

Under Nutrition among People Aged 60 and Over in Southern Benin

Paraiso MN¹, Kedote NM², Fiatsi A¹ and Sossa-Jerome C¹

¹Health Promotion Department, Regional Public Health Institute, Comlan Alfred Quenum, University of Abomey-Calavi, Benin

²Health and Environment Department, Regional Public Health Institute, Comlan Alfred Quenum, University of Abomey-Calavi, Benin

*Corresponding author: Paraiso MN, Health Promotion Department, Regional Institute of Public Health, University of Abomey-Calavi, Benin, Tel: +229 96757440, E-mail: mparaiso@irsp-ouidah.org, ORCID: <https://orcid.org/0000-0003-4958-7722>

Citation: Paraiso MN, Kedote NM, Fiatsi A, Sossa-Jerome C (2021) Under Nutrition among People Aged 60 and Over in Southern Benin. *J Nutr Health Sci* 8(1): 104

Received Date: August 26, 2021 **Accepted Date:** September 13, 2021 **Published Date:** September 15, 2021

Abstract

The physical appearance of older people in the commune of Ouidah seems to be correlated with the economic level of the people. However, it is now clear that the nutritional status of older people is a key element for natural ageing and improved quality of life.

Objective: To identify the factors associated with undernutrition among people aged 60 years and over in the commune of Ouidah in southern Benin.

Methods: This was a cross-sectional analytical survey that took place between May and June 2020 and involved older people aged 60 and over selected by cluster sampling using a questionnaire and an interview guide. Their sociodemographic characteristics, health status, diet and the health system in their environment were explored.

Results: A total of 271 older people were surveyed, 69% of whom lived in rural areas. The prevalence of undernutrition was 31%. Current occupation as a farmer (OR = 53.62, 95% CI = 5.54-518.34), shopkeeper (OR = 17.24, 95% CI = 2.15-138.21), or other (OR = 16.79, 95% CI = 2.06-136.54); a rural place of residence (OR = 0.40, 95% CI = 0.21-0.76); and presence of anorexia (OR = 10.07, 95% C = 4.61-21.96) were associated with undernutrition.

Conclusion: Undernutrition remains a nutritional problem affecting older people in the commune of Ouidah. Actions to improve their knowledge of healthy, balanced and diversified nutrition, and to strengthen the skills of health personnel in the area of food and nutrition for older people could reduce the prevalence of undernutrition among older people.

Keywords: Older People; Undernutrition; Associated Factors; Benin

Introduction

Ageing brings new health challenges to all countries in the world and is accompanied by an increase in age-related pathologies, including undernutrition a major public health problem that can affect all older populations. However, undernutrition seems to be frequently underestimated and neglected in older subjects because its clinical manifestations are non-specific, especially at the early stage [1].

According to Food and Agriculture Organisation (FAO) estimates, 821 million people worldwide are affected by chronic food insecurity, which contributes to undernutrition and encourages overweight, which partly explains the coexistence of these different forms of malnutrition in many countries [2]. The prevalence of undernutrition is a function of frailty and physical dependence [1].

In Africa, according to a few rare studies, the prevalence of undernutrition among older people living at home varies from 13.1% to 36.1% [3]. Previous study carried out in Senegal reported that the prevalence of malnutrition among patients aged 60 years and over was estimated at 6.6% [4].

Undernutrition has important consequences. It depletes the body's reserves and increases mortality and morbidity. It is also responsible for frailty, loss of autonomy and reduced quality of life, and loss of functional and cognitive abilities. Deterioration in nutritional status leads to weight loss, muscle wasting and decreased muscle capacity (strength, tone, endurance) and causes asthenia (fatigue) in older people. These functional impairments, among others, reduce the autonomy of older people and make them more vulnerable to opportunistic infections [5].

Studies conducted in 2016 and 2017 in island of the Reunion found that five groups of factors can influence the occurrence of undernutrition in people aged 60 and over (Vincenot, 2019; Torres, 2014). These are sociodemographic and psychosocial factors (age, gender, ethnicity, social isolation, etc.), socioeconomic factors (monthly income, financial assistance, etc.), environmental factors (hygiene of the living environment, the older person's home) and behavioural factors (tobacco consumption, alcohol consumption, physical activity, etc.) [1,6].

