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Quality of life, functional impairment and social factors as determinants of nutritional status in older adults: the VERISAÚDE study

Ana Maseda, Clara Diego-Díez, Laura Lorenzo-López, Rocío López-López, Laura Regueiro-Folgueira, José C. Millán-Calenti

Universidade da Coruña, Gerontology Research Group, Instituto de Investigación Biomédica de A Coruña (INIBIC), Complexo Hospitalario Universitario de A Coruña (CHUAC), SERGAS, E-15071 A Coruña, Spain

Summary

Background & aims.

Malnutrition is an important and growing health problem in elderly people. The main aim of this research was to examine the relationship between socio-demographic factors, social resources, functional status and quality of life and malnutrition or risk of malnutrition in elders.

Methods.

A cross-sectional study was conducted with a representative sample of 749 community-dwelling elders aged 65 years and over. A comprehensive assessment was carried out, including the collection of socio-demographic factors, social resources by the Older Americans Resources and Services Scale, nutritional status by the Mini-Nutritional Assessment-Short Form, functional status by the Lawton's instrumental activities of daily living scale and quality of life by the World Health Organizations's Quality of Life measure-brief version (WHOQOL-BREF).

Results.

Being female, the presence of totally impaired social resources and low scores in the physical health domain of the WHOQOL-BREF were the strongest determinants of malnutrition/risk of malnutrition. This model predicted 85.7% of the cases correctly. In men, the best determinants were being unmarried and having poor satisfaction with their health, with a percentage of 89.8% of cases of poor nutritional status correctly predicted. The best determinant for women was also the physical health domain of the WHOQOL-BREF, reaching a correct prediction of 83.0% of malnutrition/risk of it.

Conclusions.

Nutritional status assessment and potential determinant factors should be incorporated as part of comprehensive assessments for early identification of malnutrition and to determine appropriate intervention strategies to address this public health problem in older adults.

Keywords

Malnourishment; Undernutrition; Mini nutritional assessment; Elderly

1. Introduction

Malnutrition is a significant and highly frequent public health problem in older people [1], associated with higher health care costs in institutionalized and community-dwelling elderly [2]. The prevalence of risk of malnutrition varies widely, from 0% to 83%, in these older adults due to the use of different nutritional screening tools and different subject's characteristics [3]. In Spain, a prevalence of poor nutritional status among community-dwelling elderly of 14.5% was reported [4]. However, there is a high amount of malnourished older people that are unrecognized [5].

Comprehensive gerontological assessments should incorporate nutritional status or nutritional risk screening to identify the main determinants of malnutrition in older adult communities. This identification would determinate the use of appropriate interventions and follow-up to improve their nutritional status [3]. Individuals with poor nutritional status are more likely to experience poor quality of life [6], together with physical, mental and social disability [7]. A current review suggests an increase in hospitalization, morbidity and mortality in malnourished patients [2].

Body mass index, depressive symptoms, polymedication, pre-frailty or frailty status, poor self-rated health [4], and cognitive impairment or chronic diseases [8] are health factors identified as determinants of nutritional status. Other authors found that social isolation and subjective loneliness [9], female sex, older age, unmarried status (as an indicator of social support) or low socioeconomic level [10], [11] are also risk factors for poor nutritional status in elderly. Poor functional status (dependence on activities of daily living, IADL) and mental health-related quality of life also contribute to malnutrition [12], [13].

Furthermore, a systematic review and meta-analysis identified different studies that found an association between nutritional status and quality of life (QOL) in older people [6]. World Health Organization (WHO) defines QOL as "*an individual's perception of their position in life in the context of the culture and value systems in which they live, and in relation to their goals, expectations, standards and concerns*" [14] and researchers must focus our studies to ensure a better quality of life in older adults, especially in those with a poor nutritional status. Intervention programs including appropriate designs to improve nutritional status significantly improve the quality of life in both physical and mental components [6].

