



## Systematic review of hypertension prevalence and awareness in Sub-Saharan Africa

Eléazar Ndabarora<sup>1\*</sup>, Clemence Nishimwe<sup>1</sup>, Dariya Mukamusoni<sup>1</sup>.

<sup>1</sup> Kibogora Polytechnic, Department of General Nursing and Midwifery, BP 31 Rusizi, Rwanda.

<sup>1\*</sup>Corresponding author address: Email: [eleazarndaba@gmail.com](mailto:eleazarndaba@gmail.com); Tel: +250 785 371 340

### HIGHLIGHTS

- We conducted a systematic review of literature on the prevalence of hypertension and awareness in Sub-Saharan Africa;
- Increasing prevalence of hypertension was found in Sub-Saharan Africa;
- A low awareness of hypertension and screening programs was found;
- Operational studies and community-based sensitization and screening programs are highly recommended.

### ABSTRACT

Several studies have reported high prevalence of hypertension in Africa, but little is known on awareness and determinants of preventive measures uptake. The purpose of the review was to identify and review the studies which reported at the same time on the prevalence of hypertension and awareness among the participants in sub-Saharan Africa, and to recommend needed research studies and interventions to prevent and control hypertension increase. High prevalence of hypertension was found across sub-Saharan African countries. The increasing hypertension rate moved from 19.7% in 1990 to 30.8% in 2010, with very high increase in some sub-regions up to 77%. A low awareness was found, less than 50% and in some place less than 10%. Also a high rate of hypertensive patients who were not on treatment was found. There is a very increasing prevalence of hypertension and unawareness in sub-Saharan Africa. There is also a high rate of hypertensive patients who are not on treatment. Studies and interventions aiming at understanding determinants of hypertension screening and treatment uptake are much recommended.

### ARTICLE INFORMATION

#### Article history:

Received 08 January 2018

Received in revised form 14 February 2018

Accepted 15 March 2018 Available online 11 April 2018

#### Keywords:

Hypertension

Prevalence

Awareness

Systematic review

Sub-Saharan Africa

### 1. Introduction

Hypertension has been reported to be a major health threat in the World, particularly in Africa and other lower-and-middle-income-countries (LMIC) (Shin & Varghese, 2014). Globally, non-communicable disease (NCDs) account for around 70% of total deaths with a very high proportion of 80% of these deaths occurring in LMIC, and cardiovascular diseases are on the first causes of these deaths (Ntuli, Maimela, Alberts, Choma, & Dikotope, 2015). Several studies have reported high rates of hypertension in Africa. A systematic review and meta-analysis conducted showed that the

prevalence rates of hypertension ranged from 0.2 to 24.8% across several studies that were reviewed (Noubi *et al.*, 2017).

In Rwanda, a population-based national estimate of the prevalence and risk factors associated with hypertension and other risk factors for NCDs in general found that the overall prevalence of hypertension was 15.3%, with slight gender differences, 16.4% for males and 14.4% for females (Nahimana *et al.*, 2017). It was found that only 22.0% of the hypertensive participants were previously diagnosed, others were not aware. These findings suggest a high prevalence of hypertension in Rwanda as compared to the lower hypertension prevalence of 8% reported in Tanzania (Mosha, *et al.*,

2017), 9.9% in Sudan, and 7.5% in Ethiopia (Adeloye, & Basquill (2014). This reiterates the urgent need of interventions to prevent and control hypertension and cardiovascular diseases in general in Rwanda. Unawareness attached to hypertension is one of the major barriers to early diagnosis and treatment, and the patients consult with delays, sometimes the complications being their motive for consultation (Oladimeji, Fawole, Nguku, & Nsubuga, 2014; Reuven, Dreiherr, & Shvartzman, 2016). The purpose of the review was to identify and review the studies which reported at the same time on the prevalence of hypertension and awareness among the participants. Specific objectives were: (1) to identify and review studies on the prevalence of hypertension in Sub-Saharan Africa, and (2) to recommend further studies and interventions based on the findings of this review.

