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# Socio-Demographic Determinants and Psychosocial Factors Influencing Mobility Limitations in Aging: Insights from a National Health Survey

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**Abstract:** This study utilizes data from the fourth National Health Survey conducted in 2019. in the Republic of Serbia, aiming to contribute to a deeper understanding of the factors influencing the mobility of the elderly population. It examines the sociodemographic and psychosocial factors associated with functional limitations in older adults. By analyzing variables such as age, gender, marital status, education, income, social support, and mental health, the study seeks to explain their impact on the prevalence of walking limitations.Questionnaires were employed as a research instrument in line with the methodology of the European Health Survey (EHIS). The analysis is based on a sample of 3,705 participants aged 65 and above. Statistical significance between variables was assessed using the Chi-square test. Post-hoc comparisons were performed using pairwise z-tests. Univariate logistic regression was employed to identify predictors of walking difficulties. Additionally, multivariable logistic regression was conducted to further explore predictors while adjusting for potential confounding variables, with odds ratios and corresponding 95% confidence intervals estimated.Women exhibit significantly higher prevalence of walking difficulties compared to men ($p < 0.001$). There is a significant variation in the prevalence of walking difficulties among different age groups. Individuals aged 75-84 show the highest prevalence in all categories of walking difficulties, with particular significance in the categories of "no difficulty," "some difficulty," and "unable to walk at all" ($p < 0.001$). Higher levels of education generally correlate with lower prevalence of walking difficulties. Married or partnered individuals have 0.522 times lower odds of reporting difficulties in walking compared to singles ($p < 0.05$). Individuals with lower wealth index (1-Least affluent) have significantly higher prevalence of walking difficulties.This knowledge can inform targeted interventions to enhance mobility and improve the overall well-being of older individuals.

**Keywords:** aging; functional limitations; socio-demographic factors; walking difficulties; population health

## 1. Introduction

Demographic challenges have become imperative in the realm of public health, with their escalation stemming from a combination of low birth rates and increased life expectancy [1]. The World Health Organization (WHO) predicts a significant rise in the elderly population, anticipating a doubling of the number of individuals aged 60 and above by 2050 compared to the current situation [2]. Concurrently, there is a notable increase in the number of individuals aged 80 and above [3,4], posing serious challenges to social, health, and welfare systems. These demographic trends

underscore the necessity for a comprehensive approach to enhancing the health and well-being of the elderly population.

Functional limitation is conceptually describedas an inhibiting factor in performing various activities in daily life, stemming from health or physical issues [5]. During the aging process, significant changes occur in the musculoskeletal system [4,6]. This intricate process involves transformations affecting muscles, bones, cartilage, ligaments, and tendons, resulting in hypotrophy and/or atrophy of tissues and loss of function [4,6,7]. These transformations deeply impact physical activity and exercise in the older population, including difficulties in movement, impaired walking, or other challenges in performing steps.There are various factors that influence the daily life of the elderly population, including social, demographic, cultural, health, mental health and behavioral dimensions. These multidimensional aspects speak to the complexity of the impact they can have on functional decline in older individuals.The onset of these limitations, often associated with chronic health conditions, not only impedes the performance of daily activities but can also have profound effects on mental health and the ability to seek and receive social support [8–10]. Walking is often regarded as a crucial indicator of lower body mobility and functionality. The presence of functional limitations in this context may indicate challenges in daily activities [5]. These difficulties can significantly influence the quality of life for the elderly population, and challenges arising from limitations affect individual social participation and quality of life, placing a strong focus on research efforts in the field of gerontological epidemiology. Functional limitations exhibit significant variations according to sociodemographic characteristics, with marital status identified as a significant factor influencing the degree and severity of functional limitations in older individuals [11]. Furthermore, a lack of support and social isolation in lower socio-economic strata can further contribute to challenges in maintaining functional capacity [11,12]. Furthermore, social support has been identified as another important factor that can influence the improvement of mental and physical health in older individuals, thereby contributing to their activities. Research indicates a consistent correlation between income and health status during the later stages of life in numerous European countries [10–13].In studies conducted in the Republic of Serbia, it was found that almost half of the elderly population (44.8%) faces mobility limitations, with 2019 data indicating that every fourth elderly resident (25.8%) reported serious walking difficulties [14,15]. In comparison to all other Central and Eastern European countries, Serbia is considered a nation with the highest percentage of the population not engaging in sufficient physical activity or being completely inactive [5,16]. This data points to a lack of developed awareness and collective interest in engaging in appropriate physical activities among individuals. With the aim of enhancing the functional independence of the elderly population, we are exploring sociodemographic differences in functional limitations related to walking and climbing stairs. This allows us to utilize these factors for environmental adjustments, thereby achieving and maintaining maximum functional independence. We categorized physical activity into walking and climbing stairs (12 steps). This study sets two fundamental objectives: firstly, it conducts an analysis of the frequency and correlations of functional walking limitations within the context of sociodemographic characteristics; secondly, it explores the relationship between mental health and social support with the level and presence of functional walking limitations among older individuals.

