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Depressive syndrome, cognitive impairment, and associated factors among community-dwelling aged persons in Cameroon

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ABSTRACT

Background: Depressive syndrome (DS) and cognitive impairment (CI) are associated with unsuccessful aging. However, little is known about Cameroon. This study aimed to assess the factors associated with DS and CI among older adults in Cameroon.

Methods: A representative sample of 599 individuals aged ≥ 60 years was selected for this cross-sectional study. Sociodemographic and health data were also collected. DS and CI were assessed using the Center for Epidemiologic Studies-Depression Scale (CES-D) and Mini-Mental State Examination (MMSE), respectively. The Rosow Mobility Scale, Activities of Daily Living (ADL), and Instrumental Activities of Daily Living (IADL) scales were used to evaluate functional abilities. Chi-2, ANOVA, and multiple regression analyses were performed to assess the factors associated with DS and CI. The threshold of statistical significance was 5 %.

Results: The average age was 68.9 ± 7.2 years, sex ratio M/F = 0.93, and weight 68.5 ± 14.7 kg. DS affected 14.5 % of the population and the CI was 21.4 %. In the multivariate analysis, DS was positively associated with male gender (Odds Ratio (OR) = 1.7 [95 % Confidence Interval (CI):1.1–2.7], $p = 0.031$) and inactivity (OR = 1.7 [95 % CI:1.0–3.0], $p = 0.043$). CI was positively associated with lack of education (OR = 6.5 [95 % CI:3.5–12.2], $p < 0.001$), inactivity (OR = 5.3 [95 % CI:1.6–17.9], $p = 0.008$), single (OR = 3.7 [95 % CI:1.2–11.3], $p = 0.023$), and widowhood (OR = 3.3 [95 % CI:1.6–6.5], $p = 0.001$), and negatively associated with no IADL (OR = 0.3 [95 % CI:0.2–0.6], $p = 0.001$) and ADL disability (OR = 0.5 [95 % CI:0.2–0.9], $p = 0.032$) limitations.

Conclusions: The associated factors suggest that it might be of interest to fight inactivity and encourage early and long-term education to prevent DS and/or CI among older adults.

1. Introduction

Depression is a common mental health condition that can affect people of all ages, including older adults [1,2]. It is characterized by a persistent feeling of sadness and loss of interest in activities that were once enjoyable. Depression can also cause changes in sleep, appetite, and energy levels and concentrations [1–3]. Cognitive impairment is a broad term that refers to a decline in cognitive functions such as memory, thinking, and judgment. It can be caused by various factors

including aging, disease, and injuries [1,2,4,5]. Cognitive impairment is common among older adults. The risk of cognitive impairment increases with age, and it is estimated that about 20 % of adults over the age of 60 have some form of cognitive impairment [1,2,4,5].

Depressive and cognitive disorders are major health issues among older adults and are serious threats to Healthy Aging [1,2,4,5]. These impairments are gradually set due to chronic pathologies, side effects of medication, metabolic or hormonal imbalances, abuse of certain products such as alcohol, brain injury, diet, lifestyle, disabilities, isolation,

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and genetics [6,7]. The prevalence of depression in older adults varies depending on the population. In general, the prevalence of depression is lower in older adults than in younger ones. However, the risk of depression increases with age, and it is estimated that approximately 10 % of adults over the age of 60 have depression [3,8–11].

In previous studies, the prevalence of Depressive Syndrome (DS) in several countries was in the range of 4.3–49.5 % and was associated with female gender, low education, social isolation, alcohol consumption, frailty, chronic diseases, and malnutrition [3,8–11], while the prevalence of Cognitive Impairment (CI) ranged from 8.8 to 42.9 % and was associated with advanced age, female gender and no education [12–15]. Depression can significantly affect the Quality of Life (QoL) of older adults. It can lead to social isolation, decreased physical activity, and problems with memory and thinking and can also increase the risk of suicide [3,8–11]. McLane et al. (2014), in their systematic review of cognitive and neurodegenerative disorders in adults in Africa, found that data on these conditions were limited and focused primarily on HIV-associated neurocognitive disorders [16]. This narrow approach risks underestimating the future burden of age-related neurocognitive disorders in the region [16].

Only two studies on CI were carried out in Cameroon, in rural [5] or urban [17] areas, using the Mini-Mental State Examination (MMSE). However, they were neither national nor representative of older people because the participants were aged ≥ 50 and 55 years, respectively [5, 17]. In both studies, univariate and multivariate analyses were performed to explore these associations. The CI ranged from 20 % to 33 % and was positively associated with increased age, female gender, illiteracy, being single, lack of formal education, and higher systolic blood pressure [5,17]. Nutritional status was not considered in the analysis.

