

What has been done about nutritional interventions for older adults receiving home care? A systematic review

O que tem sido feito a nível de intervenções nutricionais nas pessoas idosas que recebem cuidados domiciliários? Uma revisão sistemática

Carolina Feliciano Duarte

ORIENTADO POR: MESTRE LILIANA FERNANDES FERREIRA

REVISÃO SISTEMÁTICA

I.º CICLO EM CIÊNCIAS DA NUTRIÇÃO | UNIDADE CURRICULAR ESTÁGIO

FACULDADE DE CIÊNCIAS DA NUTRIÇÃO E ALIMENTAÇÃO DA UNIVERSIDADE DO PORTO

TC

PORTO, 2026



Abstract

Background: Ageing and the preference for ageing in place increase the need for effective nutritional care for older adults receiving home care. However, evidence regarding the types and effects of nutritional interventions in this setting remains scattered.

Objective: To identify nutritional interventions implemented among older adults receiving home care and describe the reported nutritional outcomes.

Methods: A systematic review was conducted following PRISMA guidelines. Medline (PubMed), Scopus and Web of Science were searched in May 2026. Original studies published in English or Portuguese involving adults aged ≥ 65 years receiving home care and reporting nutritional interventions with nutritional outcomes were included. The studies were selected via the Rayyan platform.

Results: Nineteen studies published between 1995 and 2026 were included. The most common interventions included individualized nutritional care plans combined with dietary counselling and nutritional monitoring, meal or food provision, nutrition education, and technology-based approaches. More recent studies also incorporated caregivers into the intervention process. Overall, the interventions were associated with improvements in nutritional status, nutritional intake, muscle strength and quality of life.

Conclusion: Nutritional interventions for older adults receiving home care are still very diverse. Current evidence supports the integration of nutritional care into home care services, although further research is needed to determine the most effective interventions and their long-term impact.

Keywords

Older adult, Home care, Nutritional intervention, Nutrition, Ageing

Resumo

Introdução: O envelhecimento e o incentivo ao envelhecimento no domicílio reforçam a necessidade de cuidados nutricionais eficazes para as pessoas idosas que recebem apoio domiciliário. No entanto, a evidência sobre os tipos e os efeitos das intervenções nutricionais neste contexto permanece dispersa.

Objetivo: Identificar as intervenções nutricionais implementadas em pessoas idosas que recebem cuidados domiciliários e descrever os outcomes nutricionais reportados.

Métodos: Foi realizada uma revisão sistemática de acordo com as recomendações PRISMA. As bases de dados Medline (PubMed), SCOPUS e Web of Science foram pesquisadas em maio de 2026. Foram incluídos estudos originais publicados em inglês ou português, envolvendo pessoas com idade superior a 65 anos a receber cuidados domiciliários e que reportaram intervenções nutricionais com outcomes nutricionais. A seleção dos estudos foi realizada através da plataforma Rayyan.

Resultados: Foram incluídos 19 estudos, publicados entre 1995 e 2026. As intervenções mais frequentes incluíram planos nutricionais individualizados combinados com aconselhamento e monitorização nutricional, fornecimento de refeições ou alimentos específicos, educação alimentar e abordagens tecnológicas. Estudos recentes integraram os cuidadores no processo de intervenção. Globalmente, as intervenções encontram-se associadas a melhorias do estado nutricional, da ingestão alimentar, da força muscular e da qualidade de vida.

Conclusão: As intervenções nutricionais dirigidas às pessoas idosas que recebem, cuidados domiciliários são ainda muito heterogéneas. A evidência disponível apoia a integração dos cuidados nutricionais nos serviços de apoio domiciliário, embora

sejam necessários mais estudos para identificar as intervenções mais eficazes e avaliar o seu impacto a longo prazo.

Palavras-chave

Pessoa idosa, Apoio domiciliário, Intervenções nutricionais, Nutrição, Envelhecimento

List of abbreviations, initialisms and acronyms

BMI - Body Mass Index

BW - Body Weight

DGS - Direção-Geral da Saúde

MNA - Mini Nutritional Assessment

MNA-SF - Mini Nutritional Assessment Short Form

NCP - Nutrition Care Process

Summary

Abstract	i
Keywords	ii
Resumo	iii
Palavras-chave	iv
List of abbreviations, initialisms and acronyms	v
Summary	vi
Introduction.....	1
Methods.....	3
Results	5
Discussion	12
Conclusion.....	15
References	16
Parecer do orientador do Trabalho Complementar	19

Introduction

Population ageing represents one of the greatest public health challenges of the 21st century. The increase in average life expectancy and the growing proportion of older people have significant implications for health and social protection systems, requiring responses tailored to the needs of this population.

Currently, in Portugal, average life expectancy at birth is approximately 82 years old⁽¹⁾, and in 2024, around 2,5 million residents were aged ≥ 65 years old⁽¹⁾, corresponding to 24,3% of the population. It is therefore necessary to guarantee the health, well-being and dignity of this significant proportion of the population. Furthermore, there is a growing preference and encouragement for older people to remain in their own homes, thereby reducing residential care facilities and minimising the costs and pressure associated with hospital admissions⁽²⁾. However, most of the older population is characterised by frailty, multimorbidity and/or functional dependence, pointing to a high vulnerability to nutritional problems⁽³⁾. Nutrition is particularly important in this age group, not only due to the high prevalence of risk factors for malnutrition and undernutrition amongst older people, namely 28,1% and 20%, respectively, as highlighted by Stratidaki et al., while investigating the factors influencing the nutritional status of older people⁽³⁾. Physiological changes associated with ageing also contribute to this situation, such as a reduced appetite, changes in taste and smell, problems in chewing and swallowing, sarcopenia (loss of muscle mass, strength and function), chronic diseases and polypharmacy and play a crucial role in the nutritional status, frequently exacerbating situations of malnutrition.

