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Determinants of Blood Pressure Control Related to the Patient, the Provision of Care and Access to Care: A National Hospital Survey in Gabon

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Abstract

Introduction: Arterial hypertension is a major public health issue due to its increasing morbidity and mortality, largely linked to inadequate control. **Objective:** To determine the prevalence and determinants of blood pressure control in adults in Gabon. **Patients and Methods:** A multicenter, cross-sectional, descriptive, and analytical study was conducted in a hospital setting over six months in seven provinces of Gabon, including 338 hypertensive patients. Exclusion criteria were gestational hypertension, suspected secondary hypertension, acute illness, concurrent treatments, and refusal to participate. A physical examination was performed to assess blood pressure, heart rate, and anthropometric parameters. A questionnaire collected socioeconomic data, characteristics of care received, follow-up location, and health insurance status. Hypertension was considered controlled when blood pressure measured on three readings was below 140/90 mmHg. Statistical analysis was performed using Epi-Info 3.5, with significance set at 0.05. **Results:** The prevalence of controlled hypertension was 35%. The main factors associated with poor control included low socioeconomic status and education level, insufficient knowledge of the disease, poor adherence to treatment, and comorbidities such as diabetes. Follow-up by a cardiologist and the use of a fixed-dose combination of antihypertensive drugs were associated with better control. **Conclusion:** In Gabon, blood pressure control remains relatively low. This there-

fore necessitates improving the socio-economic status of patients, the quality of practitioners, and access to health insurance.

Keywords

Blood Pressure Control, Determinants, Gabon

1. Introduction

Arterial hypertension (HTN) is a major public health issue worldwide. Despite its high prevalence across all continents, it remains underdiagnosed, and both its treatment and control are insufficient [1], particularly in Africa. Recent projections indicate an expected 80% increase in this condition in developing countries [1]. HTN is a major cardiovascular risk factor, leading to significant cardiac, renal, and cerebrovascular morbidity and mortality. Therefore, better blood pressure control is necessary to prevent the complications associated with hypertension [2]. In Gabon, the universal health insurance system established in 2007 through the National Health Insurance and Social Guarantee Fund (CNAMGS) has improved population access to healthcare services and treatments. This insurance covers between 80% and 90% of the health expenses of people who live there. However, there is limited data on blood pressure control among hypertensive patients benefiting from this health insurance. The main objective of our study was to assess the prevalence of controlled hypertension among hypertensive patients in Gabon and to identify the determinants of blood pressure control related to patients, socioeconomic status, their affiliation with the universal health insurance system, the presence of comorbidities, and the conditions under which hypertension is managed.

2. Methodology

This was a prospective, cross-sectional, multicenter study with descriptive and analytical objectives, conducted from August 18, 2017, to February 28, 2018. The survey was carried out within public and parapublic healthcare facilities across seven provinces of Gabon, namely the teaching hospital of Libreville and Angondjé (Estuaire), the Regional Hospitals of Makokou (Ogooué-Ivindo), Tchibanga (Nyanga), Oyem (Woleu-Ntem), Mouila (Ngounié), Lambaréné (Moyen Ogooué), and Port-Gentil (Ogooué Maritime), as well as the Oyem Health and Social Action Center and the Tchibanga Urban Medical Center. Blood pressure monitoring was conducted on a voluntary basis among hypertensive patients aged 18 years and older attending outpatient consultations at the selected healthcare facilities, regardless of the reason for consultation. Inclusion criteria were patients diagnosed with hypertension at least six months prior, with or without ongoing antihypertensive treatment. Pregnant hypertension, poor general condition, and the presence of acute illness were the main exclusion criteria. After obtaining informed consent, a questionnaire was used to collect administrative data and vari-

