

# Nutritional Status of Diabetic Individuals Aged 60 Years and Older and Associated Factors in Conakry University Hospitals

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## Abstract

Aging modifies the metabolic functions and nutritional status of elderly people; however, in the Republic of Guinea, few studies have been conducted on the nutritional status of elderly people, especially those suffering from diabetes. The objective of this work was to evaluate the nutritional status of individuals aged 60 and above with diabetes in the university hospitals of Conakry. Methodology: The study was descriptive cross-sectional, the variables analyzed were socio-economic, anthropometric on the assessment of the nutritional status of people aged 60 years and over through BMI, MNA-SF and MUAC. Results: A total of 149 people aged 60 years and over were surveyed in Donka and Ignace Deenn University Hospitals. The average age was 66.66±6.69 years; that of the nutritional status assessment tools BMI, MNA-SF and MUAC were respectively 26.56±5.96 kg/m<sup>2</sup>, 10.12±2.3, 28.77±5.27 cm. The overall mean blood glucose level was 201.43±98.03 mg/dl and that of women was 207.24±108.18 mg/dl, 120 (80.54%) elderly subjects were obese according to MUAC, 54 (36.24%) elderly people were overweight and 83 (55.70%) subjects were at risk of malnutrition. In the age group of 60 to 69 years, 45.5% were underweight, 76.8% were overweight, among the obese 82.9% were in this group, that of 80 years and over had 2.9% who suffered from obesity. Malnutrition affected 54.5% of men, compared to 74.3% of women who were obese, 69.6% of married people were overweight. However, 65.7% of this group suffered from obesity. Age, sex, marital status, household size, occupation, income possession and monthly income amount had no significant association with BMI. However, education level had a significant influence on BMI ( $p = 0.028$ ). Age, household size were significantly related to nutritional status via the MNA-SF. 51.8% and 62.2% of women were respectively at risk of malnutrition and malnourished, 54.2% of those who were not in school were at risk of being underweight, while 8.9% of elderly subjects who had a higher education level suffered from thinness. 46.3% of elderly diabetics suffering from malnutrition had a monthly income between one and two million Guinean francs (62,500 to 12,500 CFA francs). Nutritional status assessment tools were not related to blood glucose levels; the OR for BMI was -0.821 with a 95% confidence interval of -4.160 to 2.517.

**Conclusion:** The elderly diabetics in this study largely presented an impaired nutritional status. Knowledge of nutritional profiles is essential for the management and the regular monitoring of elderly diabetics

**Keywords:** Nutritional Status, Elderly, Diabetes, University Hospital, Conakry.

## 1. Introduction

The health of an elderly person often depends on the interactions between their genetic makeup, lifestyle habits (physical activity, diet, etc.), environment (socio-educational and professional), and the onset of chronic diseases [1]. Chronic diseases associated

with aging are often linked to the onset of underdenutrition [2]. It affects 30 to 70% of hospitalized elderly people, 4 to 10% of elderly people living at home, and 15 to 38% of those in institutions [3,4]. Underweight in older adults increases morbidity and mortality, length of hospital stays, healthcare costs, and affects

quality of life and independence [5]. In Africa, the prevalence of undernutrition ranges from 13.1% to 36.1%, depending on the screening tool used and the population studied [6]. We are witnessing a resurgence of non-communicable diseases (high blood pressure, diabetes, and coronary heart disease), which are often associated with life-threatening complications that have a significant social and economic impact on those affected [6]. Cardiovascular diseases cause approximately 18 million deaths each year, and the main risk factors are related to diabetes or high blood pressure [7]. Diabetes is one of the most widespread noncommunicable diseases in the world, with approximately 463 million people living with diabetes in 2019 [8]. The WHO notes that the prevalence of diabetes among people over 65 years of age is between 12% and 25%. Previous studies have shown that glycemic control is associated with a 12% reduction in morbidity and mortality [9]. Overweight and obesity are considered the greatest risk factors for diabetes [10]. Furthermore, aging associated with obesity is an increased risk factor for diabetes and could increase the prevalence of diabetes in older adults [11].

Guinea is not immune to nutritional problems, particularly among elderly diabetics in Conakry's university hospitals. The STEPS survey conducted in 2009 in Conakry and Lower Guinea noted that the prevalence of diabetes in the population aged 15 to 64 was 3.5%, and 5.7% with a 95% confidence interval in the 35 to 64 age group [12]. Given the scarcity of studies on the nutritional status of elderly diabetics in hospitals, we conducted this study at the Donka and Ignace Deen University Hospitals to assess the nutritional status of elderly diabetics who were seen in consultation or hospitalized in the Neurology and Cardiology departments at Donka and the Diabetology and Cardiology departments at Ignace Deen.

