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Research Article

Practice of Screening for Arterial Hypertension in People Aged 18 and over in the Commune of Niakhene, in a Context of the Need for Information in Rural Senegal

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Abstract

Introduction: Like urban areas, rural areas are facing lifestyle changes, with an increasingly sedentary lifestyle and an increase in cardiovascular risk factors such as obesity and arterial hypertension. This study aimed to investigate the awareness, prevalence, and control of arterial hypertension and associated risk factors in the town of Niakhene in rural Senegal. *Methodology:* This study was a cross-sectional, descriptive survey conducted in October 2020, targeting individuals aged 18 and older residing in the commune of Niakhene. A sample was drawn from a systematic random sample, stratified according to gender and age group. The questionnaire was based on a literature review. The knowledge score was derived from a set of 17 items evaluated using an optimized 5-point Likert scale. Results: 300 individuals were surveyed. The average age was 35.3 years (+/-16.9), 52.3% were female, 65.7% were married and 67.7% were predominantly uneducated. The signs cited were headache (74.0%), visual blur (63.7%), and ringing in the ears (60.0%). The average score was 54.6 (+/-13.1) and a score above the average was classified as good knowledge, accounting for 55.3% of the study population. Hypertension was associated with advanced age (40-59 years) (ORaj 2.7{1.21-6.28}) and higher education (ORaj 4.07{1.81-9.87}). Screening for arterial hypertension was found in 31.3% of patients and was associated with the 40-59 age group (ORaj 3.5{1.47-7.98}), the 60 and over age group (ORaj 3.5{1.47-7.98}) and the existence of a history of hypertension in the family (ORaj 2.76{1.56-5.0}). *Conclusion:* This study revealed that only 55.3% of participants had a good knowledge of hypertension and that only 31.3% had undergone screening. Older age and a history of hypertension in the family were the main factors associated with better knowledge and more frequent screening. These results highlight the need to improve awareness and health education for better management of hypertension in rural areas.

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Keywords

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1. Introduction

Hypertension is a rise in blood pressure of ≥140 mmHg systolic and/or ≥ 90 mmHg diastolic. [1]. Controlling arterial hypertension is an important objective for any healthcare system, given the potential for reducing disability and premature death, since AH is the world's leading cause of premature death [2]. More than 3/4 of people suffering from hypertension live in developing countries. In sub-Saharan Africa, around 74.7 million people live with hypertension. It is estimated to affect 10-15% of the adult population [2] with higher rates in urban areas and variations between countries of up to 40%. [3, 4]. Various national surveys show prevalence rates of between 24% in rural areas and 32% in urban areas in West Africa, slightly less in South Africa (10% in rural areas and 25% in urban areas) and even less in Ethiopia (10%). [5].

The prevalence of hypertension increases with age, weight and male sex, reaching a plateau after the age of 60. Its cardiovascular impact may be cerebral (stroke), cardiac (coronary artery disease, atrial fibrillation, and heart failure), or renal [6, 7].

In Senegal, arterial hypertension is the main cardiovascular disease in the Senegalese adult population, with a prevalence of 24% according to the STEPS survey [8]. Women are the most affected. Cardiovascular disease is also more common in rural areas (26.2%). than in urban areas (21.7%) [8]. Population surveys have also shown that in certain regions of Senegal the prevalence of arterial hypertension varies between 10 and 47%. [9, 10].

Awareness of hypertension can motivate individuals to adopt preventive measures and foster positive attitudes and practices [11]. Research indicates that knowledge of the disease can be influenced by an individual's level of education [12, 13]. The presence of a family history of diabetes [14, 15] and personal factors such as age, sex, socio-economic status, marital status, and exposure to health education have been shown to influence knowledge of the disease [16, 17]. One of the most effective strategies for combating diabetes is the adoption of preventive measures through early detection. However, this practice remains inconsistent among populations in developing countries. In Africa, an estimated two-thirds of at-risk individuals are either undiagnosed or unaware of their diabetic status. [9].

In Senegal, most studies have examined the prevalence of arterial hypertension in the population, whether in urban areas [10] rural [9] or at national level with the STEPS survey. However, few studies have assessed knowledge. Hence this study of the factors associated with knowledge and practice of screening for arterial hypertension in the commune of Niakhene in central Senegal, enabling the adjustment of preventive policies and strategies for a more effective response to this global scourge.

2. Materials and Methods

2.1. Type and Population of the Study

This was a cross-sectional, descriptive, and analytical survey of people aged 18 and over who had been living for at least six months in the commune of Niakhene in the Thies region of Senegal. The study was conducted during the second half of October 2020.

2.2. Sampling

With a view to obtaining significant results that could be used to describe attitude and practical knowledge with satisfactory power, the number of individuals to be included in this study was calculated using the Schwartz formula $N = \varepsilon^2 PQ / i^2$ considering the following parameters:

Standard error (for an alpha error risk of 5%) = 1.96

Expected prevalence P = 24% (Prevalence of hypertension at national level found in the 2015 STEP survey in Senegal). [18].

Q is the complement of P, so Q = 1-P

Accuracy (i) = 5%.