ous variables related to education, income, and patient management. Educational level was categorized as none (never attended school), primary, secondary, or tertiary, and monthly income was classified as low (<150,000 CFA francs [≈265 US dollar]), high (>600,000 CFA francs [≈1061 US dollar]), or intermediate. Additionally, information on the usual site of hypertension follow-up (private or public facility), treatment adherence (regular medication intake), type of treatment (monotherapy, combination therapy either as fixed-dose or separate molecules), type of healthcare provider (general practitioner or cardiologist), patient knowledge about hypertension and its consequences, and number of follow-up visits per year (≤2, 3 - 6, >6 visits) was documented. Health insurance affiliation (through the National Health Insurance Fund as public sector or private sector employees, or low-income people) was also verified. Anthropometric measurements were obtained using a Seca Vogel and Halke Model scale. Height was measured with a Robé Médical stadiometer and waist circumference with a measuring tape. Blood pressure (BP) was measured according to standard guidelines using an OMRON electronic sphygmomanometer, model HEM-790ITCAN, which automatically provided the average of three consecutive readings. A rest period of five minutes was observed between each measurement. BP was considered controlled if systolic BP was <140 mmHg and/or diastolic BP < 90 mmHg, and uncontrolled for values equal to or exceeding these thresholds. Obesity was defined as a body mass index (BMI) > 30 kg/m^2. Hypercholesterolemia was defined as total cholesterol > 2 g/L. Data were entered into Excel and exported to Epi-info version 3.5 for analysis. The chi-square test was used for statistical comparisons, with a significance threshold set at p-value < 0.05.

3. Results

The number of subjects included in the study was 338. Among them, 95.3% had universal health insurance. The sex ratio was 0.4. The mean age was 60 years ± 11.1 years, with a range of 35 to 92 years. The national prevalence of blood pressure control was 35% (n = 119), with 26% of controlled patients residing in the capital. The description of the study population is summarized in Table 1.

There was no significant difference between patients with controlled blood pressure and those with uncontrolled blood pressure across age groups (p = 0.90). The same was true for obese subjects (p = 0.5). Educational level significantly impacted blood pressure control, with uncontrolled blood pressure being significantly higher among those with no education (p = 0.001). Individuals with low and middle incomes had significantly higher rates of uncontrolled blood pressure than those with controlled blood pressure. There was no significant difference between individuals with controlled blood pressure and those with uncontrolled blood pressure in the higher-income category (p = 0.90).

Among public employees, there was a significant difference between those with controlled PA and those with uncontrolled PA (p = 0.001). The control of blood pressure is lower in patients without medical insurance than those with insurance.

Table 1. Description of the study population.

	BP controlled	Uncontrolled BP	Total	p-value
Age				
30 - 60	184 (54.4)	65 (35.3)	119 (64.7)	0.90
≥60	154 (45.6)	54 (35.1)	100 (64.9)	
BMI				
<18	6 (1.8)	0	6 (100)	0.10
18 - 30	222 (65.7)	77 (34.7)	145 (65.3)	0.90
≥30	110 (32.5)	42 (38.2)	68 (61.8)	0.5
Education				
None	4	75	79 (23.4)	0.001
Primary	28	15	43 (12.7)	0.001
Secondary	65	101	166 (49.1)	0.20
University	22	28	50 (14.8)	0.20
Salary (FCFA)				
<150 000	54	140	194 (57.4)	0.001
150,000 - 600,000	63	76	139 (41.1)	0.01
≥600 000	2	2	5 (1.5)	0.90
Residence				
Urban	108	178	286 (84.6)	0.05
Rural	11	41	52 (15.4)	

Table 2. Frequency of blood pressure monitoring based on associated risk factors.

	BP controlled	Uncontrolled BP	p-value
Tobacco			
yes	5 (4.2)	10 (4.6)	0.9
no	114 (95.8)	209 (5.4)	
Alcohol			
yes	34 (28.6)	66 (30.1)	0.3
no	85 (71.4)	153 (9.9)	
Physical activity			
yes	86 (72.3)	137 (62.6)	0.10
no	33 (27.7)	82 (37.4)	
Snoring			
yes	36 (36)	64 (64)	0.04
no	83 (34.9)	155 (65.1)	

Continued

Diabetes			
yes	9 (7.6)	42 (10.2)	0.01
no	110 (92.4)	177 (88)	
Dyslipidemia			
yes	3 (2.5)	9 (4.1)	0.5
no	116 (7.5)	210 (95.9)	

Table 3. Blood pressure control according to patient follow-up and treatment methods.