Thus, in view of the precarious situation in which older people live, many initiatives have been taken throughout the world to promote their well-being (health, nutrition, consumption, housing, environment, family, social well-being, income security, employment and education) and their inclusion in research. The action plan adopted at the World Assembly on Ageing in Madrid is based on: older persons and the development and promotion of their health and well-being [7]. On the African continent, in addition to the African meetings on gerontology, the African Union (AU) adopted a Union Plan of Action on Ageing in 2003 [8].

Several African countries, including Benin, have promoted the well-being and health of older people. However, the information available is only approximate [9,10]. In order to support the political decision in this area, several structures have been set up for the care of the elderly [5]. According to the two studies on the nutritional status of the elderly in the Commune of Ouidah, neither of these studies focused on dietary diversification and knowledge assessment [11,12]. Our objective is to know the factors associated with undernutrition in the elderly aged 60 years and over in our region in order to develop more specific nutritional interventions for them.

Methods

Study setting

The commune of Ouidah is located in the Ouidah-Kpomassé-ToriBossito (OKT) health zone in the south of the Atlantique department. It has ten arrondissements subdivided into sixty city districts and villages. The main activities carried out are: agriculture, fishing, livestock, processing of various products, trade, sand quarrying, tourism, crafts and transport. The commune of Ouidah has

six markets, two of which are daily and four periodic. It is home to the zone's hospital, the largest health facility in the health zone, and 14 health centres. The population of the municipality was 192,395 in 2019, according to a projection. People aged 60 and over accounted for 3.95% of this population (7,617) and within this group, women accounted for 58.6% [13].

Type of study and inclusion or exclusion criteria

This was a cross-sectional, descriptive and analytical survey, targeting people aged 60 years and over living in the commune of Ouidah (located on the Atlantic coast in the south of Benin) and who had given their consent to participate. Anyone who met the inclusion criteria but could not freely answer the questions because of their condition was not included.

Sampling

The cluster technique was chosen for sampling as it enabled broad coverage of the unit, which was the village or city district. In each unit, we were exhaustive for all persons aged 60 and over through a questionnaire. On a few occasions, we interviewed some of the carers to better understand the answers given by some of the respondents.

Study variables

The dependent variable was undernutrition. It was assessed in the elderly using the MNA (Mini Nutritional Assessment) tool. This measure includes objective information (Body Mass Index, anthropometry) and anamnestic information (eating habits, autonomy of the subject) that is easy to evaluate and does not require blood sampling. It allows a non-specialist practitioner to assess the patient's nutritional status in a few minutes. It is an inexpensive tool that takes into account the whole person (social, cognitive, psychosocial and functional aspects). The MNA provides a score that reassures or alerts the patient early enough to rebalance and monitor their diet. It is broken down as follows: MNA score above 23.5 (normal); MNA score between 17 and 23.5 (risk of malnutrition) and MNA score below 17 (malnutrition). This is practically the most widely used tool. We recall that there are several other screening and assessment tools for undernutrition such as: the Nutritional Self-Assessment Checklist (NSI); the Rating Scale (RAS). In our study, however, we adopted a two-group categorisation as follows: "undernutrition if the MNA score is below 23.5" and "no undernutrition if the MNA score is above 23.5" [14].

The independent variables were those related to the older person, the health system and their environment. They were mainly: Sociodemographic, psychosocial and economic variables such as age, sex, ethnicity, marital status, place of residence, level of education, social isolation, monthly income, financial assistance and current occupation; Behavioural variables such as alcohol consumption, tobacco consumption, physical activity, eating habits, organisation of meals, dietary diversification, exposure to sunlight, personal hygiene, type of drinking water, nutritional knowledge; Biological variables: difficulty chewing, taste impairment, autonomy in taking meals, medical history, surgical history, use of medication, oral health and anorexia and the presence of illness during the last 30 days; and Environmental Variables, namely the ventilation of the older person's home and the hygiene of the living environment.

Data collection equipment

This was essentially the equipment needed to take anthropometric measurements and included: an ILANIA[®] mechanical scale with a capacity of 120 kilograms graduated per kilogram with an accuracy of 0.1 kg to measure weight, and a SECA[®] portable height gauge with a capacity of 2 metres graduated per centimetre with an accuracy of 0.1 cm to measure height.