## 2. Methods

### 2.1 Type, study setting, and period

This was a descriptive cross-sectional study conducted at the Donka University Hospital (Diabetology and Cardiology Department) and Ignace Deen University Hospital (Neurology and Cardiology Department) from September 5 to December 15, 2023, inclusive. Study population It consisted of people aged 60 and over.

### 2.2 Inclusion criteria:

- Individuals aged 60 and over with diabetes;
- Elderly subjects monitored by the Donka and Ignace Deen University Hospitals (Cardiology and Diabetology at Donka and Neurology and Cardiology at Ignace Deen);
- Individuals whose health status allowed for the collection of data (anthropometric, biological, and socioeconomic);
- Elderly individuals who agreed to participate in the study.

### 2.3 Sociodemographic parameters

The sociodemographic parameters included gender, age, level of education, occupation, source of income, monthly income, family history, marital status, and marital regime.

### 2.4 Biological parameter

This parameter focused on capillary blood glucose levels in older adults, which were measured using a humaSens2.0 blood glucose meter. Older adults with fasting blood glucose levels greater than or equal to 126 mg/dl [13] were considered diabetic.

### 2.5 Anthropometric parameters

Weight was determined using an Omcron bathroom scale with an accuracy of 0.1 kg. Elderly subjects were weighed without shoes. Height was measured using a height rod with an accuracy of 1 centimeter; elderly subjects stood on the height rod without shoes [14].

For subjects who had difficulty standing on the height rod, knee height was measured to estimate height based on gender using the formulas below.

Height for women (cm) =  $84.88 - 0.24 \times \text{age (years)} + 1.83 \times \text{HG (cm)}$ ;

Height for men (cm) =  $64.19 - 0.04 \times \text{age (years)} + 2.03 \times \text{HG (cm)}$  [15].

To determine nutritional status, we used Body Mass Index (BMI), the Mini Nutritional Assessment Short Form (MNA-SF), and upper arm circumference (UAC).

To determine BMI, we used the following WHO standards:

- If BMI is less than 18.5: this is undernutrition;
- If BMI is between 18.5 and 24.9: this is normal nutritional status;
- If BMI is between 25 and 29.9: overweight;
- If BMI is greater than or equal to 30: obesity [14].

- Mini Nutritional Assessment Short-Form (MNA-SF)

For MNA-SF, the score standards were as follows:

- If the MNA-SF score is less than or equal to 7: this indicates undernutrition;
- If the score is between 8 and 11: this indicates a risk of undernutrition;
- If the score is greater than or equal to 12: this indicates a normal nutritional status [15].

The upper arm circumference (MUAC) was measured using a UNICEF-type tape measure on the dominant arm, at mid-distance between the olecranon and the acromion. If  $\text{MUAC} < 21 \text{ cm}$ , there is malnutrition, and if  $\text{MUAC} > 24 \text{ cm}$ , there is obesity [16].

We collected the data using a survey form containing the MNA-SF questionnaires designed using Sphinx software.

The data were entered into Sphinx software and analyzed using IBM SPSS version 27. Qualitative variables were expressed as percentages and counts, quantitative variables were expressed as means and standard deviations, and a linear regression was performed to determine the correlation between diabetes and the nutritional status of older adults using BMI, MNA-SF, and MUAC, as well as sociodemographic parameters.

### 3. Results

Our study looked at a sample of 149 people with diabetes aged 60 and over who were seen in consultation or hospitalized at the

Donka and Ignace Deen University Hospitals. The average age was 66.66 ±6.69 years, with extreme values of 60 and 93 years. The means of the different variables are presented in Table 1.