	BP controlled	Uncontrolled BP	p-value
Practitioners			
Cardiologist (57%)	97	97	0.001
General practitioner (37.9%)	20	107	0.001
Others spécialists (3.6%)	1	11	0.05
Paramedics (1.5%)	1	4	0.5
Drugs class			
ARB II (0.6%)	1	1	0.2
Diuretics (4.4%)	1	11	0.5
Betablockers (1.8%)	0	6	0.01
Calcium blockers (12.4%)	11	31	0.20
ACEI (2.4%)	4	4	0.5
Centrally acting agents (0.1%)	0	5	0.1
Treatment			
Monotherapy (23.1%)	20	58	0.05
Bitherapy (49.7%)	65	103	0.2
Tritherapy (18%)	27	34	0.1
Fixed Association (47.6%)	68	93	0.01
Separed drugs (26%)	31	57	0.9
Annual visits			
≤2	23	113	0.001
3 - 6	89	102	0.001
>6	7	4	0.05

Diabetes and snoring were determinants of poor BP control (p = 0.01; p = 0.04).

Lack of knowledge of the disease and poor adherence to treatment were determinants of uncontrolled blood pressure.

Table 4. Frequency of blood pressure monitoring depends on knowledge of the disease and adherence to treatment.

	BP controlled	Uncontrolled BP	p-value
Knowledge about the disease			
yes	93 (78.2)	119 (54.3)	0.001
no	26 (21.8)	100 (45.7)	
Treatment compliance			
yes	110 (92.4)	119 (54.3)	0.001
no	9 (7.6)	100 (45.7)	

Table 5. Frequency of blood pressure checks based on health insurance coverage.

	BP controlled	Uncontrolled BP	p-value
Hypertensives with insurance (N = 322)			
Public sector	57 (47.9)	63 (29.7)	0.001
Private sector	12 (10)	26 (11.9)	0.9
Unemployed	8 (35.1)	116 (53)	0.1
Hypertensives without insurance (N = 16)	2 (1.6)	14 (6.4)	

There was a significant difference in blood pressure control among hypertensive patients followed by a physician (cardiologist or general practitioner) compared to other healthcare providers. Poor blood pressure control was influenced by the prescription of Betablockers. However, combination therapy with a fixed-dose combination was a determining factor in blood pressure control (p = 0.01).

4. Discussion

The main objectives of our study were to determine the prevalence of controlled hypertension among hypertensive patients in Gabon and to identify the determinants of blood pressure control related to patients socioeconomic status, universal health insurance affiliation, comorbidities, and conditions of hypertension management. This study acknowledges a selection bias related to hospital-based and voluntary recruitment, which could influence the reported control rate. Indeed, the results likely reflect patients already under care. Furthermore, in our setting, patients often present at the hospital with symptoms and elevated blood pressure. Additionally, a potential recall bias regarding self-reported variables such as treatment adherence or alcohol consumption could be observed. Nevertheless, it remains one of the few nationwide studies on hypertension conducted in Gabon.

4.1. Overall Prevalence

Only one-third of hypertensive patients in our cohort achieved blood pressure control. This prevalence of adequate control is far higher than that reported by Ngoungou *et al.* [3] in a semi-urban population (5.8%). It may also reflect the broader sampling in our study compared with the restricted recruitment in a single secondary locality. Ayetenew *et al.* reported a higher prevalence of uncontrolled hypertension in sub-Saharan Africa (50.3%) in a meta-analysis [4]. Our prevalence is close to that reported by Nejjari in North Africa (35.7%) [5], Maepe in South Africa (31%) [6], and Goverwa in Zimbabwe (32.8%) [7]. Dzudie in Cameroon found a lower control rate (24.6%) [8], similar to the findings of Essayagh and Belayachi in Morocco (27% and 26.5%, respectively) [9] [10]. Even lower rates have been reported in Egypt (8%) [11], Benin (1.9%) [12], and Uganda (9.4%) [13].

This variability likely reflects differences in sociocultural and economic environments and disparities in health systems across the continent. These factors influence hypertension management, access to care and medications which remains unequal in sub-Saharan Africa and treatment adherence. Gabon's universal health insurance, particularly the 90% State coverage of chronic diseases such as hypertension, likely contributes to these results.

4.2. Blood Pressure Control and Sociodemographic Variables

4.2.1. Limited or No Formal Education

Low education achievement was associated with poor blood pressure control. Kayima *et al.* [14] reported low overall control in Africa and better control among patients with middle to high education levels. In the PROTECT study, Krzesinski [15] found that higher education improved disease knowledge and treatment adherence, making it a key determinant of blood pressure control. In Sudan, Fawzi likewise found high rates of uncontrolled hypertension even among highly educated individuals (55%) and workers [16].