Statistical analysis

The data collected was checked for completeness and consistency. They were entered using Epidata software and analysed using Stata

11 software. Descriptive statistics, χ^2 test and multivariate logistic regression were used to conduct statistical analysis.

A bi-variate analysis of the data was performed using the Pearson Chi-2 statistical test. This allowed us to determine the associations between nutritional status and the independent variables. Associations between the independent variables and the dependent variable were also measured as the Odds Ratio (OR) and their 95% confidence interval (95% CI).

In our multivariate analysis, a logistic regression, factors associated with the nutritional status of the older people were searched after adjustment. Variables with a p-value of less than 15% in the bivariate analysis were entered into the initial logistic regression model and a stepwise top-down elimination was performed. The variables that were retained in the final model were those with a p-value of less than 5%. Effect modifying and confounding factors were searched for. The adequacy of the model was investigated using the Hosmer-Lemeshow test. The model was said to be adequate when the p-value was greater than 5%.

Ethical aspects

The health and local authorities were informed about the survey in the selected villages and neighbourhoods. They gave their permission instead of an ethics committee. All targets were presented with the nature and objectives of the survey as well as the terms of participation in order to obtain their informed and written consent. At any time during the survey, targets who did not wish to participate were able to withdraw. To ensure anonymity and confidentiality, a code was assigned to each older respondent and marked on the questionnaires. Advice on diet was given to each respondent aged 60 and over.

Results

Bivariate analysis

A total of 271 people aged 60 years and over and 12 carers of older people were surveyed with a prevalence of undernutrition of 31%. The sociodemographic, psychosocial and economic characteristics of the older people surveyed were calculated and detailed (Table 1). Dietary and medical factors with a p-value of less than or equal to 15% in the bivariate analysis were identified (Table 2). These were anorexia, chewing difficulty, taste impairment, digestive disorders, medical history, surgical history and the presence of illness in the last 30 days. Regarding the behavioural factors (Table 3a and b), the following variables: nutritional knowledge, frequency of consumption of foods rich in protein, fibre, unsaturated fatty acids, calcium, vitamin D and vitamin A, dietary restrictions and dietary diversification had a p-value less than or equal to 15% after the bivariate analysis.

The only health system factor investigated as associated with undernutrition in people aged 60 years and over was dietary advice with OR= 1.6 (CI95%: 0.97-2.87). It was not significant.

Multivariate analysis

The initial model for the multivariate analysis included all independent variables with a p-value less than or equal to 15%.

After eliminating variables with a p-value of less than 5%, three variables were retained as factors associated with undernutrition in older people in the final model. These were current occupation OR= 53.6 (CI95%: 5.5-518.3), anorexia OR= 10.1 (CI95%: 4.6-21.9) and area of residence OR=0.40 (CI95%: 0.2-0.7). Indeed, older people who were farmers had a higher risk of being malnourished compared to those who were retired when adjusting for other variables. The risk for retirees was also lower than for those who were traders or in other occupations. Similarly, those with anorexia were at greater risk of undernutrition than those without anorexia, and finally, those living in rural areas were at less risk of undernutrition than those living in urban areas. Table 4 presents the details of results obtained.

