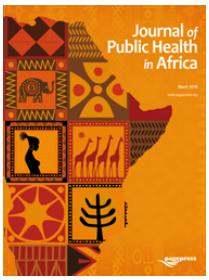

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Associated factors to hypertension, known poorly controlled hypertension and newly diagnosed hypertension among people aged 18-70 in Senegal

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Abstract

Introduction: In this study, we aimed to determine the factors associated with hypertension, known poorly controlled hypertension and newly diagnosed hypertension in 2015 in order to improve the prevention of this pathology in our country.

Materials and Methods: This was a secondary analysis of the national WHO STEPwise survey database. It was quantitative, descriptive with an analytical aim. The sampling was done in stratification in three stages of sampling. Statistical analysis was performed using Rstudio 4.0.2 software. It was a descriptive, bivariate and multivariate analysis using binomial logistic regression for explanatory purposes.

Results: The risk factors for being hypertensive among 18-70-year-olds in Senegal in 2015 are: having taken their blood pressure at least once in their life, having taken their cholesterol levels at least once in their life, having received advice to reduce salt consumption, have received advice on how to reduce the amount of sugar, be lean BMI, overweight, obesity III, be between 35-39 and 65-70 years old. The protective factors are: checking the salt content indicated on the labels, Consuming salt-rich dishes “often” compared to “never”,

The risk factors for being newly diagnosed with hypertension among 18-70-year-olds in Senegal in 2015 are: having a history of stroke, having a resting heart rate greater than 80 beats per minute, consuming palm oil, have high fasting blood sugar. The protective factors are: Having a high average number of meals eaten per week not prepared at home, checking the salt content indicated on the labels, and being of the female sex.

The risk factors for being known to have poorly controlled hypertension among 18-70-year-olds in Senegal in 2015 are: judging their reduction in salt consumption “Very important”, and having received advice to reduce their salt consumption. The protective factors are: performing physical activity only when traveling and limiting the consumption of salty-ready meals.

Conclusion: Senegalese family cooking exposes to hypertension, small actions limiting salt consumption strongly protect against hypertension, and simple physical activity during travel strongly protects against hypertension, but the health system is very little proactive in the primordial and primary prevention of hypertension.

Introduction

According to the WHO, worldwide, more than one in three adults suffer from hypertension **[1].** It is the main risk factor for the global burden of disease. It causes an estimated 9.4 million deaths per year **[1,2]**, i.e. more than half of the 17 million deaths caused each year by cardiovascular diseases **[1,2]** and 13% of global mortality all causes combined **[1].** Although a

global public health problem, the magnitude of hypertension is decreasing in high-income countries **[1]** but, on the other hand, low- and middle-income countries are increasingly bent under the increasing magnitude of morbidity and mortality linked to hypertension **[1,3].** Indeed, it is in the WHO African Region that the prevalence of hypertension is the highest with 46% **[3].** In addition, the average value of blood pressure in African populations is much higher than the world average **[3].** Within the Economic Community of West African States (ECOWAS), the prevalence of hypertension varies from 25.8% in Mali to 41.5% in Niger **[4].**

In 2015, the State of Senegal carried out its first study at the national level according to the WHO STEPwise approach to know the prevalence of NCDs and their risk factors within its population **[5].**

In view of the emergencies revealed by this study, Senegal has developed and implemented national plans and programs for the period 2016-2020 in order to curb mortality and minimize suffering attributable to cardiovascular diseases **[6].**

In Senegal, we did not find a study at the national level that identifies the factors associated with the occurrence of cardiovascular diseases or cardiovascular accidents in a population setting.

This is how we set ourselves the objective of researching the factors associated with the occurrence of arterial hypertension, known poorly controlled arterial hypertension and newly diagnosed arterial hypertension on the scale of the national population of the Senegal using the WHO Stepwise national survey database, Senegal 2015.

This will allow preventive management of hypertension, well targeted, focused on the specific associated factors within the Senegalese population.

Conceptual frame

The conceptual framework of our study is the contextualization of the four fields of the theoretical model of Marc Lalonde applied to the occurrence of hypertension. Within the limits of the available data and in line with the literature.

Materials and Methods

This is a secondary analysis. Our study was descriptive quantitative epidemiology with an analytical aim.

Data collection was done from August 1 to December 15, 2015.

The target population is the entire population living on the territory of Senegal as of 2015.

The source population was all individuals meeting the eligibility criteria.

The inclusion criteria for the study were to be between 18 and 70 years of age during the year of the survey, to reside in the territory of Senegal, urban or rural, at least more than 6 months before the start of investigation

The criteria for non-inclusion in the study were being pregnant, having a mental and/or physical disability and or being sick in bed, being an absent member of the household whose return was not expected within two and a half days presence of the team in the DR, not having given their consent to participate in the study

The size of the representative sample to be drawn from the source population was calculated according to the Steps methodology with the following formula:

$$N = Z^2 * \frac{p * (1 - p)}{e^2} * d * t * s * a$$

Z = level of confidence=1.96; p = initial level of indicators; e = is the margin of error= 5%; d = effect of sampling plan =2; t = non-response rate (20%) = 1.2; s=stratum by sex = 2; a=stratum by age= 6

The sampling was done by stratification in three stages. The first stage of sampling concerned the selection of census districts (CD). A systematic selection with probability proportional to the size of the CD (number of households in the CD) was made from the computer file of 17,166 CD from the General Population and Housing Census, from Agriculture and Livestock of 2013. Thus, 252 CDs had been drawn across the 14 regions of Senegal (114 CDs in urban areas and 138 in rural areas). The second level of survey concerned the selection of households. To do this, a count of households in each of the 252 CDs provided the list of households from which 25 households per CD were drawn according to a systematic selection with equal probability. Finally, the third and last degree of sampling concerned the selection of individuals. Individuals were drawn for each household using the Kish method. Kish's method provided a random sampling procedure for selecting an individual in a household. To be able to meet the quotas for the 65-70 age group, it was necessary to include all members of the sampled households who fall within these age groups.

The statistical unit of the study was the individual aged 18 to 70 on Senegalese territory in 2015 and having been chosen by the survey. The sampling unit was initially the DR, then the household and finally the individual.

The survey form consisted of the WHO STEPS BASIC AND EXPANDED MODULES survey form. The final survey sheet included : a questionnaire section devoted to STEP 1 and a form section to collect data relating to STEP 2 and STEP 3.

The support for the data collection tool was electronic. The final version of the survey form had been implemented in an electronic data collection device (PDA: Personal Digital Assistant) configured with the appropriate STEPS application. However, note that paper media were also available.

The variables collected at the level of STEP 1 were first the socio-demographic and economic characteristics, then the behavioural characteristics (consumption of tobacco, alcohol, fruit and vegetables, salt, fast sugars, fat, activity physical, sedentary behaviour), finally the history (hypertension, diabetes mellitus, high cholesterol, cardiovascular accident, therapy, advice received for lifestyle change).

The variables collected at the STEP 2 level were physical measurements (weight, height, waist circumference, hip circumference, three blood pressure measurements, and three heart rate measurements)

The variables collected at STEP 3 were biochemical measurements with: fasting capillary blood glucose, triglyceridemia, total cholesterolemia, HDL-cholesterolemia

Data collection for STEP 1 was done during a face-to-face interview with each individual. Interviewers used picture cards to help respondents remember important information and rate different items. In addition, respondents had enough time to examine the cards and think about the answer they gave.

Data collection for STEP 2 required direct contact with the participant. All physical measurements were taken in an isolated location. Privacy was ensured for the measurements of the waist circumference and the hip circumference. It was up to the participant to define the degree of intimacy desired. Physical measurements were taken on the participant in the following order: blood pressure and heart rate, weight, height, waist circumference and hip circumference last.

Data entry was done directly in the field with the PDAs which served as a collection medium. In the event of failure of the PDA, the paper questionnaires were exceptionally used to be entered immediately after repairing the device.

The analysis of the database was done with the statistical analysis software Rstudio version 4.0.2.

Once the database was opened in the Rstudio software, we proceeded to convert the quantitative variables (continuous or discontinuous) into NUMERIC, the binary and nominal qualitative variables into FACTOR and their modalities bear the correct names, the ordinal qualitative variables into ORDERED. Then we proceeded to the creation of independent variables that would be useful for the understanding and analysis of our variables of interest.

Finally, we had taken the necessary steps for the creation of our dependent variable of interest, binary with the modalities "Yes", "No".

The dependent variables of interest were:

Hypertension in Senegal: included known antecedents of hypertension and new cases of hypertension diagnosed during the survey.

New hypertension in Senegal: included cases of hypertension diagnosed during the survey among subjects who were not known to have hypertension. Arterial hypertensive subjects who were unaware of themselves.

Known poorly controlled hypertension: included known antecedents of hypertension who had high blood pressure figures (SBP>140 mmHg and/or TAD>90 mmHg) during the survey.

The descriptive analysis of the qualitative variables consisted in expressing the modalities of the qualitative variables in the form of absolute frequency, relative frequency and 95% confidence interval. The “sex” variable was also expressed as a male/female ratio.

The descriptive analysis of the quantitative variables was made with the position parameters (mean, median) and the dispersion parameters (standard deviation, extremes). The means were given with their 95% confidence interval.

Before moving on to univariate and multivariate analysis, we had taken care to define for each variable the modality that would serve as a reference.

The univariate or bivariate analysis consisted of crossing unpaired variables with, on the one hand, the dependent variable of interest with individually explanatory variables from the database. Before each crossing, we had made two hypotheses:

H0: hypothesis of absence of statistical link between the crossed elements (hypothesis of equality or null)

H1: alternative hypothesis or presence of statistical link between the crossed elements.

The type I risk α had been set at 5% (the risk of wrongly asserting that there is a link).

When it came to crossing a qualitative dependent variable with a qualitative explanatory variable: We were doing a comparison of unpaired proportions. The objective was to find the existence of a statistically significant link between the two variables. This link was retained as statistically significant for a p-value ≤ 0.05. This link was searched with the appropriate statistical test according to its conditions of applicability, so we used the:

• Pearson's Chi 2 parametric test, if all the theoretical values were ≥ 5

• Yates' corrected Chi 2 parametric test, if at least one of the theoretical values was between 3 and 5

• Fischer's non-parametric test, if at least one of the theoretical values was < 3.

When it came to crossing a binary qualitative dependent variable with a quantitative explanatory variable: We were comparing two unpaired means. The objective was to find the existence of a statistically significant link between the two variables. This link was retained as statistically significant for a p-value ≤ 0.05. This link was searched with the appropriate statistical test according to its conditions of applicability, so we used the:

• Student's T parametric test, if on the one hand there was a normal distribution of the quantitative variable in the strata of the dichotomous dependent qualitative variable and on the other hand if their variances were homogeneous (Bartlett test: p.Value ≥ 0.05)

• Parametric Weilsh's T test, if on the one hand there was a normal distribution of the quantitative variable in the strata of the dichotomous dependent qualitative variable but only their variances were non-homogeneous (Bartlett's test: p.Value<0 .05)

• Wilcoxon M.W. non-parametric test if the distribution of the quantitative variable in the strata of the dichotomous dependent qualitative variable was abnormal

The normality test of the distributions was done graphically using two methods: that of boxplots and that of histograms. The normal character of the distribution was affirmed in front of the bell or Gaussian shape in the histogram and the horizontal bar in the middle of the boxplot.

When it came to crossing a multimodal qualitative dependent variable with a quantitative explanatory variable: We were comparing more than two unpaired means. The objective was to find the existence of a statistically significant link between the two variables. This link was retained as statistically significant for a p-value ≤ 0.05. This link was searched with the appropriate statistical test according to its conditions of applicability, so we used the:

• The ANOVA test, if normal distribution of the quantitative variable in the strata of the qualitative variable and if the variances are homogeneous

• If only one condition was missing then we used the Kruskal Wallis test

The normality test of the distributions was done graphically using boxplots or histograms. The test on the homogeneity of the variances was done with the Barlett test. A p-Value ≤ 0.05 on the Barlett test shows that the variances are not homogeneous.

The first step of the multivariate analysis consisted in determining a base made of all the observations without missing data with regard to our explanatory variables and our variable of interest. Once completed, we obtained a base with X observations without missing data for all the variables considered.

We define two sub bases in the base without missing data. A base on which the construction of a parsimonious model was made (70% of the observations of the base without missing data)

and a base on which the measurement of the intrinsic characteristics of the parsimonious model built was made (30% of the observations database with no missing data).

Automatic random drawing made the choice of observations that constituted the sub-base for the construction of a parsimonious model.

The determination of a parsimonious model was made on the sub-base which is 70% of the base without missing data. It consisted of looking for the smallest possible set of explanatory variables that best predicts the occurrence of the dependent variable (the most parsimonious model). To achieve this, we used an analysis by modelling according to binomial logistic regression for explanatory purposes.

We proceeded in two different ways to determine the most parsimonious model: the automatic ascending stepping method and the automatic Stepwise method.

The automatic Stepwise method consisted of starting from a full model (model containing all the explanatory variables without prejudice to the p-Value in bivariate) to automatically obtain the explanatory variables which form the most parsimonious model.

The automatic ascending step-by-step method consisted of starting from a full model (model containing all the explanatory variables without prejudice to the p-Value in bivariate) and from an empty model (model containing no explanatory variable) to obtain in such a way automatically the explanatory variables that form the most parsimonious model.

After having obtained the two parsimonious models according to the 2 methods described above, we compared these models with each other in order to retain the most plausible model. This comparison of the likelihoods of the models used the AIC, BIC and blorr tests.

The model having obtained the smallest AIC, BIC and blorr was retained as being the parsimonious model and the most plausible of the two.

The study of the residuals of the selected model is done graphically with the parsimonious and most probable model. We seek to identify possible observations having strong leverage effects by calculating COOK distances.

This is to create a new base without these leveraged observations. This in order to improve the likelihood of the model (to have an AIC, BIC and blorr as small as possible).

The search for third-party factors between the explanatory variables of the selected model consisted of looking for the 1 to 1 interaction effect between the explanatory variables, which were suspected of having them within the most plausible parsimonious model, according to the literature. An interaction effect was retained when a p-value ≤ 0.05 was found. Otherwise, we concluded that there was no interaction effect between the two variables tested.

The search for multicollinearity between the explanatory variables of the selected model was done by calculating the VIF. A VIF <2.5 allowed us to conclude that there was no collinearity for a given explanatory variable compared to the others in the model.

The calibration of the selected model was evaluated with the adequacy or calibration test of Hosmer Lemeshow. The model was declared well calibrated if the p-value was greater than 0.05.