The objective of this study was to assess the factors associated with Depressive Syndrome and Cognitive Impairment among older adults in Cameroon using a representative national sample.

2. Methods

2.1. Design and Ethical approval

The study was carried out from December 2018 to September 2020 in the entire national territory of Cameroon, which was divided into 10 regions (Adamawa, Center, East, Far North, Littoral, North, North-West, West, South, South-West). Its population was estimated to be 19, 406, 100 inhabitants in 2010 [18]. The study was cross-sectional and involved older adults (aged ≥ 60 years) living in the community, residing for more than six months in the location, not hospitalized, and without hearing disability and/or delirium. The research protocol was approved by the Institutional Ethics Committee (IEC) of the University of Douala (Cameroon) (decisions N° 1668 CEI-Udo/12/2018/T and N° 1668 CEI-Udo/02/2020/T). Signed informed consent was obtained from participants or their legal representatives.

2.2. Sample size

Owing to the lack of representative data in Cameroon, the prevalence of impairments was considered unknown when calculating the sample size. The estimated prevalence of altered functional abilities was 50 % and the error margin was set at 4 % for a minimum sample size of 597.

2.3. Sampling

We used a two-stage sampling procedure (stratified and simple random sampling). Two areas (urban and rural) were defined according to the 2010 Country General Census of Population and Housing [18]. The ten regional capitals were considered urban areas and any other locality as rural. In urban areas, three neighborhoods (or more, if necessary) were randomly selected. In rural areas, three villages (or more, if necessary) were selected from a randomly selected division and

subdivision. A door-to-door approach was implemented in the selected neighborhoods and villages. The trained staff used the Kobocollect® (KoBoToolbox, Cambridge, USA) electronic questionnaire to fill data.

2.4. Data collection

Qualified and trained personnel collected the data. Sociodemographic data included age, gender, living area, marital status, religious belief, level of education, household size, position in the household, lifestyle, housing, activity, and income (availability, source, and monthly level). Health condition data included chronic diseases (cancer, diabetes, hyperlipidemia, hypertension, tuberculosis, viral infections, chronic pain, urinary and/or fecal incontinence, stroke, arthritis and/or osteoarthritis, eye disorders, and malaria) and blood pressure (systolic and diastolic). Blood pressure was measured using an automatic cuff blood pressure monitor (Omron®, M3-HEM-7131-E, Kyoto, Japan). The mean of six measurements (three per arm) was used. High blood pressure was defined as systolic pressure ≥ 140 mmHg, diastolic pressure ≥ 90 mmHg, or use the antihypertensive medication [19].

The Center for Epidemiologic Studies-Depression (CES-D) scale developed by Radloff in 1977 was used to assess self-reported symptoms (20 items) associated with depression experienced in the past week, such as restless sleep, poor appetite, and feeling lonely. Responses ranged as follows: 0 = rarely or none, 1 = some or little time, 2 = moderately or much time, and 3 = most or almost all time. DS was defined as a CES-D score ≥ 17 in male and >23 in female [20].

The Mini-Mental State Examination (MMSE) developed by Folstein in 1975 was used to assess cognitive impairment (CI) through six elements (orientation, learning and transition skills, attention and calculation, recall of information and memory retention, language and identification, and constructive praxis) of 30 questions, scored 0 = dependent and 1 = independent. A CI was considered if the MMSE < 24 [21].

The 1966 Rosow and Breslau scale was used to assess the mobility of subjects through three tasks of everyday life: carrying out heavy household chores, walking (between 500 m and 1 km), and moving around stairs (up and down two-story stairs or a 100 m slope) [22]. For each item, a binary variable (0 = independent; 1 = dependent) was created. Older adults were dependent if they were dependent on one item.

The Katz scale (Activity of Daily Living/ADL) was used to classify people as dependent or independent on the need for assistance to perform six functions of personal daily life: toilet, clothing, going to the toilet, eating, getting around, and continence [23]. The level of performance was rated 0–2 (0 for less able and 2 for able), and the maximum score was 12. The lower the score, the greater the person's dependency. An older adult was dependent if the total score was ≤ 6 , and independent if >6 [23].

Instrumental Activity of Daily Living (IADL) was used with a level of performance coded as 0 = less able, 1 = able, and was calculated for the five common gender functions (phone, shopping, transport, medication, and budget management). The lower the score, the greater is the person's dependency. The older adult was qualified as dependent if the total score was <2.5 and independent if ≥ 2.5 [24].

