

Prevalence of hypertension and factors associated with screening uptake in Kanjongo, Nyamasheke District, Rwanda

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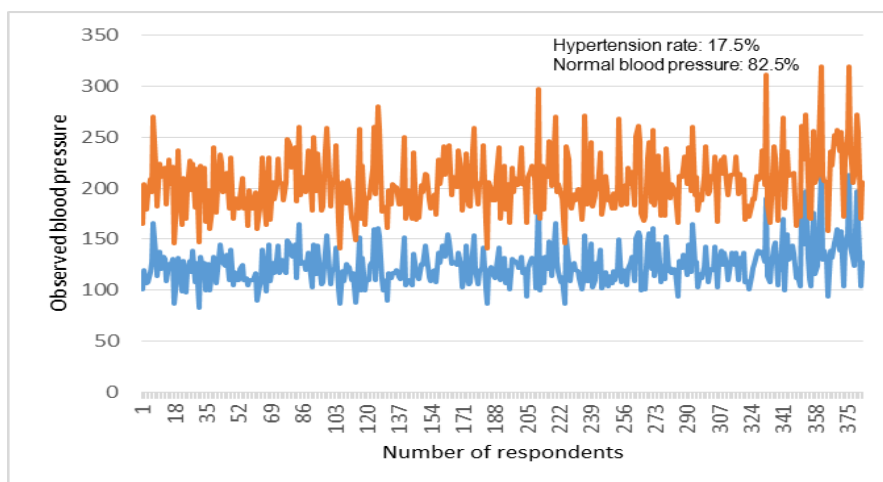
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HIGHLIGHTS

- We estimated the prevalence of hypertension through blood pressure measurement;
- We surveyed the respondents to identify the factors associated with hypertension screening;
- The prevalence of hypertension was higher than the national prevalence estimate;
- Factors associated with hypertension screening were related to community sensitization, and we highly recommend community-based sensitization and screening programs.

GRAPHICAL ABSTRACT



Blood pressure measurements during Umuganda at Kanjongo, Nyamasheke, Rwanda, Aug 2017

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:
 Prevalence
 Hypertension
 Screening
 Rwanda

ABSTRACT

Hypertension in Africa was estimated to 30.8% in 2010 with dramatic increase in some regions ranging between 36.2%-77.3% (Adeloye & Basquill, 2014). In Rwanda, the prevalence of hypertension was estimated to 15.3%, but the factors associated with screening uptake were not explored (Nahimana *et al.*, 2017). The study objectives were: (1) to determine the prevalence of hypertension among the population attending the monthly community work "Umuganda" in a selected sector, and (2) to identify the factors associated with screening uptake. Data were collected using an interview questionnaire, the blood pressure was at the same time measured, and analytic cross-sectional design was adopted. The respondents were 383, of them 60.3% were female and 39.7% were male, aged between 18-34 years old (30.5%), 35-49 years old (39.4%), and 50 years and above (30.0%). The prevalence of hypertension was 17.5%, and 46.5% have never been tested before. The majority (96.3%) planned to get tested regularly, 95.6% perceived hypertension as a serious disease, and 64.8% perceived themselves susceptible to get hypertension. Sources of

information were media (89.6%), health staff (79.4%), campaigns (73.1%), Community Health Workers (CHWs) (67.1%), and neighbors (57.7%). Reported barriers to screening were lack of information (87.5%), delay of health insurance (79.1%), lack of readiness of the health care staff (75.7%), perceived quality of health care delivery (52.2%),

and the perceived cost (46.5%). Factors influencing the screening were gender (Chi-square 7.82, $p=0.004$), age (Chi-square 8.35, $p=0.015$), and occupation (Chi-square 19.53, $p<0.000$). The perceived susceptibility influenced the perceived severity (Chi-square 33.51, $p<0.000$), community sensitization (Chi-square 5.52, $p=0.019$), and perceived benefits (Chi-square 9.08, $p=0.003$). Hypertension prevalence was higher than the national estimates. Perceived susceptibility, community sensitization, age, gender and occupation were the key factors influencing the screening uptake. Community-based interventions to increase awareness and screening of hypertension are highly recommended.

1. Introduction

Cardiovascular diseases are the leading cause of mortality and morbidity among non-communicable diseases (NCDs) across the globe (Lobstein & Brinsden, 2014). Hypertension has been increasing in Africa from 19.7% in 1990 to 27.4% in 2000 and 30.8% in 2010 (Adeloye & Basquill, 2014). Hypertension rates increased dramatically from 92.3 million cases in 2000 to 130.2 million cases in 2010, and the projections suggest that this increase will reach 216.8 million in the year 2030, which is a very high increase since it will double in less than two decades (Kibret & Mesfin, 2015; Mills *et al.*, 2016). Evidence showed that major issues for hypertension prevention and control among many other NCDs include lack of community-based aiming to provide necessary information to increase awareness among the people, which results in delayed detection of the disease (Kibret & Mesfin, 2015). Awareness on hypertension in Africa was found very low from 29.2% in 2000 to 33.7% in 2010 (Adeloye & Basquill, 2014). Since the prevalence of hypertension in Africa vary from one region to the other, it is important to study it in different sub-regions and understand the factors associated with hypertension screening for early detection of the disease in local context.