To our knowledge, social support, functional status and quality of life have been identified, at individual level, as risk factors of poor nutritional status. Besides, no published studies associating social resources (assessed with a standardized full-scale and assessing two concepts: the satisfaction with the subject's social network, and the adequacy of social support in case of disability) and malnutrition were found. Moreover, research is not considering these multiple factors with a possible joint effect providing a joint likelihood for malnutrition or risk of malnutrition in a large elderly sample. Besides, most of the studies are involving frail or institutionalized older adults but not healthy elders, the priority for early identification of poor nutritional status.

Based on the above, the aim of this study is to examine the relationship between socio-demographic factors, social resources, functional status and quality of life and malnutrition or risk of malnutrition in a representative community-dwelling elderly population.

2. Materials and methods

2.1. Selection and description of participants

Data were used from baseline assessments from the VERISAÚDE (Effectiveness of the Comprehensive Gerontological Assessment and longitudinal follow-up in the healthy ageing promotion) project, which is a large longitudinal study (in this study, we are using the cross-sectional data) covering a sample of 749 community-dwelling subjects representative of Galician population (NW of Spain), aged 65 years and older living at their home and attending senior centers. Older adults were recruited from 43 local senior centers. The details of participants' selection and sample size estimation are given elsewhere [4].

The distribution of the sample by age and sex was similar to that of the entire Galician elderly population, according to the municipal register of the 2011 National Health Survey [15]. From October 2013 through March 2014, a Comprehensive Gerontological Assessment (CGA) was conducted.

The inclusion criteria for the participants were as follows: (a) being ≥65 years of age, (b) be actively enrolled in a Galician association or senior center, and (c) willingness to sign the informed consent form. The exclusion criterion for the sample was: (a) inability to perform the CGA.

2.2. Ethical statement

The study protocol was approved by the Ethics Committee of the University of A Coruña and in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki). Before the data collection, all participants were informed about the study and signed the corresponding informed consent form.

2.3. Variables and instruments

The instruments were administered by a multidisciplinary team of professionals with experience in gerontological assessment (clinical psychologists, nurses, occupational therapists, and social workers) that were trained to unify criteria.

2.3.1. Socio-demographic factors and social resources

Information on age, sex and educational level was self-reported. Educational level was categorized into three levels according to years of formal education: ≤8 years, 9–17 years, ≥18 years.

Social support was measured by the Spanish version [16] of the Older Americans Resources and Services (OARS) [17]. This scale consists of nine items, and raw scores are coded on a scale based on the following six categories: (a) excellent, (b) good, (c) mild impairment, (d) moderate impairment, (e) severe impairment, and (f) total impairment. Other three items from the OARS were also selected to assess the differences among the groups: marital status (single, married, widowed, divorced, separated), who lives with the participant (alone, spouse, children, grandchildren, parents, siblings, other kin, friends, non-related helper or other) and frequency of feelings of loneliness (often, sometimes or almost never).

2.3.2. Nutritional status

The Mini-Nutritional Assessment-Short Form (MNA-SF) [18] is made up of six questions extracted from the full MNA questionnaire [19]: appetite loss or eating problem; recent weight loss; mobility; acute disease or psychological stress; neuropsychological problems (dementia or depression); and BMI. The research staff measured weight and height according to standardized protocols. BMI was estimated by dividing weight (kg) by height^2 (m^2). A clothing adjustment of approximately 0.8 kg for women and 1.2 kg for men was made [20]. The MNA-SF has been identified, in a study including 22,007 elders, as a suitable screening tool to detect malnourished elders and those at risk for malnutrition, correlating strongly with the full MNA version ($r = 0.85$) [21]. The Spanish version of the MNA-SF was used in this study [22]. The total scores of MNA-SF screening test range from 0 to a maximum score of 14 points. Those receiving 11 or fewer points were classified as malnourished or at risk of it, whereas well-nourished individuals had 12 or more points (2 comparison groups were established in this study, low MNA-SF scores ($\leq$11) versus normal MNA-SF scores), following the dichotomization made by other studies with the MNA (normal nutritional status versus malnutrition/risk) [4], [23], [24].

