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Health and Functioning of Community-Dwelling Older Adults in Urban and Rural Areas of Portugal—What Are the Implications for Physiotherapy Care?

Sara Ferreira [1], Magda Reis [1,2], Monserrat Conde [3] and Anabela Correia Martins [1,4,5,6,*]

[1] Coimbra Health School, Polytechnic University of Coimbra, Rua 5 de Outubro, 3045-043 Coimbra, Portugal
[2] Fisioterapia, Centro Cirúrgico de Coimbra, R. Dr. Manuel Campos Pinheiro 51, 3045-089 Coimbra, Portugal
[3] Nuffield Department of Primary Care Health Sciences, University of Oxford, Woodstock Rd, Oxford OX2 6GG, Oxford, UK
[4] H&TR-Health & Technology Research Center, Coimbra Health School, Polytechnic University of Coimbra, Rua 5 de Outubro, 3045-043 Coimbra, Portugal
[5] Center for Rehabilitation Research, Health School, Polytechnic of Porto, Rua Dr. António Bernardino de Almeida, 4200-072 Porto, Portugal
[6] SUScita—Research Group on Sustainability, Cities and Urban Intelligence, 3045-093 Coimbra, Portugal
* Correspondence: anabelacmartins@estesc.ipc.pt

Abstract

Ageing leads to physical, cognitive, and social changes that affect functionality and social participation. Health literacy, sociodemographic, and environmental factors influence health outcomes and access to care. This study aimed to characterize the health and functioning of Portuguese adults aged 65 and over, focusing on sociodemographic factors, health status, lifestyle, fall risk, functional capacity, and social participation, comparing rural and urban populations. An exploratory, cross-sectional study was conducted using data from older adults who completed the FallSensing screening protocol. Participants were classified by residence type (rural vs. urban), and group comparisons were made. The sample (n=474) was predominantly female (66.5%) with a mean age of 74.62 (±6.49) years. Rural participants were older, had higher body mass index (BMI), lower education, and more hypertension, while urban participants showed higher rates of osteoporosis, hearing loss, and alcohol use. Rural residents scored worse on grip strength, gait speed, timed up and go test (TUG), and exercise self-efficacy, with greater use of assistive devices and more severe social participation limitations. Although falls were more reported in urban areas, rural residents experienced them more frequently. These findings suggest that rural living is associated with lower functional capacity and poorer health, underscoring the need for targeted physiotherapy and primary care strategies in rural settings.

Keywords: older adults; rural vs. urban; health disparities; functional capacity; fall risks

1. Introduction

Population ageing has become an increasingly relevant societal concern, driven by declining birth and mortality rates, reduced morbidity, and rising life expectancy. In Europe, individuals aged 65 and over represent 19.7% of the total population, a figure projected to reach 30% by 2050 [1,2]. In Portugal, 21.5% of the population is aged 65 or older, with this proportion expected to increase to 26.8% by 2030 [3].

Ageing is accompanied by physical, psychological, and social changes that can compromise health and functional capacity. Successful ageing depends on maintaining healthy lifestyles, engaging in regular physical activity, and participating in meaningful social activities [1]. Functional capacity refers to the ability to independently perform daily activities while interacting effectively with one's environment, especially the home [3].

Engaging in physical activity helps older adults improve not only physical condition but also quality of life, promoting physical, psychological, and social well-being [1,4]. Community-based approaches are particularly effective, as they enhance physical functioning and reduce social isolation [2]. Exercise also has neuroprotective benefits [5] and, when individualized, serves as a valuable tool for both prevention and treatment [6].

Globally, significant health disparities persist between urban and rural populations. Rural communities often experience socio-economic disadvantages, reduced access to healthcare, shortages of health professionals, and transportation barriers. These challenges contribute to lower levels of health literacy compared to urban areas [7]. It is crucial for healthcare providers, including physiotherapists, to recognize these disparities and avoid underestimating patients' health literacy, which significantly influences physical activity, exercise habits, and fall risk [7,8].

A 2019 systematic review found that while barriers to physical activity are similar across age groups, facilitators vary, emphasizing the need to account for age-specific differences in intervention strategies [9]. Furthermore, the built and natural environment increasingly draws research attention due to its impact on physical activity. A 2024 systematic review reported that rural Europeans have fewer opportunities for physical activity compared to urban residents [10]. Similarly, a 2012 review found that urban dwellers in Europe are more likely to walk or cycle for transportation, while rural residents engage in physical activity primarily for leisure [11].