Social factors are sometimes overlooked, but they also have a significant impact on the nutritional status of older people. Social isolation, widowhood, financial difficulties and limitations in purchasing and preparing food are often hidden and must be addressed to promote better nutritional status. Furthermore, family involvement in interventions can be crucial for improving the overall nutritional status of older people⁽³⁾.

Malnutrition, especially among older people, can lead to the loss of muscle mass and functionality, increased risk of falls, more hospital admissions and greater use of healthcare resources, resulting in a reduced quality of life, as well as increased mortality⁽⁴⁾.

Home-based nutritional interventions emerged in this context of the association between aging in place and specific nutritional needs. According to the Nutrition Care Process (NCP), a “nutritional intervention is an intentional action by a dietitian, specifically planned to address or improve a nutritional diagnosis by influencing dietary behaviour, environmental conditions or clinical aspects related to the health of an individual or group”⁽⁵⁾.

Although there are few studies on this topic, a small number of nutritional interventions have already been published, including nutritional screening and assessments, personalised nutritional counselling, and home-delivered meals⁽³⁾.

It is believed that by improving and investing in home-based nutritional interventions, it is possible to improve older adults’ dietary intake and independence, reduce physical limitations in daily activities due to chronic or acute conditions, reduce the use of healthcare services and costs, mitigate the impact of malnutrition and decrease the rate of complications and the hospital length⁽²⁾.

However, the strategies described and implemented to date appear not to fully meet the population's needs. The wide variety of tools used to assess nutritional status makes it difficult to compare different studies⁽⁶⁾, in addition to the lack of a single, valid tool to screen malnutrition risk in the older population receiving home care⁽⁴⁾. Also, studies about the nutritional status of the community-dwelling older population highlight the need for further research into the factors that influence nutritional risk⁽³⁾.

Although integrated home care provides health benefits, there is limited knowledge about its specific effects on nutritional status, and the evidence is limited regarding the types of interventions used, how they are implemented, and their effects on nutritional outcomes in this population. Furthermore, there is a need for targeted interventions to reduce the risk of malnutrition and other related nutritional issues⁽³⁾.

Therefore, it is fundamental to synthesise the available evidence in this area to better understand what have been done and how. This systematic review aims to identify nutritional interventions implemented among older adults receiving home care and evaluate their types and effects on nutritional outcomes.

Methods

A systematic review was conducted and reported according to the requirements for submitting scientific articles to biomedical journals, as established by the International Committee of Medical Journal Editors⁽⁶⁾. The review was based on

the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines⁽⁷⁾.

Medline (PubMed), SCOPUS and Web of Science were searched between May 21, 2026, and May 26, 2026. The search strategy was established by the search team, defining the search terms for SCOPUS and Web of Science and subsequently adapting them to MeSH terms for Medline. The final search expression was: “nutritional intervention*” OR “diet* intervention*” OR “nutritional therap*” OR “diet* management” OR “nutrition-sensitive intervention*” OR “nutrition-specific intervention*” OR “medical Nutrition therap*”) AND (“home care” OR “domiciliary care” OR “home healthcare” OR “home assistance” OR “home help” OR “home health care” OR “home based care” OR “home care service*”) AND (“older adult*” OR “older person*” OR “older people” OR “elderl*” OR “senior*” OR “geriatric*” OR “aging population*” OR “ageing population*” OR aged.

Table 1 describes the eligibility criteria used to identify and select studies that answer the research questions.

Table 1 Eligibility criteria of original studies included in this review according to the population, intervention, indicator, comparator, outcomes, and study design (PICOS) format.

	Inclusion criteria	Exclusion criteria
Population	Older adults aged ≥65 years old who live at home receiving home care	Children, adolescents and adults aged <65 years old, older adults in long-term care facilities or hospitalized
Intervention	- Nutritional/anthropometric assessment at home; - Prescription of individualized meal plans; - Supplementation at home; - Training on making healthier food choices; - Referral for nutritional care plans; - Other nutritional interventions considered by the research team.	Physical exercise and/or activities of daily living or recreational activities, administration of medication, psychological interventions, provision of basic home care and other interventions that do not meet the inclusion criteria
Comparator	Not applicable	Not applicable
Outcomes	- Anthropometric measurements; - Food/nutritional intake; - Nutritional status/risk; - Dietary quality; - Other nutritional outcomes considered by the research team	Physical health, mental health or other non-nutritional outcomes
Study design	Original research studies and prospective observational studies in English or Portuguese	Review studies, case studies, abstracts, conference papers, books and other study types than original articles Studies not in English and/or Portuguese

The Rayyan⁽⁸⁾ platform was used to conduct the selection process for the studies to be included in this review. First, duplicates, all review articles, and all articles not written in Portuguese or English were excluded. The titles and abstracts of the articles were independently reviewed by two researchers to assess their potential eligibility. The full texts of potentially eligible records were screened for eligibility by two researchers independently. Any disagreements were solved by consensus. Data from the included articles were extracted to a standardized table by one researcher, with final confirmation by a second researcher. The information from the articles was added to the table in chronological order (date of publication) as the first criterion, and in alphabetical order (country) as the second criterion.

Studies in which the intervention involved the home delivery of meals were included if the outcomes assessed were those specified in the eligibility criteria. Furthermore, the study sample corresponds to the population defined as eligible for this review.

Results

Of 3,984 records identified in the search, after the removal of duplicate records and title and abstract screening, full texts were assessed against the eligibility criteria, with a total of 19 articles included in this review. The main reasons for excluding articles were study outcomes (n=1 802), study population (n=1 042), study design (n=424) and language (n=162). In addition, studies for whose full text

were unable to access (n=12), as they were too old to access, were also excluded, as seen in the PRISMA flow diagram (Figure 1).