Furthermore, height (m) was measured using a carpenter (Yong Heng®, YH-89 U, Henan, China) to the nearest 0.1 cm. Older adults were weighed barefoot using a digital scale (Omron®, Heathcare Co., Ltd., Kyoto, Japan) to the nearest 0.1 kg. Body Mass Index (BMI = weight/(height)² in kg/m²) was calculated [25]. Waist Circumference (WC) was measured with a non-stretch tape midway between the last rib and iliac wing. The Mid-Upper Arm Circumference (MUAC) was measured with a Comed® (Villefranche-de-Rouergue, France) tape on the dominant arm, midway between the olecranon and acromion. Nutritional status was defined according to BMI (kg/m²: BMI <18.5 = undernutrition; $18.5 \leq \text{BMI} < 25$ = normal; $25 \leq \text{BMI} < 30$ = overweight; BMI ≥ 30 obesity), MUAC (<24 cm = undernutrition), and WC (≥ 102 cm in men and ≥ 88

Table 1

General information, health conditions, nutritional status in the total population (n = 599), and comparisons between groups with and without depressive syndrome or cognitive impairment.

	All (N = 599) N (%/mean ±SD)	Depressive syndrome		p	Cognitive impairment		p
		Yes (N = 87, 14.5 %) N (%/mean±SD)	No (N = 512, 85.5 %) N (%/mean±SD)		Yes (N = 128, 21.4 %) N (%/mean±SD)	No (N = 471, 78.6 %) N (%/mean±SD)	
Area				0.590			0.296
Urban	201 (33.6)	27 (13.4)	174 (86.6)		38 (18.9)	163 (81.1)	
Rural	398 (66.4)	60 (15.1)	338 (84.9)		90 (22.6)	308 (77.4)	
Age	68.9 ± 7.1	69.8 ± 6.6	68.7 ± 7.2	0.478	72.9 ± 8.2	67.8 ± 6.4	<0.001
60–69 years	359 (59.9)	48 (13.4)	311 (86.6)	0.569	49 (13.6)	310 (86.4)	<0.001
70–79 years	185 (30.9)	31 (16.8)	154 (83.2)		47 (25.4)	138 (74.6)	
≥80 years	55 (9.2)	8 (14.5)	47 (85.5)		32 (58.2)	23 (41.8)	
Gender				0.058			0.192
Male	288 (48.1)	50 (17.4)	238 (82.6)		55 (19.1)	233 (80.9)	
Female	311 (51.9)	37 (11.9)	274 (88.1)		73 (23.5)	238 (79.5)	
Marital status				0.421			<0.001
Married/free union	286 (47.7)	40 (14.0)	246 (86.0)		24 (8.4)	262 (91.6)	
Widowed	253 (42.2)	37 (14.6)	216 (85.4)		90 (35.6)	163 (64.4)	
Divorced	29 (4.8)	7 (24.2)	22 (75.9)		4 (13.8)	25 (86.2)	
Single	31 (5.2)	3 (9.7)	28 (90.3)		10 (32.2)	21 (67.7)	
Formal education				0.520			<0.001
No	204	27 (13.2)	177 (86.8)		84 (41.2)	120 (58.8)	
Yes	395	60 (15.2)	335 (84.8)		44 (11.1)	351 (88.9)	
Household size	6.2 ± 3.6	5.8 ± 3.2	6.2 ± 3.7	0.674	5.3 ± 4.1	6.4 ± 3.5	<0.001
Active				0.417			<0.001
No	171 (28.5)	28 (16.4)	143 (83.6)		63 (36.8)	108 (63.2)	
Yes	428 (71.5)	59 (13.8)	369 (86.2)		65 (15.2)	363 (84.8)	
Income				0.071			<0.001
No	116 (19.4)	23 (19.8)	93 (80.2)		46 (39.7)	70 (60.3)	
Yes	483 (80.6)	64 (13.3)	419 (86.7)		82 (17.0)	401 (83.0)	
Income stability (N = 483)				0.853			<0.001
Yes	171 (35.4)	22 (12.9)	149 (87.1)		8 (4.7)	163 (95.3)	
No	312 (64.6)	42 (13.5)	270 (86.5)		74 (23.7)	238 (76.3)	