4.2.2. Low Income

Iwelunmor, Seedat, and Sorato identified poverty as a determinant of poor hypertension control [17]-[19]. Similarly, Goverwa [7] showed that a household income above USD 200 per month (110,000 FCFA) was associated with better control. The high proportion of low- or middle-income individuals (98.5%) in our cohort may explain the poor control rate. More broadly, in low- and middle-income countries, inadequate or inaccessible primary healthcare due to low income is a major barrier to blood pressure control [18]. In the United States, however, education and income were not or only minimally associated with adequate blood pressure control [20].

4.2.3. Urban Residence

Among the 119 patients with controlled hypertension, 74.8% lived in Libreville. This likely reflects more favorable access to specialists and health facilities con-

centrated in the capital, as well as better access to medications, all of which promote adherence. Urbanization may also offer advantages related to improved food availability [19].

4.3. Blood Pressure Control and Cardiovascular Risk Factors

4.3.1. Alcohol and Tobacco

No statistically significant association was found between blood pressure control and smoking, alcohol consumption, or dyslipidemia in our cohort (**Table 2**). He *et al.* [20] similarly found little or no association between alcohol, smoking, and blood pressure control. In contrast, Goverwa [7] identified active smoking, alcohol consumption, and physical inactivity as determinants of poor control. Fawzi *et al.* reported a higher prevalence of uncontrolled hypertension among male smokers (43%) compared with women (4%) [16]. Belayachi *et al.* also found smoking associated with increased hypertension risk and poor control [10]. Chimiel *et al.* found that smoking was independent predictors of elevated blood pressure in uncontrolled hypertensive patients [23].

4.3.2. Obesity

Although 32.5% of patients with controlled hypertension were obese, anthropometric parameters did not significantly influence blood pressure control in our study ($p = 0.5$) (**Table 1**). However, the literature often describes a relationship between overweight and poor control [21] [22]. Chimiel *et al.* found that overweight was independent predictors of elevated blood pressure in uncontrolled hypertensive patients [23]. Belayachi in Morocco identified overweight or obesity as factors for poor control [10].

4.3.3. Diabetes and Dyslipidemia

These comorbidities were important determinants of blood pressure control in our cohort, which underscores the need to strengthen lifestyle interventions and glycemic control. Similar to Bog-Hansen [24], we found no significant association between dyslipidemia and blood pressure control. However, Balijepali [25] identified dyslipidemia and diabetes as predictors of poor control. Kika [26] also demonstrated associations between these comorbidities and hypertension control, with metabolic syndrome being the main risk factor for uncontrolled hypertension. Mohamed *et al.*, in a meta-analysis, reported a prevalence of uncontrolled hypertension of 78.6% in sub-Saharan Africa among patients with comorbidities [27].

4.4. Determinants Related to the Health System: Healthcare Facilities and Practitioners

In our study, the type of healthcare facility (public or private) did not influence blood pressure control. However, practitioner qualification cardiologist versus general practitioner was a major determinant.the result of the study showing that patients treated by cardiologists obtained significantly better results (**Table 3**).

Yet, uncomplicated hypertension should be managed by non-specialists, who often exhibit therapeutic inertia [28].

Le Jeune *et al.* [28] defined "clinical inertia" in the context of hypertension as the failure to intensify therapy despite uncontrolled blood pressure. Clinical inertia includes overestimation of treatment effectiveness, inappropriate justification for not intensifying therapy, and lack of training on therapeutic targets. Nelson *et al.* [29] demonstrated the role of failure to intensify therapy as a determinant of poor control in general practice. In the United States, Wang *et al.* [30] found that general practitioners often failed to follow hypertension guidelines due to lack of awareness, disagreement, or reluctance to change prescribing habits. Notably, 43% did not initiate antihypertensive therapy unless systolic BP was ≥160 mmHg and were less aggressive in older adults.

4.5. Determinants Related to Treatment

Our study shows that monotherapy versus combination therapy is a determinant of blood pressure control (**Table 3**). Patients on monotherapy were less controlled than those on combination therapy. Their blood pressure profiles should be examined to determine whether treatment is adequate. Guidelines clearly state that most hypertensive patients require at least two drugs to achieve optimal control [19].