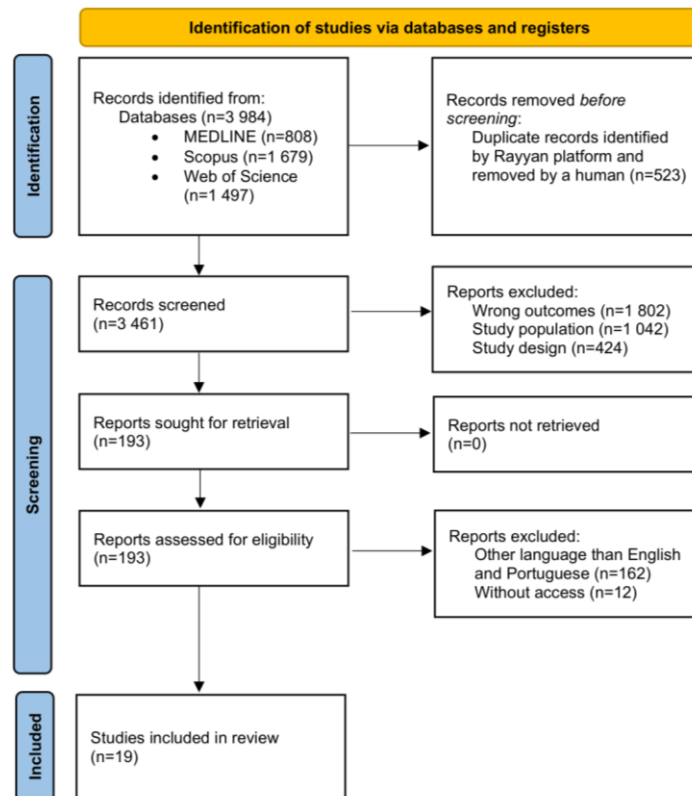


Figure 1 Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) fluxogram

Table 2 outlines the articles included in this systematic review. From the 19 included papers, 14 describe a nutritional-only intervention. The remaining 5 studies incorporate nutritional interventions with other health areas, such as physical activity, occupational therapy or oral health. The studies included were published between 1995 and 2026; however, an increase in this research area has only been observed since 2013. The studies were carried out in 11 different countries; the first study to meet the inclusion criteria was conducted in the USA, although there is a high volume of research in this area in Finland and Denmark (5 and 4 articles included, respectively).

Table 2 Characteristics, methods and outcomes, of included studies presented

Author	Year	Country	Age (years mean)	n	Intervention	Outcomes	Nutritional-only intervention
Neal et al. ⁽⁹⁾	1995	USA	-	16	A natural laxative, "Power Pudding", was prescribed, with a recommendation to increase fluid intake	Increased the frequency of bowel movements from 0-3,5 times a week to 4 times a week	YES
Payette et al. ⁽¹⁰⁾	2002	Canada	82	83	Participants were provided with two commercial liquid nutritional supplements and were given nutrition counselling and encouragement to improve their food and supplement intake	Increased body weight (1,62 ±1,77 kg) over 16 weeks Increased energy intake in 269 ±434 kcal Increased protein intake Proportion of subjects not meeting their nutritional requirements in protein (19%), magnesium (48%), zinc (69%), or iron (29%) at baseline dropped to 10%, 21%, 38% and 15%, respectively There were no significant improvements in muscle strength or functional variables	YES
Beck et al. ⁽¹¹⁾	2013	Denmark	-	152	Comprehensive nutritional assessment and development of a nutrition care plan consistent with estimated nutritional requirements and nutritional rehabilitation goals. Dietitians performed 3 home visits to provide nutritional care and maximize participants nutritional status by reviewing the nutritional care plan, providing dietary counselling, motivation and education, monitoring participant's weight and ensuring the energy and protein requirements	Improved functional status (improved mobility in 46%) Improved nutritional status by gaining weight and improving energy and protein intake Higher intake of Oral Nutritional Supplements (ONS) Reduced use of meals-on-wheels	YES
Locher et al. ⁽¹²⁾	2013	USA	81	34	Dietitians provide verbal and written instructions regarding how to improve caloric intake and involved collaborative goal setting. All participants received an in-home follow-up assessment post 60 days	Increased caloric intake, but not significantly The percentage of participants who were meeting caloric needs to maintain body weight did not differ significantly between groups The percentage of participants who were weight stable did not differ between groups	YES
Beck et al. ⁽¹³⁾	2016	Denmark	-	246	Participants received a new model for multidisciplinary nutrition support, focused on individual treatment of the potentially modifiable nutritional risk factors involving physical therapist, dietitian, and occupational therapist. All participants in the intervention group were offered 30 to 45 min exercise programs of moderate intensity twice a week and received one bottle of an oral training supplement (241,4kcal and 14,4g of protein per 100ml) immediately after the two weekly exercise sessions. If a participant did not attend the group exercise, the supplement was offered when possible. The occupational therapist was asked to consult the participants who suffered from eating dependency or chewing and swallowing problems to confirm diagnosis, determine if any help was needed during meals, and initiate intervention to solve these problems.	Significant improvement in quality of life, 30-seconds chair stand, and oral care No other differences were observed	NO
Polonen et al. ⁽¹⁴⁾	2017	Finland	84	227	Elaboration of a plan for individualised nutritional care with the older adult and her/his nurse or relatives, for those with insufficient energy or protein intake, or with weight loss. The information (weight, height, daily eating routines, other relevant health	The mean change in MNA score was 2,3 points The mean change in plasma albumin levels was 1,6g/L There were no differences in BMI between the groups	YES