These parameters gave a required number of subjects of 281. For greater power, the size was increased to 300 individuals.

Sampling was conducted using a stratified systematic random sampling method [19] organized into clusters of 10 individuals, resulting in 30 clusters distributed across the villages of the commune of Niakhene. Within each selected cluster, stratification was applied proportionally based on population size by age and sex to ensure greater representativeness. Upon entering the cluster, the itinerary method was used to guide interviewers to the concessions. After randomly selecting a road intersection, the interviewer used a pen to randomly determine the direction to follow. All concessions along the selected street/road were included until 10 individuals per cluster were reached, stratified by sex and age. If multiple people in a household met the selection criteria, one individual was chosen randomly. If the chosen street did not

meet the target, the first street on the right was selected until the target was achieved.

2.3. Data Collection

The data were collected using a pre-coded questionnaire to answer the research questions, based on a search of the literature on the subject of NCDs by reference organizations such as the World Health Organization's STEPS [20]. But also by articles in different countries evaluating knowledge, attitudes, and practices on hypertension [21, 22]. The finalized questionnaire was then recorded on an electronic terminal using ODK Collect software (ODK Open Data Kit), which was synchronized with a server via an internet connection, allowing the information to be recorded as individual face-to-face interviews within the households were completed. This process ensured simultaneous transmission of the data to both a memory card and a secure server for validation.

Each interviewer was assigned a pre-established quota based on gender and age group for each selected cluster (village) following the application of the sampling procedures.

2.4. Operational Definition of Variables

Average scores for knowledge of hypertension were calculated, and practice was assessed based on the question of whether screening had been conducted, using a dichotomous response format. To compute the average knowledge score, participants responded to a 5-point Likert scale. These average scores were then used to categorize participants into two groups: good and poor knowledge. For both knowledge and attitude questions, respondents who scored above average were classified as having good knowledge, while those who scored below average were categorized as having poor knowledge. This approach has been employed in studies assessing knowledge, attitudes, and practices (KAP) regarding cardiovascular risk factors. [23, 24].

2.5. Data Analysis

At the end of the survey, the data were extracted, compiled and cleaned before being analysed using R 3.4.4 software. Quantitative variables were described in terms of average and standard deviation, median and extremes, and qualitative variables were described in terms of frequency.

For the analytical study, variables were cross-tabulated to reflect certain concerns expressed in the objectives, and related to the relationship between personal characteristics and knowledge and practices. The Chi-square test was used with an alpha risk of 5%. To take account of confounding factors in the multivariate analysis, all the variables whose p values were less than 0.25 in the bivariate analysis were retained for the initial model [25, 26]. The top-down stepwise selection procedure was used to build the final model. Variables that did not improve the model were removed one by one. The likelihood ratio test was used to compare the nested models [27]. The adequacy of the model was studied using the Hosmer Lemeshow [28].

2.6. Ethics

The approval of the Research Ethics Committee (CER) of Cheikh Anta Diop University of Dakar was obtained before the commencement of the study, with the reference number O25/2020/CER/UCAD.

Informed, voluntary consent was obtained from each participant prior to the interview, and participants were free to discontinue the interview or withdraw from the study at any time without consequence. Anonymity was upheld, and the results were kept confidential. The collected data remained confidential, and participants' identities were not recorded on the data collection tools or in any report of the results. Anonymity was strictly maintained, and no information that could identify participants was included in the database.

This study did not offer any compensation or remuneration to the participants. The general nature of the subjects covered was preserved. The primary benefit of this study will be to enhance understanding of preventive measures and improve policy responses to high blood pressure.

3. Results

3.1. Descriptive Results

The study involved 300 individuals with an average age of 35.3 (±16.7) years, with a median of 30 years and extremes ranging from 18 to 83 years. The most representative age group was between 25 and 39, with 37.7% of respondents. The majority of respondents were married (65.7%) and uneducated (67.7%). Nearly 75% of the population were unemployed (40%) and belonged predominantly to the middle quintile of socio-economic well-being. The most common family history was hypertension (42.0%), followed by diabetes (9.0%) and stroke (5.7%) (Table 1).

Table 1. *Breakdown by personal characteristics (n=300).*

	Absolute frequency (n)	**Relative frequency (%)**
Age range of respondents		
<25	98	*32,7*
25-39	113	*37,7*
40-59	48	*16,0*
>60s	41	*13,7*
Gender		

	Absolute frequency (n)	Relative frequency (%)
Female	157	*52,3*
Male	143	*47,7*
Marital status		
Married	197	*65,7*
Single	83	*27,7*
Widowed	15	*5,0*
Divorced	5	*1,7*
Level of education		
Without instruction	203	*67,7*
Primary	51	*17,0*
Secondary and above	46	*15,3*
Profession		
Shrew/unemployed	120	*40,0*
Farmer/breeder	67	*22,3*
Retailer	42	*14,0*
Student / Pupil	19	*6,3*
Worker	15	*5,0*
Senior executive	2	*0,7*
Other	35	*11,7*
Socio-economic well-being		
Poorer	46	*15,3*
Poor	46	*15,3*
Medium	75	*25,0*
Rich	69	*23,0*
Richer	64	*21,3*
Family history 1er degree		
Hypertension	126	*42,0*
Diabetes	27	*9,0*
Stroke	17	*5,7*

The community (94.3%), healthcare staff (46.3%), television (26.7%), radio (26.0%) and awareness days (10.0%) were the main sources of information about high blood pressure. Social networks accounted for 0.7% of the communication channels cited (Figure 1).