## 2. Materials and Methods

The research was conducted as part of the fourth national survey "Health Survey of the Population of Serbia in 2019," carried out by the Statistical Office of the Republic of Serbia in collaboration with the Institute of Public Health of Serbia "Dr Milan Jovanović Batut" and the Ministry of Health of the Republic of Serbia. The analysis is based on a sample of 3,705 participants aged 65 and above. The research adhered to the methodology and instruments of the European Health Interview Survey (EHIS Wave 3) [17]. Participants who met the inclusion criteria were informed about the research protocol, and their consent was obtained.The sampling process encompassed all households listed in every enumeration area during the 2011 Census. A combination of stratification and multistage sampling techniques was employed to ensure a representative sample [14,15].

Stratification was based on settlement type (urban and other) and four regions: Belgrade, Vojvodina, Sumadija and Western Serbia, Southern and Eastern Serbia. The resulting sample comprised 5,114 households, totaling 15,621 individuals, including 13,589 aged 15 and above, and 1,493 children aged 5 to 14. Only residents of private households within the Republic of Serbia were included, excluding those in collective households, geriatric institutions, and non-participants.

Demographic characteristics (age, gender, region, place of residence, marital status) and socioeconomic status (education, household wealth index) were used as independent variables. Participants' age was categorized into age groups (65-69, 70-74, 75-79, 80-84, 85-89, 90+) , gender as male or female, place of residence as urban or rural, region as Belgrade, Vojvodina, Sumadija and Western Serbia, Southern and Eastern Serbia, and marital status as unmarried/single, married, cohabiting, divorced, or widowed [15]. Variables reflecting socioeconomic status included education (no schooling, incomplete primary school, secondary school, higher education, master's or doctorate) and household wealth index. The population of Serbia was classified into five socioeconomic categories, with the first representing the poorest and the fifth the wealthiest residents.

The social support score was formed by assigning and summing points for each response to three possible questions from the "Oslo-3 Social Support Scale"[18]: "How many people are so close to you that you can count on them when you have serious personal problems?" (points range from 1 ("None") to 4 ("6 or more")), "How much are people really interested in you, in what you do, what happens in your life?" (points range from 1 ("Not at all interested") to 5 ("Very interested")), "How easy is it to get practical help from neighbors/friends if you need it?" (points range from 1 ("Very difficult") to 5 ("Very easy")). By summing points on these three questions, a social support score was established: strong social support (12-14 points), moderate (9-11 points), and poor (3-8 points).

To assess the presence of depression, the PHQ-8 questionnaire (Patient Health Questionnaire-8) was used as a diagnostic tool [19]. It consists of eight items related to specific mental problems and distress. A PHQ-8 score ranging from zero to four indicates no symptoms of depression, a score from five to nine indicates mild symptoms of depression, and a total PHQ-8 score of ten and above indicates a high probability of depression, further classified as moderate (PHQ-8 score from 10 to 14), moderately severe (PHQ-8 score from 15 to 19), and severe depressive episode (PHQ-8 score 20 and above).

The Demographic and Health Survey Wealth Index, or wealth index estimation, has been extensively described in previous studies and includes variables related to property, excluding income [20]. Well-being index - a complex measure of household cumulative living standards, calculated using data on household ownership of selected assets such as televisions and bicycles; materials used for housing construction; and types of access to water and sanitation facilities. Household wealth in Serbia is ranked into five socio-economic categories (5- wealthiest,4-rich, 3-middle class, 2- poor, and 1- poorest).

We explored two categories of walking difficulties with the aim of assessing individuals' capacities and personal independence. The first category encompassed difficulties in walking half a kilometer on level ground without the use of any aids. The posed question was: "Do you have difficulties walking half a kilometer on level ground without using any aids?", and the response options were: "without difficulty," "some difficulty," "a lot of difficulty," and "cannot do at all/incapable of doing." The second category included difficulties in climbing or descending 12 steps. The question asked was: "Do you have difficulties climbing or descending 12 steps?", and the response options were: "without difficulty," "some difficulty," "a lot of difficulty," and "cannot do at all/incapable of doing."

To assess the statistical significance between variables, a Chi square test was employed. The Chi square test was utilized to examine the relationship between categorical variables, presenting results in both percentages and absolute frequencies. The p-value was calculated to determine the significance of the observed associations. In order to examine specific group differences, pairwise z-tests were conducted as post-hoc comparisons following the Chi square test. Univariate logistic regression analysis was conducted to identify potential predictors of difficulties in walking half a kilometer on level ground without aids or difficulties in ascending or descending 12 steps. This

analysis aimed to assess the individual contribution of each predictor variable to the outcome of interest. Multivariable logistic regression analysis was performed to further investigate predictors of the aforementioned difficulties while adjusting for potential confounding variables. This analysis aimed to identify independent predictors by simultaneously considering multiple variables. Odds ratios (OR) with corresponding 95% confidence intervals (CI) were estimated to assess the associations between predictor variables and the outcomes of interest.