In rural areas, the availability and accessibility of recreational facilities is positively associated with leisure-time physical activity. However, perceived lack of safety can negatively impact walking levels [10]. Physiotherapy is vital in mitigating the consequences of ageing - particularly the risk of falls - through individualized therapeutic exercise plans that address physical function [12,13]. Yet, sociodemographic variables such as place of residence may influence health outcomes and should be considered in care planning [9,14].

In Portugal, a study concluded that sociodemographic factors significantly impact health-related quality of life [15]. Thus, analysing factors such as place of residence is essential for developing tailored healthcare strategies that facilitate early intervention and prevent disease progression [15,16]. Despite progress in prevention and treatment, physical decline in older adults remains a challenge [2]. Assessing functional capacity and levels of dependency support the development of self-care strategies that foster motivation, independence, and autonomy [1,17].

Nevertheless, the impact of sociodemographic characteristics on individual health remains underexplored. Considering that our environment shapes both behaviour and personality, it is essential to develop comprehensive population profiles. Such data can help primary healthcare systems identify key intervention areas and enhance overall health outcomes.

Physiotherapy - and healthcare more broadly - can benefit significantly from studies that inform context-specific, targeted interventions. With a growing emphasis on health promotion and disease prevention, physiotherapy is playing an increasingly central role in proactive healthcare models. To effectively contribute to this paradigm shift, it is essential to identify risk and protective factors linked to various health outcomes.

These factors may vary depending on sociodemographic and environmental contexts, particularly between urban and rural populations, who face distinct challenges and opportunities in terms of healthcare access, physical activity, and social participation. Understanding these differences is crucial for designing equitable, personalized, and geographically sensitive physiotherapy interventions that support healthy ageing across diverse contexts.

The present study aimed to characterize the Portuguese population aged 65 and over in terms of health and functioning - specifically considering sociodemographic characteristics, health and lifestyle indicators, fall risk, functional capacity, and social participation, in relation to their living environment (urban vs. rural). The findings aim to inform improvements in healthcare delivery and support the development of personalized physiotherapy strategies.

2. Materials and Methods

2.1. Study Design and Site

This exploratory, analytical, cross-sectional study was approved by the Ethics Committee of the Polytechnic Institute of Coimbra (registration code: 6_CEIPC_2017) and conducted in accordance with the ethical principles outlined in the Declaration of Helsinki. All participants provided written informed consent prior to data collection.

Portuguese community-dwelling adults aged 65 years or older were recruited through parish councils and other community facilities. Participants were eligible if they were able to stand and walk independently, with or without walking aids, and had provided informed consent. Exclusion criteria included severe sensory impairments (e.g., deafness or blindness) and cognitive impairments. Individuals who were able to reach the screening site, regardless of educational background, were considered for participation. However, those exhibiting signs of cognitive impairment that interfered with test completion or raised concerns were assessed by the Portuguese version of the six-item cognitive impairment test (6CIT) [18] and subsequently excluded.

Sample size and statistical power were calculated using G*Power 3.0. To ensure representativeness of the Portuguese population aged 65 and older (approximately 2.5 million individuals), a 95% confidence level, 5% margin of error, and an estimated proportion of p = 0.5 (maximal variability) were used. The required sample size was approximately 384 participants. A total of 474 individuals met the eligibility criteria and agreed to participate.

2.2. Outcome Measures

The outcome measures were part of the FallSensing screening protocol, which included both questionnaires and functional tests [17].

Questionnaires included a series of yes/no questions to characterize participants based on sociodemographic and clinical variables, such as fall history in the previous 12 months, fear of falling, sedentary behaviour, health conditions, medication use, use of upper limbs to rise from a chair, alcohol consumption, sex, education level, and self-perceived health status.

The Self-Efficacy for Exercise Scale, a five-item questionnaire, was used to assess participants' confidence in performing physical activity under five emotional conditions: feeling worried or experiencing problems, feeling depressed, feeling tired, feeling tense, and being busy [19].

