

## **Study of Risk Factors for Major Non-communicable Diseases in Two Hospitals in Dakar (Senegal) in 2018**

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**Abstract:** Introduction: The development of non-communicable diseases is supported by modifiable and non-modifiable risk factors. In both primary prevention and secondary prevention, the possibility of action remains possible for individual modifiable risk factors. This study on the frequencies of individual and modifiable risk factors of a behavioral and metabolic nature within the population of patients accommodated in the services of the population is in order to carry out preventive actions on the major non-communicable diseases of vulnerable populations. hospitality and emergency services were carried out in Senegal. Methods: The framework of the study was the reception and emergency services of the hospital of Pikine and the hospital of Dakar. It was an observational, cross-sectional and descriptive study. The study period was from January 25 to March 5, 2018. The source population consisted of patients over 18 years of age and not pregnant, who were seen in consultation in both services and who gave their free and informed consent for participate in the survey. The data collection tool was based on the WHO STEPwise survey questionnaire. The questionnaire was administered during a face-to-face interview with each patient. The data was collected confidentially with strict respect for the privacy of the participant. Results: The study involved 615 patients 53.7% at the main hospital in Dakar and 46.3% at the Pikine hospital. The proportion of active smoking was 12%. The share of current alcohol consumption is 7.8% and daily consumption concerns 8.3% of these current drinkers. Regarding abdominal obesity, 55.5% of women had a waist size corresponding to a high risk against 10.2% of men. Insufficient physical activity and insufficient consumption of fruits and vegetables were the most common comorbidities. For blood pressure values, 38.9% of patients had blood pressure values above 140 mmhg / 90 mmhg and for random blood sugar values, 10.5% of patients had random blood sugar values above 2 g / l with signs of hyperglycemia. Finally, 40.4% of our patients declared that they had never controlled their blood sugar in their life and 32.2% declared that they had never had their blood pressure controlled in their life. Conclusion: The measurement of glycemia, blood pressure and BMI must be systematic for all patients seen in the emergency departments, whatever the reason for their visit. They should also continue their efforts to develop public spaces for sport and to make fruit and vegetables more accessible to the community.

**Keywords:** Risk-factors, Behavioral, Metabolic, Non-Communicable Diseases, Senegal

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# 1. Introduction

Sub-Saharan Africa suffers from a double burden with, on the one hand, the persistence of major infectious diseases (malaria, HIV infection, tuberculosis) and, on the other hand, the galloping development of major non-communicable diseases such as cardiovascular diseases (CVD), cancers, diabetes mellitus and chronic respiratory diseases [1-4].

As an illustration, three quarters of deaths due to CVD worldwide occur in low- and middle-income countries [5-8]. According to the International Diabetes Federation (IDF) between 2000 and 2017, the greatest increase in the prevalence of diabetes mellitus occurred in low- and middle-income countries, and more than 80% of deaths due to diabetes mellitus worldwide occurred in these countries [9-10-11].

The spread of these major non-communicable diseases is supported by powerful risk factors. In accordance with the determinants of health status according to Marc LALONDE, these risk factors are divided into several sectors, including the individual sector. Within this individual sector, there are non-modifiable risk factors (age, sex, family history) and modifiable risk factors which are either behavioral (insufficient consumption of fruit and vegetables, insufficient physical activity, smoking, excessive alcohol consumption), or metabolic (overweight-obesity, abdominal obesity, high blood sugar, high blood pressure and dyslipidaemia) [1-3-4-12-13].

Because we can act on modifiable risk factors in both primary and secondary prevention, in this study we were interested in individual and modifiable behavioral and metabolic risk factors in patients seeking emergency care in Senegal.

The objective was to:

First of all to estimate the proportions of insufficient consumption of fruit and vegetables, insufficient physical activity, smoking with industrial cigarettes, excessive alcohol consumption, overweight-obesity, abdominal obesity, high blood sugar, high blood pressure.

Then to classify in descending order of frequency the comorbidities of insufficient consumption of fruit and vegetables, insufficient physical activity, smoking per industrial cigarette, excessive alcohol consumption, and overweight-obesity.

Finally to evaluate the proportions of certain aspects such as: attempts to stop smoking/abusive alcohol consumption, the need for help to stop smoking/abusive alcohol consumption, people who have never measured blood pressure/glycaemia in their life, the modalities of blood pressure/glycaemia control if any.

## 2. Methodology

### 2.1. Study Framework

We selected the reception and emergency services of the Pikine Hospital (HP) and the Hospital Principal of Dakar

(HPD) as the study framework for the following reasons:

The Dakar region is the most densely populated region of Senegal [14] with 23.13% of the total population in 2017 [15].

In the Dakar region, the departments of Pikine and Dakar together contain more than 60 percent of its population and are home to the Pikine Hospital (HP) and the Hospital Principal of Dakar (HPD), respectively [15].

HP and HPD are both level 3 public health facilities with reception and emergency services (SAU) that receive both medical and surgical emergencies.

In addition, HP, which is located in the suburbs of Dakar, serves a population with a low socioeconomic level, while HPD, which is located in the more developed urban center of Dakar, serves a population with a high socioeconomic level.

### 2.2. Type and Period of Study

It was an observational, cross-sectional and descriptive study.