## 3. Results

The study involved a total of 3,743 participants, with 55.1% being females and 44.9% males. The average age of all participants is 73.46 ± 6.811, with the youngest participant being 65 and the oldest 99 years old. Women are older than men with an average age of 73.78 ± 6.968, while the average age for men is 73.06 ± 6.594 (F=10.568, p<0.01). Participants were categorized into six age groups, with the majority falling in the 65 to 69 years category (36.3%). Most participants completed either high school (38.9%) or elementary school (25.4%), the majority are married or in a common-law relationship (58.1%). Regarding the well-being index, the distribution across all categories is similar, with the fewest being the wealthiest participants (16.2%). The highest percentage of participants reported no difficulty walking half a kilometer on level ground without assistance (53.2%) or climbing up or down 12 steps (48.5%).

Concerning social support, the majority stated they can rely on 1 or 2 (41.4%) or 3-5 individuals (41.3%) when facing serious personal problems. Participants also commonly mentioned receiving practical help from neighbors when needed (44.8%). Based on these responses, all participants were categorized into strong (85.6%), moderate (14.1%), and poor (0.3%) social support.

Mental health was assessed using the PHQ-8 questionnaire, with the highest percentage of participants experiencing issues with fatigue or lack of energy (27.2%) and sleep problems (25.1%). The average score was 2.26 ± 3.573, with the majority of patients showing no symptoms of depression (81.9%).

Prevalence of sociodemographic variables in relation to walking difficulties half a km on level ground without the use of any aid were presented in Table 1.

**Table 1.** Prevalence of sociodemographic variables in relation to walking difficulties half a km on level ground without the use of any aid.

| Variables | No difficulty N(%) | Some difficulty N(%) | A lot of difficulty N(%) | Cannot do at all N(%) | p* |
|---|---|---|---|---|---|
| **GENDER** | | | | | |
| Male | 1014(50.9)a | 393(40.5)b | 168(34.1)c | 106(36.9)b, c | |
| Female | 978(49.1)a | 577(59.5)b | 324(65.9)c | 181(63.1)b, c | <0.001 |
| **AGEGROUP** | | | | | |
| 65-69 | 950(47.7)a | 271(27.9)b | 96(19.5)c | 41(14.3)c | |
| 70-74 | 562(28.2)a | 258(26.6)a | 96(19.5)b | 46(16.0)b | |
| 75-79 | 265(13.3)a | 210(21.6)b | 102(20.7)b | 63(22.0)b | |
| 80-84 | 176(8.8)a | 139(14.3)b | 104(21.1)c | 72(25.1)c | <0.001 |
| 85-89 | 34(1.7)a | 78(8.0)b | 72(14.6)c | 40(13.9)c | |
| 90+ | 5(0.3)a | 14(1.4)b | 22(4.5)c | 25(8.7)d | |
| **MARITALSTATUS** | | | | | |
| Single | 55(2.8)a | 12(1.2)b | 7(1.4)a, b | 6(2.1)a, b | |
| Married/commonlaw | 1303(65.5)a | 536(55.3)b | 218(44.5)c | 115(40.1)c | |
| Widiwed | 562(28.2)a | 381(39.3)b | 254(51.8)c | 156(54.4)c | <0.001 |
| Divorced | 70(3.5)a | 40(4.1)a | 11(2.2)a | 10(3.5)a | |

The header row of the table spans "Difficulty in walking half a km on level ground without the use of any aid" across the four data columns.

| | | | | |
|---|---|---|---|---|
| **REGION** | | | | |
| Belgrade | 508(25.5)a | 213(22.0)b | 80(16.3)c | 56(19.5)b, c |
| Vojvodina | 491(24.6)a | 157(16.2)b | 126(25.6)a | 94(32.8)c |
| ŠumadijaandWesternSerbia | 583(29.3)a | 320(33.0)b | 138(28.0)a, b | 77(26.8)a |
| SouthernandEasternSerbia | 410(20.6)a | 280(28.9)b | 148(30.1)b | 60(20.9)a |
| **PLACEOFRESIDENCE** | | | | |
| City | 1087(54.6)a | 508(52.4)a | 263(53.5)a | 165(57.5)a |
| Anotherpleace | 905(45.4)a | 462(47.6)a | 229(46.5)a | 122(42.5)a |
| **EDUCATIONLEVEL** | | | | |
| Noformaleducation | 39(2.0)a | 70(7.2)b | 59(12.0)c | 51(17.8)d |
| Incompleteprimaryschool | 200(10.0)a | 159(16.4)b | 128(26.1)c | 79(27.5)c |
| Primaryschool | 435(21.8)a | 297(30.7)b | 142(28.9)b | 75(26.1)a, b |
| Secondaryschool | 935(46.9)a | 331(34.2)b | 125(25.5)c | 65(22.6)c |
| Higherorvocationalschool | 347(17.4)a | 107(11.0)b | 36(7.3)c | 16(5.6)c |

Legend columns: <0.001 (REGION); 0.431 (PLACEOFRESIDENCE); <0.001 (EDUCATIONLEVEL).