The Activities and Participation Profile Related to Mobility (PAPM) is an 18-item instrument that assesses the degree of difficulty individuals experience in performing daily activities in their natural environment. It covers domains such as social interactions, education, employment, financial management, and community life, all of which may influence social participation. Responses are rated on a 5-point Likert scale from 0 ("no limitation or restriction") to 4 ("complete limitation or restriction"). Not all items are necessarily applicable to every individual. A participation profile is generated based on valid responses, and the final score should be interpreted along a continuum of restriction levels. Scores from 0 to 0.19 indicate no restrictions on participation. Values between 0.20 and 0.99 reflect mild restrictions, while scores between 1.00 and 1.99 denote moderate restrictions. Scores between 2.00 and 3.87 represent severe restrictions, and scores between 3.88 and 4.00 correspond to complete restrictions on participation [20].

Functional capacity was assessed using four standardized tests as described in the FallSensing protocol [17]:

- Grip Strength Test: Assesses upper limb strength, which correlates with lower limb strength and is a predictor of disability, mobility limitations, and mortality. Participants were seated in a standard armless chair, with shoulders adducted and neutrally rotated, elbows flexed at 90°, and wrists in 0–15° of ulnar deviation. Using a dynamometer set to the second handle position, participants held the device in their dominant hand in a vertical orientation and exerted maximum grip strength for 5 seconds. The final score, in kilograms of force, was recorded.

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Normative values differ by sex; values below 15 kg in women and below 21 kg in men indicate increased fall risk [21].

- 10-Meter Walk Speed (10-mWS) Test: Assesses walking speed over a central 10-meter section of a 20-meter walkway. The initial and final 5 meters were used for acceleration and deceleration. Time was recorded between the 5- and 15-meter marks. Participants wore comfortable footwear and could use assistive devices. A walking speed ≤1 m/s indicates increased fall risk, while ≥1.42 m/s is considered safe for street crossing [22].
- 30-Second Sit-to-Stand (30s STS) Test: Evaluates lower limb strength by counting the number of times participants could rise from a seated to standing position and return to sitting within 30 seconds. The final score was the total number of complete repetitions. Normative values vary by age and sex [23].
- TUG: Measures dynamic balance, mobility, and lower limb strength. Participants began seated in a standard chair and were instructed to stand, walk 3 meters, turn around, return to the chair, and sit down as quickly and safely as possible—without running or using upper limb support. Times greater than 12 seconds suggest an increased fall risk in older adults [24].

2.3. Procedures

All questionnaires and functional tests were administered through structured interviews conducted by two trained researchers. Both received standardized training of the FallSensing protocol to ensure consistency and reliability.

2.4. Statistical Analysis

Statistical analyses were performed using IBM SPSS™ Statistics (version 29) for Windows. Descriptive statistics (means and standard deviations for continuous variables; frequencies and percentages for categorical variables) were computed. Differences between urban and rural groups were analysed using independent samples Student's *t*-tests or Chi-square tests, as appropriate. A significance level of $p \leq 0.05$ and a 95% confidence interval were applied to all statistical tests.

3. Results

Of the 474 participants included in the study, the mean age was 74.62 ± 6.49 years (range: 65–95), 63.1% lived in urban areas and 36.9% resided in rural areas.

Table 1 presents the characteristics of the sample, including sociodemographic data, fall history, health conditions, lifestyle factors, alcohol consumption, use of mobility aids, social participation, and functional test results.

Table 1. Sociodemographic characteristics, health and lifestyle, fall risks, functional capacity, and social participation, overall and stratified by living environment (rural vs. urban).

Characteristics	**Overall (n=474)**	**Rural (n=175)**	**Urban (n=299)**	***p***
Age (years) mean (SD)	74.62 (6.49)	76.87 (6.89)	73.30 (5.87)	<0.001
Sex n (%)				
Female	315 (66.5%)	116 (66.3%)	199 (66.6%)	0.952
Male	159 (33.5%)	59 (33.7%)	100 (33.4%)	
Education n (%)				
No education	61 (12.9%)	40 (22.9%)	21 (7.0%)	<0.001
To 4 years	223 (47.0%)	101 (57.7%)	122 (40.8%)	
5 to 9 years		17 (9.7%)	103 (34.4%)	
Completed high school		8 (4.6%)	29 (9.7%)	