2.3.3. Functional status

Functional status was measured using the Spanish version of the Lawton instrumental activities of daily living (IADL) scale [25], [26]. The eight IADL included were as follows: using the telephone, shopping, preparing meals, housekeeping, doing the laundry, using transportation, taking medications and handling finances. Participants were asked if they had any difficulty performing each task without help from another person or special equipment. Individuals that were unable to perform any one of the activities were considered to be functionally incapacitated (IADL-dependent).

2.3.4. Quality of life

The World Health Organizations's Quality of Life measure-brief version (WHOQOL-BREF) was developed as a shortened version of the WHOQOL-100 so that it would be suitable for elderly people [27]. The WHOQOL-BREF contains 26 items, two of which are from the Overall Quality of Life and General Health facet and one item from each of the remaining 24 facets. These facets are categorized into 4 major domains: physical health (7 items: Pain and discomfort; Energy and fatigue; Sleep and rest; Mobility; Activities of daily living; Dependence on medical substances and medical aids; Working capacity), psychological (6 items: Positive feelings; Thinking, learning, memory and concentration; Self-esteem; Body image and appearance; Negative feelings; Spirituality/Religion/Personal beliefs), social relationships (3 items: Personal relationships; Social support; Sexual activity), and environment (8 items: Freedom, physical safety and security; Home environment; Financial resources; Health and social care: accessibility and quality; Opportunities for acquiring new information and skills; Participation in and opportunities for recreation/leisure activities; Physical environment (pollution/noise/traffic/climate); Transport) [27], [28]. Each item is scored on a five-point Likert scale (higher scores denote the higher self-rated quality of life). The Spanish version was used [29].

2.4. Statistical analysis

Characteristics of the sample were analyzed where the quantitative variables were expressed as mean ± S.D. and the qualitative variables as an absolute value and percentage. The normality of the data was tested using the Kolmogorov–Smirnov test, which rejected the assumption of normality, but the sample size was sufficiently large to apply parametric instead of nonparametric tests. Between-group comparisons were made using the Student *t*-test for continuous variables and the χ^2-test to test categorical variables. For multiresponse variables, column proportions were compared using custom tables (*z* test).

Associations with the MNA-SF scores were tested using Pearson's correlation coefficient in quantitative variables, or Spearman's test where the data was measured with an ordinal scale. In order to determine which variables modified a dichotomic dependent variable (MNA-SF categories: well-nourished (normal score, 12–14) versus malnourished/at risk of malnutrition (low score, ≤11 points)), a multiple logistic regression analysis (forward stepwise likelihood ratio) was made using that dichotomic variable as dependent variable and all the other variables introduced in the model as co-variables (gender, age categories, educational level, marital status, living condition (alone versus accompanied), presence/absence of loneliness feelings, social support categories, presence/absence of IADL dependence, 2 items from the overall quality of life and general health facet of the WHOQOL-BREF and its 4 major domains: physical health, psychological, social relationships and environment). Categorical variables with more than two values were converted to dummy variables for inclusion in the multivariate models. Odds ratios (OR) and 95% confidence intervals (CI) were calculated for each covariate included in the model. The percentage correctly predicted (with a cut-off value of 0.5 for the estimated probability) in the classification table was calculated to evaluate the fit of the final regression model. A *P*-value of <0.05 was taken to define statistical significance. The data analysis was conducted using the software package IBM SPSS Statistics v.23.0 (Armonk, NY: IBM Corp., USA).

The manuscript was written according to the STrengthening the Reporting of OBservational studies in Epidemiology (STROBE) statement [30], [31].

3. Results

For nutritional status, 642 participants (85.7%) were well-nourished, 101 participants (13.5%) were at risk of malnutrition and 6 (0.8%) were malnourished. The combined prevalence for the malnourished/at risk of malnutrition group was 14.3%. The mean score of MNA-SF was significantly ($P < 0.0001$) lower in the subjects at risk of malnutrition compared to the normal group (10.1 ± 1.2 versus 13.5 ± 0.8).