*Chi square test with pairwise z-tests; each subscript letter denotes a subset of difficulty categories whose column proportions do not differ significantly from each other at the 0.05 level of significance.

Prevalence of sociodemographic variables in relation to walking difficulties up or down 12 steps, were presented in Table 2.

**Table 2.** Prevalence of sociodemographic variables in relation to walking up or down 12 steps.

| Variables | Difficultyinwalkingupordown12steps | | | | p* |
|---|---|---|---|---|---|
| | Nodifficulty | Somedifficulty | Alotofdifficulty | Cannotdoat all | |
| | N(%) | N(%) | N(%) | N(%) | |
| **GENDER** | | | | | |
| Male | 958(52.8)a | 415(39.3)b | 203(35.7)b | 102(34.1)b | |
| Female | 855(47.2)a | 641(60.7)b | 365(64.3)b | 197(65.9)b | <0.001 |
| **AGEGROUP** | | | | | |
| 65-69 | 883(48.7)a | 311(29.5)b | 125(22.0)c | 38(12.7)d | |
| 70-74 | 514(28.4)a | 277(26.2)a | 123(21.7)b | 45(15.1)c | |
| 75-79 | 246(13.6)a | 210(1.9)b | 115(20.2)b | 69(23.1)b | |
| 80-84 | 139(7.7)a | 173(16.4)b | 106(18.7)b, c | 72(24.1)c | |
| 85-89 | 26(1.4)a | 73(6.9)b | 77(13.6)c | 48(16.1)c | <0.001 |
| 90+ | 5(0.3)a | 12(1.1)b | 22(3.0)c | 27(9.0)d | |
| **MARITALSTATUS** | | | | | |
| Single | 52(2.9)a | 15(1.4)b, c | 5(0.9)c | 8(2.7)a, b | |
| Married/commonlaw | 1206(66.6)a | 589(55.8)b | 260(45.9)c | 115(38.6)d | |
| Widowed | 486(26.8)a | 414(39.2)b | 282(49.8)c | 168(56.4)c | <0.001 |
| Divorced | 67(3.7)a | 38(3.6)a | 19(3.4)a | 7(2.3)a | |
| **REGION** | | | | | |
| Belgrade | 453(25.0)a | 241(22.8)a, b | 107(18.8)b | 56(18.7)b | |
| Vojvodina | 447(24.7)a | 193(18.3)b | 130(22.0)a | 92(30.8)c | |
| SumadijaandWesternSerbia | 515(28.4)a | 346(32.8)b | 180(31.7)a, b | 78(26.1)a | <0.001 |
| SouthernandEasternSerbia | 398(22.0)a | 279(26.1)b | 151(26.6)b | 73(24.4)a, b | |
| **PLACEOFRESIDENCE** | | | | | |
| City | 982(54.2)a, b | 571(54.1)a, b | 291(51.2)b | 177(59.2)a | |
| Anotherpleace | 831 (54.8)a, b | 485(45.9)a, b | 277(48.8)b | 122(40.8)a | 0.171 |
| **EDUCATIONLEVEL** | | | | | |
| Noformaleducation | 35(1.9)a | 60(5.7)b | 53(9.4)c | 70(23.4) d | |

| Incompleteprimaryschool | 184(10.1) a | 159(15.1) b | 143(25.3) c | 79(26.4) c | |
|---|---|---|---|---|---|
| Primaryschool | 383(21.1) a | 327(31) b | 163(28.8) b, c | 75(25.1) a, c | |
| Secondaryschool | 861(47.5) a | 376(35.6) b | 157(27.7) c | 60(20.1) d | |
| Higherorvocationalschool | 317(17.5) a | 126(11.9) b | 49(8.7) c | 14(4.7) d | <0.001 |
| Master'sordoctorate | 33(1.8) a | 8(0.8) b | 1(0.2) b | 1(0.3) a, b | |
| **WEALTHINDEX** | | | | | |
| 1-Poorest | 267(14.7) a | 242(22.9) b | 165(29) c | 72(24.1) b, c | |
| 2-poor | 368(20.3) a | 234(22.2) a, b | 138(24.3) b | 75(25.1) a, b | |
| 3-middleclass | 432(23.8) a | 231(21.9) a | 96(16.9) b | 69(23.1) a | <0.001 |
| 4-rich | 397(21.9) a | 191(18.1) b | 104(18.3) a, b | 48(16.1) b | |
| 5-Wealthiest | 349(19.2) a | 158(15.0) b | 65(11.4) c | 35(11.7) b, c | |

*Chi-square test with pairwise z-tests; each subscript letter denotes a subset of difficulty categories whose column proportions do not differ significantly from each other at the 0.05 level of significance.