The discrimination capacity of the selected model. This was done graphically with ROC and AUC curves. If AUC = 0.5 then the model's ability to discriminate was said to be zero; if AUC between 0.5 and 0.8 then the discrimination capacity of the model was said to be acceptable; if AUC between 0.8 and 0.9 then the discrimination capacity of the model was said to be excellent; if AUC greater than 0.9 then the model's ability to discriminate was said to be exceptionalarsimonious model and the most plausible of the two.

We calculated the sensitivity-specificity of the selected model and then finally, we interpreted the results of the selected model according to the adjusted Odds Ratio (ORa) or odds ratio or exponential of the coefficients: The ORa is a number between] 0; +∞ [. It is given with its 95% confidence interval (95% CI). It expresses the risk of being hypertensive for a given modality compared to the reference modality in the same given explanatory variable. An ORa < 1 means that the modality presents a lower risk for the dependent variable of interest compared to the reference modality. An ORa > 1 means that the modality presents a greater risk for the dependent variable of interest compared to the reference modality. We were only interested in explanatory variables that showed a statistically significant link with the dependent variable of interest (p-Value<0.05).

Since the p-Value is sensitive to sample size, each p-Value in this study was given with its 95% confidence interval. This made it possible to search both for the existence of a statistical link or not depending on whether the confidence interval contains the value 1 or not, but also to judge the power of the sampling according to the extent of the interval of confidence.

With regard to the ethical framework, the STEPS survey complied with Law No. 2009-17 of March 9, 2009 on the Code of Ethics for Health Research in Senegal **[7,8].** The STEPS survey had obtained a favourable scientific opinion from the National Ethics Committee for Health Research and an administrative authorization issued by the Health Authority. Notices of passage for the STEPS survey were distributed beforehand to the households selected in the CDs. In each household, the interviewer provided the respondent with the information form on the study and offered to go through it with him, highlighting the various elements mentioned. All this with a view to its free and informed participation. This form clearly explained the

objectives of the study, what each step involved the benefits of the study and the rights of the participant. If the respondent was illiterate or unable to read on their own, the information form was read and explained to them. In cases where the interviewee was dissuaded, or coerced, from participating in the survey by a third party, such as a spouse, relative or other member of the local population, the interviewer clearly indicated that it was their the interviewee and it is up to them alone to decide whether they wish to be interviewed or not. The interviewer checked that the respondent had read and understood the form information, only after that the consent had to be in writing. The interviewee was asked to sign two informed consent forms before proceeding with the interview. One of the two was given to the participant after acceptance and signature and the investigator kept the other. All physical measurements were taken in an isolated location. Intimacy was ensured for waist circumference and hip circumference measurements in accordance with the degree of privacy desired by the participant. In the event of an anomaly or not during the medical tests during the collection of information, the participant was informed with a sheet bearing the results of his measurements. If necessary, the respondent was referred to the nearest health center. A respondent's identification number thanks to a coding associating the census district, the interviewer, the date and time of the interview, ensured anonymity.

Results

IV.1. Descriptive results

IV.1.1. Global context: The rural environment was the predominant origin with 58.1% (3103/5343).

IV.1.2. Family living environments. The notion of high family burden: the number of people over the age of eighteen living in the household under your care was on average 4.37 people ± 2.88 with a median of 4 people and extremes ranging from 1st person to 30.

IV.1.3. Individual characteristics

IV.1.3.1. Individual socio-demographic economic characteristics: Women were in the majority with 63.4% with a sex ratio (M/F) of 0.57. The 18-23 age group was the most represented with 18.9%. The average number of years to study was 4.17 years with a standard deviation of 5.35 years. Half of the sample had at most 1 year of study. The extremes ranged from 0 to 30 years of schooling. 55.3% of respondents said they had no official instructions. The "married" status was the most widespread with 73.7%. Only two socio-professional activities had a relative workforce of two figures. These are "Self-employed (including farmer, breeder, fisherman)" with 48.0% then "Homeowner" with 28.5%. It is 41.5% (2217/5344) of

the sample who answered the question related to the estimate of the annual household income. Among them, 48.4% (1074/2217) said they did not know (Table 1).

IV.1.3.2. Individual behavioural characteristics

IV.1.3.2.1. Tobacco consumption: The current consumption of smoked tobacco concerned 5.9% (313/5321) of the sample. This current consumption was daily in 88.5% of them (277/313). The mean age at the start of daily smoked tobacco consumption was 19.4 years with a standard deviation of 5.78. Half of those who use smoked tobacco daily had started before the age of 19. The extremes were 8 and 46 years. In terms of average quantity of daily consumption, we have in descending order the industrial cigarette (5.32 ± 6.16), the rolled cigarette (2.34 ± 5.0), the pipe (1.18 ± 4.05) and finally cigar/cigarillo (0.0110 ±0.182). Half of the daily industrial cigarette consumers smoked more than 4 sticks per day. The extremes were 0 and 25 batons. In terms of average quantity of weekly consumption, we have in descending order always the industrial cigarette (5.63 ± 18.6), the rolled cigarette (0.664 ± 4.07), the pipe (0.0473 ± 0.294) and finally cigar/cigarillo (0.0392 ±0.485). Smoking in the past concerned 5.5% of the sample (273/4995). In 80.1% of cases, it was a daily consumption (246/307). The age at weaning was on average 30.2 ± 12.1 years. The median was 28.5 years with extremes of 8 to 64 years. The duration of exposure to smoked tobacco therefore varied from zero (8-8) to 56 years (64-8). The proportion of smoking cessation attempts over the past 12 months among current smokers through smoked smoking (313) was 60.5% (188/311).

Passive smoking: Exposure to other people's tobacco smoke during the last 30 days at home had a proportion of 19.7% (1043/5305). Exposure to second-hand tobacco smoke in the last 30 days in an enclosed place at work was 10.2% (345/3371). Exposure to second-hand tobacco smoke in the past 30 days both at home and at work was 4.5% (237/5305). The proportion of passive smokers at home or at work was 21.7% (1151/5304).

Smokeless tobacco: Current consumption of smokeless tobacco had a proportion of 0.5% (24/5303). Daily consumption of this smokeless tobacco was 78.3% (18/23). In terms of average frequency per day of smokeless tobacco consumption, chewing tobacco was in the lead with an average of 1.12 ± 2.13 times. Similarly, according to weekly frequency, chewing tobacco was in the lead with an average of 0.3 ± 0.675 times. The proportion of former smokeless tobacco use was 0.3% (18/5281). The proportion of former daily use of smokeless smoking was 37.5% (9/24) (Table 2).

IV.1.3.2.2 Alcohol consumption

Alcohol consumption over the last 12 months and last 30 days preceding the survey: They were 178 out of 5124 or 3.4% who were not naive in relation to alcohol consumption. Among those who were not naïve to alcohol consumption (178), 61.7% declared having consumed in the last 12 months (108/175). Alcohol consumption in the last 30 days was found in 64.8% of those who had consumed in the last 12 months (70/108).

Frequency and quantity of alcohol consumption over the last 12 months and last 30 days preceding the survey: Among those who had had to drink in the last 12 months (108), 46.7% (50/107) had had to drink less than once a month and 14.0% (15/107) reported daily alcohol consumption. Those who reported having consumed alcohol during the past 30 days, reported having an average of 3.97 ± 6.03 occasions to drink at least one standard drink of alcohol in the month with a median of 2 occasions and extremes of 1 to 30 occasions

On average, the quantity of standard drinks of alcohol consumed per occasion was 4.22 ± 6.26 with a median of 2 standard drinks and extremes of 1 to 45 standard drinks during the last 30 days. The highest number of standard drinks of alcohol drunk at one time during the last 30 days averaged 3.98 ± 6.41 with a median of 3 and extremes of 1 to 50 standard drinks. In the last 30 days, it was on average 2.11 times with a standard deviation of 2.96 times that the consumption of six or more standard drinks of alcohol on a single occasion occurred with a median of 1e times and extremes of 0 to 15 times.

Frequency of alcohol consumption over the 7 days of the last week preceding the survey: The average number of standard glasses of alcohol drunk during the last 7 days was highest at weekends with 1.87 ± 5.57 glasses standards on Saturday and 1.98 ± 5.71 standard drinks on Sunday. Better the median on Saturday is higher (0.5 drinks) than that of Sunday (0.0 drinks) for the same extreme values 0 and 40 drinks. Monday had the lowest average number of standard drinks of alcohol consumed over the past 7 days.

Dependence and negative consequences due to alcohol consumption over the past 12 months: They were 12.3% (7/57) to declare that it was daily or almost daily that they were no longer able to stop drinking after having started and 6.6% (6/91) say they had to drink alcohol the morning after heavy drinking to get back into shape. Over the past 12 months, the proportion of those who, once drinking alcohol, found themselves prevented from doing what was normally expected of them was 2.1% (2/96). In the last 12 months, the proportion of those who had problems with their family or with their partner because of alcohol consumption was 0.6% (32/5238).

Cessation of alcohol consumption for health reasons: Among the 178 who were not naïve to alcohol consumption, 64 had spoken about the notion of cessation for health reasons. This was the reason for 29.7% (19/64) of them.

Consumption of tax-free alcohol as brazed at home in the last 7 days: They were 70 to comment on the consumption of tax-exempt alcohol as brazed at home in the last 7 days. This was the case in 27.1% of them (19/70). This consumption was 89.5% male (17/19) and urban 78.9% (15/19). Home-brewed beer or wine was the form of tax-exempt alcohol that was consumed the most over the past 7 days with an average of 2.63 ± 2.03, a median of 2 and extremes ranging from 0 to 7 (Table 3).

IV.1.3.2.3. Fruit and vegetable consumption: The average number of days per week of fruit consumption was 2.39 ± 2.27 days. Half of the 5187 who filled in this variable claimed to have at most 2 days in the week when they consumed fruit, with extremes ranging from 0 to 7 days. The amount of fruit consumption on one of these days in terms of fruit servings eaten was on average 1.91 ± 1.38 servings. The median was 2 servings with extremes of 1 to 20 servings. The average number of days per week of vegetable consumption was 4.93 ± 2.52 days. The median was 7 days with extremes ranging from 0 to 7 days. The quantity of vegetable consumption during one of these days in portions of vegetables eaten was on average 3.99 ± 2.86 portions. The median was 3 servings with extremes of 1 to 20 servings. The consumption of uncooked vegetables was found in 32.0% (1546/4831). The frequency in days per week of consumption of uncooked vegetables was on average 2.25 ± 1.86 days with a median of 2 days and extremes of 1 to 20 days.

IV.1.3.2.4. Salt consumption: The addition of salt, a salty sauce, or a salty seasoning in the meal once served at home was done according to the “always” modality in 12.1% (641/5292). The addition of salt, a salty sauce, or a salty seasoning when cooking meals at home was done according to the “always” modality in 64.1% (3390/5292). Consumption of high-salt dishes such as pre-packaged savory snacks, savory preserves, savory fast food dishes, was done according to the “always” modality in 3.86% (204/5290). They were 74.7% (3957/5294) to perceive as “very important” the reduction of their own salt consumption. It was 8.4% (445/5295) who declared that a high salt consumption could not be a source of health problems. The regular attitude taken to control salt intake was in descending order: “Limit the consumption of salty ready meals” at 67.1% (3550/5290); “Use spices other than salt in the preparation of dishes” at 50.5% (2676/5294); “Avoid eating meals prepared elsewhere than at

home" at 46.7% (2472/5294); "Buying salt and/or sodium substitutes" at 39.0% (2064/5294); "Check the salt content on the labels" was in 5th position with 16.0% (846/5294).

IV.1.3.2.5. Consumption of fast sugars: The proportion of those who consumed cubed sugar was 98.4% (5211/5298). The amount of refined sugar cubes used at breakfast was 2 cubes at 50.8% (2231/4394). Consumption of 4 or more cubes concerned 17.6% (775/4394). Consumption of sugary drinks was 83.0% (4395/5297). Canned or bottled sodas accounted for 14.8% (649/4395) depending on the type of sugary drink consumed.

IV.1.3.2.6. Fat consumption: The type of fat used most often for the preparation of meals at home was vegetable oil with 96.6% (5113/5295). Palm oil consumption accounted for 79.2% (4192/5295). The most represented modality for frequency of palm oil consumption was "Less than once a week - every 15 days" with 60.2% (2524/4192). They were 98.1% (5173/5272) to eat Senegalese style at home. The average quantity of meals eaten per week not prepared at home (breakfast, lunch and dinner) was 1.03 ± 2.39 meals with a median of 0 meals and extremes of 0 to 21 meals (Table 4).

IV.1.3.2.7. Physical activity

Intense physical activity at work: The proportion of those whose work included intense physical activity for at least 10 minutes in a row was 20.6% (1093/5299). The average number of days per week that they performed intense physical activities at work was 5.32 ± 2.11 days with a median of 7 days and extremes of 1 to 7 days. The average of the total time devoted during a usual day during which intense physical activities of at least ten consecutive minutes was practiced was in terms of hours was 4.29 ± 3.52 hours with a median of 4 hours and extremes of 0 at 16.

Moderate physical activity at work: They were 44.7% (2369/5299) to declare that they carried out moderate physical activity during their work, for at least 10 minutes in a row. The average number of days per week of practice of this moderate physical activity in the context of work was 5.72 ± 1.90 days with a median of 7 days and extremes of 1 to 7 days. The average total time devoted during a usual day during which moderate physical activities are practiced for at least ten consecutive minutes was in terms of hours of 4.40 ±3.17 hours with a median of 4 hours and extremes of 0 to 16 hours.

Physical activity during transport and moving from one place to another: To the question "Do you make trips of at least 10 minutes on foot or by bike", 86.5% (4585/5299) answered with the affirmative. The average number of days per week where journeys of at least 10 minutes on foot or by bicycle were made was 5.71 ± 1.86 days with a median of 7 days and extremes

of 1 to 7 days. The average total time spent on a typical day when travel is on foot or by bicycle for at least ten consecutive minutes in terms of hours was 1.08 ± 1.73 hours with a median of 1 hour and extremes of 0 to 3 p.m.

Intense physical activity during free time, leisure: The presence of intense physical activity for at least 10 minutes in a row during free time, leisure was found in 10.9% (578/5299). The average number of days per week where intense physical activity was performed during free time was 4.18 ± 2.32 days with a median of 4 days and extremes of 1 to 7 days.

Presence of any intense or moderate physical activity: The proportion of those who had only intense activities was 0.1% (5/5299). The proportion of those who had only moderate activities was 0.3% (15/5299).

Presence of physical activity only at work or when traveling or during free time, leisure: The proportion of those who had physical activity only at work was 1.26% (67/5299). The proportion of those who had physical activities other than commuting was 35.0% (1854/5299). The proportion of those who had physical activities only at leisure was 0.1% (7/5298).