Variables	Undernutrition Share (%)	OR	CI95%	p
Gender				
Male*(103)	26 (25.24)	1		
Female (168)	58 (34.52)	1.56	0.90-2.69	0.110
Age				
Under 70*(152)	35 (23.03)	1		
70-80 (89)	30 (33.71)	1.69	0.95-3.03	
Over 80 (30)	19 (63.33)	5.77	2.51-13.28	0.000
Ethnicity				
Fon* (182)	52 (28.57)	1		
Other (89)	32 (35.96)	1.18	0.90-1.55	0.218
Marital Status				
Married* (123)	27 (21.95)	1		
Divorced (148)	57 (38.51)	2.22	1.29-3.82	0.004
Area of residence				
Urban* (84)	36(42.86)	1		
Rural (187)	48(25.67)	0.46	0.26-0.79	0.005
Education				
No education (174)	72 (41.38)	12.35	2.87-53.00	0.001
Primary school (60)	10 (16.67)	3.2	0.72-16.96	0.120
Secondary school and above*(37)	2 (5.71)	1		
Social isolation				
Yes (26)	8 (30.77)	0.98	0.41-2.37	0.970
No* (245)	76 (31.02)	1		
Current occupation				
Retired*(25)	1 (4)	1		
Farmer (27)	11 (40.74)	16.49	1.93-140.60	0.010
Trader (136)	43 (31.62)	11.09	1.45-84.72	0.020
Other (83)	29 (34.94)	12.88	1.65-100.18	0.015
Financial assistance				
Yes* (131)	45 (34.35)	1		
No (140)	39 (27.86)	0.73	0.44-1.23	0.249
Monthly income (CFA Franc)				
> 40 000* (100)	17 (17)	1		
< 40 000 (136)	42 (30.88)	2.18	1.15-4.12	0.016
No income (35)	25 (71.43)	12.20	4.96-20.02	0.000

*Reference category for comparison

Table 1: Sociodemographic, psychosocial and economic factors associated with undernutrition in people aged 60 years and over in the commune of Ouidah in 2020 (n=271)

Variables (n)	Undernutrition Share (%)	OR	CI95%	p
Taste impairment				
Yes (100)	41 (41)	2.06	1.22-3.50	0.007
No* (171)	43 (25.15)	1		
Independence in eating				
Yes*(268)	82 (30.60)	1		
No (3)	2 (66.67)	4.53	0.40-50.73	0.220
Surgical history				
Yes (30)	4 (13.33)	0.30	0.10-0.91	0.034
No* (241)	80 (33.20)	1		
Medical history				
Yes (156)	40 (25.64)	0.55	0.33-0.93	0.027
No* (115)	44 (38.26)	1		
Medication use				
Yes (151)	51 (33.77)	4.27	2.44-7.47	0.268
No*(120)	33 (27.50)	1		
Decreased sensation of thirst				
Yes (106)	29 (27.36)	0.75	0.44-1.28	0.300
No*(165)	55 (33.33)	1		
Difficulty chewing				
Yes (144)	52 (36.11)	1.67	0.99-2.83	0.054
No*(127)	32 (25.20)	1		
Oral health				
Yes (174)	55 (31.61)	1.08	0.36-1.85	0.770
No*(97)	29 (29.90)	1		
Digestive disorders				
None* (188)	50 (26.60)	1		
Nausea/vomiting (11)	9 (81.82)	12.41	2.59-59.45	0.002
Constipation (63)	20 (31.75)	1.28	0.68-2.38	0.431
Diarrhoea (6)	3 (50.00)	2.76	0.53-14.12	0.223
Dysphagia (3)	2 (66.67)	5.51	0.48-62.21	0.167
Presence of illness in the last 30 days				
Yes (128)	53 (41.41)	2.55	1.50-4.34	0.001
No*(143)	31 (21.68)	1		

*Reference category for comparison

Table 2: Dietary and medical factors associated with undernutrition among people aged 60 and over in the commune of Ouidah in 2020 (n=271)

Variables	Undernutrition Share (%)	OR	CI95%	p
Tobacco consumption				
Yes (9)	2 (22.22)	0.26	0.12-3.08	0.566
No* (262)	82 (31.30)	1		
Alcohol consumption				
Yes (213)	62 (29.11)	0.67	0.36-1.23	0.199
No*(58)	22 (37.93)	1		
Sun exposure				
Rarely (111)	37 (33.33)	1.66	0.61-4.50	0.314
Often (134)	41 (30.60)	1.46	0.54-3.92	0.443
Every day* (26)	6 (23.08)	1		
Meal organisation				
3 meals per day*(215)	70 (32.56)	1		
Less than 3 meals per day (56)	14 (25.00)	0.69	0.33-1.34	0.278
Physical activity				
Not very active*(107)	33 (30.84)	1		
Sedentary (164)	51 (31.10)	1.01	0.59-1.71	0.964
Dietary restrictions				
Yes (104)	52 (50.00)	4.15	2.41-7.16	0.000
No*(165)	32 (19.39)	1		
Dietary diversity				
Acceptable diet *(152)	35 (23.03)	1		
Moderately acceptable diet (89)	30 (33.71)	1.69	0.95-3.03	0.073
Limited diet (30)	19 (63.33)	5.77	2.51-13.28	0.000
Anorexia				
Yes (164)	74 (45.12)	7.97	3.88-16.38	0.000
No*(107)	10 (9.35)	1		
Advice on feeding older people				
Yes*(110)	27 (24.55)	1		
No (159)	56 (35.22)	1.6	0.97-2.87	0.064
Nutritional knowledge				
Low (106)	32 (30.19)	0.93	0.55-1.59	0.818
High* (165)	52 (31.52)	1		
Hand washing				
Yes* (233)	76 (32.62)	1		
No (38)	8 (21.05)	0.55	0.24-1.25	0.157
Type of drinking water				
SONEB* (214)	69 (32.24)	1		
Borehole (37)	13 (35.14)	1.13	0.54-2.36	0.729
Well (20)	2 (10.00)	0.23	0.05-1.03	0.055