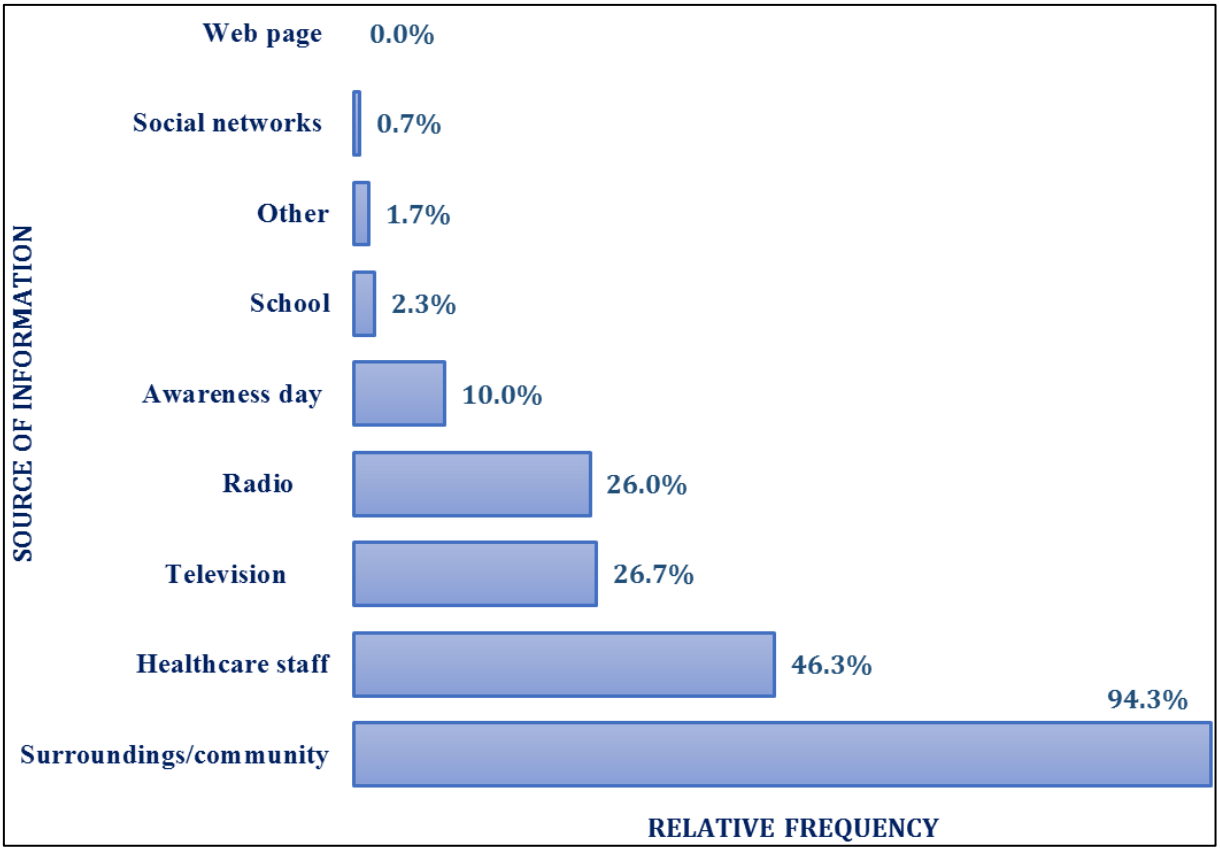

Figure 1. *Distribution of sources of information on hypertension (n=300).*

Nearly one in three people (31.6%) surveyed agreed that high blood pressure was a non-communicable disease, and 27.4% thought it could be cured. A quarter of the population agreed that hypertension had a genetic component and only 15% said that it only affected the elderly. Three quarters of the population (74.0%) agreed that headaches were one of the main signs of hypertension. Other signs, such as blurred vision and ringing in the ears, were mentioned by 63.7% and 60% of the population respectively. The study on the complications of hypertension found that 43.6% of respondents mentioned that hypertension could cause heart failure or heart attack, 31.3% mentioned kidney failure, 55.4% mentioned eye damage and 60.7% cerebrovascular damage (Table 2).