Sedentary behaviour: The average hourly time spent in a sitting or lying position during a day was 4.23 ± 3.23 hours with a median of 3 hours and extremes of 0 to 16 hours (Table 5).

IV.1.3.3. Personal history

History of hypertension: 24.5% (787/3208) were known hypertensive, diagnosed by a health professional. The duration of this known state of hypertension was greater than 12 months in 62.3% (490/787). This seniority of more than 12 months was female at 80.8% (396/490) and rural at 52.2% (256/490).

History of diabetes mellitus: 9.5% (104/1095) were known diabetics, diagnosed by a healthcare professional. This proportion who knew themselves to be diabetic was female at 67.3% (70/104) and urban at 70.2% (73/104). The duration of this known diabetic state was more than 12 months in 57.7% (60/104). This seniority of more than 12 months was female at 63.3% (38/60) and urban at 70.0% (42/60).

History of high cholesterol: Knowledge of a state of dyslipidaemia diagnosed by a health professional was found in 31.6% (72/228). This proportion was female at 79.2% (57/72) and urban at 80.6% (58/72). Among the 72 who had a history of dyslipidaemia, the duration of this state was more than 12 months in half of them (36/72). This seniority was female at 88.9% (32/36) and urban at 77.8% (28/36).

History of cardiovascular disease: The proportion of history of cardiovascular disease (heart attack, chest pain, stroke) was 3.8% (203/5298) (Table 6).

IV.1.3.4. Anthropometric measurements

Heart rate: The average of the individual averages of the 3 resting heart rates was 80.5 beats per minute with a standard deviation of 13.1 beats per minute. The median was 80.2 beats per minute with extremes ranging from 30 to 145 beats per minute. They were 2658 out of 5208 or 51.0% to have an individual average of the 3 heart rates which is said to be at risk because greater than 80 beats per minute at rest.

Waist circumference: The average waist circumference was 77.3 ± 13.7 cm with a median of 75.0 cm and extremes of 7.0 to 200 cm. In men, the proportion of abdominal obesity was 6.02% (113/1878). This proportion was urban at 71.7% (81/113). In women, the proportion of abdominal obesity was 41.8% (1378/3295).

Weight, height, body mass index: The average weight was 62.8 ± 14.8 Kg with a median of 60.0 Kg and extremes of 28.0 to 350 Kg. The average height was 167 ± 9.6 cm with a median of 167 cm and extremes from 100 cm to 270 cm. The average body mass index was 22.5 ± 6.01 Kg/m2 with a median of 21.4 Kg/m2 and extremes of 8.09 Kg/m2 to 159 Kg/m2. Nearly 1 in 4 people were overweight or obese 24.3% (1257/5180). Obesity accounted for 7.7% (400/5180) (Table 7).

Blood pressure: The mean of the individual averages of the 3 SBPs was 127mmHg ±19.8 mmHg with a median of 123 mmHg and extremes of 73 to 243 mmHg.

The mean of the individual averages of the 3 DBPs was 83.1mmHg ±12.4 mmHg with a median of 81.7 mmHg and extremes of 47.3 to 145 mmHg.

According to the average of the individual averages of the 3 SBP and 3 DBP taken, the systolic and/or diastolic hypertension was 28.9% (1506/5207).

Just over one in five people had newly diagnosed systolic/diastolic hypertension 23.8% (563/2361).

Thus, in 2015, the prevalence of hypertension in Senegal (old and new) was 23.5% (1254/5343).

More than half of those with known hypertension had high blood pressure (one could speak of uncontrolled or poorly controlled hypertension): 56.9% (443/778). This proportion was female at 63.4% and exclusively urban (Table 8).

IV.1.3.5. Biochemical measurements

Fasting blood sugar: Fasting capillary blood sugar was on average 0.68 g/L ±0.27 g/L with a median of 0.66 g/L and extremes of 0.2 to 6 g/L. According to fasting blood glucose

measurement, there was 2% diabetes (93/4694), 1.7% (15/872) had newly diagnosed diabetes. Thus, in 2015, the prevalence of diabetes in Senegal (old and new) was 2.2% (116/5343).
Total cholesterolemia: Total cholesterolemia was on average 1.56 g/L ±0.45 g/L with a median of 1.50g/L and extremes of 0.26 to 4.00 g/L. According to the biological measurements carried out, there was 16.4% total hypercholesterolemia (779/4755). 21.9% (30/137) had newly diagnosed total hypercholesterolemia. Thus, in 2015, the prevalence of total hypercholesterolemia in Senegal (old and new) was 1.9% (99/5343). More than 1/3 of those who were known to have dyslipidemia had high total cholesterolemia (one could speak of unstabilized or poorly stabilized total hypercholesterolemia): 38.5% (25/65). HDL-cholesterolemia was on average 0.39g/L±0.15g/l with a median of 0.36g/l and extremes of 0.03 to 1 g/l. According to the biological measurements carried out, there was 77.1% hypo HDL cholesterolemia (3636/4718) (Table 9).

IV.1.4. HEALTH SYSTEM

IV.1.4.1. The presence of advice received over the past 3 years for a change in behavior: 2.8% (149/5299) of the sample had received advice over the past 3 years to stop or not to start smoking. It is 17.4% (54/5305) of the sample who had received advice in the last 12 months for smoking cessation. 13.0% (690/5299) of the sample had received advice over the past 3 years to reduce salt consumption. It is 7.6% (404/5296) of the sample who had received advice received during the last 12 months to reduce the amount of sugar in the diet. This advice was given by health personnel in 71.2% of cases (287/403). It is 12.6% (667/5300) of the sample who had received advice during the last 3 years to eat at least 5 portions of fruit and/or vegetables per day. It is 8.3% (439/5299) of the sample who had received advice during the last 3 years to reduce fat consumption. It is 10.3% (547/5299) of the sample who had received advice during the last 3 years to start or do more physical activity. It is 5.1% (271/5299) of the sample who had received advice during the last 3 years to maintain a healthy weight or lose weight. It is 82.7% (86/104) of known diabetics (104) who had received dietary modification recommendations to treat their diabetes.

IV.1.4.2. Monitoring of biological parameters and blood pressure: The fact of having already had their blood pressure taken by a health professional at least once in their life was found in 60.6% (3208/5298). The fact of having already had their blood sugar taken by a health professional at least once in their life was found in 20.7% (1095/5298). The fact of having already had their cholesterol levels taken by a health professional at least once in their life was found in 4.3% (228/5298) (Table 10).

IV.2. Results of multivariate analyses

IV.2.1. Interpretations of the parsimonious model according to the Odds Ratio adjusted with arterial hypertension as dependent variable in Senegal

According to our parsimonious model, the most likely of the two, well calibrated (Hosmer Lemeshow adequacy or calibration test p-Value = 0.1166), with an absence of collinearity between the explanatory variables, an acceptable capacity for discrimination (AUC = 0.78), with a sensitivity of 91.8% [88.4; 95.2] and a specificity of 28.6% [18.9; 38.2], the variables that show a statistically significant link with being hypertensive are :

The subject responding to the reference modalities of the variables of the model is a factor associated with the presence of hypertension: the fact of being a subject at the references was associated with 10 times less risk of being hypertensive compared to the subject at the opposite of the references (p-Value < 0.001; OR=0.10; 95% CI = [0.05; 0.19]).

The presence of at least one blood pressure measurement in one's life is a factor associated with the presence of hypertension: The fact of having taken one's blood pressure at least once in one's life was associated with a 3.22 times greater risk of being hypertensive compared to never having had it (p-Value < 0.001; OR=3.22; 95% CI = [2.02; 5.24]).

Advice received in the last 3 years to reduce your salt intake is a factor associated with the presence of hypertension: The fact of having received advice during the last 3 years to reduce your salt intake was associated with 2.13 times more risk of being hypertensive compared to not having received one (p-Value =0.009; OR=2.13; 95% CI = [1.20; 3.77]).

BMI class is a factor associated with the presence of hypertension : Compared to having a BMI class corresponding to normal, having a BMI class corresponding to underweight was associated with a 2.25 times greater risk of being hypertensive (p-Value=0.003; OR=2.25; 95% CI = [1.30; 3.85]); being overweight was associated with a 2.17 times greater risk of being hypertensive (p-Value< 0.002; OR=2.17; 95% CI = [1.33; 3.55]) and being obese III was associated with a 10.2 times greater risk of being hypertensive (p-Value = 0.047; OR=10.2; 95% CI = [1.41; 216]).

Age: Compared to being between 18-23 years old; being between 35-39 years old was associated with a 2.24 times greater risk of being hypertensive (p-Value=0.022; OR=2.24; 95% CI = [1.12; 4.47]) and between 65-70 years old was associated with 3.05 times more likely to be hypertensive (p-Value=0.026; OR=3.05; 95% CI = [1.14; 8.19]).

Regular attitude taken to control your salt intake Check the salt content indicated on the labels: The fact of checking its salt intake by checking the salt content indicated on the labels was

associated with 2.08 times less risk of being hypertensive by compared to not doing it (p-Value=0.007; OR=0.48; 95% CI = [0.28; 0.80]).

Advice received in the past 12 months to reduce the amount of sugar in the diet: Receiving advice in the past 12 months to reduce the amount of sugar in the diet was associated with a 2.19 times greater risk of being hypertensive compared to not having received one (p-Value=0.032; OR=2.19; 95% CI = [1.06; 4.46]).

Frequency of eating high-salt foods (pre-packaged savoury snacks, canned, fast food): Having a frequency of consuming high-salt foods (pre-packaged savoury snacks, canned, fast food) categorized as “Often” was associated with 2.43 times less risk of being hypertensive compared to having a consumption frequency classified as “Never” (p-Value= 0.008; OR= 0.41; 95% CI = [0.21; 0.78]).

The presence of at least one cholesterol level in your life: Having taken your cholesterol level at least once in your life was associated with a 2.40 times greater risk of being hypertensive compared to not having any not done (p-Value=0.032; OR=2.40; 95% CI = [1.08; 5.39]).

IV.2.2. Interpretations of the parsimonious model according to the Odds Ratio adjusted with known poorly controlled arterial hypertension as the dependent variable in Senegal

According to our parsimonious model, the most likely of the two, well calibrated (Hosmer Lemeshow adequacy or calibration test p-Value = 0.4872), with an absence of collinearity between the explanatory variables, an excellent capacity for discrimination (AUC = 0.8959), with a sensitivity of 45.5% [16; 74.9] and a specificity of 61.5% [35.1; 88], the variables that show a statistically significant link with being poorly controlled known hypertensive:

The degree of personal perception of the importance of reducing one's salt consumption is a factor associated with the "known poorly controlled hypertension" profile: Being a subject whose degree of personal perception of the importance of reducing one's salt consumption salt is "Very important" was associated with a 21.7 times greater risk of being poorly controlled known hypertensive compared to the subject responding "fairly important" (p-Value = 0.018; OR=21.7; 95% CI = [2.49; 601]).

Physical activity only when moving is a factor associated with the "known poorly controlled hypertension" profile: Performing physical activity only when moving was associated with 9.09 times less risk of being known to be poorly controlled hypertensive compared to the subject who not doing so (p-Value = 0.015; OR=0.11; 95% CI = [0.02; 0.58]).

Advice received over the past 3 years to reduce salt intake is a factor associated with the "known poorly controlled hypertension" profile: Having received this advice was associated with a 12.1 times greater risk of being known to be hypertensive poorly controlled compared

to the subject who did not had not received any (p-Value = 0.023; OR=12.1; 95% CI = [1.81; 144]).

Regular attitude taken to control your salt intake: Limiting the consumption of salty ready meals is a factor associated with the “known poorly controlled hypertension” profile: Limiting the consumption of salty ready meals was associated with a 25 times lower risk of being known to be hypertensive poorly controlled compared to the subject who did not (p-Value = 0.046; OR=0.04; 95% CI = [0.00; 0.57]).

IV.2.3. Interpretations of the parsimonious model according to the Odds Ratio adjusted with newly diagnosed arterial hypertension as dependent variable in Senegal

According to our parsimonious model, the most likely of the two, well calibrated (Hosmer Lemeshow adequacy or calibration test p-Value = 0.8193), with an absence of collinearity between the explanatory variables, an acceptable capacity for discrimination (AUC = 0.72), with a sensitivity of 96% [92.5; 99.4] and a specificity of 0% [0; 0], the variables which present a statistically significant link with the fact of being “new hypertension”:

The subject responding to the reference modalities of the model variables is a factor associated with the "new hypertension" profile: Being a subject to the references was associated with 7.14 times less risk of being "new hypertension" compared to the opposite subject references (p-Value = 0.001; OR=0.14; 95% CI = [0.04; 0.45]).

Average quantity of meals eaten per week not prepared at home (breakfast, lunch and dinner) is a factor associated with the "new HTA" profile: The higher the average, the more it is associated with 1.21 times less risk of being “new hypertension” (p-value =0.024; OR=0.85; 95% CI = [0.74; 0.97]).

Checking the salt content indicated on the labels is a factor associated with the "new hypertension" profile: The fact of doing so is associated with 3.45 times less risk of being "new hypertension" (p-Value =0.004; OR=0.29 ; 95% CI = [0.12; 0.64]).

History of heart attack, chest pain, stroke is a factor associated with the “new hypertension” profile: Having had a cardiovascular event is associated with a 6.47 times greater risk of being “new hypertension” (p- Value =0.013; OR=6.47; 95% CI = [1.50; 30.1]).

Resting heart rate greater than 80 is a factor associated with the "new hypertension" profile: Having a resting heart rate greater than 80 bpm is associated with a 2.09 times greater risk of being "new hypertension" (p-Value = 0.010 ; OR=2.09; 95% CI = [1.20; 3.70]).

Gender is a factor associated with the “new hypertension” profile: Being female is associated with 2.32 times less risk of being “new hypertension” (p-Value =0.006; OR=0.43; 95% CI = [0.24; 0.79]).

Consumption of palm oil is a factor associated with the "new hypertension" profile: Its consumption is associated with a 2.65 times greater risk of being "new hypertension" (p-Value =0.047; OR=2.65; 95% CI = [1.09 ; 7.63]).

Average fasting blood sugar is a factor associated with the "new hypertension" profile: the higher the average, the more it is associated with a 2.66 times greater risk of being "new hypertension" (p-Value =0.025; OR=2.66; 95% CI = [1.10; 6.61]) (Table 11).