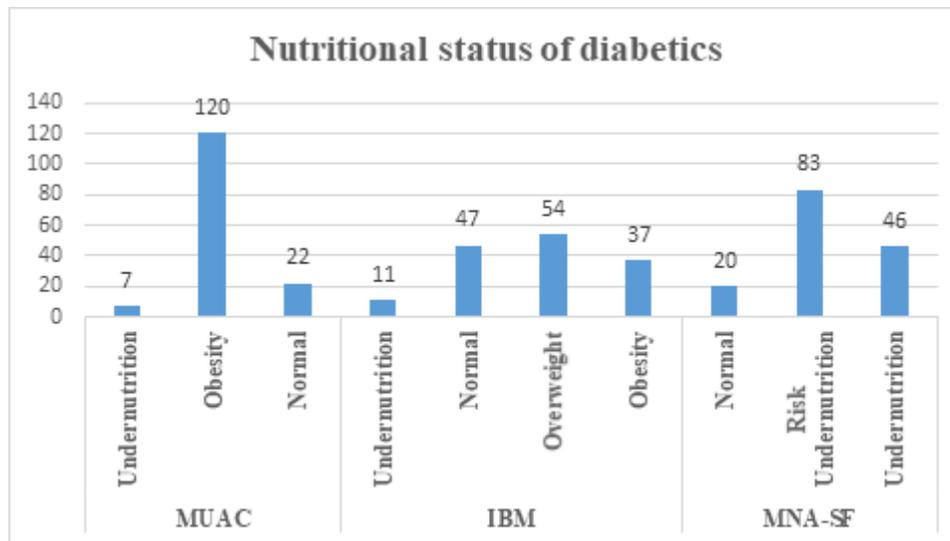
Variable	Total average	Average	
		Women	Men
Age	66.66±6.69 years	66.85±6.49 years	66.43±6.97 years
Fasting blood sugar	201.43±98.03 mg/dl	207.24±108.18 mg/dl	194.77±85.59 mg/dl
BMI	26.56 ±5.96 kg/m <sup>2</sup>	27.67±6.53 kg/m <sup>2</sup>	25.21±4.90 kg/m <sup>2</sup>
MNA-FS	10.12±2.3	10,16±2,42	10,07±2,16
MUAC	28.77±5.27 cm	29.94±5.27 cm	27.34±4.94 cm

**Table 1: Average quantitative variables**

In Table 1, the average age was 66.66±6.69 years, with women (66.85±6.49 years) being slightly older than men (66.43±6.97 years). The overall average fasting blood glucose level was 201.43±98.03 mg/dl, with the average blood glucose level for women (207.24±108.18 mg/dl) higher than that for men (194.77±85.59 mg/dl). The average values of the nutritional status assessment tools BMI, MNA-SF, and MUAC for women were

27.67±6.53 kg/m<sup>2</sup>, 10.16±2.42, and 29.94±5.27 cm, respectively, and higher than those observed in men (25.21±4.90 kg/m<sup>2</sup>, 10.07±2.16, and 27.34±4.94 cm).

The nutritional status of elderly people with diabetes according to the different anthropometric tools used is shown in the figure.



**Figure 1: Nutritional status of elderly people with diabetes according to the nutritional status assessment tools used.**

We can see from Figure 1 that 120 (80.54%) elderly people with diabetes were obese and 4.69% of people with diabetes were undernourished according to the MUAC. The same figure shows that the body mass index (BMI) of elderly people with diabetes indicates that 36.24% were overweight, 24.83% were obese, and 7.38% of people with diabetes were underweight. The risk

of undernutrition affected 55.70% of diabetics and 30.87% were underweight according to MNA-SF (Figure 1).

The results of the test of the association between nutritional status and sociodemographic parameters are presented in Tables 2 and 3.