Data were collected from January 25 to February 5, 2018 in HP and from February 25 to March 5, 2018 in HPD.

The target population consisted of patients seen in both SAU.

The source population was defined by the inclusion criteria of being at least 18 years of age and the exclusion criteria of not participating in the survey, being deceased in the SAU, or being pregnant.

### 2.3. Sampling

The sample size was calculated according to the following formula. [6]

$$n_0 = e^2 \cdot \frac{P(1 - P)}{i^2}$$

=1.96 for a risk of error of the first kind  $\alpha=5\%$ .

P=expected proportion of patients with diabetes among those admitted to SAU (50%)

I=accuracy (5%)

$$n_0 = 1.96^2 \cdot \frac{0.5(1 - 0.5)}{0.05^2} = 384$$

A review of the consultation records for the two SAU revealed that the average number of patients admitted to each SAU was 25 per day. Thus, the expected size (N) of the target population was 750 patients per month. Since this number was less than 10,000, the sample size was adjusted (n) according to the following formula:

$$n = \frac{n_0}{1 + \frac{n_0}{N}} = \frac{284}{1 + \frac{284}{750}} = 254$$

In anticipation of non-respondents (10%), the minimum sample size selected was 280 patients in each SAU.

The sampling procedure. This was a consecutive recruitment of eligible patients during the study period until

the required sample size for each study site was reached.

#### 2.4. Data Collection Tool

The data collection tool was based on the WHO STEPwise survey questionnaire (17). It included

On the one hand a questionnaire composed of four sections with sociodemographic characteristics (age, sex, marital status, level of education, professional status), behavioral characteristics of the patient (smoking, alcohol consumption, fruit/vegetable consumption and physical activity), blood pressure and blood sugar control modalities.

On the other hand, a form was used to collect anthropometric parameters (weight, height, waist circumference, and body mass index), capillary blood glucose and blood pressure.

It should be noted that these collection tools were first tested at the FANN hospital SAU.

#### 2.5. Data Collect

Data collection took place in the sorting room of each SAU.

The questionnaire was conducted in a face-to-face interview with each patient. The form was filled out using standardized and approved materials.

The weight was measured in all subjects wearing a minimum of clothing and standing upright on a SECA mechanical scale on a horizontal plane, calibrated with a unit scale in Kg, ranging from 0 to 150 kg.

Height was measured in all patients in a vertical position, back against the wall, heels together, without shoes and looking straight ahead with a SECA 206 wall scale with metal tape, ranging from 0 to 220 cm, with a unit graduation of 1 mm.

The waist circumference was measured in all subjects in standing position, with legs approximately 25cm to 30cm apart. The measurement was made at mid-distance from the lower limit of the rib cage and the iliac crest with a flexible, non-stretchable tape measure, graduated in mm.

Blood pressure (BP) was measured with an OMRON model M6 Comfort electronic blood pressure monitor expressing systolic blood pressure (SBP) and diastolic blood pressure (DBP) in mmHg. The measurement was made in the subject's recumbent position, after a rest of at least 10 minutes in the right arm and then in the left arm. This was repeated three times, with a three-minute interval between measurements. Only the measurement with the highest SSP and PAD values was retained.

Capillary blood glucose was measured with an INFINITY brand blood glucose meter using INFINITY brand single-use test strips. Rigorous asepsis was performed on the pulp of the middle finger of the non-dominant hand. An injection was performed using a sterile single-use lancet. The patient's finger was delicately placed on the end of the test strip which automatically drew 0.5µL of blood. A "beep" was heard when the sample was correctly drawn and the test started automatically. After a 5-second countdown, the result of the

capillary blood glucose measurement appeared on the LCD display in mg/dl. After the test, the test strip and used lancet were placed in the sharps container.

#### 2.6. Operational Definitions of Variables

**Smoking smoke from industrial cigarette**

Only industrial cigarette smoking was considered in our study.

We considered as active smokers all subjects who reported smoking in the last three years prior to the survey [17, 18].

Frequency of consumption was assessed according to the five-point Likert scale [19].

We considered as former smokers all subjects who had spent at least the last three years preceding the survey without smoking [17, 18].

We considered as passive smokers all non-smokers who were exposed to tobacco smoke from others [20]. The frequency of exposure was assessed according to the five-level Likert scale [19].

**Alcohol consumption**

We considered as active alcohol consumers any subject who reported having drunk alcohol in the thirty days preceding the survey [12-17].

Frequency was assessed using the five-level Likert scale [19].

We considered heavy drinking to be any consumption of more than 3 standard drinks per day or more than 6 standard drinks on a single occasion at least once during the last 30 days [12-21].

**Fruit and vegetable consumption (FEL)**

Based on the participant's declarations, the quantity of consumption was evaluated with three items: 1 to 2 fruits and vegetables, 3 to 4 fruits and vegetables, 5 or more fruits and vegetables.

Frequency of consumption was assessed using the five-level Likert scale [19].

Insufficient fruit and vegetable consumption was considered to be any consumption of less than 5 fruits and/or vegetables per day [12-21].

**Physical activity**

Adequate physical activity is defined as moderate-intensity endurance physical activity with a threshold duration of 150 minutes per week or 75 minutes of sustained-intensity endurance activity per week [12-22].