Discussion

Prevalence of arterial hypertension, unaware hypertensives and poorly controlled known hypertensives in Senegal based on the STEPS survey, 2015

Taking BP by a healthcare professional at least once in their life was found in 2 out of 3 people (60.6% [59.21, 61.86]). The STEP survey in Burkina Faso the same reality. Blood pressure had never been measured in 39.8% of respondents (STEP Burkina Faso) **[9].** The rise in this prevalence is partly due to the promotion of blood pressure measurements outside the hospital, either by self-measurement or in pharmacies. Traore et al. wondered about it because from their study two aspects emerged. Firstly, even within the population of patients seen in the reception and emergency departments of Dakar, more than a third of these patients (32.2%) declared that they had never had their blood pressure checked during their entire life. life **[10]** and secondly among patients who had already had their blood pressure checked at least once in their life, recourse to a consultation in a health structure was by far the most frequent modality for controlling their BP with 61.3% followed by measurement in pharmacies (29.4%) and finally self-measurement (10.7%) **[10].**

Arterial hypertension was newly diagnosed during this survey in 23.8% [22.14, 25.62] of the subjects.

The antecedent state of known arterial hypertension concerned 24.5% [23.05, 26.06].

More than half of them had high blood pressure figures (known poorly controlled hypertension) (56.9% [53.37, 60.44]). Also in 2015, Ataklte et al. estimated that of the more than 100 million hypertensives in Africa, 90 million were uncontrolled **[11].**

The prevalence of Arterial Hypertension in Senegal (old cases + new cases) is 23.5% [22.34, 24.63]. The STEP survey in the different countries of the sub-region found a prevalence of hypertension of 17.6% in Burkina 2013 (9); 19% in Togo 2010 **[12];** 22.1% in Mali 2008; 22.4% in Mauritania 2006 **[13];** 25.9% in Ivory Coast 2005; 27.3% in Benin 2007 **[14].** According to 2015 WHO statistics, the prevalence of hypertension ranged from 28% to 36% in all ECOWAS countries **[4].** Also in 2015, WHO Africa estimated that 46% of adults in the

Region were hypertensive, recording the highest rate in the world **[15].** The percentage of adults with hypertension ranged from 16% to 40% with a median of 31% [15]. Atakte et al. through their systematic review and meta-analysis estimated the prevalence of hypertension at 30% in sub-Saharan Africa [11].

Associated factors to hypertension in Senegal (Old and new cases) based on the STEPS survey, 2015

The presence of at least one blood pressure measurement in one's life is an associated factor to hypertension: The fact of having taken one's blood pressure at least once in one's life was associated with a 3.22 times greater risk of being hypertensive compared to never having had it (p-Value < 0.001; OR=3.22; 95% CI = [2.02; 5.24]).

The presence of at least one cholesterol level in your life: Having taken your cholesterol level at least once in your life was associated with a 2.40 times greater risk of being hypertensive compared to not having any not done (p-Value=0.032; OR=2.40; 95% CI = [1.08; 5.39]).

These two results are sadly serious. They illustrate the virtual absence of monitoring of its vital parameters in primordial and primary prevention. Populations and health personnel seem to wait for the onset of illness to control blood pressure and cholesterol levels. There is an urgent need to promote self-measurements and in-office blood pressure measurements. We need to conduct qualitative studies to understand the reasons for the non-use of BP control in primary prevention, both in the population and among health personnel.

Advice received in the last 3 years to reduce your salt intake is a an associated factor to hypertension: The fact of having received advice during the last 3 years to reducing salt intake was associated with a 2.13 times greater risk of being hypertensive compared to not having received any (p-value =0.009; OR=2.13; 95% CI = [1.20; 3.77]).

Advice received in the past 12 months to reduce the amount of sugar in the diet: Receiving advice in the past 12 months to reduce the amount of sugar in the diet was associated with a 2.19 times greater risk of being hypertensive compared to not having received one (p-Value=0.032; OR=2.19; 95% CI = [1.06; 4.46]).

These results show how late awareness of cardiovascular risk factors is in our country. The advice for a reduction in the consumption of salt or sugar should be done more in primary prevention than primary and even less secondary.

BMI class is an associated factor to hypertension: Compared to having a BMI class corresponding to normal, having a BMI class corresponding to underweight was associated with a 2.25 times greater risk of being hypertensive (p-Value=0.003; OR=2.25; 95% CI = [1.30; 3.85]); being overweight was associated with a 2.17 times greater risk of being

hypertensive (p-Value< 0.002; OR=2.17; 95% CI = [1.33; 3.55]) and being obese III was associated with a 10.2 times greater risk of being hypertensive (p-Value = 0.047; OR=10.2; 95% CI = [1.41; 216]).

In a 2019 study, Leung found overweight and/or obesity to be a risk factor for hypertension in the Canadian population with an RR of 1.57 in women and 1.45 in men **[16].** Similarly Shikha Singh et al. in India, found that obesity and overweight were both risk factors for hypertension with a higher risk for obesity, with OR: 3.57 and OR: 1.99 respectively **[17].** Based on the Framingham cohort study, Kannel concluded that obesity is the major determinant of hypertension in the general population **[18].** The same was true with the study by Duda et al. in Ghana: a BMI > or equal to 30 was associated with 2.89 times greater risk (OR=2.89 [2.26,3.70], p<0.001) (19). Katchunga et al. found that overweight/obesity was associated with a 2.22 times greater risk of being hypertensive in adults from South Kivu in Congo (OR=2.22, p-Value<0.001) **[20].** A study in the Great Lakes region by Safari et al. found that hypertension was six times higher in obese than in non-obese (OR adjusted for age and sex = 6.2 [3.9–9.7]) **[21].** A study carried out in Benin once again showed that overweight-obesity was associated with a 4.81 times greater risk of being hypertensive (OR= 4.81, p-Value= 0.000) **[22].**

Age in class: Compared to being between 18-23 years old; being between 35-39 years old was associated with a 2.24 times greater risk of being hypertensive (p-Value=0.022; OR=2.24; 95% CI = [1.12; 4.47]) and between 65-70 years old was associated with 3.05 times more likely to be hypertensive (p-Value=0.026; OR=3.05; 95% CI = [1.14; 8.19]).

The higher the age group, the greater the risk of being hypertensive. Fuh Princewel found the same observation in Cameroon through the study: being aged 41 to 60 had an OR of 2.5 and being over 60 had an OR of 4.5 for being hypertensive compared to at least 40 years old **[23].** Also in Ghana, Duda et al. found that significant risk factors for hypertension included age greater than or equal to 50 years (OR=14.24 [10,74,18.8], p<0.001) **[19].** Selly Ruth Defianna et al. in Indonesia found the same finding by gender analysis **[24].** In Congolese adults from South Kivu, an age greater than 55 years was associated with a 2.35 times greater risk of being hypertensive (OR=2.35, p-Value < 0.001) **[20].** We also found, in one of our previous studies, the same finding for the risk of cardiovascular disease within the emergencies service's population in Senegal: being between the ages of 40 and 69 exposed to 2.83 times more risk and being over the age of 70 years exposed to 6.16 times more risk compared to at least 40 years **[10].**

Regular attitude taken to control your salt intake: Check the salt content indicated on the labels: The fact of checking its salt intake by checking the salt content indicated on the labels was

associated with 2.08 times less risk of being hypertensive compared to not doing it (p-Value=0.007; OR=0.48; 95% CI = [0.28; 0.80]).

Indeed high sodium intake (> 2 grams/day, the equivalent of 5 grams of salt per day) contributes to high blood pressure and the WHO has identified the decline in salt intake as the one of the most cost-effective measures that countries can take to improve the health situation of their populations **[25].** This result confirms the fact that the WHO recommends as one of the main strategies for the reduction of salt the fact of choosing for its consumption products low in sodium, this passes among other things by checking the salt content indicated on the labels **[25].**

In addition, since 2017, through its SHAKE strategy, the WHO has been advocating the adoption of labeling and marketing standards so that they accurately reflect the composition of foods, including their salt content. Indeed to allow consumers to make informed choices **[2].**

Frequency of eating high-salt foods (prepackaged savory snacks, canned food, fast food): Having a frequency of consuming high-salt foods (prepackaged savory snacks, canned food, fast food) ranked as “Often” was associated with 2.43 times less risk of being hypertensive compared to having a consumption frequency classified as “Never” (p-Value= 0.008; OR= 0.41; 95% CI = [0.21; 0.78]).

Associated factors to newly diagnosed hypertension in Senegal (New cases) based on the STEPS survey, 2015

Average quantity of meals eaten per week not prepared at home (breakfast, lunch and dinner is an associated factors to newly diagnosed hypertension profile: the higher the average, the more it is associated with 1.21 times less risk of being " new HTA” (p-Value =0.024; OR=0.85; 95% CI = [0.74; 0.97]).

This result suggests that meals prepared in Senegalese households are more hypertensinogenic than those prepared outside. This could be explained by the high salt content of ready meals in Senegalese households.

First, a survey of salt consumption in Senegal reveals that the amount of salt consumed per person per day is about the same regardless of place of residence and socioeconomic level **[26].** Then, NDAO DIAO et al. demonstrated that in Dakar and Thiès, individual daily salt consumption based on meals prepared at home varied from 8.81 to 32.34 g of salt/day, i.e. 176.2 to 646.8% of the value guide of 5g of salt per day recommended by the WHO **[25,27].**

Regular attitude taken to control your salt intake: Checking the salt content indicated on the labels is an associated factors to newly diagnosed hypertension profile: Checking the salt

content indicated on the labels is associated with 3.45 times less risk of being “new hypertension” than that which did not (p-value =0.004; OR=0.29; 95% CI = [0.12; 0.64]).

Here too, the regular attitude of controlling your salt intake by checking the salt content indicated on the labels is protective. This shows how much this simple behaviour is to be promoted.

History of heart attack, chest pain, stroke is an associated factors to newly diagnosed hypertension profile: Having had a cardiovascular event is associated with a 6.47 times greater risk of being “new hypertension” (p- Value =0.013; OR=6.47; 95% CI = [1.50; 30.1]).

This result is very sad. If it is necessary to discover one's hypertensive status following a cardiovascular accident, this once again testifies to an insufficiently proactive health system in terms of primary prevention and even secondary prevention of hypertension in within our populations. It is known that hypertension is a silent killer, which is why we need to be a generation of health professionals focused more and more on prevention. We are no longer satisfied with diagnosis and treatment.

Resting heart rate greater than 80 beats per minute is an associated factors to newly diagnosed hypertension profile: Having a resting heart rate greater than 80 beats per minute is associated with a 2.09 times greater risk of being "new hypertension" (p -Value =0.010; OR=2.09; 95% CI = [1.20; 3.70]).

Physiologically, according to Poiseuille's law, blood pressure depends on heart rate on the one hand (BP= SEV x HR x R). It is therefore understandable that a continuously high resting heart rate exposes you to hypertension **[28].**

Indeed, several studies find that a high resting heart rate is a risk factor for the occurrence of hypertension. Taku Inoue et al. in Japan demonstrated that a higher heart rate predicts the risk of developing hypertension in a normotensive cohort **[29].** Palatini Paolo et al. in France found through the HARVEST Study that patients whose heart rate was consistently high (>85 bpm) during the study had a doubly increased risk of developing sustained hypertension compared to subjects with a normal heart rate **[30].**

Gender is an associated factors to newly diagnosed hypertension profile: Being female is associated with 2.32 times less risk of being “new hypertension” (p-Value =0.006; OR=0.43; 95% CI = [0.24; 0.79]).

This could be explained by the fact that women, for physiological (female hormones) and social (less stress due to a lower level of social responsibilities) reasons, are less at risk of cardiovascular disease in general compared to men. Traore et al. found that women were 2.24

times less likely to have cardiovascular disease than men in the patient population of reception and emergency services in Senegal **[10].**

However, in view of the literature, it must be said that this ceases to be accurate after menopause. Indeed, menopause is associated with a significant increase in arterial and metabolic risk **[31–33].** In adults, up to 50–60 years of age, high blood pressure is less common in women than in men **[31–33].** After menopause, the risk of arterial hypertension in women increases and quickly reaches that of men to even exceed it from the seventh decade **[31–33].** We talk about the vascular and metabolic transition of women **[34].**

Consumption of palm oil is an associated factors to newly diagnosed hypertension profile: Its consumption is associated with a 2.65 times greater risk of being “new hypertension” (p-Value =0.047; OR=2.65; 95% CI = [1.09 ; 7.63]).

The literature is very cautious about the existence of a link between palm oil and cardiovascular disease. Jean-Michel Lecerf of the Institut Pasteur, asserted with great reserve that: "A growing and excessive consumption of palm oil in our diet, through manufactured products, could be harmful" **[35].** Sophia Rasheeqa Ismail et al. stated that given the abundance of palm oil on the market, it is difficult to quantify its true association with cardiovascular disease outcomes (36) and concluded at the end of her systematic review that she did not could not establish strong evidence for or against palm oil consumption with respect to cardiovascular disease risk and cardiovascular disease-specific mortality **[36].** Eva Gesteiro et al. after critically reviewing the two main published reviews on palm oil and several studies that are more recent concluded that there are relevant methodological errors so that extrapolation of data is currently very difficult **[37].**

Mohamed A Bayorh et al. demonstrated that in rats, palm oil attenuates the progression of salt-induced hypertension and mortality, via mechanisms involving modulation of endothelial function and reduction of oxidative stress **[38].**

However, Chun-Yi et al. in an experimental study still in rats found that prolonged consumption of palm oil heated repeatedly causes an increase in blood pressure **[39].**

In short, in view of the literature and our result which affirms that the consumption of palm oil increases by 2.65 times the risk of being hypertensive who is unaware of it in Senegal, poses the following problems: What is the composition of palm oil consumed in Senegal? What are the culinary attitudes of the Senegalese towards palm oil: several times heated reused?

Average fasting blood sugar is an associated factors to newly diagnosed hypertension profile: the higher the average, the more it is associated with a 2.66 times greater risk of being “new hypertension” (p-Value =0.025; OR=2.66; 95% CI = [1.10; 6.61]). Duda et al. in Ghana, found

that high fasting blood sugar was associated with a 3.98 times greater risk of hypertension (OR=3.98 [2.38, 6.64], p<0.001) **[19]** . Leung found that the state of diabetes was a risk factor for hypertension in the Canadian population with an RR of 2.25 in women and 1.68 in men **[16].** A study carried out among 699 Congolese from South Kivu aged 20 and over revealed that diabetes mellitus increased the risk of hypertension by 2.67 times (OR=2.67, p-Value<0.05) **[20].**

Factors associated with being poorly controlled known hypertensive in Senegal based on the STEPS survey, 2015

The degree of personal perception of the importance of reducing one's salt consumption is an associated factor to the "known poorly controlled hypertension" profile: Being a subject whose degree of personal perception of the importance of reducing one's salt consumption salt is “Very important” was associated with a 21.7 times greater risk of being poorly controlled with hypertension compared to the subject responding “fairly important” (p-Value = 0.018; OR=21.7; 95% CI = [2.49; 601]). This observation is truly regrettable.