*Reference category for comparison

Table 3a: Behavioural factors associated with undernutrition among people aged 60 and over in the commune of Ouidah in 2020 (n=271)

Variables	Undernutrition Share (%)	OR	CI95%	p
Frequency of consumption of protein-rich foods				
Rarely (3)	1 (33.33)	0.86	0.07-9.66	0.904
Several times a month (21)	6 (28.57)	0.68	0.25-1.85	0.461
Several times a week (51)	5 (9.80)	0.18	0.07-0.49	0.461
Every day (196)	72 (36.73)	1		
Frequency of consumption of foods rich in carbohydrates				
Rarely (5)	3 (60.00)	3.46	0.56-21.12	0.178
Several times a month (4)	2 (50.00)	2.30	0.31-16.67	0.407
Several times a week (4)	1 (25.00)	0.76	0.07-7.51	0.821
Every day* (258)	78 (30.23)	1		
Frequency of consumption of fibre-rich foods				
Rarely (22)	10 (45.45)	1.98	0.78-5.03	0.148
Several times a month (40)	19 (47.50)	2.15	1.02-4.51	0.042
Several times a week (94)	21 (22.34)	0.68	0.36-1.28	0.239
Every day (115)	34 (29.57)	1		
Frequency of consumption of calcium-rich foods				
Rarely (116)	57 (49.14)	7.60	3.34-17.28	0.000
Several times a month (84)	19 (22.62)	2.30	0.93-5.63	0.068
Every day (71)	8 (11.27)	1		
Frequency of consumption of foods rich in vitamin D				
Rarely (62)	9 (14.52)	0.22	0.10-0.48	0.000
Several times a month (58)	10 (17.24)	0.02	0.12-0.58	0.001
Every day (151)	65 (43.05)	1		
Frequency of consumption of foods rich in vitamin A				
Rarely (53)	9 (16.98)	0.31	0.14-0.67	0.003
Several times a month (57)	11 (19.30)	0.36	0.17-0.75	0.006
Every day (161)	64 (39.75)	1		
Frequency of consumption of foods rich in unsaturated fatty acids				
Rarely (76)	12 (15.79)	0.21	0.10-0.08	0.000
Several times a month (61)	9 (14.75)	0.19	0.08-0.42	0.000
Every day (134)	63 (47.01)	1		

*Reference category for comparison

Table 3b: Behavioural factors associated with undernutrition among people aged 60 and over in the commune of Ouidah in 2020. Bivariate analysis (n=271)

Factors	OR	CI95%	p-value
Current occupation			
Retired*	1		
Farmer	53.62	5.54-518.34	0.001
Tradesman	17.24	2.15-138.21	0.007
Other	16.79	2.06-136.54	0.008
Area of residence			
Urban*	1		
Rural	0.40	0.21-0.76	0.005
Anorexia			
Yes	10.07	4.61-21.96	0.000
No*	1		

*Reference category for comparison

Table 4: Logistic regression. Final model. Factors associated with undernutrition among the elderly in May 2020 in the commune of Ouidah (n=271)

Discussions

Achievement of objectives

The main issues are the extent to which the objectives of the study were achieved, the quality and validity of the results and the comparison of the results obtained. Our objective was to study the factors associated with undernutrition among people aged 60 years and over in the commune of Ouidah in southern Benin in 2020. We were able to determine the prevalence (31%) and investigate the factors associated with it. We consider that the objectives of the study were achieved.