Women exhibit a higher prevalence of walking difficulties compared to men. The percentage of females facing some difficulty, a lot of difficulty, or being unable to walk at all is significantly higher than males (p<0.001).Prevalenceof walkingdifficultiesvaries significantlyacross different agegroups. Individualsaged 75-84showthehighestprevalenceinallcategoriesofwalkingdifficulties.

Widowed individuals tend to report higher levels of walking difficulties compared to other marital status categories (p<0.001). Regional differences are evident, with Belgrade showing a lower prevalence of walking difficulties compared to other regions Tables 1 and 2. There is no significant difference in walking difficulties between individuals residing in cities and those in other places (p>0.05).Tables 1 and 2. Higher levels of education generally correlate with lower prevalence of walking difficulties. Individuals with no formal education or incomplete primary school education show higher rates of walking difficulties (p < 0.001).Individuals who reported the highest percentage (28.7%) of walking half a kilometer on level ground with significant difficulty were associated with the Wealth Index categorized as 1-Poorest (Chi Square=110.041,df=12,p<0.001). The largest percentage of respondents (29%) facing significant difficulties in climbing or descending 12 steps were identified with the Wealth Index as 1-Poorest, based on the wealth index (Chi Square=101.424,df=12, p<0.001. The scores of mental health and social support Table 3. were statistically significantly associated with the mentioned walking functional limitations (p<0.05).

**Table 3.** Influence of mental health and social support on functional limitations.

| | Difficultyinwalkinghalfakmon level | | | | | Difficultyinwalkingupordown12steps | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | No difficulty | Some difficulty | A lot of difficulty | Cannot doat all | p* | No difficulty | Some difficulty | A lot of difficulty | Cannotdo at all | p* |
| Variables | N(%) | N(%) | N(%) | N(%) | | N(%) | N(%) | N(%) | N(%) | |
| **MENTALHEALTH** | | | | | | | | | | |
| Nosymptoms | 1838(94.0) a | 734(78.3) b | 241(53.9) c | 92(44.2) d | | 1667(93.8) a | 850(82.7) b | 305(57.3) c | 79(38.3) d | |
| Mildsymptomsof depressive | 90(4.6) a | 166(17.7) b | 150(33.6) c | 70(33.7) c | | 87(4.9) a | 138(13.4) b | 170(32) c | 80(38.8) c | |
| Moderate depressive | 21(1.1) a | 27(2.9) b | 31(6.9) c | 26(12.5) d | <0.001 | 18(1.0) a | 30(2.9) b | 29(5.5) c | 28(13.6) d | <0.001 |
| Moderatelysevere depressive | 6(0.3) a | 9(1.0) b | 18(4.0) c | 13(6.3) c | | 5(0.3) a | 9(0.9) b | 19(3.6) c | 13(6.3) c | |
| Severedepressive | 0(0.0) a | 2(0.2) b | 7(1.6) c | 7(3.4) c | | 0(0.0) a | 1(0.1) a | 9(1.7) b | 6(2.9) b | |
| **SOCIALSUPPORT** | | | | | | | | | | |
| Poorsocialsupport | 1695(88.1) a | 781(84.2) b | 346(80.3) b | 155(79.1) b | <0.001 | 1546(88.4) a | 860(85.0) b | 409(79.4) c | 160(80.4) b, c | <0.001 |

| Moderate social support | 226(11.8)a | 145(15.6)b | 79(18.3)b | 40(20.4)b | | 200(11.4)a | 149(14.7)b | 101(19.6)c | 38(19.1)b, c |
| Strong social support | 2(0.1)a | 2(0.2)b | 6(1.4)b | 1(0.5)a, b | | 2(0.1)a | 3(0.3)a, b | 5(1.0)b | 1(0.5)a, b |

*Chi-square test with pairwise z-tests; each subscript letter denotes a subset of difficulty categories whose column proportions do not differ significantly from each other at the 0.05 level of significance.

In all categories of investigated limitations (no difficulty, with minor difficulty, with significant difficulty, unable to do), respondents without symptoms of depression and those with poor social support predominated in the dominant percentage. The relative prevalence of respondents with mild depressive symptoms, who face significant difficulty in walking half a kilometer on level ground or are unable to do so, exceeded 30% (Chi Square=693.512,df=8,p<0.001).In order to identify statistically significant predictors of functional limitations in walking, specifically difficulties in walking half a kilometer on level ground without any assistance, all examined sociodemographic characteristics, mental health score and social support score were included in the binary logistic regression model. Only the variables that showed statistical significance in the multivariable model are presented in Table 4.