	IBM					P-value
	Undernutrition N = 11 (%)	Normal N= 47 (%)	Overweight N= 56 (%)	Obesity N= 35 (%)		
<b>Age</b>						
60 – 69	5 45.5%	35 74.5%	43 76.8%	29 82.9%	0.228	
70 - 79	4 36.4%	7 14.9%	10 17.9%	5 14.3%		
Over 80	2 18.2%	5 10.6%	3 5.4%	1 2.9%		
<b>Gender</b>						
Men	6 54.5%	24 51.1%	28 50.0%	9 25.7%	0.060	
Women	5 45.5%	23 48.9%	28 50.0%	26 74.3%		
<b>Marital status</b>						
Single	1 9.1%	2 4.3%	1 1.8%	0 0.00%	0.470	
Married	5 45.5%	29 61.7%	39 69.6%	23 65.7%		
Widowed	5 45.5%	16 34.0%	16 28.6%	11 31.4%		
Divorced	0 0.00%	0 0.0%	0 0.00%	1 2.9%		
<b>Level of education</b>						
Not in school	10 90.9%	34 72.3%	26 46.4%	16 45.7%	0.028	
Elementary school	1 9.1%	5 10.6%	5 8.9%	5 14.3%		
Middle school	0 0.0%	4 8.5%	18 32.1%	8 22.9%		
High school	0 0.0%	4 8.5%	7 12.5%	6 17.1%		
<b>Household size</b>						
≤ 4	1 9.1%	7 14.9%	1 1.8%	2 5.7%	0.074	
≥ 4	10 90.9%	40 85.1%	55 98.2%	33 94.3%		
<b>Profession</b>						
Shopkeepers	1 9.1%	14 29.8%	17 30.4%	13 37.1%	0.121	
Retired people	0 0.0%	3 6.4%	9 16.1%	6 17.1%		
Farmers	1 9.1%	5 10.6%	1 1.8%	1 2.9%		
Livestock farmers	0 0.0%	2 4.3%	1 1.8%	0 0.0%		
Fishermen	0 0.0%	0 0.0%	1 1.8%	1 2.9%		
Manual workers	2 18.2%	4 8.5%	9 16.1%	3 8.6%		
Civil servants	0 0.0%	3 6.4%	9 16.1%	4 11.4%		
Not working	7 63.6%	16 34.0%	9 16.1%	7 20.0%		
<b>Do you have any income</b>						
Yes	8 72.7%	40 85.1%	50 89.3%	30 85.7%	0.544	
No	3 27.3%	7 14.9%	6 10.7%	5 14.3%		
<b>What amount</b>						
< One million FG	6 75.0%	17 42.5%	19 38.0%	10 33.3%	0.275	
Between one and two million	2 25.0%	11 27.5%	21 42.0%	13 43.3%		
> two million	0 0.0%	12 25.53%)	10 20.0%	7 23.3%		

**Table 2: Nutritional status of elderly people with diabetes based on BMI across socioeconomic characteristics**

We observe in Table 2 that the 60-69 age group was the most affected by malnutrition based on BMI. In fact, 45.5% of undernourished individuals in this study according to BMI across all age groups, 76.8% of overweight subjects, and 82.9% of obese subjects were in this age group, compared to 36.4% of undernourished individuals, 17.9% of overweight subjects, and 14.3% of obese subjects in the 70-79 age group. Furthermore, those aged 80 and

over were even less affected by malnutrition. According to the same table, undernourishment was more prevalent among men with diabetes (54.5%) than among women (45.5%), and women were more affected by obesity than men (74.4% vs. 25.7%), but this difference was not statistically significant, although it tended to be (P=0.06). In terms of marital status, married people were the most affected by malnutrition. Almost all of those who were

undernourished according to their BMI were married (45.5%) or divorced (45.5%), compared to 9.1% of single people and 0.00% of divorced people. In addition, married people accounted for 69.6% of overweight subjects and 65.7% of obese people. People with no schooling were more numerous in this study and were affected by undernutrition, overweight, and obesity at rates of 90.9%, 46.4%, and 45.7%, respectively (Table 2). Diabetics who lived in households with four or more people were more affected by undernutrition, overweight, and obesity, at 90.9%, 98.2%, and 94.3%, respectively. This high rate could be explained by the large number of diabetics with more than four individuals in the household. People who did not engage in any income-generating activity accounted for 63.6% of undernourished subjects. These people were followed by workers, who accounted for 18.2%, and no farmers, fishermen, or civil servants were underweight. On the other hand, traders accounted for 30.4% and 37.1% of overweight and obese subjects, respectively. Among manual workers, civil servants, and people without income-generating activities, the prevalence of overweight was identical at 16.1%. The rate of overweight was lower, but also identical for farmers, livestock farmers, and fishermen (1.8%). People without income-generating

activities, civil servants, and manual workers accounted for 20%, 11.4%, and 8.6% of obese individuals, respectively. Farmers and fishermen accounted for only 2.9% of obese subjects, and no cases of obesity were observed among livestock farmers. Elderly diabetic subjects with an income were more affected by malnutrition (undernourishment and overweight), with elderly people with a monthly income of less than one million Guinean francs being the most affected, accounting for 75% of those suffering from undernutrition, unlike elderly subjects with a monthly income of more than two million Guinean francs, among whom there were no cases of undernutrition.