Table 2. *Distribution of the study population by hypertension knowledge items (n=300).*

Knowledge of diabetes	**Yes, I totally agree 5**		**Yes, I quite agree 4**		**Neutral in response 3**		**No, tend to disagree 2**		**No, I don't agree at all 1**		**Don't know 0**	
	n	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
General knowledge												
Non-communicable disease	58	*19,3*	37	*12,3*	37	*12,3*	12	*4,0*	85	*28,3*	30	*10,0*
A disease with a permanent cure	56	*18,7*	26	*8,7*	81	*27,0*	40	*13,3*	77	*25,7*	20	*6,7*
Genetic component	41	*13,7*	34	*11,3*	83	*27,7*	14	*4,7*	87	*29,0*	41	*13,7*
Diabetes only affects the elderly	18	*6,0*	27	*9,0*	78	*26,0*	40	*13,3*	132	*44,0*	5	*1,7*
Knowledge of signs												
Headaches	141	*47,0*	81	*27,0*	62	*20,7*	2	*0,7*	2	*0,7*	12	*4,0*
Visual blur	113	*37,7*	78	*26,0*	68	*22,7*	4	*1,3*	8	*2,7*	29	*9,7*
Ringing in the ears	104	*34,7*	76	*25,3*	72	*24,0*	5	*1,7*	9	*3,0*	34	*11,3*
Vertigo	116	*38,7*	88	*29,3*	62	*20,7*	4	*1,3*	6	*2,0*	24	*8,0*
Palpitation	80	*26,7*	66	*22,0*	84	*28,0*	6	*2,0*	13	*4,3*	51	*17,0*
Knowledge of complications												
Heart failure or heart attack	70	*23,3*	64	*21,3*	87	*29,0*	8	*2,7*	4	*1,3*	67	*22,3*
Renal insufficiency	52	*17,3*	42	*14,0*	104	*34,7*	8	*2,7*	7	*2,3*	87	*29,0*
Eye problems or blindness	119	*39,7*	77	*25,7*	75	*25,0*	3	*1,0*	5	*1,7*	21	*7,0*
Cerebral diseases Stroke	102	*34,0*	80	*26,7*	80	*26,7*	3	*1,0*	5	*1,7*	30	*10,0*
Knowledge of risk factors												
Family history of hypertension	48	*16,0*	74	*24,7*	36	*12,0*	49	*16,3*	56	*18,7*	37	*12,3*
Being overweight and/or obese	95	*31,7*	112	*37,3*	19	*6,3*	21	*7,0*	28	*9,3*	25	*8,3*
Being physically inactive	106	*35,3*	117	*39,0*	15	*5,0*	14	*4,7*	26	*8,7*	22	*7,3*
Bad eating habits	132	*44,0*	119	*39,7*	14	*4,6*	4	*1,3*	8	*2,7*	23	*7,7*

Table 3. Description of knowledge and practice of hypertension screening.

	Absolute frequency (n)	Relative frequency (%)
Hypertension knowledge score		
Average (Standard deviation)	54,6	13,1
Median (Min-Max)	55	0-84
Hypertension knowledge		
No	166	55,3
Yes	134	44,7
Screening for hypertension		
Yes	94	31,3
No	206	68,7

In terms of knowledge of risk factors, 40.7% of the population felt that family history was a major risk factor in the development of hypertension. More than half of those questioned (69%) agreed that obesity was a risk factor. Others identified a sedentary lifestyle (74.3% of the population) and poor eating habits (83.7% of the population) as factors predisposing to the onset of hypertension (Table 3).

The knowledge score was measured on a set of 17 items assessed by a 5-point maximized Likert scale. The average score was 54.6 (+/-13.1) with a median of 55 and extremes ranging from 0 to 84. Those with a score above the average were considered to have good knowledge and represented 55.3% of the study population. In addition, the study revealed that 31.3% (94 individuals) had been screened for hypertension (Table 3).

3.2. Analytical Results

Factors associated with knowledge of hypertension were level of education, audio-visual awareness, community awareness, and family history of hypertension and stroke. No statistically significant association was found at 5% between personal characteristics, sources of information and family history of non-communicable disease and the practice of screening for arterial hypertension (Table 4).

Table 4. Factors associated with knowledge and practice of screening for hypertension in the bivariate model.

Variable	Good knowledge		P value	Practical screening		P value
	Yes (%) N=166	No (%) N=134		Yes (%) N= 94	No (%) N= 206	
Gender						
Female	92 (58,6)	65(41,4)	0,282	47 (29,9%)	110 (70,1%)	0,587
Male	74 (51,7)	69 (48,3)		47 (32,9%)	96 (67,1%)	
Age range						
[18-25 years]	54 (55,1)	44 (44,9)		30 (30,6%)	68 (69,4%)	
[25-40 years]	62 (54,9)	51 (45,1)	0,082	32 (28,3%)	81 (71,7%)	0,568
[40-59 years old]	33 (68,8)	15 (31,2)		19 (39,6%)	29 (60,4%)	
60 and over	17 (41,5)	24 (58,5)		13 (31,7%)	28 (68,3%)	
Level of education						
Without instruction	100 (49,3)	103 (50,7)		66 (32,5%)	137 (67,5%)	
Primary	30 (58,8)	21 (41,2)	0,001	16 (31,4%)	35 (68,6%)	0,698
Secondary/Higher	36 (78,3)	10 (21,7)		12 (26,1%)	34 (73,9%)	
Profession						
Housewife/Unemployed	69 (57,5)	51 (42,5)		37 (30,8%)	83 (69,2%)	
Other	26 (52,0)	24 (48,0)		14 (28,0%)	36 (72,0%)	
Senior executive	2 (100)	0 (0,00)	0,209	1 (50,0%)	1 (50,0%)	0,313
Retailer	23 (54,8)	19 (45,2)		11 (26,2%)	31 (73,8%)	
Cultivator	29 (46,0)	34 (54,0)		24 (38,1%)	39 (61,9%)	