Various sociodemographic variables were associated with the presence of malnourishment/risk of malnutrition (Table 1): female sex ($P = 0.009$), living with the spouse ($P = 0.016$), the frequency of feelings of loneliness ($P = 0.028$) and social resources ($P = 0.044$).

Table 1. Characteristics of the elderly according to their nutritional status (MNA-SF), well-nourished (normal score, 12–14) versus malnourished/at risk of malnutrition (low score, ≤11 points).

	Normal MNA-SF score: 12–14 (*n* = 642)	Low MNA-SF score: ≤11 (*n* = 107)	*P*-value	Total (*n* = 749)
Sex, *n* (%)*			0.009[a]	
Men	265 (41.3%)	30 (28.0%)		295 (39.4%)
Women	377 (58.7%)	77 (72.0%)		454 (60.6%)
Age (years), mean (SD)	75.7 (SD 7.1)	75.9 (SD 7.3)	0.789[b]	75.8 (SD 7.2)
Education, years, *n* (%)			0.412[a]	
≤8	381 (59.3%)	70 (65.5%)		451 (60.2%)
9–17	155 (24.1%)	24 (22.4%)		179 (23.9%)
≥18	106 (16.6%)	13 (12.1%)		119 (15.9%)
Marital status, *n* (%)			0.064[a]	
Single	48 (7.5%)	8 (7.5%)		56 (7.5%)
Married	383 (59.8%)	50 (46.7%)		433 (57.9%)
Widowed	186 (29.0%)	44 (41.1%)		230 (30.7%)
Divorced or separated	24 (3.7%)	5 (4.7%)		29 (3.9%)
Who lives with you … ?, *n* (%)				

Table 1. Characteristics of the elderly according to their nutritional status (MNA-SF), well-nourished (normal score, 12–14) versus malnourished/at risk of malnutrition (low score, ≤11 points).

	Normal MNA-SF score: 12–14 (*n* = 642)	Low MNA-SF score: ≤11 (*n* = 107)	*P*-value	Total (*n* = 749)
No one	159 (24.8%)	34 (31.8%)	0.127[a]	193 (25.8%)
Spouse*	379 (59.1%)	50 (46.7%)	0.016[a]	429 (57.4%)
Children	186 (29.0%)	30 (28.0%)	0.836[a]	216 (28.9%)
Grandchildren	46 (7.2%)	11 (10.3%)	0.263[a]	57 (7.6%)
Parents	12 (1.9%)	3 (2.8%)	0.525[a]	15 (2.0%)
Brothers and sisters	18 (2.8%)	6 (5.6%)	0.128[a]	24 (3.2%)
Other relatives	46 (7.2%)	6 (5.6%)	0.555[a]	52 (7.0%)
Non-related paid helper	2 (0.3%)	1 (0.9%)	0.346[a]	3 (0.4%)
Others	6 (0.9%)	3 (2.8%)	0.101[a]	9 (1.2%)
Frequency of feelings of loneliness, *n* (%)*			0.028[a]	
Quite often	35 (5.5%)	8 (7.5%)		43 (5.8%)
Sometimes	100 (15.6%)	27 (25.2%)		127 (17.0%)
Almost never	504 (78.9%)	72 (67.3%)		576 (77.2%)
Social resources rating, *n* (%)*			0.044[a]	
Excellent	209 (33.4%)	30 (28.3%)		239 (32.7%)
Good	277 (44.4%)	44 (41.5%)		321 (43.9%)
Mild impairment	83 (13.3%)	20 (18.9%)		103 (14.1%)
Moderate impairment	32 (5.1%)	3 (2.8%)		35 (4.8%)
Severe impairment	17 (2.7%)	4 (3.8%)		21 (2.9%)
Total impairment	7 (1.1%)	5 (4.7%)		12 (1.6%)
Total Lawton score, mean (SD)*	7.8 (0.6)	7.6 (1.1)	0.016[b]	7.8 (0.7)
IADL dependence	76 (11.8%)	17 (15.9%)	0.240[a]	93 (12.4%)
How would you rate your quality of life?, *n* (%)**			<0.0001[a]	
Very poor	1 (0.2%)	2 (1.9%)		3 (0.4%)
Poor	8 (1.2%)	7 (6.5%)		15 (2.0%)
Neither poor nor good	192 (29.9%)	31 (29.0%)		223 (29.8%)
Good	334 (52.0%)	52 (48.6%)		386 (51.5%)
Very good	107 (16.7%)	15 (14.0%)		122 (16.3%)
How satisfied are you with your health?, *n* (%)			0.051[a]	
Very dissatisfied	6 (0.9%)	3 (2.8%)		9 (1.2%)
Dissatisfied	21 (3.3%)	7 (6.5%)		28 (3.7%)
Neither satisfied nor dissatisfied	110 (17.1%)	24 (22.4%)		134 (17.9%)
Satisfied	366 (57.0%)	58 (54.3%)		424 (56.6%)
Very satisfied	139 (21.7%)	15 (14.0%)		154 (20.6%)
Physical health – WHOQOL-BREF score, mean (SD)*	14.3 (SD 2.1)	13.3 (SD 2.3)	<0.0001[b]	14.1 (SD 2.1)
Psychological WHOQOL-BREF score, mean (SD)*	14.4 (SD 1.9)	13.8 (SD 2.3)	0.013[b]	14.3 (SD 2.0)
Social relationships WHOQOL-BREF score, mean (SD)	14.0 (SD 2.5)	13.6 (SD 3.0)	0.122[b]	13.9 (SD 2.5)
Environment WHOQOL-BREF score, mean (SD)	13.7 (SD 1.8)	13.5 (SD 1.9)	0.350[b]	13.7 (SD 1.8)