**Table 4.** Odds ratios (OR) and 95% confidence intervals (CI) for the association of difficulty in walking half a km on level ground without the use of any aid and of difficulty in walking up or down 12 steps.

| Variables | Not having difficulties N | Having difficulties N | Univariate model | | Multivariable model | |
|---|---|---|---|---|---|---|
| | | | OR(95%CI) | p | OR(95%CI) | p |
| Difficulty in walking half a km on level ground without the use of any aid | | | | | | |
| **GENDER** | | | | | | |
| Female | 978 | 1082 | 1 | | 1 | |
| Male | 1014 | 667 | 0.595(0.522-0.677) | **<0.001** | 1.291(1.091-1.529) | **0.003** |
| **WEALTH INDEX** | | | | | | |
| 3-Middle class | 478 | 351 | 1 | | 1 | |
| 1-Poorest | 298 | 450 | 2.056(1.682-2.514) | **<0.001** | 1.000(0.764-1.309) | 1.000 |
| 2-Poor | 398 | 417 | 1.427(1.175-1.733) | **<0.001** | 1.380(1.028-1.851) | **0.032** |
| 4-Rich | 436 | 306 | 0.956(0.782-1.168) | 0.659 | 1.262(0.957-1.664) | 0.099 |
| 5-Wealthiest | 382 | 225 | 0.802(0.647-0.994) | **0.044** | 1.103(0.843-1.444) | 0.474 |
| **REGION** | | | | | | |
| Šumadija and Western Serbia | 583 | 535 | 1 | | 1 | |
| Belgrade | 508 | 349 | 0.749(0.625-0.896) | **0.002** | 0.880(0.709-1.092) | 0.246 |
| Vojvodina | 491 | 377 | 0.837(0.700-1.000) | 0.050 | 0.973(0.762-1.244) | 0.973 |
| Southern and Eastern Serbia | 410 | 488 | 1.297(1.088-1.547) | **0.004** | 0.713(0.564-0.901) | **0.005** |
| | | | | | | |
| **EDUCATION LEVEL** | | | | | | |
| Secondary school | 935 | 521 | 1 | | 1 | |
| No formal education | 39 | 180 | 8.283(5.765-11.900) | **<0.001** | 2.414(0.977-5.962) | **0.056** |
| Incomplete primary school | 200 | 366 | 3.284(2.681-4.023) | **<0.001** | 6.083(2.212-16.732) | **<0.001** |
| Primary school | 435 | 514 | 2.121(1.795-2.505) | **<0.001** | 3.412(1.345-8.660) | **0.010** |
| Higher or vocational school | 347 | 159 | 0.822(0.662-1.021) | 0.076 | 3.841(1.541-9.576) | **0.004** |
| Master's or doctorate | 36 | 7 | 0.349(0.154-0.790) | **0.012** | 1.799(0.720-4.491) | 0.209 |
| **MARITAL STATUS** | | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Married/commonlaw | 1303 | 869 | 1 | | 1 | |
| Single | 55 | 25 | 0.682(0.422-1.102) | 0.118 | 0.801(0.525-1.224) | 0.305 |
| Widowed | 562 | 791 | 2.110(1.838-2.423) | **<0.001** | 0.408(0.194-0.858) | **0.018** |
| Divorced | 70 | 61 | 1.307(0.917-1.861) | 0.139 | 0.769(0.497-1.191) | 0.240 |
| **AGE** | | | 1.118(1.106-1.131) | **<0.001** | 1.095(1.081-1.110) | **<0.001** |
| **MENTAL HEALTH SCORE** | | | 1.373(1.330-1.416) | **<0.001** | 1.304(1.262-1.348) | **<0.001** |
| **SOCIAL SUPPORT SCORE** | | | 1.111(1.061-1.164) | **<0.001** | 1.066(1.009-1.127) | **0.023** |