University	150 (25.3%) 37 (7.8%) 33 (6.9%)	9 (5.2%)	24 (8.0%)	
Living alone n (%)				
Yes	206 (43.5%)	67 (38.3%)	139 (46.5%)	0.082
No	268 (56.5%)	108 (61.7%)	160 (53.5%)	
Heart attack n (%)				
Yes	23 (4.9%)	8 (4.6%)	15 (5.0%)	0.828
No	451 (95.1%)	167 (95.4%)	284 (95.0%)	
Stroke n (%)				
Yes	31 (6.5%)	14 (8.0%)	17 (5.7%)	0.325
No	443 (93.4%)	161 (92.0%)	282 (94.3%)	
Diabetes n (%)				
Yes	144 (30.4%)	55 (31.4%)	89 (29.8%)	0.704
No	330 (69.6%)	120 (68.6%)	210 (70.2%)	
Hypertension n (%) (n=473)				
Yes	292 (61.7%)	127 (72.6%)	165 (55.4%)	<0.001
No	181 (38.3%)	48 (27.4%)	133 (44.6%)	
High cholesterol n (%) (n= 473)				
Yes	265 (56.0%)	97 (55.4%)	168 (56.4%)	0.841
No	208 (44.0%)	78 (44.6%)	130 (43.6%)	
Osteoarthtitis n (%)				
Yes	239 (50.4%)	89 (50.9%)	150 (50.2%)	0.885
No	235 (49.6%)	86 (49.1%)	149 (49.8%)	
Osteoporosis n (%)				
Yes	98 (20.7%)	25 (14.3%)	73 (24.4%)	0.009
No	376 (79.3%)	150 (85.7%)	226 (75.6%)	
Urinary incontinence n (%)				
Yes	179 (37.8%)	61 (34.9 %)	118 (39.5%)	0.318
No	295 (62.2%)	114 (65.1%)	181 (60.5%)	

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Hearing problems n (%) (n=473)				<0.001
Yes	172 (36.4%)	47 (26.9%)	125 (41.9%)	
No	301 (63.6%)	128 (73.1%)	173 (58.1%)	
Poor vision n (%)				
Yes	283 (59.7%)	119 (68.0%)	164 (54.8%)	0.005
No	191 (40.3%)	56 (32.0%)	135 (45.2%)	
Self-perceived health n (%) (n=389)				0.303
Poor	71 (18.3%)	20 (18.0%)	51 (18.3%)	
Fair	170 (43.7%)	53 (47.7%)	117 (42.1%)	
Good	109 (28.0%)	31 (27.9%)	78 (28.1%)	
Very good	29 (7.5%)	7 (6.3%)	22 (7.9%)	
Excellent	10 (2.6%)	0 (0%)	10 (3.6%)	
Benzodiazepines n (%) (n=419)				
Yes	123 (29.4%)	49 (29.9%)	74 (29.0%)	0.851
No	296 (70.6%)	115 (70.1%)	181 (71.0%)	
Total medication mean (SD) (n=351)	5.37 (2.89)	5.58 (2.95)	5.16 (2.82)	0.192
More 4 medicines n (%)				
Yes	294 (62.0%)	125 (71.4%)	169 (56.5%)	0.001
No	180(38.0%)	50 (28.6%)	130 (43.5%)	
Mobility assistive device n (%)				<0.001
Yes	63 (13.3%)	35 (20.0%)	28 (9.4%)	
No	411 (86.7%)	140 (80.0%)	271 (90.6%)	
Type of assistive device n (%) (n=63)				
Walking stick/cane	26 (41.9%)	15 (42.9%)	11 (40.7%)	
Crutch	33 (53.2%)	19 (54.3%)	14 (51.9%)	0.710
Walker	3 (4.8%)	1 (2.9%)	2 (7.4%)	
Sedentary Behaviour n (%)				
Yes	250 (52.7%)	88 (50.3%)	162 (54.2%)	0.412
No		87 (49.7%)	137 (45.8%)	

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	224 (47.3%)			
Upper extremities assistance to stand up from a chair n (%)				
Yes	205 (43.2%)	75 (42.9%)	130 (43.5%)	0.895
No	269 (56.8%)	100 (57.1%)	169 (56.5%)	
BMI mean (SD) (n=458)	27.82 (4.21)	28.32 (4.31)	27.51 (4.12)	0.044
Alcohol consumption n (%)				
Yes	42 (8.9%)	4 (2.3%)	38 (12.7%)	<0.001
No	432(91.1%)	171 (97.7%)	261 (87.3%)	