For subjects with an income between one and two million Guinean francs, overweight and obesity rates were 42.0% and 43.3%, respectively. The prevalence of overweight and obesity was lower among elderly diabetics with an income above two million Guinean francs, at 20.0% and 23.3%, respectively. Educational level was associated with the nutritional status of elderly diabetics ( $p=0.028$ ). Age, gender, marital status, household size, occupation, income, and monthly earnings had no significant influence on nutritional status by BMI ( $P>5\%$ ) (Table 2).

Variables	MNA – SF			P-value
	Normal N= 21 (%)	Risk undernutrition N= 83 (%)	Undernutrition N= 45 (%)	
<b>Age</b>				
60 – 69	10 47,6%	64 77,1%	38 84,4%	0,013
70 - 79	8 38,1%	15 18,1%	3 6,7%	
Over 80	3 14,3%	4 4,8%	4 8,9%	
<b>Gender</b>				
Men	10 47,6%	40 48,2%	17 37,8%	0,550
Women	11 52,4%	43 51,8%	28 62,2%	
<b>Marital status</b>				
Single	1 4,8%	1 1,2%	2 4,4%	0,209
Married	10 47,6%	60 72,3%	26 57,8%	
Widowed	10 47,6%	22 26,5%	16 35,6%	
Divorced	0 0,0%	0 0,0%	1 2,2%	
<b>Level of education</b>				
Not in school	15 71,4%	45 54,2%	26 57,8%	0,470
Elementary school	3 14,3%	7 8,4%	6 13,3%	
Middle school	1 4,8%	20 24,1%	9 20,0%	
High school	2 9,5%	11 13,3%	4 8,9%	
<b>Household size</b>				
≤ 4	3 14,3%	1 1,2%	7 15,6%	0,000
≥ 4	18 85,7%	82 98,8%	38 84,4%	
<b>Profession</b>				
Shopkeepers	4 19,0%	27 32,5%	14 31,1%	0,530
Retired people	1 4,8%	13 15,7%	4 8,9%	
Farmers	1 4,8%	4 4,8%	3 6,7%	
Livestock farmers	0 0,0%	3 3,6%	0 0,0%	

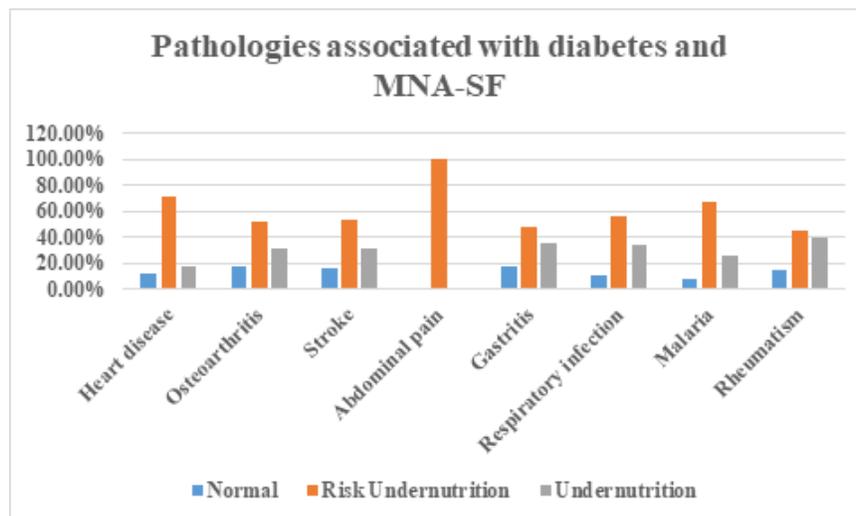
Fishermen	1	4.8%	1	1.2%	0	0.0%	
Manual workers	2	9.5%	9	10.8%	7	15.6%	
Civil servants	2	9.5%	9	10.8%	5	11.1%	
Not working	10	47.6%	17	20.5%	12	26.7%	
Do you have any income							
Yes	15	71.4%	72	86.7%	41	91.1%	0.081
No	6	28.6%	11	13.3%	4	8.9%	
What amount							
< One million FG	8	53.3%	27	37.5%	17	41.5%	0.195
Between one and two million	3	20.0%	25	34.7%	19	46.3%	
> two million	3	20.0%	20	27.8%	5	13.04%	