Fixed-dose combination therapy was also a major determinant of good control compared to combinations of separate agents. This has been confirmed by Jankowska-Polanska, Chimiel, and others due to better adherence [23] [31]. Pio reported monotherapy in 41%, dual therapy in 52.6%, and triple therapy in 6.3% of cases [32]. In Côte d'Ivoire, Konin *et al.* [33] found 45% on monotherapy, 28.5% on dual therapy, and 26.5% on triple or more therapy. The high proportion of combination therapy in many studies, including ours, reflects the severity of hypertension in Black African populations, often requiring two or three drugs for adequate control. However, the high cost of treatment remains a predictor of poor adherence.

4.6. Determinants Related to Disease Knowledge, Treatment Adherence, and Follow-Up

Disease knowledge was a major determinant of blood pressure control in our cohort (**Table 4**). Sorato *et al.* demonstrated that poor knowledge of hypertension and its complications was a major predictor of uncontrolled hypertension [19]. Ikama *et al.* [34] confirmed that inadequate understanding of treatment and complications leads to nonadherence, both of them affect control. Lulebo *et al.* [35] identified lack of therapeutic education as a determinant of poor control.

Regular follow-up also plays a role. We found a positive association between the number of follow-up visits and hypertension control. Egan *et al.* [36] estimated that at least two visits per year are necessary for adequate control.

Medication adherence is a major determinant of blood pressure control. It is

defined as the agreement between the physician's recommendations and the patient's behavior [28]. Its assessment in our study was subjective, based solely on patient self-report, without validated adherence questionnaires or electronic pill counts. Nevertheless, our findings align with the literature [26] [34]. The results indicate that beta-blocker prescription was associated with poor blood pressure control ($p = 0.01$). Their potential side effects likely have a negative impact on treatment adherence. Therapeutic education should therefore be reinforced to improve patients' understanding of antihypertensive treatment and adherence [37].

4.7. Universal Health Insurance as a Determinant of Blood Pressure Control

The influence of health insurance on hypertension control in Gabon varies by socioeconomic group: limited impact among private-sector employees, who often have full private coverage, and limited benefit for low-income individuals (GEF), who struggle to pay co-payments and therefore make little use of available services explaining the high number of uncontrolled patients in this group (**Table 5**). Thus, insurance seems to benefit some groups more than others, particularly low-income patients who continue to face out-of-pocket expenses.

Conversely, public-sector employees with sufficient income to pay the co-payment benefit significantly from health insurance, which is associated with better hypertension control. This aligns with findings related to financial vulnerability. Hendricks *et al.* [38] reported that improving healthcare access and quality through community-based health insurance programs significantly reduced blood pressure. Adoubi *et al.* [39] noted that lack of insurance contributed to nonadherence among hypertensive patients. Dzudie *et al.* [8] also highlighted that high costs and lack of insurance favored poor control. Mirzaei in Iran confirmed that having health insurance was significantly associated with blood pressure control [40]. However, these results must take into account the very different contexts of healthcare systems.

5. Conclusions

The prevalence of blood pressure control remains relatively low in Gabon despite notable improvements in healthcare provision and access, and is similar to that reported in other African countries. Disease awareness, therapeutic adherence, regular follow-up particularly by a cardiologist and the use of fixed-dose combination therapy emerged as key determinants of optimal blood pressure control. Continuous training of healthcare providers, especially general practitioners and frontline clinicians, is essential to prevent therapeutic inertia, which contributes to poor hypertension control. Health insurance coverage appeared to be a determinant with variable impact: it mainly benefited public-sector workers and had little influence on individuals in the private sector or those classified as economically vulnerable. Low socioeconomic status and diabetes as an associated cardiovascular risk factor were among the main determinants of inadequate blood pres-

sure control.

Low educational level and limited income are determinants of poor blood pressure control in both urban and rural settings. Emphasis should be placed on improving the living conditions of hypertensive patients, enhancing patient education, ensuring comprehensive management particularly of associated cardiovascular risk factors and strengthening universal health coverage. Major efforts are needed to identify modifiable risk factors in order to maximize blood pressure control.