					information, nutritional status, nutrient intake) for these plans was obtained through one nutritional meeting		
Tsuji et al. ⁽¹⁵⁾	2017	Japan	86	34	Dietary counselling that promoted highly varied food intake using an educational leaflet provided by a visiting nurse	Improvement in MNA-SF score, especially in "Appetite loss" and "Weight loss"	YES
Fernández-Barrés et al. ⁽¹⁶⁾	2017	Spain	84	173	Sessions of nutrition education for caregivers of dependent patients at risk of malnutrition, conducted within the Home Care program, and individual dietary monitoring of the patient in the presence of his caregiver	Participants increased their consumption of egg, fruit (234,1±121,3 to 263,6±138,3 g/d), nuts (0,7±1,8 to 1,6±3,8g/d), protein (60,2±14,4 to 64,3±17,8g/d), polyunsaturated fatty acids, folate and vitamin E Nutritional status improved as MNA score increased Decrease in the percentage of malnourished patients (9% at 6 months follow-up to 4,8% at 12 months of follow-up) Increase in the percentage of patients who have achieved a normal nutritional status Improvement in the nutritional knowledge by 1,5 points (8,5±1,4 to 9,7±1,2) according to the 11-item questionnaire Maintained Barthel score, weight and body mass index The baseline BMI and baseline Barthel score were the factors positively associated with the MNA score after 12 months of follow-up	YES
Arjuna et al. ⁽¹⁷⁾	2018	Australia	84	41	Participants received lunchtime meals. The energy and protein content of the meals was manipulated by fortifying the recipes of the soups and desserts. Nutritional counselling, as giving strategies to achieve the goals, and monitorization from a qualified dietitian who estimated participant's energy and nutrient requirements.	Increased the energy, protein, total fat, saturated fat, and carbohydrate intake Increased the MNA score The intervention group reported greater energy intakes at morning tea, lunch, and afternoon tea, and protein intakes were greater at lunch and afternoon tea. There was no difference in the markers of nutritional status, physical function, quality of life, number or length of stay for hospital admissions, number of self-reported falls or psychological wellbeing between any of the groups from baseline to week 12	YES
Nykanen et al. ⁽¹⁸⁾	2018	Finland	82	85	Intervention with both high-protein dairy products and energy-enriched berry purées consumed as snacks six days a week. The drinks were milk-based added with vitamin D, milk protein and sugar. The berry products were frozen whole berry purées with sugar and standard or cold pressed rapeseed oil	Increased MNA score in 1,8 points after adjustment for age and gender No significant change was observed in the plasma albumin concentration, BMI, and haemoglobin Significant effect on grip strength of the right and left hand in women All participants reported satisfaction with the products' taste, and were willing to continue using them in the future	YES
Husted et al. ⁽¹⁹⁾	2019	Denmark	83	257	A dialog tool and a training program was developed to be used in a rehabilitation program. The first part of the intervention consisted of training the healthcare staff and empowering the case managers. The second part consisted of a rehabilitation program which include physical visits with meal-related activities	Increased the health-related quality of life over time determined by EQ-5D-3L index score	NO
Nihtilä et al. ⁽²⁰⁾	2019	Finland	85	216	Individually targeted xerostomia intervention with written information about oral health and nutrition was given for participants reporting occasional or continuous feeling of dry mouth. An individually targeted xerostomia intervention was carried out for participants. Also, an individual nutritional care plan and written material was developed for each participant to increase the overall intake and correct deficiencies in the diet. To relieve the symptoms, participants were given individual instructions to rinse	Feeling of dry mouth decreased by 30,3%, mainly in those suffering from occasional xerostomia (decreased by 27,3%) Decrease the percentage of malnutrition or risk of malnutrition based on the MNA score (63,3%) Improvement in daily drinking and eating habits (drinking more than five glasses of liquids increased by 19,1%, eating two or more portions of fruits and vegetables increased by 15,0% and eating three or more warm meals increased by 8,1%)	NO

					their mouth with water, to use xylitol tablets or chewing gum to stimulate saliva, to use dry mouth products and to spread a small amount of cooking oil on their mucosal surfaces.	Reduction in prevalence of xerostomia	
van Doorn-van Atten et al. ⁽²¹⁾	2019	Netherlands	81	31	Telemonitoring health measurements (weekly body weight, track steps 1 week per month and five participants also measured their blood pressure bi-weekly or monthly). The television included menus for agenda, messages, measurement results, and dietary and physical activity advice	50% of the participants were satisfied with the project; however, some participants perceived the project as a heavy burden on their daily lives 89% of the participants found it easy to weight themselves 79% of the participants found it easy to use the pedometer, 100% to use the sphygmomanometer and 67% to use the tablet Significant improvements in scores for compliance to dietary guidelines for fish, dietary fibre, protein and vitamin D Significant decreased in the score for compliance to the guideline for saturated fatty acids	NO
Kunvik et al. ⁽²²⁾	2021	Finland	78	67	A protein-rich home meal, a snack and bread were delivered every day. The main ingredients of the protein-rich meal, snack and bread were naturally protein-rich; artificial protein fortification were not used	Participants ate all protein sources offered in 72% of the days Side dishes were consumed in 69% of the days, warm vegetables in 76% of the days and dessert in 89% of the days Participants ate the whole snack offered in 88% of the days One bread slice was consumed 25,5% of the days Increased protein intake Decreased salt intake Increased saturated fat intake Improvement excretion activities items	YES
Aure et al. ⁽²³⁾	2021	Norway	79	25	Participants were provided with an iPad with the Appetitus app and mobile Internet. The Appetitus app was developed to prevent and relieve malnutrition in older adults. The app suggests a meal plan, including pictures of the dishes, allow users to record their dietary intake and adjust the portion size and calculate the recommended daily intake	Most of the participants used the app over an 8-week period; however, there was a decline in the number of participants who used the app in the last weeks of the trial 14 participants use the app every day 6 participants were weekly users 5 participants reported using it occasionally 1-2 days a week The participants used the app to record their consumption 1 to 9 times per day Most daily users found self-assessment of diet led to increased awareness of their food intake Those who described their recording pattern as less regular, revealed that recording their consumption had given them an overview of their diet Most of the participants described it as a quick and easy way to record their daily consumption	YES
Due et al. ⁽²⁴⁾	2022	Denmark	81	76	Three different meal service programs (the 24-h meal service, the Protein-rich meal service and the Rehabilitation meal service) were developed, with one programme being trialled in each of the three municipalities in a randomised trial. The 24-h meal service program was covering the total daily energy needs and comprised of six energy dense meals. The protein-rich meal service program consisted of three between meals high in protein and fat (provided 40% of energy needs) and was identical to the between meals in the 24-h program. The Rehabilitation meal service program consisted of	Increased energy intake in all intervention groups by 328,4 kcal (19%); however, this difference was not significant between groups and was due to a 35% increase in fat intake. Increased protein intake by 13g (19%) Reduction in readmission to hospital (0 participants were admitted to the hospital) Increased energy intake on subjects receiving the 24-h meal service by 956kcal due to an increase in protein and fat intake Increased Body Mass Index (BMI) in the protein-rich meal service	YES