Inadequate physical activity is defined as any duration below the threshold of recommended [21, 22].

**Body Mass Index**

The body mass index (BMI) was calculated by the ratio weight (kg) / height<sup>2</sup> (m<sup>2</sup>).

The BMI has been classified into the following categories: lean if BMI < 18.5 kg / m<sup>2</sup>, normal if BMI between 18.5 and 24.9 kg / m<sup>2</sup>, overweight if BMI between 25 and 29.9 kg / m<sup>2</sup> and obese if BMI ≥ 30 kg / m<sup>2</sup> [23-26].

**Abdominal obesity**

A waist circumference threshold > 102cm for men and > 88cm for women was used.

**Classification of glycemic values**

Random capillary blood glucose values were classified into:

Hypoglycemia for any blood glucose value less than 0.7g/L [21-24].

Normal blood glucose for any blood glucose value between 0.7g/l and 1.1 g/l [21-24].

High blood glucose for any blood glucose value between 1.1 g/l and 2g/l [21-24].

A subject was considered diabetic if random capillary blood glucose was greater than 2 g/l with signs of hyperglycemia syndrome (polydipsia, polyuria, polyphagia, weight loss) or when undergoing antidiabetic treatment (oral antidiabetic or insulin). [25, 26]

Classification of blood pressure values

According to the WHO 1999 classification of Adult Hypertension [27-30] in:

We considered as having optimal blood pressure, any subject with a PAS < 120 mmHg and a DBP < 80 mmHg [31, 32].

We considered as having normal blood pressure, any subject with 120 mmHg ≤ PAS < 130 mmHg and 80 mmHg ≤ MAP < 85 mmHg [31, 32].

We considered any subject with 130 mmHg ≤ NOT < 140 mmHg and/or 85 mmHg ≤ MAP < 90 mmHg (31, 32) to have high normal blood pressure.

We considered hypertensive any subject with PAS ≥ 140 mmHg and/or ABP ≥ 90 mmHg (31, 32) or on antihypertensive therapy [2].

We considered as stage I hypertensive any subject with 140 mmHg ≤ PAS < 160 mmHg and/or 90 mmHg ≤ PAD < 100 mmHg [31, 32].

We considered as stage II hypertensive any subject with 160 mmHg ≤ PAS < 180 mmHg and/or 100 mmHg ≤ PAD < 110 mmHg [31, 32].

We considered as stage III hypertensive, any subject with PAS ≥ 180 mmHg and/or PAD ≥ 110 mmHg [31, 32].

Shock is defined for any PAS < 70mmHg with signs of organic hypo perfusion (cyanosis, polypnea, short pulse, cold extremities, diuresis fracture).

## 2.7. Statistical Analysis

The analysis was done using Statistical Package for Social Sciences version 18 (SPSS 18). It was a descriptive analysis. The quantitative variables were expressed as a mean with its standard deviation and the median framed by extreme values and mode. Qualitative variables were expressed with their absolute and relative frequencies.

## 2.8. Ethical Considerations

The study was authorized by SAU managers. In addition, the ethical framework was adhered to through a clear, complete and precise information text that presented the context and purpose of the study for free and informed consent of the participants. The consent was signed. In addition, data collection was conducted in a confidential manner and with strict respect for the privacy of the participant. Subsequently, access to the data collected was limited exclusively to the analyst, which ensured the confidentiality of the data.

## 3. Results

A total of 615 patients were included, including 330 (53.7%) HPD patients and 285 (46.3%) HP patients.

Socio-demographic characteristics (Table 1): Men were in the majority with 52.4%. Patients under 40 years of age accounted for 44.5% in our study. According to marital status, married people were in the majority with 64.5%. 32.0% of our patients were high school graduates. The proportion of employed patients was 46.7%.

**Table 1.** Socio-demographic characteristics of patients in the reception and emergency services of two hospitals in Dakar (Senegal) in 2018.

Characteristics	Absolute Frequencies (n)	Relative Frequencies (%)
Sex		
Men	322	52.4
Women	293	47.6
Age in Years		
<40	272	44.4
[40-69]	235	38.3
>70	106	17.3
Marital Status		
Married	397	64.5
Single	218	35.4
Level of Education		
none	153	25.5
Elementary	155	25.8
Secondary	192	32.0
Higher education	100	16.7
Professional status		
Employed	285	46.7
Jobless	325	53.3

**Table 2.** Individual Behavioral Modifiable Risk Factor: Smoking smoked by industrial cigarette.

Individual Behavioral	Absolute Frequencies (n)	Relative Frequencies (%)
Smoking with an industrial cigarette		
Active Smoking	74	12.0
Old way of smoking	74	12.0
Never smoked	467	76.0
Frequency of consumption among active smokers per industrial cigarette		
Rarely		
Occasionally	2	2.7
Often	1	1.4
Always	71	95.9
Attempt to Stop Smoking in Active Smokers by using Industrial Cigarettes		
Yes	58	78.4
No	16	20.6
Expressing the need to be helped to stop active smoking by resorting to cigarette		
Yes	59	79.7
No	15	20.3
Exposure to second-hand smoke		
Never	376	69.5
Rarely	20	3.7
Occasionally	55	10.2
Often	14	2.6
always	76	14.0
Places of Exposure to Passive Smoking		
At Home	95	57.6
At work	47	28.5
In public places	20	12.1
In the Market	4	2.4
In the means of transportation	2	1.2
Dancing clubs or pubs	2	1.2