Quality and validity of results

The data were obtained from a cross-sectional survey, using two-stage cluster sampling based on the list of villages/neighbourhoods in the commune of Ouidah and the expected number of older people per cluster unit. The ease of use of the short version of the MNA test was preferred for its scientific validation and performance. It is commonly used in practice in urban areas, hospitals and institutions for older people. The combination of qualified dietitians and community relays facilitated data collection because of their command of the languages spoken in the area. All of these arrangements ensured the quality of the data.

Prevalence of undernutrition in people aged 60 and over

We obtained 31% undernutrition among the people aged 60 and over surveyed. This is higher than that obtained in a study conducted by Sissoko (2014) specifically in the city of Ouidah, which was 12.1% [12]. This discrepancy could be justified by the difference in scope of the study, as ours was conducted in both urban and rural areas in the commune of Ouidah. In addition, it had been shown that older people living in rural areas were more undernourished than those living in urban areas [1]. The present result shows that undernutrition remains a nutritional problem affecting older people in Benin. Other studies have found higher prevalence than ours. A study by Hien et al. in Burkina Faso (2012) found a prevalence of 39.2% [15]. The discrepancy between this prevalence and our result could be due to the fact that our study did not just focus on older people with multimorbidity, which was a real factor associated with the risk of undernutrition. Another study by Jesus et al. (France, 2012) found a prevalence of 53.3% [16], but included subjects with dementia. In our study, we did not use a scale that could assess the level of cognition and conclude about dementia in our respondents.

Factors associated with undernutrition

Current occupation

Current occupation was significantly associated with undernutrition among the older people in our survey ($p=0.001$). Farmers ($p=0.001$), shopkeepers ($p=0.007$) and other occupations ($p=0.008$) were more likely to be undernourished than retirees. Since the risk was higher among farmers because those in our regions who are mostly rural do not consume their production in a balanced way, we expect a better nutritional status among retired older people because they would have pensions, access to health care, health information and an almost perfect diet.

Area of residence

An association was found between area of residence and undernutrition ($p=0.005$). Older people living in rural areas were less at risk of undernutrition than those living in urban areas. This was previously reported by Torres (2014) who found an association between area of residence and undernutrition [1]. This could be explained by access to fresh, varied and more nutritious products from agriculture (fruit, fresh vegetables) and fishing. There is also more mutual aid and frequent visits between older people in rural areas than in urban areas. Indeed, because of the lack of social links, an older person no longer sees the point of eating as much since he or she does it alone and no longer has any incentive or enjoyment in doing so, which subsequently leads to a loss of appetite.

Anorexia

Anorexia was associated with undernutrition in older people ($p=0.000$). In the presence of anorexia, they had a 10.7-fold risk of being undernourished. This is similar to the results reported by Torres (2014) who found the same association [1]. It is possible that an increase in satiety signals from the digestive tract, an increase in circulating levels of leptin and a decrease in the action of opioids involved in the positive regulation of appetite justify this association. Elevated levels of anorectic signals such as leptin in older subjects contribute to prolonged satiety and inhibition of hunger [17]. The threshold for taste detection, “the sense of discerning the flavour of food”, is increased. The cause of the loss of taste is complex; hypotheses include a reduction in the number of taste buds and a decrease in the functionality of receptors in the cell membrane involved in taste sensation. This impairment of the senses may affect appetite regulation by inducing a decrease in the pleasure of eating and frustration at mealtimes.

Marital status

Our final model did not find an association between marital status and undernutrition, although this association was found in the univariate analysis ($p=0.004$). We estimated that older widows/widowers have a 2.22 times greater risk of being undernourished. This could be explained by the fact that older people, upon the loss of their spouse, enter a state of depression that leads to a loss of appetite. Indeed, these people are confronted with a change in their eating habits. Widowhood leads to a reduction in the quantities prepared and consumed or to the elimination of certain dishes traditionally eaten by the couple. This seems to be confirmed by the results reported by Boulos et al. (2013) in Lebanon [18].