					four different meal kits containing three different complementary food ingredients, cooking instructions and recipes with graduation in degree of preparation complexity.		
Kaipainen et al. ⁽²⁵⁾	2022	Finland	84	325	A clinical nutritionist planned a personal nutritional care with the client and her/his nurse or family members and provided one nutritional counselling session for those at risk of malnutrition. The target for protein intake was 1,0g/kg of body weight (BW) and for energy intake was 30kcal/kg/d. Participants were advised to use milk powder in foods and high protein dairy products and to eat daily two warm meals with meat, chicken, fish or eggs	The mean energy intake increased, but the difference was not significant between groups The mean protein intake increased (0,04 g/kg BW), as the fibre (0,8g), vitamin D (8,5 µg), E (0,6 mg), B12 (0,7 µg), folate (8,7 µg), iron (0,4 mg), and zinc (0,5 mg) intake The proportion of participants with a protein intake less than 1,0g/kg BW declined from 67,2% to 50,8% Among home care clients with cognitive decline the protein intake increased 0,2 g/kg BW	YES
Meriç e Yabancı Ayhan ⁽²⁶⁾	2025	Turkey	84	92	The home care team organized a group educational session with multiple caregivers followed by an individual nutrition monitoring of the patient in the presence of their caregiver. The content of the session was based on the Turkish guidelines for those of older age and included information about foods, macronutrients, and micronutrients, along with examples of foods with high nutrition value, demonstration how to plan a balanced diet, emphasizing macronutrient distribution and food selection, offer guidance on dietary adaptations to address common nutrition issues in this population and provided advice on fundamental cooking practices.	Increased energy and carbohydrate intake Decreased fat intake Improvements in the intakes of vitamin B1 (0,1mg/d), B2 (0,3mg/d), B6 (0,1mg/d), B12 (0,8 mg/d), E (1,0 mg/d), C (24,0 mg/d), potassium (229 mg/d), magnesium (15 mg/d), calcium (133 mg/d) and phosphorus (116 mg/d) Increased the MNA score by 1,4±2,0 points Percentage of participants malnourished decreased from 44,7% to 37,2% Percentage of participants at risk of malnutrition decreased (37,2% to 35,1%) Percentage of participants with normal nutrition status increased (18,1% to 27,7%) Improvement in the quality of life (WHOQOL-OLD quality of life total increased from 57,5±25,7 to 66,7±22,1, with a statistically significant increase of 9,2±10,4 points) Increased body weight, waist circumference, and BMI values Those of older age classified as underweight according to BMI decreased from 18,1% to 10,6% Increased serum albumin level (0,1g/dl), haemoglobin (0,1g/dl), and haematocrit levels (0,1%) and a decrease in C-Reactive Protein (15,0mg/L), Aspartate Aminotransferase (0,5U/L), Alanine Aminotransferase (0,7U/L), urea (5,9mg/dl), creatinine (0,1mg/dl), sodium (0,5mmol/L), and potassium (0,1mmol/L) levels	YES
Biersteker et al. ⁽²⁷⁾	2026	Amsterdam	74	295	A progressive resistance training program was performed by all participants and including twice-weekly training sessions for 12 weeks. Training intensity was divided into 4 groups: low intensity, medium-low intensity, medium high intensity, and high intensity. Participants received a dietary intervention focused on protein, targeting a daily protein intake of 1,2-1,5g/kg bodyweight/day and a protein intake of >25g per main meal, which include dietary counselling. In addition, participants were provided with two 10g daily protein supplements: whey protein isolate and protein-enriched orange juice	Increased protein intake by 0,3g/kg BW Among participants whose usual protein intake was below the recommended 1,2g/kg, the protein intervention improved leg press muscle strength by 6,4kg Participants with a low usual protein intake level of ≤0,8g/kg experienced the greatest benefit of the intervention on muscle strength, improving leg pressed (10,9kg) and leg extension muscle strength (4,5kg) There was no significant interaction effect between dietary intervention focused on protein and training intensity groups for all outcomes	NO

Most of the interventions included in this review are based on the development of nutritional care plans, monitoring of parameters (anthropometric and biochemical) and dietary advice (n=8); it is this last type of intervention that accounts for almost all the interventions that are not nutritional-only (n=4). Interventions based on the distribution of food or meals are also highly prevalent (n=6), with an even distribution (n=3) between the delivery of specific foods and the provision of meals. It was not until 2013 that a study focusing on dietary education as its main intervention was published; however, that definition had not yet been applied to it. A total of four studies focusing on dietary education were included. A single study was included in which the main intervention involved activities related to meal preparation and, thus, was not exclusively nutritional. Most of the included articles did not feature just one type of intervention, so this analysis was based on the focus of each article's intervention.