Physical activity only when moving is an associated factor to the "known poorly controlled hypertension" profile: Performing physical activity only when moving was associated with 9.09 times less risk of being known to be poorly controlled hypertensive compared to the subject who not doing so (p-Value = 0.015; OR=0.11; 95% CI = [0.02; 0.58]).

Indeed, physical activity is beneficial for the hypertensive subject **[40,41].** A significant drop in blood pressure numbers occurs after physical activity and can be sustained for 9 to 22 hours **[42].** This decrease is greater in the hypertensive subject than in the normal tense subject **[43].** It decreases from 4 to 9 mmHg of SBP in the hypertensive subject **[42,43].** Through a meta-analysis, Cornelissen et al demonstrated that moderate-intensity dynamic (endurance) physical activity was more beneficial than static (resistance) physical activity **[43].** It is therefore not surprising that physical activity performed during movements only, which is more endurance than resistance, is a protective factor against poorly controlled hypertension **[44].** Regular physical activity can be a real antihypertensive treatment **[43].** Roberts et al. demonstrated that simple regular moderate-intensity dynamic physical activity could reduce the number of hypertensive patients on treatment **[45].** Thus, the practice of dynamic physical activity of moderate and regular intensity (at least 3 to min per day over 5 to 7 days) is a recommendation class I level of evidence A for the management of arterial hypertension according to learned societies **[46].**

This is even more effective in the African subject and is explained on a physiological level. Indeed, it is known that hypertensive black subjects have higher endothelin levels than

hypertensive Caucasians **[47–49].** While endothelin is one of the most potent systemic vasoconstrictors **[47–49].** Thus, physical activity, which installs systemic vasodilation, acts by reducing the effect of this endothelin, especially in black subjects.

Advice received over the past 3 years to reduce salt intake is an associated factor to the "known poorly controlled hypertension" profile: Having received this advice was associated with a 12.1 times greater risk of being poorly controlled hypertensive compared to the subject who did not had not received any (p-Value = 0.023; OR=12.1; 95% CI = [1.81; 144]).

This again proves the very little proactive nature of our health system for the primordial and primary prevention of arterial hypertension in our country. Advice is given more to prevalent cases of hypertension than to healthy subjects.

Regular attitude taken to control one's salt intake: Limiting the consumption of salty ready meals is an associated factor to the "known poorly controlled hypertension" profile: Limiting the consumption of salty ready meals was associated with a 25 times lower risk of being hypertensive controlled compared to the subject who did not (p-Value = 0.046; OR=0.04; 95% CI = [0.00; 0.57]).

Reducing salt intake to less than 5 g per day is a class 1 and level A evidence recommendation for the management of high blood pressure **[46]** and is also recommended by the WHO **[25].** The result of our study shows how important this recommendation is. Indeed, the simple limitation of the consumption of salty ready meals was associated with 25 times less risk of being poorly controlled hypertensive in Senegal.

The formidable effectiveness on hypertension of all these small gestures which tend to reduce salt consumption can be explained physiologically by the phenomenon of water and sodium retention and increased sensitivity to salt in subjects with black complexion **[49– 55].** Indeed, black subjects are in a state of basal sodium retention, responsible for hypervolemia which suppresses the RAAS (low renin, low or normal aldosterone) **[49–55].** Thus, an increase in salt intake will cause hypertension because it is impossible for the body and essentially for the kidney to adapt the elimination of sodium to the quantity of salt provided by the diet. This results in retention of sodium and water, with an increase in circulating blood volume, hence hypertension **[49–55].**

This basal sodium retention state is explained by mutations in the gene encoding the ENaC channel (epithelial sodium channel) of the collecting tubule, increasing the activity of this channel which supports the final regulation of the sodium balance and thereby causing increased sodium reabsorption even basal and continuous **[49–55].** This mutation found in black subjects offered a survival advantage in conditions of drought and lack of sodium to

preserve blood volume **[49–55].** However, with a Western diet, very rich in sodium, it predisposes to hypertension **[49–55].**

While it has been shown that the Senegalese consume at least twice as much salt as the daily threshold recommended by the WHO. Indeed, the study by NDAO DIAO et al reveals that both Dakar residents and Thiess residents consume between 8.81 and 32.34g of salt/day, i.e. 176.2 to 646.8% of the daily intake recommended by the WHO) **[27].**

The therapeutic implications are that the antihypertensive showing the greatest efficacy for blood pressure control in black patients are thiazide diuretics and calcium channel blockers **[56–58].** A combination with an RAAS blocker is proposed, above all for their organo-protection because their expected contribution to lowering blood pressure is less, due to a suppressed RAAS **[56–58].**

Conclusions

In conclusion, we can draw from our study the following strong points:

Insufficient control of its parameters: The fact of having already had a health professional take it at least once in its life, its blood pressure was found in 60.6%; its glycaemia 20.7% and its cholesterolemia 4.3% of Senegalese.

The Senegalese family kitchen exposes to hypertension: The higher the average quantity of meals eaten per week not prepared at home, the more it is associated with 1.21 times less risk of being "new hypertension".

Small actions to reduce salt consumption have a positive effect on hypertension: checking your salt intake by checking the salt content indicated on the labels was associated with 2.08 times less risk of being hypertensive and 3.45 times less risk of being “new hypertension”; limiting the consumption of savory ready meals was associated with a 25 times lower risk of being poorly controlled with hypertension.

The simplest physical activity has a positive action on hypertension: Performing physical activity only when moving was associated with 9.09 times less risk of being poorly controlled hypertensive

Senegal's health system is very little proactive in the primordial and primary prevention of hypertension: The fact of having received advice during the last 3 years to reduce salt consumption was associated with a 2.13 times greater risk of to be hypertensive; Having received advice in the past 12 months to reduce the amount of sugar in the diet was associated with a 2.19 times greater risk of being hypertensive; Having had a cardiovascular event is associated with a 6.47 times greater risk of being “new hypertension”; Having received advice

in the past 3 years to reduce salt intake was associated with a 12.1 times greater risk of having poorly controlled hypertension

The Senegalese population only comes into contact with health services when they are already sick: Having taken their blood pressure at least once in their life was associated with a 3.22 times greater risk of being hypertensive; Having taken cholesterol levels at least once in life was associated with a 2.40 times greater risk of being hypertensive; Being a subject whose degree of personal perception of the importance of reducing salt intake is “Very important” was associated with a 21.7 times greater risk of being poorly controlled with hypertension.

An inconvenient truth: the consumption of palm oil is associated with a 2.65 times greater risk of being “new hypertension”.

Truths about cardiovascular risk factors, from Western studies, seem timeless and universal: being overweight was associated with 2.17 times more risk of being hypertensive and being in obesity III was associated with 10.2 times more risk; The higher the age group, the greater the risk of being hypertensive (being between 35-39 years old was associated with 2.24 times more risk of being hypertensive and being between 65-70 years old was associated with 3.05 times more risk); Having a resting heart rate above 80 bpm is associated with a 2.09 times greater risk of being "new hypertension"; Being female is associated with 2.32 times less risk of being "new hypertension"; The higher the average fasting blood sugar, the more it is associated with a 2.66 times greater risk of being “new hypertension”.

Recommendations

Given the national scope of the database of our study, in the light of the results of our analyses and following the discussion, we formulate the following recommendations for the achievement of target 3. of the SDGs in Senegal:

To the people

It is in the absence of disease that we act for our health!

- Do not wait for illness to have regular checks on your health parameters: blood pressure, fasting blood sugar, cholesterol, BMI
- Senegalese women: Replace salt with other spices when preparing meals

To health practitioners

Go to the people!

- Develop essential prevention through advice for behavioural changes vis-à-vis the risk factors of hypertension in general and in particular for the reduction of consumption of salt, sugar, palm oil and using travel for physical activity

- Work to increase within the population the degree of personal perception of the importance of reducing salt consumption for their health

To researchers

Conduct studies to understand the proponents of bad attitudes!

- Qualitative type study to understand the factors limiting the use of blood pressure, glycaemia and cholesterolaemia control outside the disease of the Senegalese population
- Knowledge, attitude and practice type study on the use of salt and its health consequences among Senegalese women

To administrative authorities

- Encourage private pharmacies to provide free blood pressure monitoring for subjects aged 18 and over
- Develop more public space for physical activity in general and in particular for physical activity when traveling (walking, cycling)

To political authorities

Create legislative, media, economic and health frameworks favourable to the fight against arterial hypertension!

- Promote good attitudes among the populations such as checking the salt content indicated on the labels, limiting the consumption of salty ready meals
- Make mandatory the labelling providing information on the salt concentration of foods sold in Senegal
- Facilitate public access to approved electronic blood pressure monitors
- Develop free policies for six-monthly monitoring of blood pressure, blood sugar, cholesterol and BMI among Senegalese aged 18 and over
- Ensure the availability and continuous accessibility in quantity and quality of the following four classes of anti-hypertensive: thiazide/thiazide-like diuretics, anti-aldosterone, calcium channel blocker and IEC/ARA2
- Set up a national program to combat high blood pressure

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Table 1. **Distribution according to socio-demographic characteristics of respondents in the national WHO Stepwise survey, Senegal 2015.**

	n	%	95%CI	N
GLOBAL CONTEXT: ENVIRONMENT				
Environment				**5343**
Rural	3103	*58.1*	**[56.73 ; 59.40]**	
Urban	2240	*41.9*	**[40.59 ; 43.26]**	
LIVING ENVIRONMENTS: FAMILY				
Number of people over the age of eighteen living in the household under your care				
Mean (Standard Deviation)	4.37 (2.88)	-	**[4.29 ; 4.44]**	
Median [Min, Max]	4.00 [1.00, 30.0]	-	-	
INDIVIDUAL CHARACTERISTICS OF SOCIODEMOGRAPHIC ECONOMIC ORDER				
Sex				**5343**
Male	1958	*36.6*	**[35.35 ; 37.95]**	
Women	3385	*63.4*	**[62.04 ; 64.64]**	
Age in class				**5343**
18-23 years old	1009	*18.9*	**[17.84 ; 19.96]**	
24-29 years old	806	*15.1*	**[14.14 ; 16.07]**	
30-34 years old	700	*13.1*	**[12.21 ; 14.04]**	
35-39 years old	627	*11.7*	**[10.89 ; 12.63]**	
40-44 years old	603	*11.3*	**[10.45 ; 12.17]**	
45-49 years old	454	*8.5*	**[7.76 ; 9.28]**	
50-54 years old	380	*7.1*	**[6.44 ; 7.84]**	
55-59 years old	329	*6.2*	**[5.53 ; 6.84]**	
60-64 years old	244	*4.6*	**[4.03 ; 5.16]**	
65-70 years old	191	*3.6*	**[3.10 ; 4.11]**	
Number of years to study				**5272**
Mean (Standard Deviation)	4.17 (5.35)	-	**[4.02 ; 4.32]**	
Median [Min, Max]	1.00 [0, 30.0]	-	-	
Highest level of education attained				**5337**
Refusal to answer	4	*0.1*	**[0.02 ; 0.20]**	
No official instructions	2952	*55.3*	**[53.96 ; 56.65]**	
Less than primary school	614	*11.5*	**[10.66 ; 12.39]**	

End of primary school	787	*14.7*	**[13.81 ; 15.73]**	
End of secondary school	480	*9.0*	**[8.24 ; 9.80]**	
End of high school or equivalent	247	*4.6*	**[4.08 ; 5.23]**	
College, University	196	*3.7*	**[3.19 ; 4.22]**	
Post-graduate diploma obtained	57	*1.1*	**[0.81 ; 1.39]**	
Marital status				**5343**
Cohabitation	6	*0.1*	**[0.04 ; 0.25]**	
Divorced	130	*2.4*	**[2.04 ; 2.89]**	
Never married	949	*17.8*	**[16.75 ; 18.81]**	
Bride	3937	*73.7*	**[72.47 ; 74.85]**	
Refusal to answer	7	*0.1*	**[0.05 ; 0.28]**	
Separated	36	*0.7*	**[0.47 ; 0.94]**	
Widowed	278	*5.2*	**[4.63 ; 5.84]**	
Socio-professional activity				**5343**
Volunteer	46	*0.9*	**[0.63 ; 1.15]**	
Unemployed	311	*5.8*	**[5.21 ; 6.49]**	
Private employee	307	*5.7*	**[5.14 ; 6.41]**	
State employee	130	*2.4*	**[2.04 ; 2.89]**	
Student)	363	*6.8*	**[6.14 ; 7.50]**	
Self-employed (including farmer, breeder, fisherman)	2565	*48.0*	**[46.65 ; 49.35]**	
Invalid	4	*0.1*	**[0.02 ; 0.20]**	
Housewife	1522	*28.5*	**[27.28 ; 29.72]**	
Refusal to answer	11	*0.2*	**[0.10 ; 0.38]**	
Retirement	84	*1.6*	**[1.26 ; 1.95]**	
Estimated annual household income				**2217**
Refusal to answer	90	*4.1*	**[3.29 ; 4.98]**	
Do not know	1074	*48.4*	**[46.34 ; 50.54]**	
Less than 60,000 CFA	239	*10.8*	**[9.53 ; 12.16]**	
Between 60,000 and 100,000 CFA	130	*5.9*	**[4.93 ; 6.94]**	
Between 100,000 and 150,000 CFA	126	*5.7*	**[4.77 ; 6.75]**	
Between 150,000 and 225,000 CFA	144	*6.5*	**[5.52 ; 7.62]**	
More than 225,000 CFA	414	*18.7*	**[17.08 ; 20.37]**	

Table 2: Distribution according to variables relating to smoked tobacco in the national WHO Stepwise survey, Senegal 2015.

	n	%	95%CI	N
SMOKING ACTIVE SMOKING				
Current consumption of smoked tobacco				**5321**
No	5008	*94.1*	**[93.44 ; 94.72]**	
Yes	313	*5.9*	**[5.27 ; 6.55]**	
Daily consumption of smoked tobacco				**313**
No	36	*11.5*	**[8.28 ; 15.69]**	
Yes	277	*88.5*	**[84.30 ; 91.71]**	
The duration of the daily consumption of smoked tobacco in terms of age of onset				**295**
Mean (Standard Deviation)	19.4 (5.78)	-	**[18.69 ; 20.02]**	
Median [Min, Max]	19.0 [8.00, 46.0]	-	**-**	
The average amount of daily industrial cigarette consumption				**269**
Mean (Standard Deviation)	5.32 (6.16)	-	**[4.58 ; 6.05]**	
Median [Min, Max]	4.00 [0, 25.0]	-	**-**	
The average amount of daily consumption of rolled cigarettes				**264**
Mean (Standard Deviation)	2.34 (5.00)	-	**[1.73 ; 2.95]**	
Median [Min, Max]	0 [0, 30.0]	-	**-**	
The average amount of daily pipe consumption				**268**
Mean (Standard Deviation)	1.18 (4.05)	-	**[0.69 ; 1.67]**	
Median [Min, Max]	0 [0, 30.0]	-	**-**	
The average amount of daily consumption of cigars, cigarillons				**272**
Mean (Standard Deviation)	0.0110 (0.182)	-	**[0.010 ; 0.032]**	