Characteristics	Overall (n=474)	Rural (n=175)	Urban (n=299)	*p*
History of falls last 12 months n (%)				
Yes	185 (39.0%)	64 (36.6%)	121 (40.5%)	0.401
No	289 (61.0%)	111 (63.4%)	178 (59.5%)	
Number of falls mean (SD) (n=183)	2.24 (2.41)	1.84 (1.32)	2.45 (2.81)	0.048
Fear of falls n (%)				
Yes	261 (55.1%)	106 (60.6%)	155 (51.8%)	0.065
No	213 (48.2%)	69 (39.4%)	144 (67.8%)	
Where falls n (%)				
Inside	64 (34.8%)	25 (39.7%)	39 (32.2%)	0.314
Outside	120 (65.8%)	38 (60.3%)	82 (67.8%)	
Reason of fall n (%) (n=184)				
Slip	44 (23.9%)	17 (26.6%)	27 (22.5%)	
Stumble	78 (42.4%)	28 (43.8%)	50 (41.7%)	0.603
Loss of consciousness	3 (1.6%)	0 (0%)	3 (2.5%)	
Dizziness	12 (6.5%)	3 (4.7%)	9 (7.5%)	
Lower extremity weakness	13 (7.1%)	4 (6.3%)	9 (7.5%)	
No special reason	20 (10.9%)	9 (14.1%)	11 (9.2%)	
Other	14 (7.6%)	3 (4.7%)	11 (9.2%)	
Need of health services assistance n (%) (n=185)				
Yes	63 (34.1%)	23 (35.9%)	40 (33.1%)	0.694
No	122 (65.9%)	41 (64.1%)	81 (66.9%)	
Which health service n (%) (n=63)				
Hospital Emergency	55 (87.3%)	19 (82.6%)	36 (90.0%)	
Primary health care center	8 (12.7%)	4 (17.4%)	4 (10.0%)	0.396
Hospitalization n (%) (n=56)				
Yes	10 (17.9%)	2 (10.5%)	8 (21.6%)	0.305

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No	46 (82.1%)	17 (89.5%)	29 (78.4%)	
Activities limitation & restrictions due to fall n (%) (n=184) Yes No	43 (23.4%) 141 (76.6%)	14 (21.9%) 50 (78.1%)	29 (24.2%) 91 (75.8%)	0.726
Characteristics	Overall (n=474)	Rural (n=175)	Urban (n=299)	*p*
PAPM n (%) (n=470) no restrictions mild restrictions moderate restrictions severe restrictions	239 (50.9%) 136 (28.9%) 64 (13.6%) 31 (6.6%)	80 (46.8%) 43 (25.1%) 31 (18.1%) 17 (9.9%)	159 (53.2%) 93 (31.1%) 33 (11.0%) 14 (4.7%)	0.013
TUG mean (SD) (n=457)	10.99 (7.40)	13.4 (10.40)	9.62 (4.43)	<0.001
Grip strengh mean (SD)	22.74 (8.27)	21.03 (7.36)	23.73 (8.61)	<0.001
Walking speed mean (SD)	1.35 (0.43)	1.17 (0.44)	1.45 (0.39)	<0.001
Sit to stand mean (SD) (n=450)	10.94 (3.96)	9.25 (3.47)	11.87 (3.90)	<0.001
Self-efficacy for exercise mean (SD) (n=471)	13.75 (4.66)	12.83 (4.97)	14.28 (4.40)	0.001

Abbreviations: BMI: Body Mass Index (kg/m2); SD: standard deviation; TUG: Timed Up and Go test; PAPM: Activities and Participation Profile related to Mobility.

The overall sample was predominantly female (66.5%), with no significant difference between rural (66.3%) and urban (66.6%) areas (p=0.952). Rural participants were significantly older (76.87 ± 6.89 years) than urban participants (73.50 ± 5.87 years) (p<0.001).

In terms of educational attainment, 223 participants (47.0%) had completed the 4th grade, 150 (25.3%) had education between the 5th and 9th grades, 37 (7.8%) had completed secondary education, and 33 (6.9%) had attained higher education. Sixty-one participants (12.9%) were illiterate. Stratification by residence revealed marked differences (p<0.001): in rural areas, 57.7% had completed only the 4th grade, 9.7% had education between the 5th and 9th grades, 4.6% had completed secondary education, and 5.2% held higher education degrees; the illiteracy rate was 22.9%. In contrast, urban participants had a more diversified educational profile, with 40.8% having completed the 4th grade, 34.4% the 5th to 9th grades, 9.7% secondary education, and 8.0% higher education. The illiteracy rate in urban areas was notably lower (7.0%).