In 2017, the first intervention emerged that also included caregivers; a total of four articles with these characteristics were included.

Finally, there is evidence of growing research in the field of technology, through the development of tools that enable telemonitoring and remote counselling (n=3).

Some of the studies reported on more than one type of outcome (n=7). Only 4 articles did not report outcomes related to nutritional status and a total of 9 articles reported outcomes exclusively related to nutritional status; the outcomes included in this classification were anthropometric and biochemical parameters, dietary and nutritional intake, and MNA scores. In addition, 5 articles included outcomes associated with functional status (muscle strength, muscle mass,

functionality, mobility). Some studies (n=3) included aspects related to the participants' quality of life. About oral health and gut health, two articles were included in each category. Finally, there was only one study that assessed participants' adherence to new technologies.

This analysis shows that most interventions based on the provision of meals or food result in improvements in nutritional intake and gut health. Interventions focusing on nutritional education affect nutritional status, quality of life and nutritional literacy. Nutritional counselling and the development of nutritional care plans improved nutritional status and muscle strength. Finally, interventions based on activities related to food preparation improved quality of life.

Discussion

This systematic review summarises the nutritional interventions developed to date for older people receiving home care. Nutritional interventions fall into three main groups: a) counselling, monitoring and the development of individualised nutritional plans; b) dietary and nutritional education; and c) delivery of meals or food (which may be modified or fortified). In addition, there has been an increase in the use of technological interventions in this population, enabling telemonitoring and self-management⁽²¹⁾. Caregivers are also becoming a target group for interventions, which appears to be effective⁽¹⁶⁾.

Most of the included studies cite the following as limitations: the difficulty in obtaining a representative sample, high participant drop-out rates, errors in assessing the 24-hours recall, the impact of the interventions generally extended beyond the study period, and the impossibility to carry out a blinded randomisation.

During the process of formulating the research question and defining the eligibility criteria, it was expected that the results would consist mainly of articles describing traditional interventions, involving direct contact between the researcher, nurse or dietitian and the participant, and involving changes to the participant's environment or habits, or the provision of nutritional advice.

However, many articles were found focusing on the adoption of new technologies, Internet and digital tools, and their effects on the nutritional and functional status of older people. The main aim of these tools is to promote self-management, telemonitoring and less human resources involvement, given that data collection can easily be extracted using this type of equipment⁽²⁸⁾. Aure et al. demonstrated that these tools help older people daily to check their diet, as well as to receive feedback on their performance and areas for improvement. Furthermore, they showed that the adherence to these interventions is not related to prior experience with new technologies or to educational level, but rather to the quality of the training provided and the ease of use of this equipment⁽²⁸⁾. This has raised questions about whether adopting these tools can be considered a nutritional intervention, as they do not directly change participant's daily routine, but rather introduce benefits in terms of health, nutrition and quality of life.

Another type of article that was also frequently found throughout the research was reports and demonstrations of enteral and parenteral nutrition at home. It is sometimes difficult to clearly identify whether they should be considered nutritional interventions, and to what extent is it correct to consider enteral or parental nutrition provided at home as nutritional intervention, given that it is a form of administered nutrition and a necessary condition for the patient's

survival⁽²⁹⁾. However, we believe that cases assessing changes to formulae or dietary preparation for enteral or parental nutrition should be considered genuine interventions⁽³⁰⁾. Articles involving this type of intervention were not included in this systematic review due to failure to meet other criteria⁽³⁰⁾.

Articles were also found in which the intervention did not require home-based support but was community-based, mainly interventions and activities organised by local authorities and other institutions for older people in the wider community. These interventions were often one-off events.

The inclusion criteria for the study population were defined based on the recommendations of the Direção-Geral da Saúde (DGS) that define the older population as those aged 65 or over, as set out in the “Estratégia Nacional para o Envelhecimento Ativo e Saudável”⁽³¹⁾. However, during the research, numerous articles emerged in which the minimum age for inclusion was 60 years or older⁽³²⁾. This suggests there is a growing focus on prevention and the promotion of healthy ageing rather than only focusing on the treatment of diseases and the consequences of this natural physiological process.

This review’s key strengths include its focus on Portugal’s current situation and the need to act urgently, considering that 24%⁽¹⁾ of the Portuguese population is aged 65 or over. Furthermore, no type of intervention was excluded; from home-delivered meals to the use of digital tools, a wide range of interventions were included, analysed and discussed.

This review is not free of limitations. It proved very difficult to obtain specific information on whether home support was available to the population included in the studies. Furthermore, there was also difficulty in understanding the context of the interventions, whether they were community-based initiatives intended to

be carried out only once, or whether they were intended to form part of daily home care. Finally, it was necessary to include the “without access” of articles as an exclusion criterion, given that their publication dates were very old except for two articles which, although relatively recent (2013 and 2021), could not be accessed.

Multidisciplinary interventions appear to offer the greatest benefits to this population, as they improve overall health, empower these individuals and promote their independence. However, involving carers and providing is also essential to enable them to look after their elderly relatives daily.