The Individual Behavioral Modifiable Risk Factor: Smoking per industrial cigarette (Table 2). The proportion of active smokers was 12% (74/615 patients). The proportion of former smokers was also 12% (74/615 patients). Patients who had never smoked in their lives accounted for 75.93% (467/615 patients). Of the 74 active smokers, the majority (95.9%) smoked daily. Of the 74 active smokers, 78.4% had tried to quit and 79.7% reported needing medical assistance to quit. Among the 541 patients who did not have active smoking, 165 patients (30.5%) were passive smokers. Home was the main place of exposure to passive smoking with 57.6%.

The behaviorally modifiable individual risk factor: alcohol consumption (Table 3). The proportion of current drinkers was 7.8% (48/615 patients). The proportion of former drinkers was 6.3% (39/615 patients). Patients who had never drunk alcohol represented 85.9% (528/615 patients).

Of the 48 current drinkers, the majority (47.9%) consumed alcohol occasionally. Of the 48 current drinkers, 45.8% drank less than 3 glasses a day and 54.2% were heavy drinkers with more than 3 glasses a day. Among the heavy drinkers (26 patients), only four patients (15.4%) attempted to stop drinking and only five patients (19.23%) expressed the need for medical assistance to stop.

**Table 3.** The individual modifiable behavioral risk factor: alcohol consumption.

Individual Behavioral	Absolute Frequencies (n)	Relative Frequencies (%)
Alcohol consumption		
Current consumer	48	7.8
Former consumer	39	6.3
Never consumed people	528	85.9
Frequency of alcohol consumption among current drinkers rarely		
Rarely	9	18.8
Occasionally	23	47.9
Often	12	25.0
Always	4	8.3
Quantity of Alcohol consumption among current drinkers Non-abusive consumption		
Non-abusive consumption	22	45.8
Abusive consumption	26	54.2
Attempt to stop abusive alcohol consumption among alcohol drinkers		
Yes	4	15.4
No	22	84.6
Expression of a need for help to stop heavy drinking		
Yes	5	19.2
No	21	80.8

The individual behavioral modifiable risk factor:

Insufficient physical activity (Table 4). The study showed that 72.4% of the respondents had insufficient physical activity.

Inadequate fruit and vegetable consumption (Table 4). Almost all patients, 96.4%, reported insufficient consumption of fruits and vegetables, i.e. less than 5 fruits/vegetables per day.

Overweight-Obesity-Abdominal obesity (Table 4). In our sample, 22.7% of patients were overweight and 17.4% were obese. The mean waist circumference was 87.8 cm with a standard deviation of 14.3 cm. The median waist circumference was 87 cm with extremes of 40 to 155 cm. The mode was 90 cm. By gender, the mean waist circumference was 89.85 cm for females versus 85.10 cm for males.

**Table 4.** Individual behavioral modifiable risk factors: insufficient physical activity, insufficient consumption of fruits and vegetables, body mass index.

Individual Behavioral	Absolute Frequencies (n)	Relative Frequencies (%)
Physical Activity		
Sufficient	170	27.6
Insufficient	445	72.4
Fruit and Vegetable consumption		
Sufficient	22	3.6
Insufficient	593	96.4
Body mass index (BMI)		
Thinness	84	14.9
Normal	255	45.1
Overweight	128	22.7
Obesity	98	17.3

Co-morbidities in terms of individual modifiable behavioral and metabolic risk factors (Table 5). Of the 510 patients who had completed their profile information on all five risk factors considered, i.e. smoking, alcohol consumption, sedentary lifestyle, low FEL consumption, BMI  $\geq 25$  kg/m<sup>2</sup>, all patients had at least one of the above risk factors and 40% were accumulating 3 RDFs at a time.

The four DRF associations with the highest numbers were, in descending order:

Insufficient physical activity + insufficient consumption of fruits and vegetables" was the most common association with 108 patients.

The association "Insufficient physical activity + insufficient consumption of fruit and vegetables + active smoking" came in second place with 105 patients.

The association "Insufficient physical activity +

insufficient consumption of fruit and vegetables + overweight/obesity" comes in 3rd position with a total of 60 patients.

The association "Insufficient physical activity + insufficient consumption of fruit and vegetables + active smoking + overweight/obesity" is in 4th position with 57 patients.

The individual modifiable metabolic risk factor: diabetes (Table 6). Of the 609 patients who answered the question, 246 patients (40.4%) reported never having controlled their blood glucose levels in their lives. Among patients who had tested at least once in their lives (360 patients), the use of a visit to a health care facility to control their blood glucose was by far the most frequent modality before the use of pharmacy and self-testing, with 69.7% (251/360).