In terms of household composition, 206 (43.5%) of participants live alone, of whom 46.5% live in rural areas and 38.3% live in urban areas (p=0.082).

Concerning health conditions, high blood pressure was the most common, affecting 292 participants (61.7%), with a significantly higher prevalence in rural areas (72.6%) compared to urban areas (55.4%) (p<0.001). Osteoporosis was stated by 98 (20.7%), with a significantly higher prevalence in urban areas (24.4%) compared to rural areas (14.3%) (p=0.009). Hearing problems were stated by 172 (36.4%) with a significantly higher prevalence in urban areas (41.9%) compared to rural areas (26.9%) (p<0.001) and poor vision by 283 (59.7%) with a significantly higher prevalence in rural areas (68.0%) compared to urban areas (54.8%) (p=0.005).

On other hand, high cholesterol was reported by 265 participants (56.0%), osteoarthritis was reported by 239 participants (50.4%), urinary incontinence by 179 (37.8%), diabetes by 144

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participants (30.4%), history of myocardial infarction (heart attack) by 23 participants (4.9%), stroke by 31 (6.5%) and Parkinson's disease by 10 (2.1%), however none of these conditions revealed statistically significant differences between groups (urban vs. rural).

Regarding self-rated health, 71 participants (18.3%) described their health as poor, 170 (43.7%) as fair, 109 (28.0%) as good, 29 (7.5%) as very good, and 10 (2.6%) as excellent (all from urban areas). No statistically significant differences between groups were found (p=0.303).

With respect to pharmacological treatment, 123 participants (29.4%) reported the benzodiazepine use, with similar prevalence between rural (29.9%) and urban (29.0%) areas (p=0.851). The mean number of medications used per participant was 5.37 ± 2.89, slightly higher in rural areas (5.58 ± 2.95) than in urban areas (5.16 ± 2.82) (p=0.192). Polypharmacy (more than four medications) was observed in 294 participants (62.0%), with a higher proportion in rural (71.4%) than urban (56.5%) areas (p=0.001).

Mobility assistive devices were used by 63 participants (13.3%), with higher prevalence in rural areas (20.0%) than urban areas (9.4%) (p<0.001). The most common device was the cratches, with regular use reported by 33 (53.2%), followed by the cane, used by 26 participants (41.9%). Walkers were used by only 3 participants (4.8%).

A total of 250 participants (52.7%) were classified as sedentary, with similar rates across locations (p=0.412). Additionally, 205 participants (43.2%) reported using their upper limbs to rise from a chair, an indicator of lower limb functional decline, with no significant difference between groups (p=0.895).

Statistically significant differences were observed in BMI between participants from rural areas (28.32 ± 4.31 kg/m²) and urban areas (27.51 ± 4.12 kg/m²) (p=0.044). The overall mean BMI was 27.82 ± 4.21 kg/m².

Alcohol consumption was reported by 42 participants (8.9%), with significantly higher prevalence in urban areas (12.7%) than in rural areas (2.3%) (p=0.001).

Overall, 185 participants (39.0%) reported at least one fall in the previous 12 months. Although the difference was not statistically significant (p=0.401), and the proportion was slightly higher in urban areas (121; 40.5%) than in rural areas (64; 36.6%). Fear of falling was reported by 261 participants (55.1%), with similar prevalence between rural (106; 60.6%) and urban (155; 51.8%) groups (p=0.065). Regarding the location of falls, 120 participants (65.8%) reported falling outdoors: 38 (60.3%) from rural areas and 82 (67.2%) from urban areas (p=0.314).

Participants identified several causes for their falls, with stumbling being the most frequently reported (78; 42.4%), followed by slipping (44; 23.9%), loss of lower limb strength (13; 7.1%), dizziness (12; 6.5%), and loss of consciousness (3; 1.6%). Twenty participants (10.9%) could not identify a specific cause, and 14 (7.6%) cited other factors. In rural areas, stumbling (28; 43.8%) and slipping (17; 26.6%) were predominant, with no cases of loss of consciousness. In urban areas, stumbling (50; 41.7%) and slipping (27; 22.5%) were also the main causes, with three cases (2.5%) of loss of consciousness. Nevertheless, the differences were not statistically significant (p=0.603).