Source of income (N = 483)				0.893			<0.001
Trade / Agriculture / Livestock / Handicrafts	259 (53.6)	34 (13.1)	225 (86.9)		43 (16.6)	216 (83.4)	
Retirement pension	120 (24.8)	18 (15.0)	102 (85.0)		6 (5.0)	114 (95.0)	
Donations and bequests	67 (13.9)	8 (11.9)	59 (88.1)		27 (40.3)	40 (59.7)	
Mixed/combined	37 (7.7)	4 (10.8)	33 (89.2)		6 (16.2)	31 (83.8)	
Monthly income (N = 483)				0.886			<0.001
< 60.000 frs CFA/92€	238 (49.3)	31 (13.0)	207 (87.0)		66 (27.7)	172 (72.3)	
≥60.000 frs CFA/92€	245 (50.7)	33 (13.5)	212 (86.5)		16 (6.5)	229 (93.5)	
Health conditions				0.482			0.006
No pathology	101 (16.9)	14 (13.9)	87 (86.1)		11 (10.9)	90 (89.1)	
One pathology	284 (47.4)	37 (13.0)	247 (87.0)		60 (21.1)	224 (78.9)	
Polypathology	214 (35.7)	36 (16.8)	178 (83.2)		57 (26.6)	157 (73.4)	
Classical medicine				0.132			0.307
No	186 (31.1)	21 (11.3)	165 (88.7)		35 (18.8)	151 (81.2)	
Yes	413 (68.9)	66 (16.0)	347 (84.0)		93 (22.5)	320 (77.5)	
Tablets consumption/d (N = 413)				0.782			0.251
1–4 tablets	227 (55.0)	33 (14.5)	194 (85.5)		49 (21.6)	178 (78.4)	
≥ 5 tablets	186 (45.0)	33 (17.7)	153 (82.3)		44 (23.7)	142 (76.3)	
Traditional medicine				0.882			0.026
No	328 (54.8)	47 (14.3)	281 (85.7)		59 (18.0)	269 (82.0)	
Yes	271 (45.2)	40 (14.8)	231 (85.2)		69 (25.5)	202 (74.5)	
Traditional medicine (N = 271): l/d				0.503			0.152
1–2 liters/d	220 (81.2)	34 (15.5)	186 (84.5)		52 (23.6)	168 (76.4)	
> 2 l/d	51 (18.8)	6 (11.8)	45 (88.2)		17 (33.3)	34 (66.7)	
Systolic pressure (mmHg)	133.6 ± 15.3	134±12.5	133.4 ± 15.7	0.047	135.0 ± 13.3	133.2 ± 15.7	0.400
Normal systolic pressure (<140 mmHg)	470 (78.5)	66 (14.0)	404 (86.0)	0.523	94 (20.0)	376 (80.0)	0.119
Systolic hypertension (≥140 mmHg)	129 (21.5)	21 (16.3)	108 (83.7)		34 (26.4)	95 (73.6)	
Diastolic pressure (mmHg)	84.6 ± 7.2	85.8 ± 6.3	84.9 ± 7.3	0.168	85.2 ± 5.9	84.4 ± 7.5	0.577
Normal diastolic pressure (<90 mmHg)	509 (85.0)	71 (13.9)	438 (86.1)	0.342	106 (20.8)	403 (79.2)	0.440
Diastolic hypertension (≥90 mmHg)	90 (15.0)	16 (17.8)	74 (82.2)		22 (24.4)	68 (75.6)	
BMI (kg/m ²)	24.7 ± 5.3	24.8 ± 4.9	24.6 ± 5.4	0.965	23.6 ± 5.1	24.9 ± 5.3	0.868
<18.5	118 (19.7)	15 (12.7)	103 (87.3)	0.573	32 (27.1)	86 (72.9)	0.172
18.5≤BMI<30	376 (62.8)	59 (15.7)	317 (84.3)		78 (20.7)	298 (79.3)	
≥30	105 (17.5)	13 (12.4)	92 (87.6)		18 (17.1)	87 (82.9)	
WC (cm)	90.1 ± 12.8	89.3 ± 10.0	90.3 ± 13.2	0.854	88.9 ± 12.4	90.4 ± 12.8	0.142
Normal	408 (68.1)	62 (15.2)	346 (84.8)	0.495	92 (22.5)	316 (77.5)	0.303
Abdominal obesity	191 (31.9)	25 (13.1)	166 (86.9)		36 (18.8)	155 (81.2)	
MUAC (cm)	28.2 ± 5.0	28.1 ± 4.1	28.2 ± 5.2	0.494	26.9 ± 5.5	28.5 ± 4.8	0.054
Undernutrition	128 (21.4)	13 (10.2)	115 (89.8)	0.114	40 (31.3)	88 (68.8)	0.002
Normal and above	471 (78.6)	74 (15.7)	397 (84.3)		88 (18.7)	383 (81.3)	
Mobility impairment				0.715			<0.001