MNA-SF: mini-nutritional assessment short-form; IADL: instrumental activities of daily living; WHOQOL-BREF: World Health Organization Quality of Life-Brief Form. *Significant (*P*-value) < 0.05; **Significant (*P*-value) < 0.01.

[a] Chi-squared test.

[b] *t*-test.

There was no statistically significant variation between marital status ($P = 0.064$). Nevertheless, there were a higher significant number of married people and people that almost never had feelings of loneliness in well-nourished participants. A higher presence of malnourished/risk of malnutrition was observed in widowed people and those that sometimes had feelings of loneliness, with totally impaired social resources or with a very poor or poor rated quality of life. We also found significant lower average IADL scores in participants with malnourishment/risk of malnutrition.

For the WHOQOL-BREF, the overall quality of life ($P < 0.0001$) and the physical health ($P < 0.0001$) and psychological ($P = 0.013$) domains were associated with poor nutritional status. Figure 1 shows the distribution of the WHOQOL-BREF domain scores according to the nutritional status.

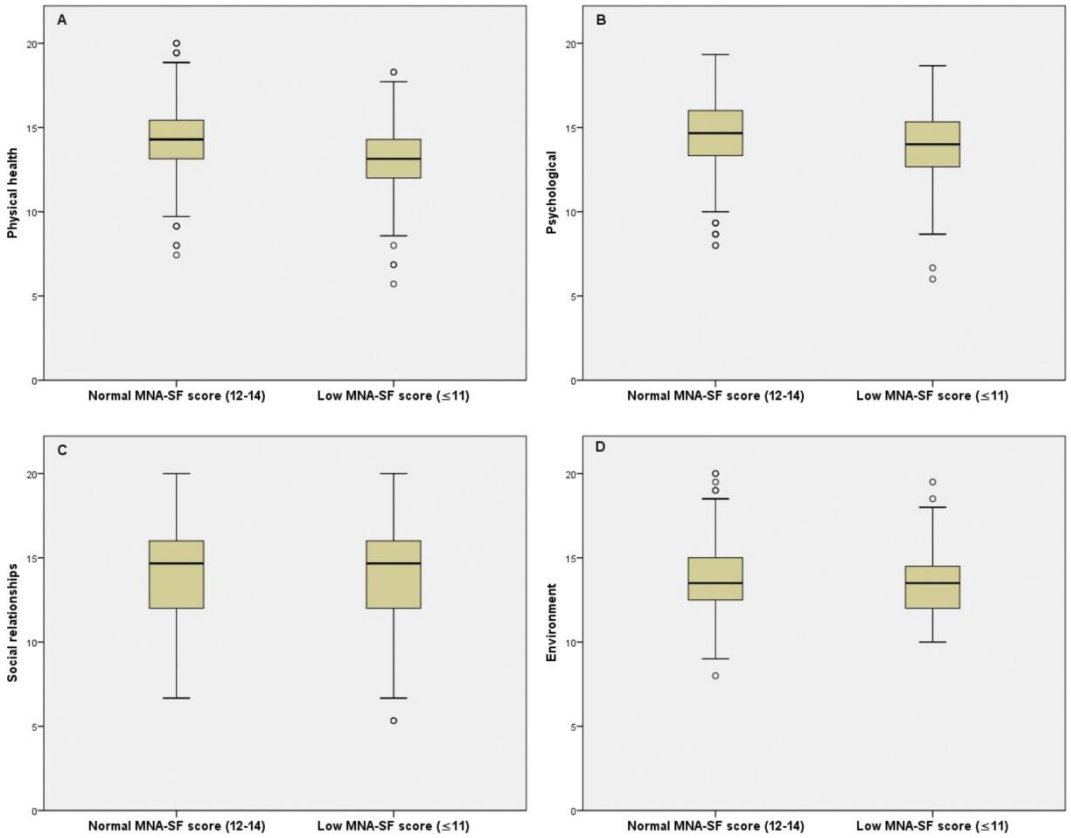

Fig. 1. Box-plot distribution of the scores of the four WHOQOL-BREF domains (A: physical health, B: psychological, C: social relationships and D: environment) according to the nutritional status, well-nourished (normal score, 12–14) versus malnourished/at risk of malnutrition (low score, ≤11 points) measured by the Mini-Nutritional Assessment Short-Form (MNA-SF).