Following a fall, 63 participants (34.1%) sought medical attention: 23 (35.9%) in rural areas and 40 (33.1%) in urban areas (p=0.694). Of those, 55 (87.3%) visited a hospital (82.6% rural; 90.0% urban), and 10 participants (17.9%) required hospitalization, 2 (10.5%) from rural areas and 8 (21.6%) from urban areas (p=0.396). As a consequence of falling, 43 participants (23.4%) reported activity limitations and participation restrictions (21.9% rural vs. 24.2% urban; p = 0.726), either in the short or long term.

According to the PAPM results, 239 participants (50.9%) reported no restrictions (46.8% rural; 53.2% urban), 136 (28.9%) reported mild restrictions (25.1% rural; 31.1% urban), 64 (13.6%) reported moderate restrictions (18.1% rural; 11.0% urban), and 31 (6.6%) reported severe restrictions (9.9% rural; 4.7% urban) on their social participation (p=0.013).

In functional tests, the overall mean TUG time was 10.99 ± 7.40 seconds, with rural participants being slower (13.40 ± 10.40 seconds) than urban ones (9.62 ± 4.43 seconds) (p<0.001). Mean grip strength was 22.74 ± 8.27 kg, lower in rural areas (21.03 ± 7.36 kg) than in urban areas (23.73 ± 8.61 kg) (p<0.001). Walking speed averaged 1.35 ± 0.43 m/s, with rural participants showing slower speeds

(1.17 ± 0.44 m/s) compared to urban participants (1.45 ± 0.39 m/s) (*p*<0.001). The 30s STS revealed worse results in rural areas (9.25 ± 3.47 seconds) compared to urban areas (11.87 ± 3.90 seconds) (*p*<0.001), with all functional differences being statistically significant.

The mean score on the self-efficacy for exercise was 13.75 ± 4.66, with rural participants scoring lower (12.83 ± 4.97) than their urban counterparts (14.28 ± 4.40), confirming the statistically significant difference (*p*=0.001).

4. Discussion

Portugal faces severe demographic ageing, which poses great challenges to healthcare planning and delivery [1,3] Cross-sectional assessments of health and functional status among older adults provide a snapshot of current needs across different living setting; also establishing baseline data necessary to inform inclusive ageing-in-place strategies, where physiotherapy care can be included, and promote equitable health-related outcomes.

Our study demonstrates significant health and demographic disparities between rural and urban Portuguese older adults, with rural residents being older, having higher BMI, polypharmacy, lower educational attainment, and more prevalent illiteracy, which may contribute to lower health literacy [16,25]. Rural areas displayed higher rates of hypertension, poor vision, and assistive device use, while residents of the urban areas reported higher rates of osteoporosis, hearing problems and alcohol use, possibly reflecting differences in healthcare access, environmental factors and cultural norms [26–29]. Alongside these discrepancies, overall, around one third of Portuguese adults over the age of 65 living in the community report diabetes and stress urinary incontinence, and more than half report hypercholesterolaemia, osteoarthritis and sedentary behaviour. Perhaps for this reason, approximately two thirds perceive their health to be poor or fair. These results corroborate those of a previous study, conducted on a representative sample of the general population of Portuguese adults aged 50 years or over, which found that about half of the population met the criteria for multimorbidity (48.9%), suggesting that the burden of multimorbidity in Portugal is excessive [30].

Although the prevalence of falls, as well as their number, is more significant among urban residents, older adults living in rural areas performed worse on physical tests and reported more restrictions on social participation. The fear of falling was reported by more than half of all older adults, which according to previous studies, may interfere with the performance of many daily activities. When fear becomes irrational and exaggerated, restricting or avoiding activities, causes functional and social declines in the long term, which consequently reduces quality of life, which in turn increases the risk of falling, thus becoming a vicious circle [31–33].

The rural residents' older average age may partially explain these outcomes due to age-related functional decline [25,34,35]. Although fall rates were slightly higher among urban residents.

For some time, research and policy attention have focused more on falls that occur indoors. However, outdoor falls account for 47–58% of falls requiring at least some medical attention [36]. In their study, there was a similar proportion of persons with severe injurious falls that occurred indoors and outdoors on streets or pavements. However, this study identified a ratio of one indoor fall to two outdoor falls.

There is a discrepancy regarding the location of the falls that is worth noting. The lower frequency of outdoor falls among rural residents may be explained by their greater dependence and reduced mobility, as supported by the finding that rural residents were older, more fearful of falling, had poorer functional capacity, used more mobility assistive devices, and approximately one-third (28%) reported moderate to severe restrictions in social participation, compared with 15.7% in urban residents. However, during basic activities of daily living performed indoors, particularly in their homes, they fall more than those living in urban areas. These findings were also corroborated in previous studies [37–39].