Authors' Contribution

Ndoume Obiang F, Adebo I, and Antchouey AM. designed the study, interpreted the results, and drafted the final manuscript. Akagha C, Ndjibah Alakoua conducted the literature search. Yekini C collected the data. Allognon C, Ayo Bivigou E improved the study design, analyzed the results, and revised the manuscript. Antchouey AM revised the final manuscript.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

[1] World Health Organization (2013) A Global Brief on Hypertension: Silent Killer, Global Public Health Crisis: World Health Day 2013. World Health Organization. https://iris.who.int/handle/10665/79059

[2] Okai, D.E., Manu, A., Amoah, E.M., Laar, A., Akamah, J. and Torpey, K. (2020) Patient-Level Factors Influencing Hypertension Control in Adults in Accra, Ghana. *BMC Cardiovascular Disorders*, **20**, Article No. 123. https://doi.org/10.1186/s12872-020-01370-y

[3] Ngoungou, E.B., Aboyans, V., Kouna, P., Makandja, R., Ecke Nzengue, J.E., Allogho, C.N., *et al.* (2012) Prevalence of Cardiovascular Disease in Gabon: A Population Study. *Archives of Cardiovascular Diseases*, **105**, 77-83. https://doi.org/10.1016/j.acvd.2011.12.005

[4] Aytenew, T.M., Kassaw, A., Simegn, A., Nibret Mihretie, G., Asnakew, S., Tesfahun Kassie, Y., *et al.* (2024) Uncontrolled Hypertension among Hypertensive Patients in Sub-Saharan Africa: A Systematic Review and Meta-Analysis. *PLOS ONE*, **19**, e0301547. https://doi.org/10.1371/journal.pone.0301547

[5] Nejjari, C., Arharbi, M., Chentir, M., Boujnah, R., Kemmou, O., Megdiche, H., *et al.* (2013) Epidemiological Trial of Hypertension in North Africa (ETHNA): An International Multicentre Study in Algeria, Morocco and Tunisia. *Journal of Hypertension*, **31**, 49-62. https://doi.org/10.1097/hjh.0b013e32835a6611

[6] Maepe, L.M. and Outhoff, K. (2011) Hypertension in Goldminers. *South African Medical Journal*, **102**, 30-33.

[7] Goverwa, T.P., Masuka, N., Tshimanga, M., Gombe, N.T., Takundwa, L., Bangure, D., *et al.* (2014) Uncontrolled Hypertension among Hypertensive Patients on Treatment in Lupane District, Zimbabwe. *BMC Research Notes*, **7**, Article No. 703. https://doi.org/10.1186/1756-0500-7-703

[8] Dzudie, A., Kengne, A.P., Muna, W.F., Ba, H. and Kouam Kouam, C. (2012) Preva-

lence, Awareness, Treatment and Control of Hypertension in a Selected Sub-Saharan African Population: A Cross-Sectional Study. *British Medical Journal*, **2**, 1-9.

[9] Essayagh, T., Essayagh, M., El Rhaffouli, A., Khouchoua, M., Bukassa Kazadi, G., Khattabi, A., *et al.* (2019) Prevalence of Uncontrolled Blood Pressure in Meknes, Morocco, and Its Associated Risk Factors in 2017. *PLOS ONE*, **14**, e0220710. https://doi.org/10.1371/journal.pone.0220710

[10] Belayachi, S., Boukhari, F.Z., Essayagh, F., Terkiba, O., Marc, I., *et al.* (2024) Non-Adherence to Antihypertensive Drugs and Its Risk Factors among Hypertensive Patients, Marrakech, Morocco. *Scientific Reports*, **14**, Article No. 2953.

[11] Ibrahim, M.M., Rizk, H., Appel, L.J., Aroussy, W.E., Helmy, S., Sharaf, Y., *et al.* (1995) Hypertension Prevalence, Awareness, Treatment, and Control in Egypt: Results from the Egyptian National Hypertension Project (NHP). *Hypertension*, **26**, 886-890. https://doi.org/10.1161/01.hyp.26.6.886

[12] Houinato, D.S., Gbary, A.R., Houehanou, Y.C., Djrolo, F., Amoussou, M., Segnon-Agueh, J., *et al.* (2012) Prevalence of Hypertension and Associated Risk Factors in Benin. *Revue d'Épidémiologie et de Santé Publique*, **60**, 95-102. https://doi.org/10.1016/j.respe.2011.09.010

[13] Musinguzi, G. and Nuwaha, F. (2013) Prevalence, Awareness and Control of Hypertension in Uganda. *PLOS ONE*, **8**, e62236. https://doi.org/10.1371/journal.pone.0062236

[14] Kayima, J., Wanyenze, R.K., Katamba, A., Leontsini, E. and Nuwaha, F. (2013) Hypertension Awareness, Treatment and Control in Africa: A Systematic Review. *BMC Cardiovascular Disorders*, **13**, Article No. 54. https://doi.org/10.1186/1471-2261-13-54

[15] Krzesinski, J.M. (2002) Quality of Hypertension Management. Can We, Must We Do Better? *Revue Médicale de Liège*, **57**, 202-206.