Median [Min, Max]	0 [0, 3.00]	-	-	
The average amount of weekly industrial cigarette consumption				**79**
Mean (Standard Deviation)	5.63 (18.6)	-	**[1.45 ; 9.80]**	
Median [Min, Max]	0 [0, 140]	-	-	
The average amount of weekly consumption of rolled cigarettes				**131**
Mean (Standard Deviation)	0.664 (4.07)	-	**[0.039 ; 1.36]**	
Median [Min, Max]	0 [0, 35.0]	-	-	
The average amount of weekly pipe consumption				**148**
Mean (Standard Deviation)	0.0473 (0.294)	-	**[0.00039;0.094]**	
Median [Min, Max]	0 [0, 2.00]	-	-	
The average amount of weekly consumption of cigars, cigarillons				**153**
Mean (Standard Deviation)	0.0392 (0.485)	-	**[0.038 ; 0.11]**	
Median [Min, Max]	0 [0, 6.00]	-	-	
Past smoking				**4995**
No	4722	*94.5*	**[93.85 ; 95.14]**	
Yes	273	*5.5*	**[4.85 ; 6.14]**	
Daily consumption in the past				**307**
No	61	*19.9*	**[15.64 ; 24.86]**	
Yes	246	*80.1*	**[75.13 ; 84.35]**	
The age of smoking cessation in terms of the age at which you stopped				**266**
Mean (Standard Deviation)	30.2 (12.1)	-	**[28.71 ; 31.62]**	
Median [Min, Max]	28.5 [8.00, 64.0]	-	-	
Smoking cessation attempt in the last 12 months				**311**
No	123	39.5	**[34.11 ; 45.24]**	
Yes	188	60.5	**[54.75 ; 65.88]**	
PASSIVE SMOKING				
Exposure to second-hand tobacco smoke in the past 30 days at home				**5305**
No	4262	*80.3*	**[79.23 ; 81.39]**	

Yes	1043	*19.7*	**[18.60 ; 20.76]**	
Exposure to second-hand tobacco smoke in the last 30 years in an enclosed area at work				**5304**
Do not work in a closed environment	1933	*36.4*	**[35.14 ; 37.75]**	
No	3026	*57.1*	**[55.70 ; 58.38]**	
Yes	345	*6.5*	**[5.86 ; 7.21]**	
Exposure to second-hand tobacco smoke both at home and at work				**5305**
No	5068	*95.5*	**[94.93 ; 96.06]**	
Yes	237	*4.5*	**[3.93 ; 5.06]**	
Exposure to second-hand tobacco smoke at home and/or work				**5304**
No	4153	*78.3*	**[77.16 ; 79.39]**	
Yes	1151	*21.7*	**[20.60 ; 22.83]**	
NON-SMOKED SMOKING				
Current use of smokeless tobacco				**5303**
No	5279	*99.5*	**[99.31 ; 99.70]**	
Yes	24	*0.5*	**[0.29 ; 0.68]**	
Daily consumption of smokeless tobacco				**23**
No	5	*21.7*	**[8.29 ; 44.20]**	
Yes	18	*78.3*	**[55.79 ; 91.70]**	
Daily frequency of sucking tobacco use				**17**
Mean (Standard Deviation)	5.71 (5.47)	-	**[2.89 ; 8.52]**	
Median [Min, Max]	7.00 [0, 20.0]	-	**-**	
Daily frequency of snuff use				**17**
Mean (Standard Deviation)	0.29 (1.21)	-		
Median [Min, Max]	0 [0, 5.00]	-		
Daily frequency of chewing tobacco use				**16**
Mean (Standard Deviation)	1.12 (2.13)	-	**[0.0074 ; 2.25]**	
Median [Min, Max]	0 [0, 7.00]	-	**-**	
Daily frequency of hemp consumption				**16**
Mean (Standard Deviation)	0 (0)	-	**-**	

Median [Min, Max]	0 [0, 0]	-	-	
Weekly frequency of snuff tobacco use				**5**
Mean (Standard Deviation)	0 (0)	-	-	
Median [Min, Max]	0 [0, 0]	-	-	
Weekly frequency of snuff use				**16**
Mean (Standard Deviation)	0 (0)	-	-	
Median [Min, Max]	0 [0, 0]	-	-	
Weekly frequency of chewing tobacco consumption				**10**
Mean (Standard Deviation)	0.300 (0.675)	-	**[0.18 ; 0.78]**	
Median [Min, Max]	0 [0, 2.00]	-	-	
Weekly frequency of hemp consumption				**16**
Mean (Standard Deviation)	0 (0)	-	-	
Median [Min, Max]	0 [0, 0]	-	-	
The former consumption of non-smoked tobacco				**5281**
No	5263	*99.7*	**[99.45 ; 99.79]**	
Yes	18	*0.3*	**[0.20 ; 0.54]**	
Former daily consumption of non-smoked tobacco				**24**
No	15	*62.5*	**[40.75 ; 80.44]**	
Yes	9	*37.5*	**[19.55 ; 59.24]**	

Table 3: Distribution according to alcohol consumption over the last 12 months and last 30 days preceding the national WHO Stepwise survey, Senegal 2015.

	n	**%**	**95%CI**	**N**
ALCOHOL CONSUMPTION OVER THE LAST 12 MONTHS AND LAST 30 DAYS PRIOR TO THE SURVEY				
Naiveness in relation to alcohol consumption				**5302**

No	5124	*96.6*	**[96.11 ; 97.10]**	
Yes	178	*3.4*	**[2.89 ; 3.88]**	
Alcohol consumption in the past 12 months				**175**
No	67	*38.3*	**[31.13 ; 45.95]**	
Yes	108	*61.7*	**[54.04 ; 68.86]**	
Alcohol consumption over the past 30 days				**108**
No	38	*35.2*	**[26.40 ; 45.03]**	
Yes	70	*64.8*	**[54.96 ; 73.59]**	
FREQUENCY AND QUANTITY OF ALCOHOL CONSUMPTION OVER THE LAST 12 MONTHS AND LAST 30 DAYS PRIOR TO THE SURVEY				
Frequency of alcohol consumption over the past 12 months				**107**
Less than once a month	50	*46.7*	**[37.10 ; 56.58]**	
1-3 days per month	20	*18.7*	**[12.05 ; 27.63]**	
1-2 days a week	15	*14.0*	**[8.31 ; 22.38]**	
3-4 days a week	3	*2.80*	**[0.72 ; 8.57]**	
5-6 days a week	4	*3.74*	**[1.20 ; 9.85]**	
Daily	15	*14.0*	**[8.31 ; 22.38]**	
Frequency of alcohol consumption over the past 30 days: Number of occasions of alcohol consumption of at least 1 standard drink				**65**
Mean (Standard Deviation)	3.97 (6.03)	-	**[2.47 ; 5.46]**	
Median [Min, Max]	2.00 [1.00, 30.0]	-	**-**	
The average number of standard drinks of alcohol drunk per drinking occasion in the past 30 days				
Mean (Standard Deviation)	4.22 (6.86)	-	**[2.51 ; 5.91]**	
Median [Min, Max]	2.00 [1.00, 45.0]	-	**-**	
Most standard drinks of alcohol drunk at one time in the past 30 days				**62**
Mean (Standard Deviation)	3.98 (6.41)	-	**[2.35 ; 5.61]**	
Median [Min, Max]	3.00 [1.00, 50.0]	-	**-**	

During the past 30 days, how often did you have six or more standard drinks of alcohol on one occasion? Heavy alcohol consumption in the past 30 days				**63**
Mean (Standard Deviation)	2.11 (2.96)	-	**[1.36 ; 2.85]**	
Median [Min, Max]	1.00 [0, 15.0]	-	**-**	
FREQUENCY OF ALCOHOL CONSUMPTION IN THE 7 DAYS OF THE LAST WEEK PRIOR TO THE SURVEY				
The number of standard drinks of alcohol drunk on each of the 7 days in the last week				
Monday				**54**
Mean (Standard Deviation)	1.24 (5.48)	-	**[0.25 ; 2.73]**	
Median [Min, Max]	0 [0, 40.0]	-	**-**	
Tuesday				**53**
Mean (Standard Deviation)	1.32 (5.55)	-	**[0.20 ; 2.85]**	
Median [Min, Max]	0 [0, 40.0]	-	**-**	
Wednesday				**53**
Mean (Standard Deviation)	1.34 (5.58)	-	**[0.19 ; 2.87]**	
Median [Min, Max]	0 [0, 40.0]	-		
THURSDAY				**54**
Mean (Standard Deviation)	1.28 (5.55)	-	**[0.23 ;2.79]**	
Median [Min, Max]	0 [0, 40.0]	-	**-**	
Friday				**55**
Mean (Standard Deviation)	1.33 (5.48)	-	**[0.15 ; 2.80]**	
Median [Min, Max]	0 [0, 40.0]	-		
SATURDAY				**54**
Mean (Standard Deviation)	1.87 (5.57)	-	**[0.35 ; 3.39]**	
Median [Min, Max]	0.500 [0, 40.0]	-	**-**	
Sunday				**56**
Mean (Standard Deviation)	1.98 (5.71)	-	**[0.45 ; 3.51]**	
Median [Min, Max]	0 [0, 40.0]	-	**-**	
DEPENDENCY AND NEGATIVE CONSEQUENCES DUE TO ALCOHOL CONSUMPTION IN THE LAST 12 MONTHS				

Dependence on alcohol consumption in the past 12 months: In the past 12 months, how often have you noticed that you were no longer able to stop drinking after you started?				**70**
Never	50	*71.4*	**[59.20 ; 81.28]**	
Less than once a month	5	*7.1*	**[2.65 ; 16.56]**	
Once a month	4	*5.7*	**[1.84 ; 14.73]**	
Once a week	4	*5.7*	**[1.84 ; 14.73]**	
Daily or Almost	7	*10.0*	**[4.45 ; 20.10]**	
Dependence on alcohol consumption in the past 12 months: In the past 12 months, how often, after a period of heavy drinking, did you have to drink alcohol first thing in the morning to get back into shape?				**108**
Never	85	*78.7*	**[69.56 ; 85.75]**	
Less than once a month	7	*6.5*	**[2.86 ; 13.36]**	
Once a month	1	*0.9*	**[0.48 ; 5.79]**	
Once a week	9	*8.3*	**[4.12 ; 15.64]**	
Daily or Almost	6	*5.6*	**[2.27 ; 12.18]**	
Negative consequences of drinking alcohol in the past 12 months: In the past 12 months, how often did drinking alcohol prevent you from doing what you were normally expected of you?				**108**
Never	94	*87.0*	**[7887 ; 92.47]**	
Less than once a month	5	*4.6*	**[1.71 ; 10.99]**	
Once a month	1	*0.9*	**[0.48 ; 5.79]**	
Once a week	6	*5.6*	**[2.27 ; 12.18]**	
Daily or Almost	2	*1.9*	**[0.32 ; 7.18]**	
The negative consequences of drinking alcohol in the past 12 months: In the past 12 months, have you had problems with your family or with your partner because of someone else's drinking ?				**5267**
No	5206	*98.8*	**[98.50 ; 99.10]**	

Yes, once or twice	32	*0.6*	**[0.42 ; 0.86]**	
Yes, several times but less than once a month	6	*0.1*	**[0.04 ; 0.26]**	
Yes, every month	1	*0.02*	**[9.91 x10^{-6} ; 1.23x10^{-3}]**	
Yes, more than once a month	22	*0.4*	**[0.26 ; 0.64]**	
STOP ALCOHOL CONSUMPTION FOR HEALTH REASONS				
Stopping alcohol consumption for health reasons				**64**
No	45	*70.3*	**[57.41 ; 80.75]**	
Yes	19	*29.7*	**[19.24 ; 42.58]**	
CONSUMPTION OF TAX-FREE ALCOHOL AS BRAZE AT HOME IN THE LAST 7 DAYS				
Consumption of tax-free alcohol such as brazed at home in the past 7 days				**70**
No	51	*72.9*	**[60.70 ; 82.47]**	
Yes	19	*27.1*	**[17.52 ; 39.29]**	
Amount of tax-exempt alcohol consumption as home brewed in the last 7 days: Liquor brewed at home				**14**
Mean (Standard Deviation)	1.07 (1.69)	-	**[0.098 ; 2.04]**	
Median [Min, Max]	0.500 [0, 6.00]	-	**-**	
Quantity of tax-exempt alcohol consumption as home-brewed in the last 7 days: Beer or Wine home-brewed				**16**
Mean (Standard Deviation)	2.63 (2.03)	-	**[1.54 ; 3.70]**	
Median [Min, Max]	2.00 [0, 7.00]	-	**-**	
Amount of consumption of tax-exempt alcohol as home-brewed in the last 7 days: Alcohol imported from another country				**15**
Mean (Standard Deviation)	0.733 (1.10)	-	**[0.12 ; 1.34]**	
Median [Min, Max]	0 [0, 4.00]	-	**-**	
Amount of tax-exempt alcohol consumption as home-brewed in the last 7 days: Alcohol not intended for consumption				**11**
Mean (Standard Deviation)	0.364 (1.21)	-		
Median [Min, Max]	0 [0, 4.00]	-		

Amount of tax-exempt alcohol consumption as home-brewed in the last 7 days: Other tax-exempt alcohol				**12**
Mean (Standard Deviation)	0.0833 (0.289)	-		
Median [Min, Max]	0 [0, 1.00]	-		

Table 4: Distribution according to fruit and vegetable consumption in the WHO national Stepwise survey, Senegal 2015.

	n	**%**	**95%CI**	**N**
FRUIT AND VEGETABLE CONSUMPTION				
The frequency of fruit consumption in terms of number of days per week				**5187**
Mean (Standard Deviation)	2.39 (2.27)	-	**[2.32 ; 2.45]**	
Median [Min, Max]	2.00 [0, 7.00]	-	**-**	
The amount of fruit consumption in terms of portions consumed in a consumption day				**3971**
Mean (Standard Deviation)	1.91 (1.38)	-	**[1.86 ; 1.95]**	
Median [Min, Max]	2.00 [1.00, 20.0]	-	**-**	
The frequency of vegetable consumption in terms of number of days per week				**5253**
Mean (Standard Deviation)	4.93 (2.52)	-	**[4.86 ; 5.00]**	
Median [Min, Max]	7.00 [0, 7.00]	-	**-**	
The amount of vegetable consumption in terms of servings consumed in a consumption day				**4747**
Mean (Standard Deviation)	3.99 (2.86)	-	**[3.90 ;4.06]**	
Median [Min, Max]	3.00 [1.00, 20.0]	-	**-**	
Consumption of uncooked vegetables				**4831**
No	3285	*68.0*	**[66.65 ; 69.30]**	
Yes	1546	*32.0*	**[30.69 ; 33.34]**	