(continued on next page)

Table 1 (continued)

	All (N = 599) N (%/mean ±SD)	Depressive syndrome		p	Cognitive impairment		p
		Yes (N = 87, 14.5 %) N (%/mean±SD)	No (N = 512, 85.5 %) N (%/mean±SD)		Yes (N = 128, 21.4 %) N (%/mean±SD)	No (N = 471, 78.6 %) N (%/mean±SD)	
No	450 (75.1)	64 (14.2)	386 (85.8)		78 (17.3)	372 (82.7)	
Yes	149 (24.9)	23 (15.4)	126 (84.6)		50 (33.6)	99 (66.4)	
ADL impairment				0.304			<0.001
No	466 (77.8)	64 (13.7)	402 (86.3)		67 (14.4)	399 (85.6)	
Yes	133 (22.2)	23 (17.3)	110 (82.7)		61 (45.9)	72 (54.1)	
IADL Impairment				0.166			<0.001
No	310 (51.8)	51 (16.5)	259 (83.5)		29 (9.4)	281 (90.6)	
Yes	289 (48.2)	36 (12.5)	253 (87.5)		99 (34.3)	190 (65.7)	

N: number; SD: standard deviation; CFA: "Communauté Française d'Afrique" currency; MUAC: Mid-Upper Arm circumference; WC: Waist circumference; BMI: Body Mass Index; ADL: Activities of Daily Living; IADL: Instrumental Activities of Daily Living; Bold values indicate $p < 0.05$.

cm in women = abdominal obesity), as recommended by the WHO [25, 26].

2.5. Statistical analysis

Data analysis was performed using Statistical Package for the Social Sciences (SPSS) version 26 (SPSS Software, Chicago, IL, USA). Quantitative data are expressed as the mean \pm standard deviation (SD), and qualitative data are expressed as numbers and percentages. The *t*-test, Mann-Whitney (or ANOVA), and Kruskal-Wallis tests were used to compare quantitative variables, the Chi-2 test for qualitative comparisons, and the Fisher exact test when the theoretical frequencies were less than five. Pearson's correlation between quantitative variables was assessed. Univariate and multivariate logistic regression analyses were performed to assess associations between neuropsychological (dependent) and nutritional status, sociodemographic characteristics, health factors, mobility, ADL, and IADL (independent) variables. Variables with $p \leq 0.25$ in the univariate analysis were included in the multivariate model, for which a stepwise backward procedure was used [27]. Missing data were handled by assessing their extent and nature. For the multivariate analysis, multiple imputation using chained equations (MICE) was used to handle missing values. Potential confounding factors were identified and included as covariates in the multivariate regression to control for their effects. The significance level was set at $p < 0.05$.

3. Results

3.1. Sociodemographic, health and nutritional characteristics

A total of 599 older adults (33.6 % in urban areas) aged ≥ 60 years were included with a sex ratio M/F of 0.93. The average age was 68.9 ± 7.2 (between 60 and 97), differing by gender (men: 67.7 ± 5.0 vs. women: 70.0 ± 8.5 y; $p < 0.001$). The BMI was 24.7 ± 5.3 kg/m², higher in urban (25.7 ± 5.3 vs. 24.1 ± 5.3 , $p = 0.001$) than in rural areas, and weakly correlated with systolic ($r = 0.12$, $p = 0.02$) and diastolic ($r = 0.15$, $p < 0.001$) blood pressure. The prevalence of undernutrition was 19.7 % and 21.4 % based on BMI and MUAC, respectively. Normal/overweight nutritional status was 62.8 %, and obesity was 17.5 % according to BMI. Men were more undernourished than women (25.4 % vs. 14.5 %, $p = 0.001$) and women were more obese than men (25.1 % vs. 9.4 %, $p < 0.001$).

3.2. DS and CI

The prevalence of DS was 14.5 % (Table 1). The CES-D score was 17.9 ± 4.7 (15.4 ± 3.8 for men and 20.1 ± 4.3 for women, $p < 0.001$). The prevalence of CI was 21.4 % and variations were found according to sociodemographic, health, and nutritional characteristics (Table 1). The MMSE score was 24.2 ± 5.0 (with no gender differences).