## 2. Methods

Extensive literature search was conducted using the MeSH terms in the PUBMED and their synonyms were identified in order to maximize picking up recently published literature (this is not more than five years) on the prevalence of hypertension and determinants of early detection in Africa, from the year 2012 to 2017. The following search terms were used: (prevalence OR incidence OR burden) AND (hypertension OR elevated blood pressure) AND (Africa OR Sub-Saharan Africa); (awareness) AND (Early detection OR screening OR diagnosis) AND (hypertension OR elevated blood pressure) AND (Africa OR Sub-Saharan Africa). Databases searched included: PubMed, Medline, LISTA (EBSCO), Cochrane and Internet engines such as Google and Google Scholar. Only articles reported at the same time the prevalence of hypertension and awareness in Africa, published in English language were included in the study. One reviewer independently screened the titles and abstracts of all identified retrieved articles, and then an agreement on articles to be reviewed in details was reached. A Meta-analysis could not be done, since the reviewed studies differed in their design, focus, and their implementation process. Ethical issues were given particular considerations along the implementation process of this study.

## 3. Results

### 3.1 Overview of the reviewed articles

The extensive literature search found a total number of 402 articles and 73 were relevant to the prevalence of hypertension. After exclusion of those out of Africa, 51 remained, and those reporting on the prevalence of hypertension only and/or out of sub-Saharan Africa were excluded, only six remained and they were reviewed (Figure 1).

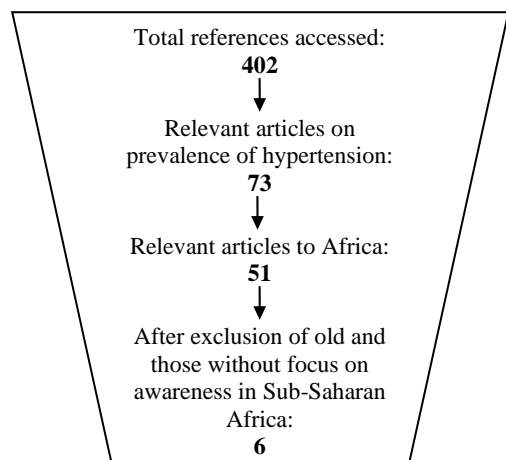


Figure 1: Flow diagram of articles selection

As summarized in Table 1, two articles reported the findings on Africa globally, one was from four countries in Southern Africa, namely Uganda, South Africa, Tanzania, and Nigeria, one article was from South Africa, one article was from Tanzania and one article was from Rwanda. Systematic reviews were two articles and the remaining three were observational descriptive studies.

Table 1: Summary of the six reviewed articles

Articles	Number of articles
<i>Article from country</i>	
Global (Africa)	2
Four countries in Southern Africa	1
South Africa	1
Tanzania	1
Rwanda	1
<i>Study design</i>	
Systematic Reviews	2
Descriptive Studies & Others	4

### 3.2 Prevalence of hypertension and awareness in Sub-Saharan Africa

As summarized in Table 2, a systematic analysis of the prevalence of hypertension and awareness in Africa between 1998 and 2013 showed an increase of the overall prevalence rates from 19.7% in 1990 to 27.4% in 2000 and 30.8% in 2010 (Adeloye & Basquill, 2014). It was found that more than 54.6 million cases estimated in 1990 increased to 92.3 million cases in 2000 and to 130.2 million cases in 2010, with the projected increase up to 216.8 million in the year 2030. The modeling and estimation of the total cases of hypertension in Africa showed that South Africa, Tanzania, Tunisia, and Senegal had the highest rates ranging from 65.4% to 77.3%. The lowest prevalence rates were observed in Soudan (9.9%) and Ethiopia (7.5%). The Northern Africa prevalence rate was 33.3%, Southern Africa had the highest with 34.6%, Western Africa 27.3%, Central Africa 27.1%, and Eastern Africa 26.7%. The study found that the level of awareness increased but still at lower level. This moved from 16.9% in 1990 to 29.2% in 2000 and then to 33.7% in the year 2010. The study found no significant differences in the prevalence rate and awareness between rural and urban areas.