Age

It was assumed during this survey that age would be associated with undernutrition in older people. But no association was found; contrary to the results reported by Coumé (2014), Boulos (2013) and Vanderwee (2010) [4,18,19]. This could be due to the fact that our study population was predominantly made up of people aged 60 to 70 years, whereas the risk of undernutrition increased with ages above this interval.

Presence of illness

None of our results found an association between the presence of illness and undernutrition in people aged 60 years and older. Vincenot (2017) in La Réunion had identified the presence of illness as a risk factor for undernutrition in older people [6], assessed over a period of 6 months prior to the study. This differs from ours which assessed for the presence of illness over a period of one month prior to the study. This could explain the difference in results observed.

Meal organisation and dietary diversity

Dietary diversity and number of meals were not associated with undernutrition in the older people in the present study. These two factors had been found in the study by Accrombessi (2017) in the commune of Djidja in Benin [5]. The criteria might not be the same in both cases. Fewer than three meals a day and dietary diversity were factors associated with undernutrition in older people. This difference in results could be explained by the low proportion of older people having less than three meals per day (20.66% vs. 78.4%), and of those with a low dietary diversity score (11.07% vs. 33.1%). It had also been reported by Rouvray et al. (2014) in the results of a survey conducted in Central Africa that fewer than three meals a day was an associated factor [20].

Conclusion

Undernutrition is a common nutritional problem among older people in Benin. In addition to the factors highlighted, the lack of health worker training on nutritional counselling for older people seems to play an important role. These factors can be avoided through joint action by the competent authorities at various levels to make the geriatric centre in the town of Ouidah operational and to strengthen the skills of health workers and community relays by organising continuous training on the food guide for older people.

Ethical Norms

The article submitted is the result of a clear study and complies with and respects fundamental ethical principles such as respect for the dignity and freedom of persons, respect for the principle of beneficence and non-maleficence.

Contributions from the Authors

All authors actively participated in the writing and editing of the article. All the authors read and approved the final version of the manuscript.

Acknowledgements

We thank all the interviewers who participated in the collection of data that enabled the database to be generated. Thanks to the political and administrative authorities who agreed to carry out the survey. Finally, thanks to all our elderly people who voluntarily agreed to contribute.