Variable	Good knowledge		P value	Practical screening		P value
	Yes (%) N=166	No (%) N=134		Yes (%) N= 94	No (%) N= 206	
Breeder	4 (100)	0 (0,00)		3 (75,0%)	1 (25,0%)	
Student / Pupil	13 (68,4)	6 (31,6)		4 (21,1%)	15 (78,9%)	
Quintile						
Poorer	22 (47,8)	24 (52,2)		16 (34,8%)	30 (65,2%)	
Poor	24 (52,2)	22 (47,8)		15 (32,6%)	31 (67,4%)	
Medium	42 (56,0)	33 (44,0)	0,371	17 (22,7%)	58 (77,3%)	0,123
Rich	36 (52,2)	33 (47,8)		29 (42,0%)	40 (58,0%)	
Richer	42 (65,6)	22 (34,4)		17 (26,6%)	47 (73,4%)	

Table 4. *Continued.*

Variable	Good knowledge		P value	Practical screening		P value
	Yes (%) N=166	No (%) N=134		Yes (%) N= 94	No (%) N= 206	
Information about diabetes on television						
No	112 (50,9)	108 (49,1)	0,015	71 (32,3%)	149 (67,7%)	0,659
Yes	54 (67,5)	26 (32,5)		23 (28,7%)	57 (71,2%)	
Diabetes information on the radio						
No	114 (51,4)	108 (48,6)	0,027	26 (33,3%)	52 (66,7%)	0,764
Yes	52 (66,7)	26 (33,3)		68 (30,6%)	154 (69,4%)	
Information on hypertension via social networks						
No	165 (55,4)	133 (44,6)	0,833	94 (31,5%)	204 (68,5%)	0,999
Yes	1 (50,0)	1 (50,0)		0 (0,00%)	2 (100%)	
Information on diabetes at awareness days						
No	157 (58,1)	113 (41,9)	0,006	86 (31,9%)	184 (68,1%)	0,709
Yes	9 (30,0)	21 (70,0)		8 (26,7%)	22 (73,3%)	
Information on diabetes from healthcare staff						
No	87 (54,0)	74 (46,0)	0,712	50 (31,1%)	111 (68,9%)	0,999
Yes	79 (56,8)	60 (43,2)		44 (31,7%)	95 (68,3%)	
Information about diabetes from friends and the community						
No	13 (76,5)	4 (23,5)	0,120	7 (41,2%)	10 (58,8%)	0,528
Yes	153 (54,1)	130 (45,9)		87 (30,7%)	196 (69,3%)	
Information on high blood pressure via the school						
No	160 (54,6)	133 (45,4)	0,136	91 (31,1%)	202 (68,9%)	0,682
Yes	6 (85,7)	1 (14,3)		3 (42,9%)	4 (57,1%)	
Family history of hypertension						
No	88 (50,6)	86 (49,4)	0,048	57 (32,8%)	117 (67,2%)	0,618

Variable	Good knowledge		P value	Practical screening		P value
	Yes (%) N=166	No (%) N=134		Yes (%) N= 94	No (%) N= 206	
Yes	78 (61,9)	48 (38,1)		37 (29,4%)	89 (70,6%)	
Family history of diabetes						
No	149 (54,6)	124 (45,4)	0,527	88 (32,2%)	185 (67,8%)	0,394
Yes	17 (63,0)	10 (37,0)		6 (22,2%)	21 (77,8%)	
Family history of stroke						
No	152 (53,7)	131 (46,3)	0,040	89 (31,4%)	194 (68,6%)	0,999
Yes	14 (82,4)	3 (17,6)		5 (29,4%)	12 (70,6%)	
Knowledge about diabetes						
Wrong	-	-	-	44 (32,8%)	90 (67,2%)	0,592
Good	-	-	-	50 (30,1%)	116 (69,9%)	

In logistic regression, the factors associated with knowledge of hypertension were age, level of education and information received during awareness days. People aged 40-59 had 2.70 times (ORaj=2.70 [1.21-6.28]) more knowledge than those aged 18-25. Those with secondary/higher education were 4.07 times (ORaj=4.07 [1.81-9.87]) more likely to know more about hypertension than the uneducated. However, those who received information on awareness days were 0.25 times less likely to have knowledge of hypertension (ORaj=0.25 [0.10-0.60]) (Table 5). With regard to the practice of screening for hypertension, the associated factors were age and family history of hypertension. Individuals aged 60 and over screened 7.47 times more often (ORaj= 7.47 [3.10-18.7]) than those aged 18-25, while those aged 49-59 screened 3.50 times more often (ORaj= 3.50 [1.57-7.98]). Those with a family history of hypertension were 2.76 times more likely (ORaj=2.76 [1.56-5.00]) to undergo screening (Table 6).