A four-country cross sectional study conducted in rural and sub-urban residents in Uganda, the school teachers in South Africa and Tanzania, and nurses in Nigeria also found that the overall age-standardized prevalence of hypertension was 25.9 %, with the highest among nurses, 25.8 %, then the school teachers 23.2 %, sub-urban residents 20.5 %, and rural residents had the lowest, 8.7 % (Guwatudde *et al.*, 2015). The overall age-standardized prevalence of pre-hypertension was found to be 21.0%. The identified risk factors were the population group, older age, higher body mass index, higher fasting plasma glucose level, lower level of education, and tobacco use. The study found that only the participants who were aware of their blood pressure rate before were only 50%.

A study conducted in South Africa also found a very high prevalence of hypertension of 49.2% (Owolabi, Ter Goon, Adeniyi, & Seekoe, 2017). A bivariate analysis (Chi-square) and multivariate logistic regression model analysis revealed that the respondents had moderately low rate of unawareness, 23.1% with significant gender difference ( $p=0.005$ ). Other factors which were associated with unawareness included the level of education, single status, employment, income, smoking, alcohol usage, and absence of diabetes and non-obese. Also it was found that most of the patients who were previously aware of their hypertension (91.7%) were on antihypertensive treatment.

**Table 2: Summary of the prevalence of hypertension and awareness in sub-Saharan Africa**

Article	Country	Study design and focus	Main findings on prevalence of hypertension and awareness
Adeloye, & Basquill (2014)	Global (Africa)	-Systematic Analysis -Prevalence and awareness of Hypertension in Africa	<ul style="list-style-type: none"> <li>o Increasing of overall prevalence was found: 19.7% in 1990, 27.4% in 2000 and 30.8% in 2010</li> <li>o More than 54.6 million cases estimated in 1990, increased to 92.3 million cases in 2000, and 130.2 million in 2010, with projected increase to 216.8 million 2030</li> <li>o South Africa, Tanzania, Tunisia, and Senegal had the highest rates ranging from 77.3% to 65.4%</li> <li>o Lowest prevalence in Sudan and Ethiopia ranging from 9.9-7.5%</li> <li>o Northern Africa prevalence: 33.3%, Sub-Saharan Africa: 27.8%</li> <li>o Southern Africa had the highest: 34.6%, Western Africa: 27.3%, Central Africa 27.1%, and Eastern Africa: 26.7%</li> <li>o Awareness rates increase was found but still low: 16.9% in 1990, then 29.2% in 2000 and 33.7% in 2010.</li> </ul>
Guwatudde, et al., (2015)	Global (Africa)	-A four-country cross sectional study -Prevalence of hypertension and awareness among nurses, school teachers, and sub-urban residents	<ul style="list-style-type: none"> <li>o The overall age-standardized prevalence was 25.9 %</li> <li>o The highest among nurses: 25.8 %, then school teachers: 23.2 % and sub-urban residents: 20.5 %, and rural residents: 8.7 %</li> <li>o The overall age-standardized prevalence of pre-hypertension was 21.0 %</li> <li>o Risk factors were: population group, older age, higher body mass index, higher fasting plasma glucose level, lower level of education, and tobacco use</li> <li>o Awareness rate was only 50%.</li> </ul>
Owolabi, et al., (2017)	South Africa	-A cross-sectional analytical facility-based study -Hypertension prevalence, awareness, treatment and control and their determinants	<ul style="list-style-type: none"> <li>o The prevalence of hypertension was 49.2%</li> <li>o Most of the patient who were aware of the their hypertension previously (91.7%) were on antihypertensive treatment</li> <li>o Moderately low rate of unawareness was found: 23.1% with significant gender difference (<math>p=0.005</math>).</li> </ul>
Pilleron, et al., (2016)	Southern Africa	-A cross-sectional population-based survey -Prevalence and the level of awareness and control of hypertension among older adults	<ul style="list-style-type: none"> <li>o The overall prevalence: 61.1%</li> <li>o Awareness: 46.7% and 17.3% were treated</li> <li>o Factors associated with hypertension rates increase included age and body mass index, occupation, tobacco use, and sedentary lifestyle.</li> </ul>
Mosha, et al., (2017)	Tanzania	-A community-based cross-sectional study -Prevalence of hypertension, awareness and risk factor	<ul style="list-style-type: none"> <li>o The lower prevalence rate of hypertension was found: 8% and pre-hypertension was 36.2%</li> <li>o Identified factors of hypertension: overweight, obesity, and diabetic individuals had a higher risk of hypertension</li> <li>o The awareness was very low: less than 10%.</li> </ul>
Nahimana, et al., 2017	Rwanda	-A population-based cross-sectional study, the WHO STEPwise approach -Prevalence of hypertension -Risk factors for non-communicable diseases (NCDs)	<ul style="list-style-type: none"> <li>o Overall prevalence of hypertension was 15.3% (16.4% for male and 14.4% for female)</li> <li>o Risk factors were: age (AOR: 8.02, <math>p&lt;0.001</math>), alcohol consumption (AOR: 1.24, <math>P=0.009</math>), and raised Body Mass Index (BMI) (AOR: 3.91, <math>p&lt;0.001</math>).</li> </ul>