In search of the relation between the MNA-SF score and the different socio-demographic aspects and indicators of functional status and quality of life (Table 2), a correlation between the MNA-SF scores and IADL score ($r = 0.072$; $P = 0.050$), the general health ($r = 0.119$; $P = 0.001$) and the four domains of the WHOQOL-BREF: physical health ($r = 0.209$; $P < 0.0001$), psychological ($r = 0.175$; $P < 0.0001$), social relationships ($r = 0.103$; $P = 0.005$) and environment ($r = 0.083$; $P = 0.023$), was found. A significant negative correlation with social resources rating ($r = -0.106$; $P = 0.004$) was also observed. In men, only a correlation between the MNA-SF and physical health and psychological domains of the WHOQOL-BREF was found. In women, the findings were similar than in the general population except for the environment domain and social resources rating.

Table 2. Associations between quantitative or ordinal variables listed in Table 1 and the MNA-SF score.

	MNA-SF		
	Total	Men	Women
Age[a] (years)	−0.056	−0.032	−0.055
Education,[a] years	0.042	0.051	0.044
Social resources rating[b]	−0.106**	−0.108	−0.085
Total Lawton score[a]	0.072*	−0.080	0.124**
How would you rate your quality of life?[b]	0.048	0.049	0.042
How satisfied are you with your health?[b]	0.119**	0.087	0.123**
Physical health – WHOQOL-BREF score[a]	0.209**	0.203**	0.189**
Psychological WHOQOL-BREF score[a]	0.175**	0.131*	0.180**
Social relationships WHOQOL-BREF score[a]	0.103**	0.109	0.117*
Environment WHOQOL-BREF score[a]	0.083*	0.111	0.058

MNA-SF: mini-nutritional assessment short-form; IADL: instrumental activities of daily living; WHOQOL-BREF: World Health Organization Quality of Life-Brief Form. *Significant (*P*-value) < 0.05; **Significant (*P*-value) < 0.01.
[a] Pearson's correlation coefficient.
[b] Spearman's correlation coefficient.