Table 5. *Factors associated with knowledge of hypertension.*

Variable	Knowledge of High blood pressure		
	P value	ORaj	95% CI
Age range			
[18-25 years]		Ref	Ref
[25-40 years]	0,3	1,35	0,74 - 2,48
[40-59 years old]	0,017	2,70	1,21 - 6,28
60 and over	>0,9	1,03	0,44 - 2,39
Level of education			
Without instruction		Ref	Ref
Primary	0,2	1,57	0,80 - 3,16
Secondary/Higher	0,001	4,07	1,81 - 9,87
Information on hypertension via television			
No	0,800	Ref	Ref
Yes		1,07	0,52 - 2,22
Information on hypertension via radio			

Variable	Knowledge of High blood pressure		
	P value	**ORaj**	**95% CI**
No	0,12	Ref	Ref
Yes		1,78	0,86 - 3,70
Information on hypertension at awareness days			
No	0,003	Ref	Ref
Yes		0,25	0,10 - 0,60
Information on hypertension via friends and the community			
No	0,068	Ref	Ref
Yes		0,32	0,08 - 1,01
Family history of hypertension			
No	0,2	Ref	Ref
Yes		1,40	0,82 - 2,39
Family history of diabetes			
No	0,6	Ref	Ref
Yes		0,78	0,30 - 2,05
Family history of stroke			
No	0,2	Ref	Ref
Yes		2,65	0,75 - 12,5

ORaj: Adjusted Odd Ratio; CI: Confidence Interval; *: Significance 5%

Table 6. *Factors associated with screening.*

Variable	Screening for arterial hypertension		
	ORaj	**95% CI**	**P value**
Age range			
[18-25 years]	Ref	Ref	
[25-40 years]	1,44	0,74 - 2,87	0,3
[40-59 years old]	3,50	1,57 - 7,98	0,002
60 and over	7,47	3,10 - 18,7	<0,001
Information on hypertension at awareness days			
No	Ref	Ref	0,065
Yes	2,20	0,95 - 5,15	
Awareness-raising by healthcare staff (doctors, nurses, midwives)			
No	Ref	Ref	0,100
Yes	1,57	0,92 - 2,70	
Information on hypertension via friends and the community			
No	Ref	Ref	0,077

Variable	Screening for arterial hypertension		
	ORaj	**95% CI**	**P value**
Yes	2,60	0,90 - 7,69	
Family history of hypertension			
No	Ref	Ref	<0,001
Yes	2,76	1,56 - 5,00	
Family history of diabetes			
No	Ref	Ref	0,071
Yes	2,26	0,94 - 5,56	
HTA knowledge			
No	Ref	Ref	0,11
Yes	1,57	0,91 - 2,77	

ORaj: Adjusted Odd Ratio; CI: Confidence Interval; *: Significance 5%

4. Discussion

This study on knowledge, attitudes, and practices related to hypertension was conducted in the commune of Niakhène, targeting individuals aged 18 to 83, and revealed that 55.3% of participants had a good overall knowledge of hypertension. Although this rate is higher than in some previous studies, it is still insufficient to ensure optimal control of the disease. [29]. With regard to risk factors, a majority of participants identified poor eating habits (83.7%), a sedentary lifestyle (74.3%) and obesity (69%) as factors favouring hypertension. However, only 40.7% mentioned family history, reflecting a lack of understanding of certain key aspects. As for complications, 43.6% recognised heart failure and 31.3% renal disease, results similar to those observed by Yusuf Ari Mashuri and al. [30] and other studies [31, 32].

Factors associated with knowledge included level of education and age. Participants with secondary or higher education had a better understanding of hypertension, confirming that education plays an essential role in improving knowledge. [33]. In addition, participants aged between 40 and 59 were significantly more likely to be aware of the disease [34] probably due to increased awareness of age-related risks [35].

The results highlight an urgent need to improve community awareness. The use of audio-visual media and community campaigns, already effective in informing 94.3% of participants [36] needs to be reinforced with more targeted messages. In addition, educational programs tailored to less-educated populations should be set up, focusing on risk factors and complications that are less well understood. Community leaders and health workers can play a crucial role in disseminating information. [37]. Integrating education about hypertension into school curricula and local awareness-raising initiatives could improve understanding of the disease and encourage the adoption of preventive behaviours. These efforts should also target vulnerable groups, including less educated populations and young adults, who appear to be less informed [33].

Despite moderate awareness, only 31.3% of participants reported having been screened for hypertension. This rate is much lower than that observed in high-income countries such as Canada (83%) [38, 39]. Among the factors associated with screening, a family history of hypertension plays a decisive role, with participants being 2.76 times more likely to undergo screening [40]. This observation aligns with the findings of Macia et al, who showed that family history increases individual awareness and motivates preventive behaviour [40].

However, there was no significant association between the level of knowledge and the practice of screening, which suggests that other obstacles, such as financial and cultural constraints, influence this practice. [41].

On the other hand, no significant link was observed between the level of knowledge and the practice of screening, which raises the question of underlying barriers. Several factors could explain this discrepancy the cost of healthcare services, as highlighted by Byiringiro et al. in their study of access to healthcare in sub-Saharan Africa [41] and mistrust of modern healthcare systems, combined with traditional beliefs about illness, limits active care-seeking, a phenomenon also observed in other African contexts [42].