[16] Babiker, F.A., Elkhalifa, L.A. and Moukhyer, M.E. (2013) Awareness of Hypertension and Factors Associated with Uncontrolled Hypertension in Sudanese Adults. *Cardiovascular Journal of Africa*, **24**, 208-212. https://doi.org/10.5830/cvja-2013-035

[17] Iwelunmor, J., Airhihenbuwa, C.O., Cooper, R., Tayo, B., Plange-Rhule, J., Adanu, R., *et al.* (2014) Prevalence, Determinants and Systems-Thinking Approaches to Optimal Hypertension Control in West Africa. *Globalization and Health*, **10**, Article No. 42. https://doi.org/10.1186/1744-8603-10-42

[18] Seedat, Y.K. (2015) Why Is Control of Hypertension in Sub-Saharan Africa Poor? *Cardiovascular Journal of Africa*, **26**, 193-195. https://doi.org/10.5830/cvja-2015-065

[19] Sorato, M.M., Davari, M., Kebriaeezadeh, A., Sarrafzadegan, N., Shibru, T. and Fatemi, B. (2021) Reasons for Poor Blood Pressure Control in Eastern Sub-Saharan Africa: Looking into 4P's (Primary Care, Professional, Patient, and Public Health Policy) for Improving Blood Pressure Control: A Scoping Review. *BMC Cardiovascular Disorders*, **21**, Article No. 123. https://doi.org/10.1186/s12872-021-01934-6

[20] He, J., Muntner, P., Chen, J., Roccella, E.J., Streiffer, R.H. and Whelton, P.K. (2002) Factors Associated with Hypertension Control in the General Population of the United States. *Archives of Internal Medicine*, **162**, Article 1051. https://doi.org/10.1001/archinte.162.9.1051

[21] Decoste, M., Vanobberghen, R., Borgermans, L. and Devroey, D. (2013) Uncontrolled Hypertension among Black Africans in the City of Brussels: A Case-Control Study. *European Review for Medical and Pharmacological Sciences*, **17**, 886-894.

[22] Arabzadeh, S., Sadeghi, M., Rabiei, K., Sarrafzadegan, N., Taheri, L. and Golshahi, J.

(2014) Determinants of Uncontrolled Hypertension in an Iranian Population. *ARYA Atherosclerosis*, **10**, 25-31.

[23] Chmiel, C., Wang, M., Senn, O., Del Prete, V., Zoller, M., Rosemann, T., *et al.* (2012) Uncontrolled Arterial Hypertension in Primary Care—Patient Characteristics and Associated Factors. *Swiss Medical Weekly*, **142**, w13693. https://doi.org/10.4414/smw.2012.13693

[24] Bøg - Hansen, E., Lindblad, U., Gullberg, B., Melander, A. and Råstam, L. (2003) Metabolic Disorders Associated with Uncontrolled Hypertension. *Diabetes, Obesity and Metabolism*, **5**, 379-387. https://doi.org/10.1046/j.1463-1326.2003.00247.x

[25] Balijepalli, C., Bramlage, P., Lösch, C., Zemmrich, C., Humphries, K.H. and Moebus, S. (2014) Prevalence and Control of High Blood Pressure in Primary Care-Results from the German Metabolic and Cardiovascular Risk Study (GEMCAS). *Hypertension Research*, **37**, 580-584. https://doi.org/10.1038/hr.2014.40

[26] Kika, T.M., Lepira, F.B., Kayembe, P., Makulo, J., Sumaili, E., Kintoki, E., *et al.* (2016) Uncontrolled Hypertension among Patients Managed in Primary Healthcare Facilities in Kinshasa, Democratic Republic of the Congo. *Cardiovascular Journal of Africa*, **27**, 361-366. https://doi.org/10.5830/cvja-2016-036

[27] Mohamed, S.F., Uthman, O.A., Mutua, M.K., Asiki, G., Abba, M.S. and Gill, P. (2021) Prevalence of Uncontrolled Hypertension in People with Comorbidities in Sub-Saharan Africa: A Systematic Review and Meta-Analysis. *BMJ Open*, **11**, e045880. https://doi.org/10.1136/bmjopen-2020-045880

[28] Le Jeune, S. and Mourad, J.J. (2012) Non-Adherence and Clinical Inertia: Two Obstacles to the Management of Hypertension. *Réalités cardiologiques*, **286**, 37-43.