References

1. Torres M. (2014) Statut nutritionnel de la personne âgée vivant à domicile : prévalence, facteurs associés et conséquences [Doctoral thesis in public health and epidemiology]. [Ecole Doctorale Sociétés, Politique, Santé Publique]: Université de Bordeaux.
2. Food and Agriculture Organization (2018) The state of food security and nutrition in the world: Building climate resilience for food security and nutrition, Rome: FAO; 2018. doi:10.18356/c94f150c-en.
3. Charlton KE, Rose D (2001) Nutrition among older adults in Africa: the situation at the beginning of the millenium. *J Nutr* 131: 2424S-8S.
4. Coumé M, Touré K, Faye A, Pouye A, Diop T (2014) Prévalence de la malnutrition dans une population de patients âgés sénégalais. *NPG Neurol - Psychiatr - Geriatr* 14: 75-80.
5. Accrombessi F (2017) Assessment of the quality of food and the nutritional status of people in the district of Dan, commune of Djidja. Dissertation in Nutrition and Dietetics. Faculty of Health Sciences. University of Abomey Calavi [Evaluation de la qualité de l'alimentation et de l'état nutritionnel des personnes dans l'arrondissement de Dan, commune de Djidja. Dissertation in Nutrition and Dietetics. Faculté des sciences de la santé. Université d'Abomey Calavi].
6. Vincenot A (2019) Factors associated with the risk of undernutrition among people aged over 65 living at home in Reunion in 2016 and 2011 [Facteurs associés au risque de dénutrition chez les personnes âgées de plus de 65 ans vivant à domicile à La Réunion en 2016 et 2011]. Thesis in medicine. UFR Santé: Université de la Réunion.
7. United Nations (2002) Report of the Second World Assembly on Ageing: Madrid, 8-12 April 2002, New York, USA.
8. Berthe A, Berthé-Sanou L, Konaté B, Hien H, Tou F, et al. (2013) The elderly in sub-Saharan Africa: a vulnerable population, too often neglected in public policies [Les personnes âgées en Afrique subsaharienne : une population vulnérable, trop souvent négligée dans les politiques publiques]. *Sante Publique* 25: 367-71.
9. Leye MMM, Diongue M, Faye A, Coumé M, Faye A, et al. (2013) Analysis of the functioning of the free care coverage plan for the elderly "Sesame Plan" in Senegal [Analyse du fonctionnement du plan de prise en charge gratuite des soins chez les personnes âgées « Plan Sésame » au Sénégal]. *Sante Publique* 25: 101-6.
10. Ministry of Labour, Civil Service and Social Affairs, World Health Organization (2016) National Policy for Active and Healthy Aging in Benin (PNVA) 2017 - 2026 [Politique Nationale pour le vieillissement actif et en bonne santé au Bénin (PNVA) 2017 - 2026]. Cotonou, Geneva, Switzerland.
11. Adom W (2007) Factors associated with the nutritional status of the elderly in the Ouidah-Kpoamassé-Tori-Bossito health zone. Master's thesis in public health and epidemiology [Facteurs associés à l'état nutritionnel des personnes âgées dans la zone sanitaire Ouidah-Kpoamassé-Tori-Bossito. Master's thesis in public health and epidemiology]. Institut Régional de Santé Publique: Université d'Abomey Calavi.
12. Sissoko M (2014) Factors associated with global malnutrition among the elderly in the city of Ouidah. Master's thesis in Nutrition and Population Health. Regional Institute of Public Health: University of Abomey Calavi [Facteurs associés à la malnutrition globale chez les personnes âgées dans la ville de Ouidah. Master's thesis in Nutrition and Population Health. Institut Régional de Santé Publique: Université d'Abomey Calavi].
13. Capo-Chichi Y, Guidibi M (2006) Monograph of the commune of Ouidah. Cotonou: Africa Council [Monographie de la commune de Ouidah. Cotonou: Afrique Conseil].

14. Vellas B (1999) Mini Nutritional Assessment (MNA): Research and Practice in the Elderly. Basel: S. Karger, 10.1159/isbn.978-3-318-00379-6.
15. Hien H, Berthé A, Drabo MK, Konaté B, Somda D, et al. (2014) Prevalence and trends of multimorbidities among the elderly in Burkina Faso [Prévalence et tendances des multimorbidités chez les personnes âgées au Burkina Faso]. *Rev Epidemiol Sante Publique* 62: S176.
16. Jesus P, Desport JC, Massoulard A, Villemonteix C, Baptiste A, et al. (2012) Nutritional assessment and follow-up of residents with and without dementia in nursing homes in the Limousin region of France: a health network initiative. *J Nutr Health Aging* 16: 504-8.
17. Landi F, Calvani R, Tosato M, Martone AM, Ortolani E, et al. (2016) Anorexia of Aging: Risk Factors, Consequences, and Potential Treatments. *Nutrients* 8: 69.
18. Boulos C, Salameh P, Barberger-Gateau P (2013) The AMEL study, a cross sectional population-based survey on aging and malnutrition in 1200 elderly Lebanese living in rural settings: protocol and sample characteristics. *BMC Public Health* 13: 573.
19. Vanderwee K, Clays E, Bocquaert I, Gobert M, Folens B, et al. (2010) Malnutrition and associated factors in elderly hospital patients: a Belgian cross-sectional, multi-centre study. *Clin Nutr* 29: 469-76.
20. De Rouvray C, Jésus P, Guerchet M, Fayemendy P, Mouanga AM, et al. (2014) The nutritional status of older people with and without dementia living in an urban setting in Central Africa: the EDAC study. *J Nutr Health Aging* 18: 868-75.

Submit your next manuscript to Annex Publishers and benefit from:

- ▶ Easy online submission process
- ▶ Rapid peer review process
- ▶ Online article availability soon after acceptance for Publication
- ▶ Open access: articles available free online
- ▶ More accessibility of the articles to the readers/researchers within the field
- ▶ Better discount on subsequent article submission

Submit your manuscript at
<http://www.annexpublishers.com/paper-submission.php>