Difficultyinwalkingupordown
12steps

| | | | | | | |
|---|---|---|---|---|---|---|
| **GENDER** | | | | | | |
| Female | 855 | 1203 | 1 | | 1 | |
| Male | 958 | 720 | 1.872(1.643-2.133) | **<0.001** | 0.651(0.551-0.768) | **<0.001** |
| **WEALTHINDEX** | | | | | | |
| 3-Middleclass | 432 | 396 | 1 | | 1 | |
| 1-Poorest | 267 | 479 | 1.957(1.598-2.396) | **<0.001** | 1.414(1.102-1.815) | **0.006** |
| 2-Poor | 368 | 477 | 1.325(1.091-1.609) | **0.004** | 1.194(0.947-1.504) | 0.134 |
| 4-Rich | 397 | 343 | 0.943(0.773-1.150) | 0.559 | 1.045(0.825-1.323) | 0.716 |
| 5-Wealthiest | 349 | 258 | 0.806(0.653-0.996) | **0.046** | 0.931(0.716-1.211) | 0.595 |
| **REGION** | | | | | | |
| SumadijaandWesternSerbia | 515 | 604 | 1 | | 1 | |
| Belgrade | 453 | 404 | 0.760(0.636-0.909) | **0.003** | 1.070(0.853-1.342) | 0.559 |
| Vojvodina | 447 | 415 | 0.792(0.663-0.946) | **0.010** | 0.764(0.614-0.949) | **0.015** |
| SouthernandEasternSerbia | 398 | 500 | 1.071(0.898-1.278) | 0.445 | 0.873(0.704-1.083) | 0.217 |
| **EDUCATIONLEVEL** | | | | | | |
| Secondaryschool | 861 | 593 | 1 | | 1 | |
| Noformaleducation | 35 | 183 | 7.592(5.210-11.061) | **<0.001** | 1.840(1.131-2.993) | **0.014** |
| Incompleteprimaryschool | 184 | 381 | 3.006(2.450-3.689) | **<0.001** | 1.150(0.880-1.502) | 0.305 |
| Primaryschool | 383 | 565 | 2.142(1.813-2.530) | **<0.001** | 1.544(1.264-1.886) | **<0.001** |
| Higherorvocationalschool | 317 | 189 | 0.866(0.703-1.066) | 0.175 | 0.811(0.635-1.037) | 0.095 |
| Master'sordoctorate | 33 | 10 | 0.440(0.215-0.900) | **0.024** | 0.539(0.244-1.191) | 0.126 |
| **MARITALSTATUS** | | | | | | |
| Married/commonlaw | 1206 | 964 | 1 | | 1 | |
| Single | 52 | 28 | 0.674(0.422-1.075) | 0.097 | 0.450(0.244-0.832) | **0.011** |
| Widowed | 486 | 864 | 2.224(1.934-2.558) | **<0.001** | 0.976(0.813-1.172) | 0.798 |
| Divorced | 67 | 64 | 1.195(0.840-1.701) | 0.322 | 1.108(0.730-1.684) | 0.630 |
| **AGE** | | | 1.120(1.107-1.132) | **<0.001** | 1.100(1.085-1.115) | **<0.001** |
| **MENTAL HEALTH SCORE** | | | 1.371(1.327-1.416) | **<0.001** | 1.305(1.261-1.351) | **<0.001** |
| **SOCIAL SUPPORT SCORE** | | | 1.117(1.067-1.170) | **<0.001** | 1.084(1.026-1.145) | **0.004** |

1-Reference category.

Individuals with incomplete primary school education were 6.08 times more likely of having difficulties in walking compared to those with secondary school education ($p<0.001$). Each additionalyearoflifeincreasesthe odds ofreportingdifficulties in walking by1.12 times($p<0.001$),and thisassociation remainsstatisticallysignificantafteradjustingforother factors,with odds of 1.09 ($p<0.001$). Widowed individuals were by 59,2% less likely of having difficulties in walking compared to those who were married/common law ($p<0.05$). Individuals categorized as "Poor" were 1.38 times more likely of having difficulties in walking compared to those categorized as "Middle class" ($p<0.05$). Additionally,with an increasein thementalhealthscorebyoneunit, the probabilityof anindividual reportingdifficultiesinwalkinghalfakilometeronlevelgroundwithout anyassistanceincreasesby 30,4% ($p<0.001$)(Table 4). Each increaseofoneunit in thesocial supportscoreincreases the odds ofreportingdifficulties in walking by1.11 times ($p<0.001$), and this association remainsstatisticallysignificantwithoddsof1.07after adjustingforother factors($p<0.05$).Table 4.

alsoshow                                   casestheoddsratios(OR)and95%confidenceintervals(CI)depictingthe correlationwithchallengesinascendingordescending12steps. Participants with no formal education and primary school education were 1.84 and 1.54 times, respectively, more likely of having difficulties inascendingordescending12steps compared to those with secondary school education (p<0.05). Single individuals were by 55% less likely of having difficulties inascendingordescending12steps compared to those who were married/common law (p<0.05). Additionally, each additionalyearoflifeincreasesthe odds ofreportingdifficulties inascendingordescending12steps by12% (p<0.001),and thisassociation remainsstatisticallysignificantafteradjustingforother factors,with odds of 1.10 (p<0.001). Eachincrease ofoneunitinthesocialsupport and mental health scoreisassociated with 1.08 and 1.30times, respectively, higher oddsof reportingdifficultiesin inascendingordescending12steps (p<0.05).

### 4. Discussion

Using nationally representative data from the 2019 Population Health Survey, this research provides deep insights into factors related to walking difficulties in older individuals, aiming for a better understanding and effective management of health interventions and support. The main focus was to identify significant predictors and risk factors contributing to walking limitations, with the intention to develop specific programs aimed at preserving functionality and preventing further loss of mobility in the older population. Study reveals significant variations in reporting walking difficulties among different age groups. Individuals aged 65-69 often do not report difficulties, with nearly 48% of them in both analyzed categories. In the 70-74 age group, about 28% of individuals have no difficulty walking half a kilometer on flat ground or climbing/descending 12 stairs. Participans aged 75-84, a significant decline in the "without difficulty" category is observed for both tasks, decreasing to more than twice as less in both analyzed subgroups (75-79 years around 13%, 80-84 years around 8%). Results suggest changes in physical ability with age, especially in individuals over 75, who more frequently report walking difficulties, possibly due to natural aging, increased frequency of health problems, or other factors affecting mobility.