The frequency in days per week of the consumption of uncooked vegetables				**1538**
Mean (Standard Deviation)	2.25 (1.86)	-	**[2.15 ; 2.34]**	
Median [Min, Max]	2.00 [1.00, 20.0]	-	**-**	
SALT CONSUMPTION				
The frequency of adding salt or a salty sauce or a salty seasoning to the meal after cooking				**5292**
Do not know	62	1.17	**[0.90 ; 1.50]**	
Never	3342	63.2	**[61.83 ; 64.45]**	
Rarely	474	8.96	**[8.20 ; 9.76]**	
Sometimes	296	5.59	**[4.99 ; 6.25]**	
Often	477	9.01	**[8.26 ; 9.82]**	
Always	641	12.1	**[11.25 ; 13.02]**	
The frequency of adding salt or a salty sauce or salty seasoning when cooking the meal at home				**5292**
Do not know	84	1.59	**[1.27 ; 1.97]**	
Never	784	14.8	**[13.87 ; 15.80]**	
Rarely	374	7.07	**[6.39 ; 7.79]**	
Sometimes	277	5.23	**[4.65 ; 5.87]**	
Often	383	7.24	**[6.56 ; 7.97]**	
Always	3390	64.1	**[62.74 ; 65.35]**	
The frequency of eating foods high in salt (pre-packaged salty snacks, canned food, fast food)				**5290**
Do not know	140	2.65	**[2.23 ; 3.12]**	
Never	2433	46.0	**[44.64 ; 47.34]**	
Rarely	1320	25.0	**[23.79 ; 26.14]**	
Sometimes	640	12.1	**[11.23 ; 13.01]**	
Often	553	10.5	**[9.64 ; 11.31]**	
Always	204	3.86	**[3.36 ; 4.41]**	
The degree of personal perception of the importance of reducing consumption				**5294**
Do not know	111	2.10	**[1.73 ; 2.52]**	

Not important at all	214	4.04	**[3.53 ; 4.61]**	
Rather important	1012	19.1	**[18.07 ; 20.20]**	
Very important	3957	74.7	**[73.54 ; 75.90]**	
The knowledge that high salt consumption can cause health problems				**5295**
Yes	4696	88.7		
No	445	8.40		
Do not know	154	2.91		
Regular attitude taken to control your salt intake: Limit the consumption of salty ready meals				**5294**
No	1744	32.9	**[31.68 ; 34.23]**	
Yes	3550	67.1	**[65.76 ; 68.31]**	
Regular attitude taken to control your salt intake: Check the salt content indicated on the labels				**5294**
No	4448	84.0	**[82.99 ; 84.99]**	
Yes	846	16.0	**[15.00 ; 17.00]**	
Regular attitude taken to control your salt intake: Buy salt and/or sodium substitutes				**5294**
No	3230	61.0	**[59.68 ; 62.32]**	
Yes	2064	39.0	**[37.67 ; 40.31]**	
Regular attitude taken to control your salt intake: Use spices other than salt in the preparation of dishes				**5294**
No	2618	49.5	**[48.09 ; 50.80]**	
Yes	2676	50.5	**[49.19 ; 51.90]**	
Regular attitude taken to control your salt intake: Avoid eating meals prepared elsewhere than at home				**5294**
No	2822	53.3	**[51.95 ; 54.65]**	
Yes	2472	46.7	**[45.34 ; 48.04]**	
Regular attitude taken to control your salt intake: Any other measure intended specifically to control your salt intake				**5294**

No	5264	99.4	**[99.18 ; 99.61]**	
Yes	30	0.57	**[0.38 ; 0.81]**	
FAST SUGAR CONSUMPTION				
Sugar consumption in cubes				**5298**
No	87	*1.6*	**[1.32 ; 2.03]**	
Yes	5211	*98.4*	**[97.96 ; 98.67]**	
Consumption of sugary drinks				**5297**
No	902	*17.0*	**[16.03 ; 18.07]**	
Yes	4395	*83.0*	**[81.92 ; 83.96]**	
The type of sugary drink consumed				**4395**
Other	2247	*51.1*	**[49.63 ; 52.61]**	
Commercial fruit juice	572	*13.0*	**[12.04 ; 14.05]**	
Traditional juices	927	*21.1*	**[19.90 ; 22.33]**	
Canned or bottled sodas	649	*14.8*	**[13.73 ; 15.85]**	
The amount of refined sugar cubes used for breakfast				**4394**
1 block	368	*8.38*	**[7.58 ; 9.24]**	
2 blocks	2231	*50.8*	**[49.28 ; 52.26]**	
3 blocks	1020	*23.2*	**[21.97 ; 24.49]**	
4 or more blocks	775	*17.6*	**[16.52 ; 18.80]**	
FAT CONSUMPTION				
The type of fat used most often for the preparation of meals at home				**5295**
None used	8	*0.2*	**[0.07 ; 0.31]**	
None in particular	22	*0.4*	**[0.26 ; 0.63]**	
Vegetable oil	5113	*96.6*	**[96.02 ; 97.02]**	
Bacon or fat	77	*1.5*	**[1.15 ; 1.82]**	
Butter or light butter	7	*0.1*	**[0.05 ; 0.28]**	
Margarine	4	*0.1*	**[0.02 ; 0.20]**	
Others	1	*0.02*	**[9.85×10^{-6};1.22×10^{-3}]**	
Do not know	63	*1.2*	**[0.92 ; 1.52]**	

Palm oil consumption				**5295**
No	1103	*20.8*	**[19.74 ; 21.95]**	
Yes	4192	*79.2*	**[78.04 ; 80.25]**	
The frequency of palm oil consumption				**4192**
Less than once a week - every 15 days	2524	60.2	**[58.70 ; 61.69]**	
Once a week	976	23.3	**[22.01 ; 24.59]**	
More than once a week	692	16.5	**[15.40 ; 17.67]**	
How do you eat at home?				**5272**
Senegalese style	5173	*98.1*	**[97.70 ; 98.46]**	
European style	29	*0.55*	**[0.37 ; 0.80]**	
Do not know	3	*0.06*	**[0.01 ; 0.18]**	
A mixture of both	67	*1.27*	**[0.99 ; 1.62]**	
The average number of meals eaten per week not prepared at home				**5149**
Mean (Standard Deviation)	1.03 (2.39)	-	**[0.96 ; 1.09]**	
Median [Min, Max]	0 [0, 21.0]	-	**-**	

Table 5: Distribution according to intense physical activity at work in the national WHO Stepwise survey, Senegal 2015

	n	***%***	**95%CI**	**N**
INTENSE PHYSICAL ACTIVITY AT WORK				
Does your job include strenuous physical activity, for at least 10 minutes at a time?				**5299**
No	4206	*79.4*	**[78.25 ; 80.45]**	
Yes	1093	*20.6*	**[19.54 ; 21.74]**	
The number of days per week that you do vigorous physical activity as part of your job				**1083**
Mean (Standard Deviation)	5.37 (2.11)	-	**[5.24 ; 5.49]**	
Median [Min, Max]	7.00 [1.00, 7.00]	-	**-**	

The total time spent on a typical day during which you perform intense physical activities of at least ten consecutive minutes? In hour				**1070**
Mean (Standard Deviation)	4.29 (3.52)	-	**[4.07 ; 4.49]**	
Median [Min, Max]	4.00 [0, 16.0]	-	**-**	
MODERATE PHYSICAL ACTIVITY AT WORK				
Does your work include moderate physical activity for at least 10 minutes at a time?				**5299**
No	2930	*55.3*	**[53.94 ; 56.63]**	
Yes	2369	*44.7*	**[43.36 ; 46.05]**	
The frequency in number of days per week that you do moderate physical activity as part of your job				**2357**
Mean (Standard Deviation)	5.72 (1.90)	-	**[5.64 ; 5.79]**	
Median [Min, Max]	7.00 [1.00, 7.00]	-	**-**	
The total time spent on a typical day during which you perform moderate physical activities of at least ten consecutive minutes? In hour				**2322**
Mean (Standard Deviation)	4.40 (3.17)	-	**[4.27 ; 4.53]**	
Median [Min, Max]	4.00 [0, 16.0]	-	**-**	
PHYSICAL ACTIVITY DURING TRANSPORTATION AND MOVING FROM ONE PLACE TO ANOTHER				
Do you make trips of at least 10 minutes on foot or by bike?				**5299**
NO	714	13.5	**[12.57 ; 14.47]**	
YES	4585	86.5	**[85.57 ; 87.42]**	
The frequency in number of days per week that you make trips of at least 10 minutes on foot or by bike?				**4565**
Mean (Standard Deviation)	5.71 (1.86)	-	**[5.65 ; 5.76]**	
Median [Min, Max]	7.00 [1.00, 7.00]	-	**-**	

The total time spent on a typical day walking or cycling for at least ten consecutive minutes? In hour				**4397**
Mean (Standard Deviation)	1.08 (1.73)	-	**[1.03 ; 1.13]**	
Median [Min, Max]	1.00 [0, 15.0]	-	**-**	
INTENSE PHYSICAL ACTIVITY DURING LEISURE TIME, LEISURE				
Do you ever do intense physical activity for at least 10 minutes in a row during your free time, leisure?				**5299**
No	4721	*89.1*	**[88.21 ; 89.91]**	
Yes	578	*10.9*	**[10.08 ; 11.78]**	
The frequency in number of days per week that you do intense physical activity during your free time?				**574**
Mean (Standard Deviation)	4.18 (2.32)	-	**[3.99 ; 4.37]**	
Median [Min, Max]	4.00 [1.00, 7.00]	-	**-**	
PRESENCE OF ANY INTENSE OR MODERATE PHYSICAL ACTIVITY				
Intense activity only				**5299**
No	5294	99.9	**[99.76 ; 99.96]**	
Yes	5	0.1	**[0.03 ; 0.23]**	
Moderate activity only				**5299**
No	5284	99.7	**[99.52 ; 99.83]**	
Yes	15	0.3	**[0.16 ; 0.47]**	
PRESENCE OF PHYSICAL ACTIVITY ONLY AT WORK OR WHEN TRAVELING OR DURING LEISURE, LEISURE TIME				
Work activity only				**5299**
No	5232	98.7	**[98.38 ; 99.01]**	
Yes	67	1.26	**[0.98 ; 1.61]**	
Travel activity only				**5299**
No	3445	65.0	**[63.70 ; 66.29]**	
Yes	1854	35.0	**[33.70 ; 36.29]**	
Recreational activity only				**5298**

No	5291	99.9	**[99.71 ; 99.94]**	
Yes	7	0.13	**[0.05 ; 0.28]**	
SEDENTARY BEHAVIOR				
How much time do you spend sitting or lying down on a typical day in hours				**5201**
Mean (Standard Deviation)	4.23 (3.23)	-	**[4.13 ; 4.31]**	
Median [Min, Max]	3.00 [0, 16.0]	-	**-**	

Table 6: Distribution by history of hypertension, diabetes, dyslipidemia and cardiovascular diseases in the WHO national Stepwise survey, Senegal 2015

	n	*%*	**95%CI**	**N**
HISTORY OF HYPERTENSION				
Knowledge of a hypertensive condition diagnosed by a health professional				**3208**
No	2421	*75.5*	**[73.93 ;76.94]**	
Yes	787	*24.5*	**[23.05 ;26.06]**	
The seniority of this state of hypertension greater than 12 months				**787**
No	297	*37.7*	**[34.35 ;41.24]**	
Yes	490	*62.3*	**[58.75 ;65.64]**	
HISTORY OF DIABETES SUGAR				
Knowledge of a diabetic condition diagnosed by a healthcare professional				**1095**
No	991	90.5	**[88.57 ; 92.14]**	
Yes	104	9.5	**[7.85 ; 11.42]**	
The seniority of this diabetic state greater than 12 months				**104**
No	44	42.3	**[32.80 ; 52.38]**	
Yes	60	57.7	**[47.61 ; 67.19]**	
HISTORY OF DYSLIPIDEMIA				

Knowledge of a state of dyslipidemia diagnosed by a health professional				**228**
No	156	*68.4*	**[61.89 ; 74.31]**	
Yes	72	*31.6*	**[25.68 ; 38.10]**	
The duration of this state of dyslipidemia greater than 12 months				**72**
No	36	*50.0*	**[38.74 ; 61.25]**	
Yes	36	*50.0*	**[38.74 ; 61.25]**	
HISTORY OF CARDIOVASCULAR DISEASES				
History of heart attack, chest pain, stroke				**5298**
No	5095	*96.2*	**[95.60 ; 96.66]**	
Yes	203	*3.8*	**[3.33 ; 4.39]**	

Table 7: Distribution according to heart rate, waist size, body mass index in the national WHO Stepwise survey, Senegal 2015.

	n	***%***	**$^{95\%}$CI**	**N**
HEART RATE				
Individual average of the 3 heart rate measurements				**5208**
Mean (Standard Deviation)	80.5 (13.1)	**-**	**[80.16 ; 80.87]**	
Median [Min, Max]	80.2 [30, 145]	-	**-**	
Heart rate above 80 beats per minute				**5208**
No	2550	*49.0*	**[47.59 ; 50.33]**	
Yes	2658	*51.0*	**[49.66 ; 52.40]**	
WAIST SIZE				
Waist size				**5173**