**Table 3: Nutritional status of elderly people with diabetes according to socioeconomic characteristics (MNA-SF)**

Table 3 shows that subjects aged 60 to 69 accounted for 84.4% of those who were underweight, and 77.1% of those at risk of undernutrition according to MNA-SF were in the 60 to 69 age group. In contrast, the 70-79 age group accounted for only 6.7% of undernourished subjects and 18.1% of participants at risk of undernutrition. Women were more affected by undernutrition (62.2%) and slightly more likely to be underweight (51.8%) than men. Married people and widows were more at risk of being underweight, at 72.3% and 26.5% respectively, whereas no divorced people were at risk of being underweight. 57.8% of people who were undernourished according to MNA-SF had no schooling, compared with only 8.9% of undernourished people who had a higher level of education. And 54.2% of subjects at risk of undernutrition had no schooling, compared to 13.3% of subjects with a higher level of education (Table 3). However, subjects with a primary school education were the least represented among those at risk of undernutrition (8.4%). Household size had a significant effect on nutritional status according to MNA-SF. In fact, 84.4% of undernourished individuals and 98.8% of those at risk of undernutrition had a household size greater than or equal to 4,

compared to 15.6% and 1.2% respectively for participants with a household size less than or equal to 4 (Table 3). By occupation, traders were the most affected by undernutrition and the risk of undernutrition (31.1% and 32.5%), compared with 0.00% undernutrition among livestock farmers and fishermen and only 6.7% undernutrition among farmers. Inactive elderly people with diabetes had a more stable nutritional status (47.6%) compared to other occupations. Elderly people with an income of between one and two million Guinean francs per month and those with an income of less than one million Guinean francs per month were underweight in 46.3% and 41.5% of cases, respectively. In contrast, 53.3% of subjects with an income of less than one million Guinean francs per month had a normal nutritional status. In this study, age and household size were significantly associated with the nutritional status of elderly people with diabetes using the Mini Nutritional Assessment Short Form tool.

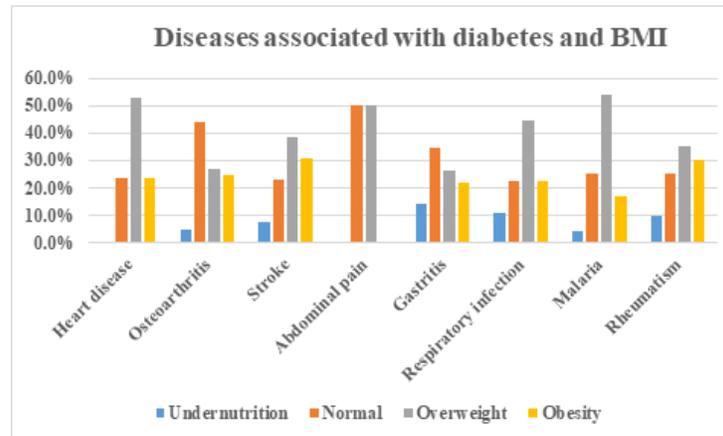
The results on the association between diabetes, other pathologies, and nutritional status according to MNA-SF are presented in Figure 2.



**Figure 2: Conditions associated with diabetes and MNA-SF**

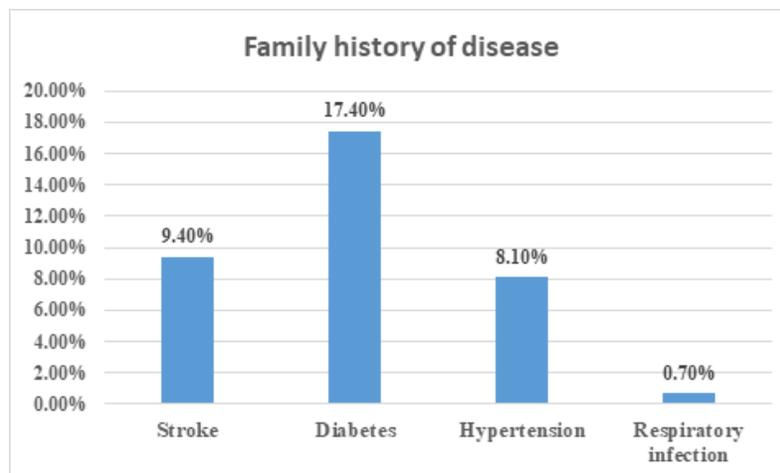
We can see in Figure 2 that elderly subjects whose diabetes was associated with abdominal pain were at greater risk of undernutrition than those with other conditions. Undernutrition

was almost identical among elderly diabetics with the following conditions: osteoarthritis, stroke, respiratory infection, and rheumatism (approximately 40%) according to MNA-SF.