[29] Nelson, S.A.E., Dresser, G.K., Vandervoort, M.K., Wong, C.J., Feagan, B.G., Mahon, J.L., *et al.* (2011) Barriers to Blood Pressure Control: A Stitch Substudy. *The Journal of Clinical Hypertension*, **13**, 73-80. https://doi.org/10.1111/j.1751-7176.2010.00392.x

[30] Wang, T.J. and Vasan, R.S. (2005) Epidemiology of Uncontrolled Hypertension in the United States. *Circulation*, **112**, 1651-1662. https://doi.org/10.1161/circulationaha.104.490599

[31] Jankowska-Polańska, B., Chudiak, A., Uchmanowicz, I., Dudek, K. and Mazur, G. (2017) Selected Factors Affecting Adherence in the Pharmacological Treatment of Arterial Hypertension. *Patient Preference and Adherence*, **11**, 363-371. https://doi.org/10.2147/ppa.s127407

[32] Pio, M., Baragou, S., Afassinou, Y., Pessinaba, S., *et al.* (2013) Adherence to Hypertension and Its Determinants in the Cardiology Department of the University Hospital of Lomé Tokoin. *Pan African Medical Journal*, **14**, Article No. 48.

[33] Konin, C., Adoh, A., Coulibaly, I., Kramoh, E., Safou, M., N'Guetta, R., *et al.* (2007) Black Africans' Compliance to Antihypertensive Treatment. *Journal of Hypertension*, **25**, A11. https://doi.org/10.1097/01.hjh.0000298996.96430.4e

[34] Ikama, M.S., Mesmer Nsitou, B., Loumouamou, M., Kimbally-Kaky, G. and Nkoua, J.L. (2013) Drug Compliance and Its Factors in a Group of Hypertensive Congolese. *Pan African Medical Journal*, **15**, 1-4.

[35] Lulebo, A.M., Mutombo, P.B., Mapatano, M.A., Mafuta, E.M., Kayembe, P.K., Ntumba, L.T., *et al.* (2015) Predictors of Non-Adherence to Antihypertensive Medication in Kinshasa, Democratic Republic of Congo: A Cross-Sectional Study. *BMC Research Notes*, **8**, Article No. 526. https://doi.org/10.1186/s13104-015-1519-8

[36] Egan, B.M., Li, J., Hutchison, F.N. and Ferdinand, K.C. (2014) Hypertension in the United States, 1999 to 2012: Progress toward Healthy People 2020 Goals. *Circulation*,

130, 1692-1699. https://doi.org/10.1161/circulationaha.114.010676

[37] Girerd, X., Radauceanu, A., Achard, J.M., Fourcade, J., Tournier, B., *et al.* (2011) Evaluation of Patient Compliance among Hypertensive Patients Treated by Specialists. *Archives Maladies Coeur Vaisseaux*, **94**, 839-842.

[38] Hendriks, M.E., Wit, F.W.N.M., Akande, T.M., Kramer, B., Osagbemi, G.K., Tanovic, Z., *et al.* (2014) Effect of Health Insurance and Facility Quality Improvement on Blood Pressure in Adults with Hypertension in Nigeria: A Population-Based Study. *JAMA Internal Medicine*, **174**, 555-563. https://doi.org/10.1001/jamainternmed.2013.14458

[39] Adoubi, K., Diby, K., Nguetta, R., Yangni-Angate, K.H. and Adoh, A.M. (2006) Factors Contributing to Poor Treatment Adherence among Hypertensive Patients in Ivory Coast. *Revue Internationale des Sciences Médicales*, **8**, 18-22.

[40] Mirzaei, M., Mirzaei, M., Bagheri, B. and Dehghani, A. (2020) Awareness, Treatment, and Control of Hypertension and Related Factors in Adult Iranian Population. *BMC Public Health*, **20**, Article No. 667. https://doi.org/10.1186/s12889-020-08831-1