Another study conducted among people from 65 years and older from the Republic of Congo and the Central African Republic found that the overall prevalence of hypertension was very high, 61.1% (Pilleron *et al.*, 2017). Also the level of awareness of their blood pressure was 46.7% and of these only 17.3% were on treatment. Identified factors associated with hypertension rates increase included age, body mass index, occupation, tobacco use, and sedentary lifestyle. A study conducted in Tanzania on the prevalence of hypertension and awareness found a lower prevalence rate of hypertension, 8% and a moderately high pre-hypertension rate, 36.2% (Mosha *et al.*, 2017). The study identified the factors of hypertension, which are common in other studies, including overweight, obesity, and diabetic individuals, had a higher risk of hypertension. The level of awareness was found to be very low, less than 10%. In Rwanda, a population-based study found that the prevalence of hypertension was 15.3% in 2015 (Nahimana, *et al.*, 2017). Although this study did not focus on the factors associated with hypertension screening uptake, it identified the risk factors for hypertension including the age (AOR: 8.02,  $p<0.001$ ), alcohol consumption (AOR: 1.24,  $P=0.009$ ), and raised Body Mass Index (BMI) (AOR: 3.91,  $p<0.001$ ).

#### 4. Discussion

The findings on the prevalence of hypertension in Sub-Saharan Africa conquer with those found previously. Several studies reported high prevalence of hypertension. For example in Ethiopia, a systematic analysis study showed a high prevalence of hypertension among Ethiopian, up to 19.6% (Kibret & Mesfin, 2015). Another study conducted in South Africa showed a very high overall prevalence of hypertension up to 41% (Ntuli, *et al.*, 2015). A study conducted in Burkina Faso also revealed a very high overall prevalence of low and high range pre-hypertension of 41.0% and 59.0% respectively. Also elevated blood pressure among children and adolescents were found in Africa (Talato, 2014).

The problematic of the increasing hypertension in Sub-Saharan Africa is the issue of lack of awareness of hypertension, risk factors, and preventive measures (Guwatudde, *et al.*, 2015; Mosha, *et al.*, 2017). It was found that since the patients are not aware of their blood pressure, they do not consult to seek health care. Even those

who are aware, there is a very low rate of enrollment on treatment (Dewhurst & Walker, 2016). With the rise of NCDs, with particular concerns for lower-and-middle-income countries, there is a need to target sound interventions to revert the course of NCDs in Sub-Saharan Africa (Shin & Varghese, 2014).

Lower-and-middle-income countries (LMICs) are still facing several issues hindering their health sectors operating effectively to deal with health issues, particularly with the epidemiological transition from infectious to non-communicable diseases (Kibret & Mesfin, 2015). There are also opportunities to reverse the course of NCDs in general, particularly hypertension and other cardiovascular diseases. These include the community sensitization and involvement, decentralization of cost-effective screening services to the nearest of the people's dwellings, so that early detection and early management of diagnosed cases are made possible (Mosha, *et al.*, 2017; Pilleron, *et al.*, 2017). This is also believed to be the best strategy in the contexts of limited resources (Dewhurst & Walker, 2016; Owolabi, *et al.*, 2017).

## 5. Conclusion

There is a very increasing prevalence of hypertension and unawareness in Sub-Saharan Africa. There is also a high rate of hypertensive patients who are not on treatment. There is a need to conduct research studies aiming at understanding the factors associated with hypertension screening and treatment uptake and design community-based interventions aiming at remove of potential barriers to prevention and control of hypertension.

## Conflict of interest

There is no conflict of interest associated with this research study.