**Figure 3:** diseases associated with diabetes and BMI

In Figure 3, which used BMI as a nutritional assessment tool, overweight was significant among diabetics with heart disease, abdominal pain, and malaria. Obesity was high among those with stroke and rheumatism, at around 30%.



**Figure 4:** Family history of disease

Figure 4 shows that 17.4% of diabetics in this study reported that their parents had diabetes, 9.4% of parents had had a stroke, 8.1% of parents had hypertension, and only 0.70% of parents had suffered from acute respiratory infection.

Variables	OR	P-value	95% confidence interval	
			Lower	Upper
IMC	-2.595	0.627	-8.177	2.987
MNA-SF	9.049	0.064	-0.532	18.630
PB	2.677	0.433	-4.067	9.422

**Table 4:** Linear regression of fasting blood glucose and nutritional status

According to Table 4, diabetics in this study are more than nine (9) times more likely to have an impaired nutritional status according to the MNA-SF, while the risk of deterioration in nutritional status according to BMI was very low (OR = -2.595) with a confidence interval of (-8.177 to 2.987).

#### 4. Discussion

This study recorded 149 people aged 60 and over who were treated or hospitalized in the diabetes and cardiology departments at Donka and the cardiology and neurology departments at Ignace Deen. In this study, we found a predominance of women, accounting for 55.03% of the sample, with a sex ratio of 1.22 in favor of women. Our results contrast with those reported by Konan et al. At the Treicheville University Hospital, where diabetic men predominated (60.77%) over women, with a sex ratio of 1.54 [17], but which corroborates the sex ratio of the study conducted at the Gerontology and Geriatrics Center in Dakar, which was 1.14 in favor of females [2]. The average age was 66.66±6.69 years, close to that found at the Marrakech University Hospital (69.2±4.3 years) [9] and that found in the study by Ntsama et al. In an internal medicine department in Cameroon [18]. The average BMI for all subjects was 26.56 ±5.96 kg/m<sup>2</sup>, which is almost similar to that reported by Koevi et al. in Bobo-Dioulasso (26.90 ± 5.80 kg/m<sup>2</sup>) [19], higher than the average BMI reported by Kézachian and Bonnet 25±3.25 kg/m<sup>2</sup> [20], but lower than that observed in the study by Bouzid et al [21] and that found in the study by Khadija et al. (28.1±4.6 kg/m<sup>2</sup>) [9]. A study conducted in sub-Saharan Africa shows that the highest average BMIs in this region were observed in Senegal (28.2 kg/m<sup>2</sup>) and South Africa (31.4 kg/m<sup>2</sup>) [22]. The average MUAC in women and men was 29.94±5.27 cm and 27.34±4.94 cm, respectively. Our average MUAC in men was similar to that found in a study conducted in Nigeria (27.5±9.24 cm). However, the average MUAC for our women was higher than that found in the Nigerian study [23]. This difference could be due to the fact that the Nigerian study was conducted in the community with an inclusion age of 58 years and did not only include diabetic subjects. The average fasting blood glucose level was 2.01±0.98.03 g/l higher than that found in the study by Chami et al in Algeria (1.62±0.66 g/l) [24] and that of a study conducted in Senegal [25], but is close to that reported by Ory et al (1.944 g/l) [26].

The MNA-SF is a nutritional assessment tool that takes several parameters into account. The average MNA-SF score in this study was 10.12±2.3. The average score for women (10.16±2.42) was slightly higher than that for men (10.07±2.16). A study conducted in Algeria using the full version of the MNA reported that the overall average, that of women and men, was 17.7±4.2, 18.1±4.0, and 17.1±4.4, respectively [27]. In this Algerian study, the total MNA score was very high among women compared to that observed among men. The men's score was identical to the score found in our study for men using the short version, which was lower than that of women. This high score among women could be explained by the stability of their nutritional status according to the MNA, whether the full or short version. The study by Ulger et al. Assessed the nutritional status of elderly people in the community using the MNA-SF. The results showed that 32% of men and 68% of women

were at risk of undernutrition. Statistically, this gender difference was not significant, although it tended to be (p=0.05). [28]. These results corroborate our own, which show that women were at greater risk of undernutrition (51.8%) than men (48.2%), and there was no correlation between gender and the MNA-SF (p=0.550). Furthermore, the study by Kézachian and Bonnet reports that MNA-SF was not related to gender (p=0.345) [20]. However, a study conducted among older adults shows that age, gender, and marital status were significantly associated with the nutritional status of subjects using the total MNA version [29].

