interest
The authors declare that there is no conflict of interest.

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