**Table 5.** Co-morbidities in terms of individual behavioral and metabolic modifiable risk factors.

	IMC $\geq 25$ + and Tobacco +	IMC $\geq 25$ + and Tobacco -	IMC $\geq 25$ - and Tobacco +	IMC $\geq 25$ - and Tobacco -	Total
Abusive alcohol + and Sufficient Physical activity + and More than 5 FEL/day +	1	0	1	1	3
Abusive Alcohol + and Sufficient physical activity + and More than 5 FEL/day -	2	0	3	10	15
Abusive Alcohol + and Sufficient physical activity - and More than 5 FEL/day +	1	0	0	3	4
Abusive Alcohol + and Sufficient physical activity - and more than 5 FEL/day -	1	3	5	8	17
Abusive alcohol - and Sufficient physical activity + and More than 5 FEL/day +	3	3	2	7	15
Abusive alcohol - and Sufficient Physical activity + and More than 5 FEL/day -	14	19	25	37	95
Abusive alcohol - and Sufficient physical activity - and More than 5 FEL/day +	9	8	7	7	31
Abusive Alcohol - and Sufficient physical activity - and More than 5 FEL/day -	57	60	105	108	330
Total	87	93	148	181	510

**Table 6.** Individual modifiable metabolic risk factor: diabetes and high blood pressure.

Variable	Absolute Frequencies (n)	Relative Frequencies (%)
Random capillary blood glucose level		
Hypoglycaemia	3	0.5
Blood glucose standards	277	45.6
High blood glucose	264	43.4
Screened diabetes	64	10.5
Frequency of capillary blood glucose monitoring		
Never	246	40.4
Rarely	125	20.5
Occasionally	176	28.6
Often	48	7.9
Always	14	2.3
Capillary blood glucose monitoring mode		
In a health care service	251	69.7
In a pharmacy or drugstore	73	20.3
By self-measurement	36	10.0
Classification according to SSP and CSA		
Shock state	11	1.8
Optimal BP	136	22.3
Normal BP	115	18.9
Normal HBP	110	18.1
HBP stage I	111	18.2
HBP stage II	73	12.0
HBP stage III	53	8.7
Frequency of blood pressure monitoring		
Never	198	32.2
Rarely	102	16.6
Occasionally	220	35.8
Often	83	13.5
Always	12	2.0
Mode of blood pressure monitoring		
In a health care service	252	61.3
In a pharmacy or drugstore	121	29.4
By self-measurement	44	10.7

In our study, randomized capillary blood glucose testing was performed in 608 patients. The mean was 1.34 g/l with a standard deviation of 0.7 g/l. The median was 1.13 g/l with extremes of 0.33 g/l to 5.80 g/l. The mode was 1.0 g/l. Capillary blood glucose was above 2 g/l with signs of hyperglycemia in 10.5% (64/608) of patients high blood pressure (Table 6). Of the 615 patients in the study, more than one-third (32.2%) reported never having had their blood pressure controlled in their lifetime. Of the remaining 417 patients (those who had had their BP checked at least once in their life), visits to a health care facility to check their BP were by far the most frequent modality with 61.4%, followed by visits to a pharmacy with 29.4% and self-measurement with 10.7%.

In our study, mean SSP was 130 mmHg with a standard deviation of 2.6 mmHg. The median was 130 mmHg with values between 60 and 250 mmHg. The mode was 120 mmHg.

The mean PAD was 80 mmHg with a standard deviation of 1.6 mmHg. The median was 80 mmHg with extreme values from 40 to 180 mmHg. The mode was 80 mmHg.

The proportion of patients with blood pressure figures that

classified them as being in the HTA category (SBR>140mmHg and/or DBR>90mmHg) was 38.9%. With respectively 18.20% for stage I MTA; 12% for stage II MTA and 8.70% for stage III MTA.

## 4. Discussion

Active consumption of smoked tobacco (daily or not): The emergency room population had a high proportion of smokers compared to the general population in some countries of the sub-region. In fact, active consumption was 12% in our study, much higher than the prevalence observed in the general population of Senegal [32], Benin [33], Togo [34] and Burkina Faso [35]. The prevalence of active smoking were higher than our result in Côte d'Ivoire [36]; Mali [37]; and Mauritania [38].

The attempt to stop the consumption of industrial cigarettes. The attempt to quit is a strong reality at the breast of smoking. In our study, 78.4% of active smokers attempted to quit. This result was similar to that of the national survey on smoking in Senegal. It stated that nearly 8 out of 10 current smokers had considered or thought about quitting [39].

Our result was higher than that obtained in Burkina Faso, where 60.7% of smokers had tried to quit [35].

The need for medical assistance to stop smoking. Among the active smokers in our study population, 79.7% reported needing medical assistance to quit. It is urgently need to set up operational cessation centers available to the population. Q as an illustration of the title of the national survey on tobacco use in Senegal showed that the majority (86%) of those who tried to drop down smoking unfortunately had to do so without assistance [39]. Similarly, in Burkina Faso, two-thirds of smokers (36.5%) did not receive any advice from a health professional on how to quit [35]. To address this problem, in Ouagadougou, Burkina Faso, the first smoking cessation center in West Africa called "Vousongou" was inaugurated on February 24, 2017 to offer medical support in the process of smoking cessation [40].