After univariate analyses (Table 2), multivariate (Table 3) were

performed. DS was positively associated with male gender (Odds Ratio (OR) = 1.7 [95 % Confidence Interval (CI):1.1–2.7], $p = 0.031$) and inactivity (OR = 1.7 [95 % CI:1.0–3.0], $p = 0.043$). CI was positively associated with widowhood (OR = 3.3 [95 % CI:1.6–6.5], $p = 0.001$), being single (OR = 3.7 [95 % CI:1.2–11.3], $p = 0.023$), not being educated (OR = 6.5 [95 % CI:3.5–12.2], $p < 0.001$), inactivity (OR = 5.3 [95 % CI:1.6–17.9], $p = 0.008$), and negatively associated with no ADL (OR = 0.5 [95 % CI:0.2–0.9], $p = 0.032$) and no IADL (OR = 0.3 [95 % CI:0.2–0.6], $p = 0.001$) limitations.

4. Discussion

This was the first national study in Cameroon on DS and CI, including nutritional status, sociodemographic factors, and health factors of community-dwelling older adults. It was representative of the aged people for age (average:68.9y), sex ratio (M/F:0.93 vs. 0.9) and area distribution (33.5 % in urban vs. 66.5 % in rural) [18]. DS affected 14.5 % of older adults and was positively associated with male gender (OR = 1.7) and inactivity (OR = 1.7), and negatively associated with stable income $\geq 92\text{€}/\text{month}$ (OR = 0.6). CI (21.4 %) was positively associated with lack of education (OR = 6.5), inactivity (OR = 5.3), single (OR = 3.7), widowhood (OR = 3.3), and negatively associated with no IADL disability (OR = 0.3), stable income $\geq 92\text{€}/\text{month}$ (OR = 0.5) and no ADL disability (OR = 0.5).

In terms of DS, very few multivariate studies using the CES-D were found in the literature, comparable to ours [3,8–11]. Furthermore, only two of them were representative of the countries in which they were carried out (China and Mexico) [8,11]. The prevalence of DS in our study (14.5 %), although within the range of studies conducted elsewhere (5.0–49.5), was quite low for reasons that might be related to the thresholds taken by other studies, their inclusion age (≥ 65 years), and other factors linked to their different contexts. The highest prevalence (49.5 %) was observed in South Africa and was associated with a higher risk of undernutrition [10]. In multivariate analyses (Table 3), male gender and inactivity were deleterious factors for DS. None of these observations has been made in the past and might be specific to Cameroon. In fact, in Molés Julio et al. (2019) and Xie et al. (2020), female gender was associated with DS, contrary to our study [9,11]. The explanation for our results might be the much greater affection shown toward older adult mothers by sons and grandchildren in Africa and Cameroon, which might induce better moral comfort and probably less depression. In addition, depression, which was more prevalent among older men than women in Cameroon, might be explained by changes in family dynamics. Traditionally, Cameroonian families were extended, with multiple generations living under the same roof and aged men serving as leaders and anchors, strengthening intergenerational ties and mutual support [28]. However, urbanization and the influence of formal education and Western cultures have led to the emergence of new family dynamics, characterized by a shift towards smaller family structures where some older men may either live alone or lose their traditional

Table 2
Socio-demographics factors, health conditions, and nutritional status factors associated with depressive syndrome and cognitive impairments in univariate analysis.