Participants with impaired social resources, lower IADL scores, poor satisfaction with their general health and low scores on the four domains of the WHOQOL-BREF presented lower MNA-SF scores (higher presence of malnourished/risk of malnutrition).

Finally, Table 3 shows the results of a logistic regression model, where seven determinants significantly associated with malnutrition/risk of malnutrition are presented according to the gender. For the total population, the three main determinants were female gender, the presence of totally impaired social resources and low scores in the physical health domain of the WHOQOL-BREF. The combination of having all the factors increased the risk of reporting malnutrition/risk of malnutrition, with a correct prediction of 85.7%. Moreover, the regression model identified different determinants according to the gender. In men, the main determinants of malnutrition/risk of malnutrition were being single or divorced/separated and to have poor satisfaction with their health; and when considered together, the correct classification of the cases reporting malnutrition/risk of malnutrition was 89.8%. The best determinant for women was also the physical health domain, reaching a correct prediction of 83.0% of malnutrition/risk of malnutrition.

Table 3. Stepwise logistic regression of major social determinants and malnourished/risk of malnutrition (low score: ≤11 points) status according to the mini-nutritional assessment short-form.

	Total			Men			Women		
	Total B	*P*-value	Odds ratio (95% CI)	Total B	*P*-value	Odds ratio (95% CI)	Total B	*P*-value	Odds ratio (95% CI)
Gender (female)	−0.511	0.028*	0.600 (0.380–0.947)	NS	NS	NS	NS	NS	NS
Social resources rating (total impairment)	−1.358	0.025*	0.257 (0.078–0.845)	NS	NS	NS	NS	NS	NS
Social resources rating (mild impairment)	NS	NS	NS	NS	NS	NS	−0.666	0.036*	0.514 (0.276–0.958)
Physical health – WHOQOL-BREF (score < 14.2857)	0.517	0.018*	1.676 (1.094–2.568)	NS	NS	NS	NS	NS	NS
Marital status (single)	NS	NS	NS	−2.523	0.001**	0.080 (0.019–0.342)	NS	NS	NS
Marital status (divorced/separated)	NS	NS	NS	−2.349	0.001**	0.096 (0.023–0.388)	NS	NS	NS
Satisfaction with your health (poor)	NS	NS	NS	1.462	0.001**	4.314 (1.816–10.246)	NS	NS	NS
% Correctly predicted (cut-off value of 0.5)			85.7			89.8			83.0

B = regression coefficient *B*; CI = confidence interval; *Significant (*P*-value) < 0.05; **Significant (*P*-value) < 0.01; NS = not significant.

4. Discussion

Our results are consistent with those from other authors that found that female gender was associated with poor nutritional status [8], [21], [32], [33].

In our study and probably due to the characteristics of the sample with a high functional ability and low frailty status [4], age and educational level were not associated with malnutrition/risk of it neither bivariate nor regression analysis, as previously found [34]. However, other studies with a higher presence of functional disability, comorbidity or frailty, find such a relationship, with a higher presence of poor nutritional status in older subjects [21], [33], [35] or those with lower levels of education [8], [33], [36], usually linked to difficulties in reaching an adequate nutritional status [36].

Marital status may also be associated with poor nutritional status in men since malnutrition/risk of it is more frequent in single and divorced/separated men. In the bivariate analysis, a higher presence of malnutrition/risk of it was also observed in widowed people, as previously found [8], [37]. Being unmarried and the presence of malnutrition was previously reported [10], [38]. Besides, in our study, those participants living with the spouse had higher MNA scores. This could be explained because the single, divorced/separated or widowed people could not have others present during meals and this companionship has been associated with better nutritional intake [37], [39]. Besides, men are more dependent than women in IADL such as cooking [40], and inability to prepare and cook meals was linked to malnutrition [36].