Passive smoking and the place of exposure. In our study, secondary exposure to tobacco smoke in the home accounted for 57.6%. This result was higher than that of the national survey on tobacco use in Senegal (19% home exposure) [32], also higher than that of Burkina Faso (36.3%) (35) and Togo (33.9%) [34]. Knowing on the one hand that no law protects against passive smoking at home and on the other hand that passive smoking is just as dangerous as active smoking, we are entitled to be concerned, given the high proportion that this highly private place represents in passive smoking. Exposure to second-hand smoke in the workplace was 28.5% in our study. It was lower than the rate reported by the national survey on smoking in Senegal (30.4%) [39]. On the other hand, it was higher than that found in Burkina Faso (22.6%) [35] and Togo (19.9%) [34]. A law, without accompanying enforcement measures, is useless. Smoking in the workplace remains a reality in Senegal, despite the 2014 law [41] which prohibits smoking in administrative buildings and closed workplaces.

The proportion of current alcohol consumption was 7.8% in our study. This was 3 times higher than the prevalence obtained in the whole Senegalese population [32] and Mali [37]. However, this proportion was lower than the prevalence obtained in Togo [34], Benin [33], Burkina Faso [35] and Ivory Coast [36].

Frequency of alcohol consumption. In our study the daily consumption of alcohol concerned 8.3% of the current alcohol drinkers. This rate was higher than in Benin [33] but lower than in Burkina Faso [35].

The number of cups of alcohol consumed. In our study 54.2% of the consumers had an excessive consumption of alcohol. This rate was higher than the one found in the whole Senegalese population [32] as well as in Burkina Faso [35] and Togo [34].

The attempt to stop and the need for medical assistance to stop the abusive consumption of alcohol. In our study 15.4% had already tried to stop and 19.23% expressed the need for medical assistance to stop heavy drinking.

As opposed to smoking, the research does not deal with these two aspects. This might suggest that cases of alcohol dependence are not taken into consideration in our countries.

However, harmful alcohol consumption is a reality in the ECOWAS area [42]. Moreover, the STEP survey in Togo revealed that harmful alcohol consumption was higher among tobacco users (5.9%) than among non-users (2.8%) [34].

Physical activity. Our emergency room population accounted for 72.4% of those with insufficient physical activity. This was higher than the prevalence found in the whole Senegalese population as well as (32); Burkina Faso (35); Ivorian [36]; Malian [37]; Togolese [34] and Mauritanian [38].

Consumption of more than 5 fruits and vegetables per day. In our study, 96.5% of patients did not meet the WHO recommendations for fruit/vegetable consumption. This rate was higher than that of the general population in Senegal (32); Burkina Faso [35]; Mali [37]; Benin [33]; Togo [34]. The consumption of at least 5 fruits and vegetables per day as recommended by the WHO is a real challenge in the ECOWAS region: more than 4 out of 5 people do not consume enough FEL) [42].

Waist circumference according to sex, overweight, obesity. In our study, the average waist circumference in men was 85.10cm and 89.85cm in women. Our results were superior to those obtained in the general population of Mauritania [38]; Togo [34]; Ivory Coast [36]; Burkina Faso [35] and Senegal [32]. It's only in Mali [37] where our results were lower than those obtained in the general population for both men and women.

The proportion of overweight in our study was 22.7%. This rate was higher than the prevalence obtained in the general population in Senegal. The proportion of obesity was 17% in our study. This proportion was higher than the prevalence of obesity in the general population in Senegal [32]. However, it was lower than the prevalence found in Mali [37], Mauritania [38] and Benin [33]. In sum, there was 1.43 times more overweight and 2.65 times more obesity in our emergency room population compared to the general Senegalese population.

Systolic blood pressure (SBP) - diastolic blood pressure (DBP).

In our study, the mean SSP was  $130 \pm 2.6$  mmHg. This average was higher than all the average SSPs obtained in the general population in Senegal. Similarly, the average PSA in our study ( $80 \pm 1.6$  mmHg) was also higher than the results for the populations of Senegal [32]. High blood pressure (hypertension). The proportion of patients with BP with PAS  $\geq 140$  and/or PAD  $\geq 90$  mmHg was 38.90% in our ED population. This proportion was much higher than the prevalence obtained in the general population in Senegal [32]; Burkina Faso [35], Côte d'Ivoire [36], Mali [37], Mauritania [38], Benin [33] and Togo [34].

In view of the above comparisons, we are quickly tempted to assert that our study population is more at risk than the general population of countries in the subregion. This assertion must be made with caution, given the great variability of BP in hospital compared to the general population.

Random capillary blood sugar. The glycemic mean of the

random measurements in our study was 1.34 g / L±0.7g / L. As the STEPwise surveys focused on fasting blood sugar, it is difficult to compare our two results

For those who have never measured their blood glucose or BP in their entire life. In the 21st century, with the rise of NCDs, it is frightening to realize that of the 615 patients who visit the emergency room, 40.39% said they never had their blood glucose control and more than one-third (32.2%) said they never had their BP controlled in their life. In fact, there are few visits where all the vitals are taken rigorously and systematically. Even in the emergency room, blood glucose was not taken systematically. There is much to be done to raise awareness of the value of blood glucose monitoring in the prevention and management of diabetes and its complications.