Conclusion

This systematic review shows that nutritional interventions for older adults receiving home care are diverse and have expanded over recent years. Individualized nutritional care plans, dietary counselling nutrition education, meal or food provision, and technology-based interventions appear to contribute to improvements in nutritional status, dietary intake, muscle strength and quality of life. The growing involvement of caregivers and the emergence of digital tools also reflect an increasing focus on person-centered and home-based care. However, the heterogeneity of interventions, outcome measures and study designs limit direct comparisons between studies. Overall, the available evidence supports the relevance of integrating structured nutritional care into home care services, although further high-quality research is needed to determine the most effective interventions and their long-term impact.

References

1. Instituto Nacional de Estatística. População residente (Série longa, início 1991 - N°) por Local de residência (NUTS - 2024), Sexo e Idade; Anual - Indicador 0012903. INE. 2026. [citado em: 18 de Junho de 2026]. Disponível em: https://www.ine.pt/xportal/xmain?xpid=INE&xpgid=ine_indicadores&contecto=pi&indOcorrCod=0012903&selTab=tab0.
2. VE IJ-H, Dijkhoorn DN, Briseno Ozumbilla CM, Wanten GJ, van den Berg MG. Effective elements of home-delivered meal services to improve energy and protein intake: A systematic review. *Nutrition*. 2020; 69:110537.
3. Stratidaki E, Mechili EA, Ouzouni C, Patelarou AE, Giakoumidakis K, Laliotis A, et al. A Study of Factors Contributing to the Nutritional Status of Elderly People Receiving Home Care. *Nutrients*. 2024; 16(18)
4. Beck AM. Nutritional interventions among old people receiving support at home. *Proc Nutr Soc*. 2018; 77(3):265-69.
5. Academy of Nutrition and Dietetics. Intervenção Nutricional. In: Academy of Nutrition and Dietetics, editor. *Electronic Nutrition Care Process Terminology (eNCP): A Standardized Terminology to Ensure Optimal Nutrition Care*. 2023 ed. ed.; 2023.
6. International Committee of Medical Journal Editors. Recommendations for the Conduct, Reporting, Editing, and Publication of Scholarly Work in Medical Journals. *ICMJE*; 2026. Disponível em: <https://icmje.org>.
7. Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *bmj*. 2021; 372
8. Rayyan. Rayyan: Intelligent Systematic Review. 2026. Disponível em: <https://www.rayyan.ai/>.
9. Neal LJ. "Power Pudding": Natural Laxative Therapy for the Elderly Who Are Homebound. *Home Healthcare Now*. 1995; 13(3):66-71.
10. Payette H, Boutier V, Coulombe C, Gray-Donald K. Benefits of Nutritional Supplementation in Free-living, Frail, Undernourished Elderly People. *Journal of the American Dietetic Association*. 2002; 102(8):1088-95.
11. Beck AM, Kjaer S, Hansen BS, Storm RL, Thal-Jantzen K, Bitz C. Follow-up home visits with registered dietitians have a positive effect on the functional and nutritional status of geriatric medical patients after discharge: a randomized controlled trial. *Clin Rehabil*. 2013; 27(6):483-93.
12. Locher JL, Vickers KS, Buys DR, Ellis A, Lawrence JC, Newton LE, et al. A randomized controlled trial of a theoretically-based behavioral nutrition intervention for community elders: lessons learned from the Behavioral Nutrition Intervention for Community Elders Study. *J Acad Nutr Diet*. 2013; 113(12):1675-82.
13. Beck AM, Christensen AG, Hansen BS, Damsbo-Svendsen S, Moller TK. Multidisciplinary nutritional support for undernutrition in nursing home and home-care: A cluster randomized controlled trial. *Nutrition*. 2016; 32(2):199-205.
14. Polonen S, Tiihonen M, Hartikainen S, Nykanen I. Individually Tailored Dietary Counseling among Old Home Care Clients - Effects on Nutritional Status. *J Nutr Health Aging*. 2017; 21(5):567-72.
15. Tsuji T, Yamasaki K, Nishikawa N, Yamamoto K, Yasui Y, Habu D. Effects of Indirect Nutritional Intervention by a Registered Dietitian through Visiting Nurses

in Nutritionally at-Risk Older Home-Care Recipients: A Randomized Pilot Study. *Journal of Aging Research and Lifestyle*. 2017;1-7.

16. Fernandez-Barres S, Garcia-Barco M, Basora J, Martinez T, Pedret R, Arijia V, et al. The efficacy of a nutrition education intervention to prevent risk of malnutrition for dependent elderly patients receiving Home Care: A randomized controlled trial. *Int J Nurs Stud*. 2017; 70:131-41.

17. Arjuna T, Miller M, Ueno T, Visvanathan R, Lange K, Soenen S, et al. Food Services Using Energy- and Protein-Fortified Meals to Assist Vulnerable Community-Residing Older Adults Meet Their Dietary Requirements and Maintain Good Health and Quality of Life: Findings from a Pilot Study. *Geriatrics (Basel)*. 2018; 3(3)

18. Nykanen I, Torronen R, Schwab U. Dairy-Based and Energy-Enriched Berry-Based Snacks Improve or Maintain Nutritional and Functional Status in Older People in Home Care. *J Nutr Health Aging*. 2018; 22(10):1205-10.

19. Husted MM, Beck AM, Ulrikkeholm LK. Involving community-dwelling older adults in activities related to meals as part of a rehabilitation program: a single-blinded cluster-controlled study. *Clin Rehabil*. 2019; 33(7):1185-96.

20. Nihtilä A, Tuuliainen E, Komulainen K, Nykänen I, Hartikainen S, Tiihonen M, et al. The combined effect of individually tailored xerostomia and nutritional interventions on dry mouth among nutritionally compromised old home care clients. *Gerodontology*. 2019; 36(3):244-50.