Most diabetics in our study stated that they had an income, but the opposite was observed in a study conducted in Côte d'Ivoire, which highlighted that nearly half of diabetic subjects had no monthly income (45.71%) [30]. Nutritional status determined by BMI showed that diabetic men were more likely to be underweight (54.5%), while obesity affected more women (74.3%). The study by Mbaye et al. Reveals that obesity was more pronounced in diabetic women [25], which corroborates the results of our study. Gender had no significant influence on nutritional status according to BMI in our study. However, opposition to this idea was found in the study by Koevi et al. in Bobo-Dioulasso, which reported that the BMI of diabetics was significantly associated with gender with p=0.014 [19]. The study by Maxime et al. Also showed that gender was significantly correlated with nutritional status [31].

Regarding marital status, Pierre Jesus et al. Reported in their study that 38.4% of married people and 52.1% of widows suffered from undernutrition. Marital status had no significant influence on nutritional status in their study, but occupation was significantly associated (p=0.0001) [31]. The same findings were made in our study. Married people and widows were the most affected by underweight, but no significant relationship was observed with nutritional status according to BMI, marital status, and occupation. More than half of the diabetic subjects in our study were at risk of undernutrition. In the literature, the HAS in France reports that 14.8% of elderly people living at home were at risk of undernutrition [1]. This observed difference may be due to the study location, which was conducted in a hospital setting, as several studies report that hospitalized elderly subjects were exposed to undernutrition [32], which can reach 80% in people aged 65 and over [33]. The rate of diabetics with monthly income was higher than that of those without monthly income in the present study. This finding contrasts with the results observed at the Ouakam Geriatric Center in Senegal, which states that 90% of people did not have monthly income, compared to only 10% who did [34].

Diabetes-related pathologies were more prevalent among overweight and obese elderly subjects in this study. Didier et al. Assert that obese elderly subjects with diabetes have increased complications from cardiovascular disease, respiratory failure, sleep apnea, and cancer. Furthermore, they emphasize that these complications could be reduced by weight loss of between 5 and 10 kg [35]. The majority of researchers agree that there is a positive association between overweight and the risk of cardiovascular disease [36]. Undernutrition affected more than 10% of elderly

subjects with respiratory infections. One study mentions that being underweight promotes infections in general through the alteration of the immune system, muscle wasting, and digestive malabsorption [37]. Chronic diseases are associated with a risk of undernutrition, which is accompanied by increased energy expenditure and causes the secretion of anorexigenic hormones [38].

In this study, 17.4% of subjects reported that their parents had diabetes, 9.4% had suffered a stroke, 8.1% had high blood pressure, and only 0.7% had suffered from acute respiratory infection. A prospective study mentions that 20 diabetic male subjects and 43 diabetic women had a family history of diabetes [39], a study conducted in Côte d'Ivoire reports that the history of family diabetes among diabetics was 26.74% [30] Yayehd et al., in a study conducted on the general elderly population, show that the family history of high blood pressure was 49% [40], these results being significantly higher than those observed in our study. The results of the present study show no significant association between nutritional status and diabetes. The literature from one study highlights that elderly subjects frequently have a deficiency in insulin secretion in response to glucose, while obese elderly subjects also suffer from insulin resistance. It reports that insulin resistance appears to be associated with nutritional status [41].

## 5. Conclusion

Aging is a process that is often associated with several physiological, psychological, and sociological changes that can impact the nutritional status of older adults. BMI is an index that must be viewed in context in older adults, as it increases with a reduction in height and does not fully reflect changes in body composition, whereas the MNA-SF takes into account several aspects of nutritional assessment in older adults. The elderly diabetic subjects in this study at the Conakry University Hospitals were largely in an altered nutritional state, and this state was associated with certain sociodemographic factors (age, household size, level of education) and pathological factors (binomial pain and diabetes; heart disease and diabetes). In-depth knowledge of the food and nutritional profiles of this population through complementary studies is necessary for the adequate management and regular monitoring of elderly people with diabetes.

## Abbreviations

BMI: Body Mass Index, FG: Guinean Franc, FCFA: Franc of the French Colonies of Africa, MUAC: Mid-Upper Arm Circumference, MNA-SF: Mini Nutritional Assessment Short Form.

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