## Acknowledgement

At the completion of this study, we would like to acknowledge the commitment of the staff in the Department of Nursing and Midwifery at Kibogora Polytechnic, for their contribution and their commitment throughout the process of conducting this study.

## References

- Adeloye, D., & Basquill, C. (2014). Estimating the prevalence and awareness rates of hypertension in Africa: a systematic analysis. *PLoS One*, *9*(8), e104300.
- Dewhurst, M. J., & Walker, R. W. (2016). Hypertension in Sub-Saharan Africa; prevalence, prescriptions, pitfalls and paradigms. *J Hum Hypertens*, *30*(4), 221-222. doi: 10.1038/jhh.2015.93 [pii]
- Guwatudde, D., Nankya-Mutyoba, J., Kalyesubula, R., Laurence, C., Adebamowo, C., Ajayi, I., . . . Dalal, S. (2015). The burden of hypertension in sub-Saharan Africa: a four-country cross sectional study. [journal article]. *BMC Public Health*, *15*(1), 1211. doi: 10.1186/s12889-015-2546-z
- Kibret, K. T., & Mesfin, Y. M. (2015). Prevalence of hypertension in Ethiopia: a systematic meta-analysis. *Public Health Reviews*, *36*(1), 14.
- Mosha, N. R., Mahande, M., Juma, A., Mboya, I., Peck, R., Urassa, M., . . . Todd, J. (2017). Prevalence, awareness and factors associated with hypertension in North West Tanzania. *Global health action*, *10*(1), 1321279.
- Nahimana, M.-R., Nyandwi, A., Muhimpundu, M. A., Olu, O., Condo, J. U., Rusanganwa, A., . . . Ota, M. O. (2017). A population-based national estimate of the prevalence and risk factors associated with hypertension in Rwanda: implications for prevention and control. *BMC Public Health*, *18*(1), 2.
- Noubiap, J. J., Essouma, M., Bigna, J. J., Jingi, A. M., Aminde, L. N., & Nansseu, J. R. (2017). Prevalence of elevated blood pressure in children and adolescents in Africa: a systematic review and meta-analysis. *The Lancet Public Health*, *2*(8), e375-e386.
- Ntuli, S. T., Maimela, E., Alberts, M., Choma, S., & Dikotope, S. (2015). Prevalence and associated risk factors of hypertension amongst adults in a rural community of Limpopo Province, South Africa. *Afr J Prim Health Care Fam Med*, *7*(1), 847. doi: 10.4102/phcfm.v7i1.847847 [pii]
- Oladimeji, A. M., Fawole, O., Nguku, P., & Nsubuga, P. (2014). Prevalence and factors associated with hypertension and obesity among civil servants in Kaduna, Kaduna State, June 2012. *The Pan African medical journal*, *18*(Suppl 1).
- Owolabi, E. O., Ter Goon, D., Adeniyi, O. V., & Seekoe, E. (2017). Social epidemiology of hypertension in Buffalo City Metropolitan Municipality (BCMM): cross-sectional study of determinants of prevalence, awareness, treatment and control among South African adults. *BMJ Open*, *7*(6), e014349.
- Pilleron, S., Aboyans, V., Mbelesso, P., Ndamba-Bandzouzi, B., Desormais, I., Lacroix, P., . . . Guerchet, M. (2017). Prevalence, awareness, treatment, and control of hypertension in older people in Central Africa: the EPIDEMCA study. *J Am Soc Hypertens*, *11*(7), 449-460. doi: 10.1186/s12933-017-0392-7 [pii]
- Reuven, Y., Dreier, J., & Shvartzman, P. (2016). The prevalence of diabetes, hypertension and obesity among immigrants from East Africa and the former Soviet Union: a retrospective comparative 30-year cohort study. *Cardiovasc Diabetol*, *15*, 74. doi: 10.1186/s12933-016-0392-7 [pii]
- Shin, H. R., & Varghese, C. (2014). WHO Western Pacific regional action plan for the prevention and control of NCDs (2014-2020). *Epidemiol Health*, *36*, e2014007. doi: 10.4178/epih/e2014007 [pii]
- Talato, K. (2014). *Prevalence and risk factors for pre-hypertension among adults in burkina faso*: Azusa Pacific University.