Regarding social resources, bivariate and logistic regression analysis showed that malnourishment/risk of it was associated with impaired social resources, especially in the female gender. Social isolation can diminish the interest in food and social interaction improves it [41]. A lack of family support in times of need and feeling of not being wanted [42], together with feelings of loneliness [9], [42] have been identified as factors that negatively influence nutrition in older adults. Loneliness, identified as a "geriatric giant" [43] is a predictor of several health outcomes linked to poor nutritional status because it affects areas such as appetite or the ability to do shopping [9]. It is important to highlight the need for increasing social resources within the community to increase social ties and interaction [9] or to make arrangements for relatives or friends to sit down and eat with the elderly [39], reducing the negative effects on nutritional status.

Functional dependence, measured using the Lawton IADL scores was associated with lower MNA scores in the bivariate analysis and in the correlation. As previously said, IADL dependence can imply a loss of ability to prepare and cook meals [36], [44], being a factor affecting malnutrition. Furthermore, IADL dependence was not identified as a determinant factor of poor nutritional status in the logistic regression, being consistent with the results of other authors [45], [46]. However, various researchers have found a positive association between being IADL dependent and malnutrition/risk of it [13], [47], [48].

Lastly and regarding the quality of life, in this study, it has been considered from a social dimension [7], covering the satisfaction with the general facets on overall QOL and health and the four domains of the WHOQOL-BREF: physical health, psychological, social relationships and the environment. Most of the studies face QOL and its relation with the nutritional status considering the health-related quality of life (HRQOL), describing that aging produces physical and psychological changes that affect the nutritional aspects of HRQOL [7]. In the present study, poor perception of general health and the physical health domain have also been associated with the nutritional status in concordance with other researchers [6], [12], [45]. Physical activity found to be associated with poor nutritional status [38] that increases muscle mass depletion and functional disability that can impact nutritional status (see reference [49] for a review). An association between poor quality of life in women and malnutrition was also found in hospitalized elderly patients [50]. In this study, poor nutritional status was associated with the psychological domain of the WHOQOL-BREF in the bivariate analysis and besides, the scores in both variables positively correlated in agreement with previous research [12] but this domain was no identified as a determinant factor in the logistic regression.

After the comprehensive gerontological assessment and the multivariate regression model analysis carried out in this study, associated factors for malnutrition or the risk of it were being female, unmarried status, to report mildly or totally impaired social resources, and poor general or physical QOL. It is important to identify factors associated with nutritional status to provide an early identification and correct intervention since a small reduction in the prevalence or severity of malnutrition/risk of it could imply substantial cost reduction for the health care system [2].

4.1. Strengths and limitations

An important strength of this research is the joint analysis of multiple factors (socio-demographic, social support, functional disability and quality of life) with a potential association with the presence of malnutrition or risk of it in a large representative sample. However, our results could be limited by the origin of the sample study that could reduce the prevalence rates of malnutrition or risk of it. Besides, the cross-sectional design of our research does not permit drawing causal relationships so it is hoped that these findings prove that future longitudinal data are needed.

5. Conclusions

The present study demonstrates how various factors are associated with the presence of malnutrition or risk of it. Only the gender and the unmarried status as socio-demographic factors were associated with the nutritional status of community-dwelling older people. Social factors that were linked to changes in nutritional status were measures of subjective loneliness and social resources rating. There is a tendency for lower scores in IADL scale, poor satisfaction with the general facet on overall QOL and in the physical and psychological domains of QOL at poor nutritional status.

Our research reveals, in a multivariate analysis, that being female, unmarried status, to report mildly or totally impaired social resources, and poor general or physical QOL are the main determinants of malnourishment and risk of malnutrition. Nutritional status assessment and potential determinant factors should be incorporated as part of comprehensive assessments for early identification of malnutrition and to determine appropriate intervention strategies to address this public health problem in older adults.

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Statement of authorship
AM, CDD and JCMC contributed with the conception and design of the study along with the critical revision of the manuscript before the final submission. CDD, LLL, RLL and LRF contributed with the acquisition of data. AM contributed with the analysis and interpretation of data along with the drafting of the manuscript. All the authors revised the final version of the manuscript and approved it to be submitted.

Conflict of interest
The authors have no potential conflicts of interest.

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