One often noted factor associated with physical activity in older adults is gender, with studies suggesting that women are less inclined towards physical activity compared to men [4,5,10–13,21–24]. Reduced physical activity in women may increase the risk of various health problems, including the more frequent occurrence of chronic diseases and the risk of falls. Our research results indicate that in both investigated task categories – walking half a kilometer on flat ground without any assistance and climbing or descending 12 stairs – the percentage of women reporting "with great difficulty" and "not able to" is almost double compared to men. It is important to note that differences in the level of physical activity among older adults are not simply a result of one factor; physical, psychological, social, cultural, and environmental factors all play a role in shaping behavior towards physical activity [5,21–24].

Study highlights a significant impact of marital status on the manifestation of walking difficulties among older respondents. We observed that married individuals are less likely to report difficulties, with a particular emphasis on differences in the "not able to" category, where around 56% of widowers and widows report such difficulties. This phenomenon can be complexly explained by the multidimensional influence of marital partnership on the physical well-being of the older population [25–27].

Social relationships, especially in the context of marriage, significantly influence encouraging an individual's physical activity. Partners not only provide explicit support for physical activities, acting as motivators or active participants in exercises, but their own behavior also has implicit influence. In other words, an individual may be motivated to engage in physical activity if they notice that their close ones are doing the same (known as social control) [26].

Loss of a marital partner, besides the emotional loss of support, also brings a lack of support in daily activities, significantly increasing challenges in maintaining unhindered mobility [27]. Similarly, the level of education shows an extremely significant influence on functional limitations in walking among older individuals, emphasizing the protective role of higher education. Research

indicates that the highest rates of limitations in both categories are recorded in groups with low education levels, including those with no formal education, incomplete primary school, or only basic education. These results support previous research that also identified similar connections between low education and increased frequency of functional limitations in older individuals [5,9–13,21–29]. It is clear that education plays a crucial role in maintaining functionality in older age, with higher education providing certain advantages that reduce the risk of walking limitations.

Results of our study clearly indicate a consistent trend where higher wealth categories significantly reduce the prevalence of walking difficulties. The wealthiest individuals show the lowest rates in all categories of difficulties. In line with previous research [5,10,13,16,22,28,29], our study confirms that older individuals with lower income have higher rates of functional limitations compared to those with higher income.We emphasize a deep connection between mental health, social support, and functional limitations in older individuals. The results indicate high frequency of functional limitations among respondents with mild depressive symptoms who simultaneously face significant difficulties in walking half a kilometer on flat ground or are unable to do so, with such a situation exceeding the threshold of 30%.The findings corroborate previous research [5,11,12,28–31] and underscore the critical role of emotional and social well-being in maintaining the functional capabilities of older individuals, particularly with regard to physical activity and mobility. The identified connection indicates the need for targeted interventions to improve mental health and social support, with the ultimate goal of reducing the prevalence of walking functional limitations among the older population. Such findings have deeper implications for the development of holistic approaches to elderly care, reminding us of the importance of the emotional and social aspects in maintaining vitality and mobility in later years.Serbia has the highest estimated prevalence of physical inactivity or insufficient activity among Central and Eastern European countries [16], the culture of physical activity is underdeveloped, indicating the need for integration into appropriate physical activity. Analyzing sociodemographic factors, it is important to develop adequate social support for older adults, especially those with lower educational levels and lower wealth indexes, to improve their mobility, functionality, and overall quality of life. There is also a recognized need to increase the availability and variety of physical medicine, rehabilitation, and home care services to prevent risk factors for impaired physical functioning [5,16,32]. The European Commission highlights demographic trends indicating rapid aging of the Serbian population and increased demand for formal care, which requires accessible home care services for all older adults [32]. The role of public health professionals is crucial in promoting healthy lifestyles and active aging, including regular exercise and maintenance of physical activity among individuals with different functional limitations [33]. Research findings underscore the necessity for tailoring healthcare programs and policies to adequately address factors contributing to walking difficulties among older individuals. For instance, there may be a discussion on the need to enhance access to physical activities and therapies aimed at preserving functionality. It is crucial to emphasize the importance of providing social support and resources for older adults, particularly those at higher risk of walking difficulties, such as widows, individuals with lower educational attainment, and lower incomes.

Limitations of this study encompass the inherent subjectivity associated with self-reported walking difficulties and the potential for variability in definitionsAlso, the time factor and the use of data from 2019 limit the ability to track current changes, while some relevant factors are not fully covered. These limitations emphasize the need for careful interpretation of results and further research to gain a more comprehensive understanding of issues related to walking in older individuals.

## 5. Conclusions

Based on the Population Health research, we have identified key factors associated with mobility difficulties in older individuals, including the influence of age, gender, marital status, as well as education and income. Our study emphasizes that wealth, marital status, and education play a crucial role in the prevalence of functional limitations, while the connection between mental health, social support, and mobility difficulties indicates the need for targeted interventions. We expect that these

conclusions will contribute to the implementation of targeted interventions and customized programs aimed at reducing functional limitations in movement and mobility among the older population.

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