Mean (Standard Deviation)	77.3 (13.7)	-	**[76.93 ; 77.68]**	
Median [Min, Max]	75.0 [7.00, 200]	-	-	
Abdominal obesity in men				**1878**
No	1765	*94.0*	**[92.78 ; 94.99]**	
Yes	113	*6.0*	**[5.00 ; 7.21]**	
Abdominal obesity in women				**3295**
No	1917	*58.2*	**[56.47 ; 59.86]**	
Yes	1378	*41.8*	**[40.13 ; 43.52]**	
WEIGHT, HEIGHT, BODY MASS INDEX				
Weight (Kg)				**5180**
Mean (Standard Deviation)	62.8 (14.8)	-	**[62.35 ; 63.16]**	
Median [Min, Max]	60.0 [28.0, 350]	-	-	
Size (cm)				**5186**
Mean (Standard Deviation)	167 (9.60)	-	**[167.06 ; 167.59]**	
Median [Min, Max]	167 [100, 270]	-	-	
BMI (Kg/m2)				**5180**
Mean (Standard Deviation)	22.5 (6.01)	-	**[22.35 ; 22.68]**	
Median [Min, Max]	21.4 [8.09, 159]	-	-	
BMI classes				**5180**
Thinness	834	*16.1*	**[15.11 ; 17.13]**	
Normal	3089	*59.6*	**[58.28 ; 60.97]**	
Overweight	857	*16.5*	**[15.54 ; 17.59]**	
Obesity I	279	*5.4*	**[4.79 ; 6.04]**	
Obesity II	84	*1.6*	**[1.30 ; 2.01]**	
Obesity III	37	*0.7*	**[0.51 ; 0.99]**	
BMI ≥ 25Kg/m2				**5180**
No	3923	*75.7*	**[74.53 ; 76.89]**	
Yes	1257	*24.3*	**[23.10 ; 25.46]**	
BMI ≥ 30Kg/m2				**5180**
No	4780	*92.3*	**[91.50 ; 92.98]**	
Yes	400	*7.7*	**[7.01 ; 8.49]**	

Table 8: Distribution according to blood pressure in the national WHO Stepwise survey, Senegal 2015.

	n	%	95%CI	N
Individual average of the 3 SBP				**5207**
Mean (Standard Deviation)	127 (19.8)	-	**[126.14 ;127.22]**	
Median [Min, Max]	123 [73.0, 243]	-	-	
Individual average of the 3 DBP				**5208**
Mean (Standard Deviation)	83.1 (12.4)	-	**[82.77 ; 83.44]**	
Median [Min, Max]	81.7 [47.3, 145]	-	-	
Systolic hypertension according to average of the 3 SBP				**5207**
No	4225	*81.1*	**[80.04 ; 82.18]**	
Yes	982	*18.9*	**[17.81 ; 19.95]**	
Diastolic hypertension according to average of the 3 DBP				**5208**
No	3946	*75.8*	**[74.57 ; 76.92]**	
Yes	1262	*24.2*	**[23.07 ; 25.42]**	
SBP classes according to the average of the 3 SBP				**5207**
Low	1	*0.02*	-	
Optimal	2118	*40.7*	-	
Normal	1285	*24.7*	-	
Normal High	821	*15.8*	-	
Grade I	633	*12.2*	-	
Grade II	224	*4.30*	-	

Grade III	125	*2.40*	-	
Classes of DBP according to the average of the 3 DBP				**5194**
Optimal	2238	*43.1*	-	
Normal	983	*18.9*	-	
Normal High	725	*14.0*	-	
Grade I	785	*15.1*	-	
Grade II	294	*5.66*	-	
Grade III	169	*3.25*	-	
Systolic and/or diastolic hypertension according to average of 3 SBP and 3 DBP				**5207**
No	3701	*71.1*	**[69.82 ; 72.30]**	
Yes	1506	*28.9*	**[27.69 ; 30.17]**	
Newly diagnosed systolic and/or diastolic hypertension				**2361**
No	1798	*76.2*	**[74.37 ; 77.85]**	
Yes	563	*23.8*	**[22.14 ; 25.62]**	
High blood pressure prevalence Senegal				**5343**
No	4089	*76.5*	**[75.36 ; 77.65]**	
Yes	1254	*23.5*	**[22.34 ; 24.63]**	
Prevalence of known hypertensives who had elevated BP				**778**
No	335	*43.1*	**[39.55 ; 46.62]**	
Yes	443	*56.9*	**[53.37 ; 60.44]**	

Table 9: Distribution according to fasting blood glucose in the WHO national Stepwise survey, Senegal 2015.

	n	**%**	**$^{95\%}$CI**	**N**
FASTING GLYCAEMIA				

Fasting blood sugar in g/l				**4694**
Mean (Standard Deviation)	0.68 (0.27)	-	**[0.67 ; 0.69]**	
Median [Min, Max]	0.66 [0.2, 6]	-	**-**	
Classes according to fasting blood glucose in g/L				**4694**
Hypoglycemia	2840	*60.5*	**[59.08 ; 61.90]**	
Normo-glycemic	1674	*35.7*	**[34.29 ; 37.05]**	
Glucose intolerance	91	*1.9*	**[1.57 ; 2.38]**	
Diabetes	89	*1.9*	**[1.53 ; 2.33]**	
Diabetes				**4694**
No	4601	*98.0*	**[97.56 ; 98.38]**	
Yes	93	*2.0*	**[1.61 ; 2.43]**	
Newly Diagnosed Diabetes				**872**
No	857	*98.3*	**[97.11 ; 98.99]**	
Yes	15	*1.7*	**[1.00 ; 2.88]**	
Diabetes prevalence Senegal				**5343**
No	5227	*97.8*	**[97.39 ; 98.19]**	
Yes	116	*2.2*	**[1.80 ; 2.60]**	
TOTAL CHOLESTEROLEMIA AND HDL CHOLESTEROLEMIA				
Total cholesterol				**4755**
Mean (Standard Deviation)	1.56 (0.454)	-	**[1.54 ; 1.57]**	
Median [Min, Max]	1.50 [0.260, 4.00]	-	**-**	
Total hypercholesterolemia				**4755**
No	3976	*83.6*	**[82.52 ;84.65]**	
Yes	779	*16.4*	**[15.34 ;17.47]**	
Newly diagnosed total hypercholesterolemia				**137**
No	107	*78.1*	**[70.06 ; 84.52]**	
Yes	30	*21.9*	**[15.47 ; 29.93]**	
Total hypercholesterolemia prevalence Senegal				**5343**

No	5244	*98.1*	**[97.73 ; 98.48]**	
Yes	99	*1.9*	**[1.51 ; 2.26]**	
Badly controlled cholesterol				**65**
No	40	*61.5*	**[48.61 ;73.08]**	
Yes	25	*38.5*	**[26.91 ;51.38]**	
HDL-Cholesterol				**4718**
Mean (Standard Deviation)	0.39 (0.15)	-	**[0.39 ; 0.40]**	
Median [Min, Max]	0.360 [0.0300, 1.00]	-	**-**	
Hypo HDL-Cholesterol				**4718**
No	1082	*22.9*	**[21.74 ;24.16]**	
Yes	3636	*77.1*	**[75.83 ;78.25]**	

Table 10: Distribution according to the presence or not of advice received in the last 3 years for a change in behavior in the national WHO Stepwise survey, Senegal 2015

	n	***%***	**$^{95\%}$CI**	**N**
ADVICE RECEIVED IN THE LAST 3 YEARS FOR A CHANGE IN BEHAVIOR				
Advice received over the past 3 years to stop or not start smoking				**5299**
No	5150	*97.2*	**[96.69 ; 97.60]**	
Yes	149	*2.8*	**[2.39 ; 3.30]**	
Advice received for smoking cessation in the last 12 months from a health professional				**311**
No	175	56.3	**[50.55 ;61.83]**	
Yes	54	17.4	**[13.41 ; 22.13]**	
No visits in the last 12 months	82	26.4	**[21.62 ; 31.69]**	

Advice received over the past 3 years to reduce your salt intake				**5299**
No	4609	*87.0*	**[86.03 ; 87.86]**	
Yes	690	*13.0*	**[12.13 ; 13.96]**	
Advice received during the last 12 months to reduce the amount of sugar in the diet				**5296**
No	4892	92.4	**[91.61 ; 93.06]**	
Yes	404	7.6	**[6.93 ; 8.38]**	
Yes depending on the nature of the advisor				**403**
Personal health	287	*71.2*	-	
Other	116	*28.8*	-	
Advice received over the last 3 years to Eat at least 5 servings of fruit and/or vegetables a day				**5300**
No	4633	*87.4*	**[86.48 ; 88.29]**	
Yes	667	*12.6*	**[11.70 ; 13.51]**	
Advice received over the past 3 years to reduce your fat consumption				**5299**
No	4860	*91.7*	**[90.93 ; 92.43]**	
Yes	439	*8.3*	**[7.56 ; 9.06]**	
Advice received in the last 3 years to start or do more physical activity				**5299**
No	4752	*89.7*	**[88.81 ; 90.47]**	
Yes	547	*10.3*	**[9.52 ; 11.18]**	
Advice received in the last 3 years to maintain a healthy weight or lose weight				**5299**
No	5028	*94.9*	**[94.24 ; 95.45]**	
Yes	271	*5.1*	**[4.54 ; 5.75]**	
Request received to change your diet since you were told you had diabetes				**104**
No	18	*17.3*	**[10.84 ; 26.24]**	
Yes	86	*82.7*	**[73.75 ; 89.15]**	
MONITORING OF HIS BIOLOGICAL PARAMETERS AND HIS BLOOD PRESSURE				

Having already had your blood pressure taken by a doctor at least once in your life				**5298**
No	2090	*39.4*	**[38.13 ; 40.78]**	
Yes	3208	*60.6*	**[59.21 ; 61.86]**	
The fact of having already had your blood sugar taken by a health professional at least once in your life				**5298**
No	4203	*79.3*	**[78.21 ; 80.40]**	
Yes	1095	*20.7*	**[19.59 ; 21.78]**	
The fact of having already had their cholesterol levels taken by a health professional at least once in their life				**5298**
No	5070	*95.7*	**[95.10 ; 96.21]**	
Yes	228	*4.3*	**[3.78 ; 4.89]**	

Table 11. Results of multivariate analyzes

	aOR	**95%CI**	**p-Value**
HYPERTENSION IN SENEGAL			
(Intercept)	0.10	[0.05 ; 0.19]	**<0.001**
The presence of at least one blood pressure measurement in his life			<0.001
No	Reference	—	
Yes	3.22	[2.02 ; 5.24]	**<0.001**
Advice received over the past 3 years to reduce your salt intake			0.01
No	Reference	—	

Yes	2.13	[1.20 ; 3.77]	**0.009**
BMI classes			<0.001
Normal	Reference	—	
Thinness	2.25	[1.30 ; 3.85]	**0.003**
Overweight	2.17	[1.33 ; 3.55]	**0.002**
Obesity I	0.87	[0.38 ; 1.93]	0.7
Obesity II	5.88	[0.90 ; 41.0]	0.059
Obesity III	10.2	[1.41 ; 216]	**0.047**
Age in class			0.003
18-23 years old	Reference	—	
24-29 years old	1.03	[0.53 ; 1.99]	>0.9
30-34 years old	0.47	[0.20 ; 1.05]	0.075
35-39 years old	2.24	[1.12 ; 4.47]	**0.022**
40-44 years old	1.57	[0.78 ; 3.15]	0.2
45-49 years old	1.06	[0.45 ; 2.44]	0.9
50-54 years old	1.96	[0.84 ; 4.53]	0.11
55-59 years old	1.64	[0.65 ; 4.08]	0.3
60-64 years old	2.74	[0.92 ; 8.12]	0.067
65-70 years old	3.05	[1.14 ; 8.19]	**0.026**

Regular attitude taken to control your salt intake Check the salt content indicated on the labels			0.005
No	Reference	—	
Yes	0.48	[0.28 ; 0.80]	**0.007**
Advice received during the last 12 months to reduce the amount of sugar in the diet			0.033
No	Reference	—	
Yes	2.19	[1.06 ; 4.46]	**0.032**
History of heart attack, chest pain, stroke			0.097
No	Reference	—	
Yes	2.05	[0.88 ; 4.71]	0.092
The frequency of consuming foods high in salt (pre-packaged salty snacks, canned food, fast food			0.012
Never	Reference	—	
Rarely	0.70	[0.43 ; 1.14]	0.2
Sometimes	1.44	[0.82 ; 2.53]	0.2
Often	0.41	[0.21 ; 0.78]	**0.008**
Always	1.14	[0.24 ; 4.03]	0.9
Do not know	0.50	[0.15 ; 1.36]	0.2
Presence of at least one cholesterolemia intake in his life			0.032
No	Reference	—	
Yes	2.40	[1.08 ; 5.39]	**0.032**
Current use of smoked tobacco			0.066
No	Reference	—	

Yes	0.35	[0.09 ; 1.06]	0.091
How much time do you spend sitting or lying down on a typical day in hours	0.95	[0.90 ; 1.01]	0.12
Heart rate above 100 bpm			0.124
No	Reference	—	
Yes	0.53	[0.22 ; 1.18]	0.14
Presence of moderate physical activity for at least 10 minutes in a row during your free time, leisure?			0.094
No	Référence	—	
Yes	0.56	[0.26 ; 1.10]	0.11
Frequency of fruit consumption in number of days per week	1.07	[0.98 ; 1.17]	0.2
KNOWN POORLY CONTROLLED ARTERIAL HYPERTENSION IN SENEGAL			
(Intercept)	0.17	[0.00, 12.3]	0.4
The degree of personal perception of the importance of reducing salt intake			
Rather important	Référence	—	
Very important	21.7	[2.49, 601]	**0.018**
Physical activity while traveling only			
No	Référence	—	
Yes	0.11	[0.02, 0.58]	**0.015**
Advice received over the past 3 years to reduce your salt intake			
No	Référence	—	
Yes	12.1	[1.81, 144]	**0.023**
Regular attitude taken to control your salt intake: Limit the consumption of salty ready meals			
No	Référence	—	
Yes	0.04	[0.00, 0.57]	**0.046**
Body mass index	1.04	[0.99, 1.14]	0.2
The frequency of fruit consumption in number of days per week	1.28	[0.91, 1.94]	0.2

NEWLY DIAGNOSED HYPERTENSION IN SENEGAL			
(Intercept)	0.14	[0.04 ; 0.45]	**0.001**
Average number of meals eaten per week not prepared at home (breakfast, lunch and dinner	0.85	[0.74 ; 0.97]	**0.024**
Check the salt content indicated on the labels			
No	Reference	—	
Yes	0.29	[0.12 ; 0.64]	**0.004**
History of heart attack, chest pain, stroke			
No	Reference	—	
Yes	6.47	[1.50 ; 30.1]	**0.013**
Resting heart rate greater than 80 bpm			
No	Reference	—	
Yes	2.09	[1.20 ; 3.70]	**0.010**
Sex			
Male	Reference	—	
Women	0.43	[0.24 ; 0.79]	**0.006**
Palm oil consumption			
No	Reference	—	
Yes	2.65	[1.09 ; 7.63]	**0.047**
Fasting blood glucose in g/L	2.66	[1.10 ; 6.61]	**0.025**
Moderate physical activity for at least 10 minutes in a row during your free time, leisure			
No	Reference	—	
Yes	0.42	[0.15 ; 1.04]	0.081

Time spent sitting or lying down on a typical day in hours	0.93	[0.85 ; 1.02]	0.12