Globally, the World Health Organization estimates that 25% of older adults experience social isolation [40]. In our study, considering that more than 40% of participants live alone, we believe this scenario may represent a critical issue, warranting prioritization at the level of public health.

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Evidence indicates that living alone and having limited social contact, as observed in the Portuguese population (both rural and urban), is associated with an increased risk of falls among older adults [41,42]. Conversely, other studies have stated social isolation because of falls, emphasizing risk factors such as frailty, comorbidities, and fear of falling [43].

In the present study, slipping or tripping, whether indoors or outdoors, was reported as the cause of falls by approximately two-thirds of older adults. Recent evidence suggests that environmental hazards account for 30-50% of fall incidents, encompassing barriers within the home, such as poor floor conditions, narrow steps, poorly arranged furniture, loose rugs, and inadequate lighting, as well as obstacles in the community environment, including slippery floors, uneven or damaged pavements, poorly lit areas, steep ramps, absence of handrails, inadequate or incorrect use of walking aids, traffic patterns, and deficiencies in the design and maintenance of public spaces [27,37,44–46].

As concluded in a recent systematic review, micro-walkability (for example, the quality of pavements or road surfaces) remains the most frequently studied external environmental characteristic. However, macro-accessibility (e.g., use of spaces) from the perspective of crime and safety, socio-economic characteristics, green spaces, and terrain has been studied to a lesser extent and has yielded contradictory results [47]. There is no doubt that it can be useful in identifying areas where intervention is needed, nevertheless we argue that this macro-scale can be useful for classifying existing or proposed neighborhoods in terms of their walkability.

At this point, it is important to recall the World Health Organization's definition of healthy ageing as the process of developing and maintaining the functional ability that enables well-being in older age, alongside the four priority action areas identified in the Decade of Healthy Ageing [48]. Our findings underscore the urgent need to transform societal attitudes towards ageing, to foster environments that support older adults' abilities, to deliver person-centred and integrated primary health care responsive to their needs, and to ensure access to long-term care for those requiring it. Physiotherapy services must also address rural–urban disparities to enhance functional ability, improve quality of life, and promote healthy ageing in Portuguese older adults [16,25].

Physiotherapists should be equipped to conduct context-sensitive assessments that consider social determinants of health influencing older adults' profiles [49], and to implement interventions aimed at enhancing functional independence, supporting autonomous living, and reducing falls and fear of falling. Such interventions include home modifications, patient education and coaching, and structured exercise programmes [48]. For rural populations, physiotherapy must be adapted to overcome barriers such as transportation difficulties, limited healthcare access, and lower health literacy [41], through culturally tailored home-based, hybrid, and telehealth strategies. Programmes should be designed for low-resource settings, drawing on community assets to ensure feasibility and sustainability [50]. Finally, physiotherapy curricula for geriatric care should embed these competencies at both postgraduate and continuing professional development levels.

This study has several limitations. Cross-sectional design only permits the identification of associations between variables at a single point in time, without the ability to determine the direction or temporality of these relationships. A longitudinal analysis would allow for tracking participants' health and functioning over time. However, our cross-sectional study also allowed for planning of care based on current needs. Participants in the rural group were, on average, approximately 3.5 years older than those in the urban group. This age disparity may have influenced the results, due to functional decline [51,52]. Even though we used a power calculation to determine the sample size, we acknowledge that socioeconomic and cultural regional differences persist across Portugal, which can influence how social determinants affect health outcomes among older adults. There are substantial regional inequalities in Portugal regarding health status, access to healthcare services, and overall well-being in older populations. Factors such as income, educational attainments, and geographical location contribute to these disparities, affecting both the prevalence of chronic conditions and access to care throughout the national territory [53–55]. These factors may shape rural–urban differences nationwide, limiting generalizability.

5. Conclusions

Our findings suggest that rural living is associated with poorer outcomes in most health and functioning domains of Portuguese older adults, reinforcing the need to implement comprehensive physiotherapy assessments that contemplate the social determinants of health. Further research is needed to disentangle the effects of age - through stratified analyses - and to investigate additional determinants of health, such as socioeconomic and psychosocial conditions, that may influence functional ability and health. This will facilitate informing the development of targeted, person-centred physiotherapy interventions that address the specific needs of older adults according to their living environment.

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