Monitoring blood glucose level or blood pressure BP. Among patients who had had to control their blood glucose level or BP at least once in their lives, a visit to a health care facility was by far the most common way to control blood glucose levels (69.5%) and BP (61.3%). This was followed by a pharmacy test with 20.2% of patients for blood glucose and 29.4% of patients for BP. Finally, self-measurement was the least frequent control modality with 9.9% of patients for blood glucose and 10.7% of patients for BP. All this could be explained by:

Either a problem of knowledge: do patients know that they can test their blood glucose or BP in a pharmacy or even by self-measurement? In the case of self-measurement, could the problem be due to a lack of knowledge about the measurement technique and/or the interpretation of the results.

Either a problem of confidence: our patients would only trust the result obtained in a health care setting and would not trust the result that the pharmacist could give in his pharmacy.

Either a cost issue: the cost of blood glucose or BP testing in a pharmacy is higher than in a health care facility. In addition, the cost of self-testing equipment for BP or blood glucose measurement is still very expensive.

## 5. Conclusion

In light of these results, the emergency room population is truly a high-risk population for major NCDs in general and diabetes mellitus and cardiovascular disease in particular.

Also in light of these results, we will benefit from educating every patient arriving at the emergency room about major NCDs and their RDFs, and encouraging them to cultivate the reflexes to regularly control their blood glucose level, blood pressure and anthropometric parameters. But also to keep them informed about the possibilities of smoking and alcohol withdrawal that exist in Senegal.

Finally, it will be highly beneficial to make the measurement of blood glucose, blood pressure and BMI systematic for all SAU patients, regardless of the reason for their visit.

The authorities should continue their efforts to develop

public spaces for sports and to make fruits and vegetables accessible to all as insufficient physical activity and insufficient consumption of fruits and vegetables were the most common co-morbidity.

## Conflicts of Interest

The authors do not declare any conflict of interest.

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## References

- [1] Fourcade L. Epidemiological transition and development: Is the growth of non-communicable diseases a fatality? *Med Trop.* 2007; 67 (6): 543-4.
- [2] WHO general director. Global Strategy for the Control of Noncommunicable Diseases [Internet]. World Health Organization; 2000 March p. 6. Report No.: WHA53/14. Available at: <http://www.who.int/iris/handle/10665/83450>.
- [3] World Health Organization. 2008-2013 Action Plan for the Global Strategy for Noncommunicable Diseases. WHO; 2010. 48 p.
- [4] Key Noncommunicable Disease Benchmarks [Internet]. [www.who.int](http://www.who.int). cited June 11, 2018]. Available at: <http://www.who.int/fr/news-room/fact-sheets/detail/noncommunicable-diseases>.
- [5] Global status report on non-communicable diseases 2010. Geneva: World Health Organization; 2011. 176 p.
- [6] Markbreiter J, Buckley P, World Heart Federation. CVD Advocacy Toolkit The Road to 2018 [Internet]. 2016. 32 p. Available at: [www.worldheart.org](http://www.worldheart.org).
- [7] AFCAO - WHO Survey [Internet]. [www.afcao.org](http://www.afcao.org). cited 11 June 2018]. Available at: <http://www.afcao.org/who.htm>.
- [8] Home - World Heart Federation - World Heart Federation [Internet]. [www.world-heart-federation.org](http://www.world-heart-federation.org). [cité 11 juin 2018]. Disponible sur: <https://www.world-heart-federation.org>.
- [9] Gan D, International Diabetes Federation. Diabetes atlas 2000. Brussels: International Diabetes Federation; 2000. 306 p.
- [10] International Diabetes Federation. Diabetes Atlas. 8th ed. 2017. 147 p.
- [11] World Health Organization. World Diabetes Report. 2016. 88 p.
- [12] World Health Organization. Regional Office for Africa. Report on the status of major health risk factors for noncommunicable diseases: WHO African Region, 2015 [Internet]. 2016. 88 p. Available at: <http://www.afro.who.int/en/clusters-a-programmes/hpr/health-risk-factors.html>.