Age was also identified as a factor influencing screening. Participants aged 40 and over were more likely to be screened, probably due to an increased awareness of the risks associated with age. [34]. However, a large proportion of young adults and individuals with no family history do not undergo screening, highlighting a missed opportunity for early pre-

vention [40].

The low rate of screening reflects persistent structural and cultural barriers. The high cost of healthcare services is a major obstacle in rural areas [41] as is mistrust of modern healthcare systems, often influenced by traditional beliefs [42]. To remedy this, free or subsidized screening campaigns should be implemented, as has been done successfully in other parts of Africa, where such initiatives have doubled participation rates [43].

Public policy must also incorporate screening for hypertension into primary health programmes, particularly in rural areas. Ongoing training for community health workers could improve their ability to promote screening among local populations. [44]. Moreover, targeted efforts should be made to raise awareness among young adults and individuals without a family history of hypertension, as they often perceive themselves as less vulnerable to the risks associated with the condition [45].

5. Conclusions

Hypertension (hypertension) remains a major public health challenge, particularly in rural areas, where a lack of awareness, screening and management is hampering efforts to combat the disease. The study highlights factors such as a lack of knowledge, educational barriers and the absence of community efforts as having a negative impact on preventive measures. To remedy this situation, it is crucial to step up community awareness campaigns and provide ongoing training for health workers. In addition, financial barriers must be reduced and health education integrated into national programs to combat chronic diseases must be promoted. The active involvement of local communities is also essential. These interventions, inspired by successes observed in other contexts, could improve the prevention and management of hypertension. They would contribute to the development of effective public policies aimed at reducing the burden of hypertension in Senegal and other developing countries.

Abbreviations

CER	Research Ethics Committee
mmhg	Millimeter of Mercury
NCD	Non-Communicable Disease
ODK	ODK Open Data Kit
KAP	Knowledge, Attitudes and Practices

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Data Availability Statement

Data are available upon request from the corresponding author.

Conflicts of Interest

The authors declare no conflicts of interest.

Appendix

Additional Results

Table 7. *Breakdown of knowledge by gender and age group.*

	Gender			Age range				
	Female N=157	**Male N=143**	**P value**	**18-24 years old N=98**	**25-39 years old N=113**	**Age 40-59 N=48**	**60 and over N=41**	**P value**
General knowledge								
High blood pressure is a non-communicable disease	48 (30,6%)	47 (32,9%)	0,762	31 (31.6%)	41 (36.3%)	16 (33.3%)	7 (17.1%)	0.157
High blood pressure is a cura-ble disease	40 (25,5%)	42 (29,4%)	0,531	29 (29.6%)	32 (28.3%)	13 (27.1%)	8 (19.5%)	0.666
High blood pressure has a genetic component	38 (24,2%)	37 (25,9%)	0,841	23 (23.5%)	32 (28.3%)	12 (25.0%)	8 (19.5%)	0.695
High blood pressure only affects the elderly	19 (12,1%)	26 (18,2%)	0,190	15 (15.3%)	15 (13.3%)	6 (12.5%)	9 (22.0%)	0.560
Knowledge of signs								
Headaches	122 (77,7%)	100 (69,9%)	0,161	62 (63.3%)	91 (80.5%)	38 (79.2%)	31 (75.6%)	0.028
Visual blur	109 (69,4%)	82 (57,3%)	0,040	49 (50.0%)	80 (70.8%)	34 (70.8%)	28 (68.3%)	0.008
Ringing in the ears	99 (63,1%)	81 (56,6%)	0,310	43 (43.9%)	76 (67.3%)	31 (64.6%)	30 (73.2%)	0.001
Vertigo	112 (71,3%)	92 (64,3%)	0,240	58 (59.2%)	84 (74.3%)	33 (68.8%)	29 (70.7%)	0.125
Palpitations	82 (52,2%)	64 (44,8%)	0,239	34 (34.7%)	67 (59.3%)	26 (54.2%)	19 (46.3%)	0.004
Knowledge of complications								
High blood pressure can lead to heart failure or heart attack	68 (43,3%)	66 (46,2%)	0,705	39 (39.8%)	56 (49.6%)	25 (52.1%)	14 (34.1%)	0.176
High blood pressure can lead to kidney failure	44 (28,0%)	50 (35,0%)	0,242	23 (23.5%)	39 (34.5%)	23 (47.9%)	9 (22.0%)	0.011
High blood pressure can cause eye problems or even blindness	106 (67,5%)	90 (62,9%)	0,477	51 (52.0%)	85 (75.2%)	36 (75.0%)	24 (58.5%)	0.002
High blood pressure can cause brain diseases such as stroke	98 (62,4%)	84 (58,7%)	0,594	51 (52.0%)	78 (69.0%)	33 (68.8%)	20 (48.8%)	0.018
Knowledge of risk factors								
Family history of diabetes (parents, brothers, sisters)	68 (43,3%)	54 (37,8%)	0,390	37 (37.8%)	48 (42.5%)	24 (50.0%)	13 (31.7%)	0.309
Being overweight and/or obese	113 (72,0%)	94 (65,7%)	0,297	58 (59.2%)	84 (74.3%)	39 (81.2%)	26 (63.4%)	0.020
Physical inactivity / sedentary lifestyle			0,459	65 (66.3%)	85 (75.2%)	39 (81.2%)	34 (82.9%)	0.105
Bad eating habits (unbalanced, too fatty, too sweet, too salty)	137 (87,3%)	114 (79,7%)	0,108	65 (66.3%)	85 (75.2%)	39 (81.2%)	34 (82.9%)	0,049