21. van Doorn-van Atten MN, Haveman-Nies A, Heery D, de Vries JHM, de Groot L. Feasibility and Effectiveness of Nutritional Telemonitoring for Home Care Clients: A Pilot Study. *Gerontologist*. 2019; 59(1):158-66.

22. Kunvik S, Rautakallio-Jarvinen P, Laaksonen M, Valve R, Salonoja M, Fogelholm L, et al. Effects of Home-Delivered Meals on Older People's Protein Intake, Physical Performance, and Health-Related Quality of Life: The Power Meals Randomized Controlled Trial. *J Nutr Gerontol Geriatr*. 2021; 40(2-3):125-49.

23. Aure CF, Kluge A, Moen A. Older Adults' Engagement in Technology-Mediated Self-Monitoring of Diet: A Mixed-Method Study. *J Nurs Scholarsh*. 2021; 53(1):25-34.

24. Due A, Beck AM, Birk CB, Justesen L, Majgaard M, Lei M, et al. Innovative rehabilitating meal service programs for old people living at home: A randomized controlled pilot study. *Clin Rehabil*. 2022; 36(7):926-39.

25. Kaipainen T, Hartikainen S, Tiihonen M, Nykanen I. Effect of individually tailored nutritional counselling on protein and energy intake among older people receiving home care at risk of or having malnutrition: a non-randomised intervention study. *BMC Geriatr*. 2022; 22(1):391.

26. Meric CS, Yabanci Ayhan N. The effect of nutrition education intervention for caregivers on the nutrition status of the elderly receiving home care: A 1-year follow-up interventional trial. *Nutr Clin Pract*. 2025; 40(4):959-72.

27. Biersteker EJM, Benali M, den Helder JV, Twisk J, Tieland M, Weijs PJM, et al. Effect of a protein intervention during resistance training with varying training intensities on muscle outcomes in frail community-dwelling older adults: a randomized controlled trial. *J Nutr Health Aging*. 2026; 30(6):100838.

28. Aure CF, Kluge A, Moen A. Promoting dietary awareness: Home-dwelling older adults' perspectives on using a nutrition application. *Int J Older People Nurs.* 2020; 15(4):e12332.
29. Draullette M, de Dreuille B, Sanchez M, Bataille J, Billiauws L, Nuzzo A, et al. Survival and parenteral nutrition dependence in patients aged 65 y and older with short bowel syndrome: a retrospective observational cohort study. *The American Journal of Clinical Nutrition.* 2025; 121(6):1387-94.
30. Burns DL, Gill BM. Reversal of parenteral nutrition-associated liver disease with a fish oil-based lipid emulsion (Omegaven) in an adult dependent on home parenteral nutrition. *JPEN J Parenter Enteral Nutr.* 2013; 37(2):274-80.
31. Portugal. Direção-Geral da Saúde. Estratégia Nacional para o Envelhecimento Ativo e Saudável 2017-2025: Proposta do Grupo de Trabalho Interministerial (Despacho nº 12427/2016. Lisboa: Direção-Geral da Saúde; 2017.
32. Sowerbutts AM, Lal S, Sremanakova J, Clamp AR, Jayson GC, Teubner A, et al. Discharging Women with Advanced Ovarian Cancer on Home Parenteral Nutrition: Making and Implementing the Decision. *Nutrients.* 2020; 12(1)

Parecer do orientador do Trabalho Complementar

PARECER

A estudante **Carolina Feliciano Duarte**, do 4º ano da Licenciatura em Ciências da Nutrição da Faculdade de Ciências da Nutrição e Alimentação da Universidade do Porto (FCNAUP), realizou o seu trabalho complementar (TC), no período concomitante ao período de estágio curricular, entre fevereiro e julho de 2026, sob minha orientação.

Tive a oportunidade de orientar e acompanhar o desenvolvimento de todo o TC da Carolina, bem como parte do seu estágio curricular. Desde o início deste percurso, a Carolina demonstrou interesse na área da geriatria, tendo a equipa (orientação de TC, orientação de estágio e estudante) refletido sobre as temáticas de interesse e o tipo de trabalho que mais correspondesse aos objetivos a que a Carolina se propôs. Inicialmente foram abordadas algumas possibilidades de trabalhos relacionados com abordagens tecnológicas de avaliação do estado nutricional de pessoas idosas e foi também explorada a dimensão da intervenção nutricional nos serviços de apoio domiciliário, dado ser esta uma área em desenvolvimento numa das entidades de estágio.

Dada a importância crescente desta temática e uma frágil sistematização da evidência sobre a mesma, foi proposta a realização de uma revisão sistemática sobre o tema “intervenções nutricionais na pessoa idosa em contexto de cuidado domiciliário”. Desde cedo, a Carolina aceitou, de forma entusiasta, o desafio proposto de realizar uma revisão sistemática, uma metodologia algo avançada para uma estudante de licenciatura.

Durante todo o período de desenvolvimento do TC, a Carolina demonstrou uma grande capacidade de trabalho, resiliência, autonomia e maturidade científica. Revelou ainda uma capacidade crescente de pesquisa e de análise crítica e um grande domínio da escrita. O acompanhamento do trabalho desenvolvido pela Carolina foi muito próximo, permitindo assistir à evolução do pensamento crítico e científico e ao interesse pela área.

Termino, afirmando que os objetivos a que a Carolina se propôs no início deste percurso, foram inteiramente cumpridos e até ultrapassados, revelando uma progressão evidente e uma evolução técnico-científica que lhe será certamente essencial para o continuar do seu percurso na área das Ciências da Nutrição.

Porto, 3 de julho de 2026,

A Orientadora,

Assinado por: **Liliana Fernandes Ferreira**
Num. de Identificação: 13736621
Data: 2026.07.03 13:19:02 +0100