- [13] World Health Organization. Global action plan for the prevention and control of noncommunicable diseases: 2013-2020. [Internet]. 2013 [cité 3 juin 2018]. 55 p. Available at: [http://apps.who.int/iris/bitstream/10665/94384/1/9789241506236\\_eng.pdf](http://apps.who.int/iris/bitstream/10665/94384/1/9789241506236_eng.pdf).
- [14] Volontaire France, exchanges and international solidarity. Presentation of Senegal region by region. 2008.
- [15] National Agency of Statistics and Demography [Internet]. cited 8 Nov 2018]. Available at: <http://www.ansd.sn/>.
- [16] How to Calculate Sample Size for Different Study Designs in Medical Research? [Internet]. Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3775042/>.
- [17] World Health Organization, Department of Chronic Diseases and Health Promotion. WHO STEPS Questionnaire (core and extended modules) [Internet]. Available at: <https://www.who.int/ncds/surveillance/steps/Questionnaire.pdf>.
- [18] Smoking [Internet]. www.who.int. 2018 [cited June 11, 2018]. Available at: <http://www.who.int/fr/news-room/factsheets/detail/tobaccoquint-essenz>: Home page [Internet]. www.quint-essenz.ch. cited 30 Jul 2018]. Available at: <https://www.quint-essenz.ch/fr>.
- [19] WHO | Why is smoking also a problem for non-smokers? [Internet]. www.who.int. Available at: <http://www.who.int/features/qa/60/fr/>.
- [20] Houehanou YCN. Epidemiology of cardiovascular risk factors in tropical populations - the case of Benin [Thesis of the doctoral school of health sciences of Cotonou - Lemancen]. University of Limoges cotutelle University of Abomey-Calavi; 2015.
- [21] World Health Organization. Global recommendations on physical activity for health. WHO; 2010. 60 p.
- [22] Prevalence and Distribution of Diabetes Mellitus in a Maximum Care Hospital: Urgent Need for HbA1c-Screening - PubMed [Internet]. Available at <https://pubmed.ncbi.nlm.nih.gov/28750430/>.
- [23] Diop PM. Epidemioclinical aspects of medical emergencies at Pikine Hospital: a one-year retrospective study in the SAU [Doctoral thesis in General Medicine]. Dakar, Senegal: Cheikh Anta Diop University of Dakar; 2010.
- [24] WHO | WHO Diabetes Programme [Internet]. www.who.int. Available at: <http://www.who.int/diabetes/fr/>.
- [25] World Health Organization. Report on the Global Status of Non-Communicable Diseases 2014. 2014.
- [26] College of Teachers of Cardiology and Vascular Diseases. Adult hypertension [Internet]. Université Médicale Virtuelle Francophone; 29 p. Available at: [http://campus.cerimes.fr/cardiologie-et-maladies-vasculaires/enseignement/cardio\\_130/site/html/cours.pdf](http://campus.cerimes.fr/cardiologie-et-maladies-vasculaires/enseignement/cardio_130/site/html/cours.pdf).
- [27] Plouin PF, Amar L, Dekkers OM, Fassnacht M, Gimenez-Roqueplo AP, Lenders JW, Lussey-Lepoutre C, Steichen O, Guideline Working Group. European Society of Endocrinology Clinical Practice Guideline for long-term follow-up of patients operated on for a pheochromocytoma or a paraganglioma. *Eur J Endocrinol* 2016; 174: G1–G10.
- [28] Hypertension: definition, symptoms, treatment - Sciences et Avenir [Internet]. cited 9 Nov 2018]. Available at: [https://www.sciencesetavenir.fr/sante/systeme-sanguin/hypertension-arterielle-definition-symptomes-traitement\\_12920](https://www.sciencesetavenir.fr/sante/systeme-sanguin/hypertension-arterielle-definition-symptomes-traitement_12920).
- [29] Zisimopoulou S, Pechère-Bertschi A, Guessous I. Hypertension. *HUG*. 2017; 16.
- [30] Aubry P, Gaüzère B-A. Cardiopathies in the tropics: News 2015. *Med Trop*. Jan 2016.
- [31] Ministry of Health and Social Action. Senegal STEPS 2015 Survey: Summary Note. 2015.
- [32] Ministry of Health Benin, National Directorate of Health Protection, National Program for the Control of Non-Communicable Diseases. Final report of the STEPS survey in Benin, Cotonou 2007. Cotonou: Ministry; 2007 Dec p. 101.
- [33] Ministry of Health of TOGO, Non-Communicable Diseases Service of the Division of Epidemiology, Agoudavi K. Final report of the STEPS Togo 2010 survey. Lomé: Ministry of Health; 2012 p. 188.
- [34] Ministry of Health of Burkina Faso. Report of the national STEP survey on the prevalence of major risk factors common to noncommunicable diseases in Burkina Faso, 2013. Ouagadougou: Ministry of Health; 2014 June p. 104.
- [35] Ministry of Health of Côte d'Ivoire. Summary note of the STEPS survey report: Evaluation of risk factors for noncommunicable diseases in Côte d'Ivoire. Abidjan: Ministry of Health; 2005 p. 1.
- [36] Ministry of Health of Mali, National Directorate of Health. STEPS survey report: assessment of risk factors for noncommunicable diseases at three sites in Mali. Mali: Ministry of Health; 2008 Jul p. 16.
- [37] Ministry of Health of the Islamic Republic of Mauritania. Survey on non-communicable diseases according to the WHO STEPwise approach: study of hypertension, diabetes and other risk factors. Nouakchott Mauritania: Ministry of Health; 2006 June p. 156.
- [38] National Agency for Statistics and Demography, Ministry of Health and Social Action, Global Adult Tobacco Survey, GATS. Adult Tobacco Survey: Senegal 2015 main report. Senegal: Ministry of Health; 2015 p. 139.
- [39] Voussongo, the first smoking cessation center in West Africa - L'Actualité du Burkina Faso 24h/24 [Internet]. cited 30 Jul 2018]. Available at: <https://burkina24.com/2017/02/24/voussongo-le-premier-centre-de-sevrage-tabagique-dafrique-de-louest/>.
- [40] Ministry of Health and Social Action, National Agency for Statistics and Demography, World Health Organization, CDC Foundation. Global Adult Tobacco Survey: Executive Summary, 2015. GATS| Senegal; 2015.
- [41] ECOWAS. Regional Strategic Plan for the Control of Non-Communicable Diseases in the ECOWAS Space 2016-2020. 2016 Apr p. 77.