Table 8. *Distribution of knowledge by level of education and socio-economic level.*

	Level of education				**Socio-economic level**					
	No instruction N=203	**Primary N=51**	**Secondary and higher N=46**	**P value**	**Poorer N=46**	**Poor N=46**	**Medium N=75**	**Rich N=69**	**Richer N=64**	**P value**
General knowledge										
High blood pressure is a non-communicable disease	62 (30,5%)	16 (31,4%)	17 (37,0%)	*0,699*	16 (34,8%)	13 (28,3%)	22 (29,3%)	18 (26,1%)	26 (40,6%)	*0,405*
High blood pressure is a curable disease	52 (25,6%)	12 (23,5%)	18 (39,1%)	*0,143*	13 (28,3%)	11 (23,9%)	14 (18,7%)	21 (30,4%)	23 (35,9%)	*0,211*
High blood pressure has a genetic component	53 (26,1%)	13 (25,5%)	9 (19,6%)	*0,649*	10 (21,7%)	8 (17,4%)	25 (33,3%)	14 (20,3%)	18 (28,1%)	*0,230*
High blood pressure only affects the elderly	27 (13,3%)	8 (15,7%)	10 (21,7%)	*0,347*	6 (13,0%)	7 (15,2%)	10 (13,3%)	12 (17,4%)	10 (15,6%)	*0,959*
Knowledge of signs										
Headaches	153(75,4 %)	35 (68,6%)	34 (73,9%)	*0,618*	37 (80,4%)	32 (69,6%)	58 (77,3%)	53 (76,8%)	42 (65,6%)	*0,341*
Visual blur	136 (67,0%)	26 (51,0%)	29 (63,0%)	*0,104*	31 (67,4%)	29 (63,0%)	45 (60,0%)	47 (68,1%)	39 (60,9%)	*0,824*
Ringing in the ears	129 (63,5%)	24 (47,1%)	27 (58,7%)	*0,098*	30 (65,2%)	25 (54,3%)	48 (64,0%)	42 (60,9%)	35 (54,7%)	*0,661*
Vertigo	141 (69,5%)	30 (58,8%)	33 (71,7%)	*0,291*	34 (73,9%)	27 (58,7%)	51 (68,0%)	50 (72,5%)	42 (65,6%)	*0,498*
Palpitations	103 (50,7%)	19 (37,3%)	24 (52,2%)	*0,198*	23 (50,0%)	21 (45,7%)	38 (50,7%)	31 (44,9%)	33 (51,6%)	*0,922*
Knowledge of complications										
High blood pressure can lead to heart failure or heart attack	86 (42,4%)	23 (45,1%)	25 (54,3%)	*0,336*	22 (47,8%)	19 (41,3%)	32 (42,7%)	31 (44,9%)	30 (46,9%)	*0,958*
High blood pressure can lead to kidney failure	58 (28,6%)	20 (39,2%)	16 (34,8%)	*0,294*	14 (30,4%)	14 (30,4%)	24 (32,0%)	19 (27,5%)	23 (35,9%)	*0,887*
High blood pressure can cause eye problems or even blindness	134 (66,0%)	32 (62,7%)	30 (65,2%)	*0,908*	31 (67,4%)	31 (67,4%)	45 (60,0%)	49 (71,0%)	40 (62,5%)	*0,676*
High blood pressure can cause brain diseases such as stroke	120 (59,1%)	32 (62,7%)	30 (65,2%)	*0,706*	30 (65,2%)	30 (65,2%)	44 (58,7%)	40 (58,0%)	38 (59,4%)	*0,882*
Knowledge of risk factors										
Family history of diabetes (parents, brothers, sisters)	74 (36,5%)	25 (49,0%)	23 (50,0%)	0,099	15 (32,6%)	19 (41,3%)	35 (46,7%)	24 (34,8%)	29 (45,3%)	*0,416*
Being overweight and/or obese	135 (66,5%)	36 (70,6%)	36 (78,3%)	0,287	29 (63,0%)	30 (65,2%)	55 (73,3%)	47 (68,1%)	46 (71,9%)	*0,735*
Physical inactivity / sedentary lifestyle	141 (69,5%)	44 (86,3%)	38 (82,6%)	0,018	29 (63,0%)	33 (71,7%)	59 (78,7%)	50 (72,5%)	52 (81,2%)	0,222
Bad eating habits (unbalanced, too fatty, too sweet, too salty)	1 (0,49%)	0 (0,00%)	0 (0,00%)	0,271	36 (78,3%)	36 (78,3%)	64 (85,3%)	60 (87,0%)	55 (85,9%)	*0,573*

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Research Fields

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