Area	Depressive syndrome (N = 599)			Cognitive impairment (N = 599)		
	Yes vs. No			Yes vs. No		
	OR	95 % CI	p	OR	95 % CI	p
Urban vs. rural	0.9	0.5–1.4	0.590	0.8	0.5–1.2	0.296
Gender						
Male vs female	1.6	1.0–2.5	0.059	0.8	0.5–1.1	0.192
Age (years)						
60–69	1		ref	1		ref
70–79	1.3	0.8–2.1	0.289	2.2	1.4–3.4	0.001
≥80	1.1	0.5–2.5	0.813	8.8	4.8–16.3	<0.001
Marital status						
-Married/free union	1		ref	1		ref
-Widowed	1.1	0.7–1.7	0.833	6.0	3.7–9.8	<0.001
-Divorced	2.0	0.8–4.9	0.150	1.7	0.6–5.4	0.336
-Single	0.7	0.2–2.3	0.509	5.2	2.2–12.3	<0.001
Formal education						
No vs. yes	0.9	0.5–1.4	0.520	5.6	3.7–8.5	<0.001
Active						
No vs. Yes	1.2	0.8–2.0	0.417	3.3	2.2–4.9	<0.001
Income						
No vs. Yes	1.6	1.0–2.7	0.073	3.2	2.1–5.0	<0.001
Source of income (N = 483)						
Trade / Agriculture / Livestock / Handicrafts	1		ref	1		ref
Retirement pension	1.2	0.6–2.2	0.622	0.3	0.1–0.6	0.003
Donations and bequests	0.9	0.4–2.0	0.796	3.4	1.9–6.1	<0.001
Mixed/combined	0.8	0.3–2.4	0.694	0.9	0.4–2.5	0.953
Monthly income (N = 483)						
≥60,000 frs vs. < 60,000 frs CFA/92€	1.0	0.6–1.8	0.886	0.2	0.1–0.3	<0.001
Pathology						
No pathology	1		ref	1		ref
One pathology	0.9	0.5–1.8	0.832	2.2	1.1–4.4	0.025
Polypathology	1.3	0.6–2.5	0.503	3.0	1.5–6.0	0.002
Classical medicine						
No vs Yes	0.7	0.4–1.1	0.134	0.8	0.5–1.2	0.307
Tablets consumption/ d (N = 413)						
No tablet	1		ref	1		ref
1–4 tablets	1.3	0.7–2.4	0.331	1.2	0.7–1.9	0.487
≥ 5 tablets	1.7	0.9–3.1	0.080	1.3	0.8–2.2	0.255
Traditional medicine						
No vs Yes	1.0	0.6–1.5	0.882	0.6	0.4–0.9	0.027
Systolic pressure (mmHg)						
Normal vs. Systolic hypertension	0.8	0.5–1.4	0.523	0.7	0.4–1.1	0.120
Diastolic pressure (mmHg)						
Normal vs. Diastolic hypertension	0.8	0.4–1.4	0.343	0.8	0.5–1.4	0.441
Nutritional status						
Normal/overweight	1		ref	1		ref
Undernutrition	0.8	0.4–1.4	0.402	0.8	0.5–1.4	0.415
Obesity	0.8	0.4–1.4	0.430	1.4	0.9–2.3	0.148
WC (cm)						
Normal vs. Abdominal obesity	1.2	0.7–1.9	0.496	1.3	0.8–1.9	0.304
MUAC (cm)						
<24 cm vs ≥24 cm	0.6	0.3–1.1	0.117	2.0	1.3–3.1	0.002
Mobility (Rosow)						
No vs. Yes	0.9	0.5–1.5	0.716	0.4	0.3–0.6	<0.001
ADL impairment						
No vs. Yes	0.8	0.5–1.3	0.305	0.2	0.1–0.3	<0.001
IADL impairment						
No vs. Yes	1.4	0.9–2.2	0.167	0.2	0.1–0.3	<0.001

N: number; CFA: “Communauté Française d’Afrique » currency; OR: Odds ratio; CI: confidence interval; WC: Waist circumference; MUAC: Mid-Upper Arm

Circumference; ADL: Activities of Daily Living; IADL: Instrumental Activities of Daily Living; Bold values indicate $p < 0.05$.

Table 3
Factors associated with depressive syndrome and cognitive impairments in multivariate analysis.

	Depressive syndrome (N = 599)			Cognitive impairment (N = 599)		
	Yes vs. No			Yes vs. No		
	OR	95 % CI	p	OR	95 % CI	p
Gender						
Men vs women	1.7	1.1–2.7	0.031	1.8	0.9–3.4	0.054
Marital status						
-Married/free union				1		ref
-Widowed				3.3	1.6–6.5	0.001
-Divorced				1.5	0.4–5.8	0.527
-Single				3.7	1.2–11.3	0.023
Formal education						
No vs. yes				6.5	3.5–12.2	<0.001
Active						
No vs. Yes	1.7	1.0–3.0	0.043	5.3	1.6–17.9	0.008
Monthly income (N = 483)						
≥60,000 frs vs. < 60,000 frs CFA/92€	0.6	0.3–1.1	0.099	0.5	0.3–1.0	0.059
ADL impairment						
No vs. Yes				0.5	0.2–0.9	0.032
IADL impairment						
No vs. Yes				0.3	0.2–0.6	0.001

N: Number; CFA: “Communauté Française d’Afrique » currency; OR: Odds ratio; CI: confidence interval; WC: Waist circumference; MUAC: Mid-Upper Arm Circumference; ADL: Activities of Daily Living; IADL: Instrumental Activities of Daily Living; Bold values indicate $p < 0.05$.

leadership roles, potentially contributing to depression [28]. Active or former alcohol consumption was found to be associated with DS [3]. Matene Fongang (2020) found that among adults in Cameroon recruited in urban and rural areas, occasional and regular alcohol consumption was significantly higher among men than among women (90.1 % vs. 86.2 %; 61.8 vs. 41.6 % respectively). This might explain why men in our study were more likely to be depressed than women. Other factors were mentioned elsewhere: being a current smoker [3], low education [3,8,11], loss of children, chronic disease [11], widowhood/celibacy/divorced/living alone [8,11], living in urban areas [11], chronic diseases [9,11] or being undernourished [10] but did not appear in our study, probably because of the thresholds used for age and CES-D score, the average age and national representativeness of the samples of previous studies, and/or differences in statistical inference. In our study, inactivity was associated with DS, as demonstrated in previous studies [29,30]. Research suggests that cardiovascular health and overall well-being could serve as potential mediators of these relationships. Physical inactivity has been linked not only to higher rates of depression, but also to poorer cognitive function, possibly through mechanisms involving reduced cerebral blood flow and neuroplasticity [15,31].

Considering CI, a few multivariate studies comparable to ours were found in the literature [12–15], and only one [12] was representative of the country (China); the others were conducted exclusively in urban [13] or rural [14,15] areas. CI was observed in 21.4 % of cases, within the range of values obtained elsewhere (8.9–42.9 %), with the highest in China (rural area) and Brazil (urban area) (42.9 and 37.7 %, respectively) [13,15]. In multivariate analyses (Table 3), CI was positively associated with widowhood, celibacy, lack of education, and inactivity and negatively associated with a monthly income of ≥ 92 €/month and no ADL or IADL impairment. Unmarried (widowed or single) people were also noted in China by Kuang et al. (2020), probably because of the isolation, worry, and stress involved, as demonstrated by us [12]. Other studies have reported that lack of education is harmful to cognition [12,

14]. Indeed, early and long-term education promotes development during childhood with protection against cognitive decline in later life, regardless of income [32]. Alley et al. added that adults with higher educational levels scored higher on all tasks at any given age [33]. Our study confirmed that education protects against CI. A link between inactivity and CI was noted by Kuang et al. in China, although each factor might induce another [12]. According to Barnes, activity can prevent or delay cognitive decline by reducing the risk of cardiovascular disease and increasing cerebral perfusion for better neurovascular coupling [34]. The absence of functional disorders (ADL and IADL) was found to be protective, confirming other observations [12,13,15], where CI was associated with ADL and IADL limitations. Previous studies have found various associations with CI: advanced age [12–15], female sex, no education [12,13], hypertension [14], visual or hearing impairments [12,15], chronic diseases [15], or undernutrition [35]. These factors did not appear to be associated in our analyses, possibly because they were not included and/or because of differences in the inclusion age and MMSE thresholds used in previous studies.

This study had limitations in its cross-sectional nature, the data collection period marked by the appearance of COVID, observation of barrier measures, and the declarative nature of certain information. Furthermore, the factors included in other studies (dietary behavior, alcohol consumption, and/or tobacco consumption) that were not included in this study might have provided important information. The cross-sectional nature of the study limited its ability to establish causal relationships or capture temporal relationships between variables. Additionally, the context of the pandemic, with its barrier measures and limited contact, did not always allow the accuracy of certain information to be verified, which may have affected the results of the study. Future research might address these limitations by using longitudinal models to better capture temporal variation and by considering adjustments to data collection methods to mitigate some of the disruptions associated with a pandemic, as well as explore the potential links between diet, alcohol and tobacco consumption, and DS and CI.

5. Conclusion

DS and CI affected 14.5 % and 21.4 % of the population, respectively, highlighting their significant prevalence as public health problems in Cameroon. The associated factors suggested that the promotion of physical activity and early cognitive stimulation through education might play a crucial role in the prevention of DS and/or CI. To combat inactivity, programs that promote physical exercise adapted to the abilities of older people should be developed and widely promoted. In addition, investing in lifelong education programs might not only enhance cognitive abilities but also raise awareness of the importance of healthy lifestyle behaviors in maintaining long-term cognitive health.

Data availability

The data are original, collected with the approval of older adults or their legal representatives. Ethical guidelines were followed by the investigator. All authors have seen and approved the final version of the document. If requested, data will be provided.

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CRedit authorship contribution statement

Gustave Mabiama: Writing – review & editing, Writing – original draft, Visualization, Validation, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Dieudonné Adigo:** Writing

– review & editing, Writing – original draft, Visualization, Supervision, Methodology, Investigation, Conceptualization. **Pierre Marie Preux:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Resources, Methodology, Funding acquisition, Conceptualization. **Jean-Claude Desport:** Conceptualization, Methodology, Funding acquisition, Writing – review & editing, Supervision, Validation. **Philippe Fayemendy:** Writing – review & editing, Writing – original draft, Visualization, Validation, Resources, Methodology, Conceptualization. **Pierre Jésus:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Resources, Methodology, Funding acquisition, Data curation, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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