A study conducted in Ethiopia showed that the prevalence of hypertension was estimated to be 19.6 % (Kibret & Mesfin, 2015), which was less than the overall hypertension rate in Africa. A larger study conducted in Africa showed that in some countries, the prevalence of hypertension are extremely high whereby South Africa, Tanzania, Tunisia, and Senegal had the highest rates ranging from 77.3% to 65.4% (Adeloye & Basquill, 2014). The Northern Africa had the prevalence rate of 33.3%, overall sub-Saharan Africa 27.8%, Southern Africa had 34.6%, Western Africa 27.3%, Central Africa 27.1%, and Eastern Africa 26.7%. Also the study found that the level of awareness increased but still at lower level, from 16.9% in 1990 to only 29.2% in 2000 and then to 33.7% in the year 2010. However, another study conducted in Tanzania showed a lower prevalence of hypertension of 8.0% but with a high pre-hypertension rate of 36.2% (Mosha *et al.*, 2017). A study conducted in South Africa showed a very high prevalence of hypertension of 49.2% (Owolabi, Ter Goon, Adeniyi, & Seekoe, 2017). In Rwanda, a population-based study for the risk factors for NCDs using the World Health Organization (WHO) STEPwise showed that the prevalence of hypertension was 15.3% in 2015 (Nahimana, *et al.*, 2017).

Even though evidence showed that screening and early detection of NCDs are the key cost-effective strategies to reverse the course of these diseases, particularly in LMIC, these programs are not established so that the people are diagnosed and treated earlier (Kibret & Mesfin, 2015; Shin & Varghese, 2014). However, community sensitization and screening for hypertension and NCDs in general are still very low (Mabaso & Oduntan, 2016; Ntuli, Maimela, Alberts, Choma, & Dikotope, 2015) and epidemiological projections suggest rapid prevalence increase for NCDs in general (Todowede & Sartorius, 2017).

2. Methods

This study on prevalence of hypertension and the factors associated with screening uptake was conducted in Kanjongo Sector of Nyamasheke District, Rwanda. The study objectives were: (1) to determine the prevalence of hypertension among the population attending the monthly community work in a selected sector, and (2) to identify the factors associated with early detection and screening uptake. The survey took place in August 2017 during the monthly community work, “Umuganda” in Kinyarwanda. The study used a descriptive cross-sectional design to measure the blood pressure using blood pressure machine and to survey the respondents on their view on factors associated with screening uptake.

The study design followed the Health Beliefs Model (HBM) to describe and analyze the predictors of hypertension screening uptake. The HBM explain the factors which lead people to taking action for health promotion and disease prevention (Rosenstock, 2005). These factors include individual characteristics, namely the age, sex, marital status, education level, modifying factors including media, community sensitization programs to increase knowledge and awareness, perceived susceptibility to get the disease, and perceived threat or seriousness of the disease, among many others. When people perceive that the benefits for using the proposed prevention measure outweigh the cost required for action taking, then they easily take that proposed action. All 383 attendants in the community work were invited to participate in the study, and they all accepted to do so. The blood pressure was measured, and individual respondents were at the same time surveyed using an interview-guide questionnaire. Hypertension was considered any case with blood pressure equal to and above the cut off “140/90 mmHg” (WHO, 2010). All ethical issues were given particular considerations; the respondents were explained the nature of the study, and they all agreed to voluntarily participate in the survey.

3. Results

3.1 Demographic characteristics of the respondents

The respondents were 383, out of which 231 (60.3%) were female and 152 (39.7%) were male (Table 1). Most of the respondents were aged between 35-49 years old (39.4%) and other age groups, 18-34 and 50 years and above were almost equal, 30.5% and 30.0% respectively. Single respondents were 192 (50.1%), 185 (48.3%) were married, and 6 (1.6%) were divorced. A number of 251 (65.5%) were able to read and write, and 132 (34.5%) were not. The majority, 212 (55.4%) had primary school, 53 (13.8%) had secondary level, 13 (3.4%) had university level, and a good number, 105 (27.4%) did not have any level of formal education. The occupation of the majority of the respondents was agriculture, 229 (59.8%), equally those who had a formal business and employment were 38 (9.9%), and those without any job were 78 (20.4%). The majority of the respondents, 271 (70.8%) were protestants, 94 (24.5%) were catholic, 16 (4.2%) were seventh day Adventists, and Muslims were 2 (0.5%).

3.2 Prevalence of hypertension

The prevalence of hypertension was 17.5% (67/383) (Table 2). The systolic mean was 124.7, median 122 and the mode 110 at Standard

Deviation of 19.4 and the diastolic mean was 80.9, median 80 and the mode 90 at 12.5 Standard Deviation.

3.3 History of blood pressure measurement and perceived benefits of early screening

A good number of the respondents, 205 (53.5%) has been tested for blood pressure before the time of this survey, and 178 (46.5%) have never been tested (Table 3). The majority, 369 (96.3%) reported that they planned to get tested regularly, and only 14 (3.7%) did not. Also the majority, 365 (95.3%) confirmed that getting careened for blood pressure is beneficial, and only 18 (4.7%) did not.

Table 1: Demographic characteristics of the respondents

Variables		Frequency (n)	Percentage (%)
Gender	Female	231	60.3
	Male	152	39.7
Age	18-34	117	30.5
	35-49	151	39.4
	50 and above	115	30
Marital Status	Single	192	50.1
	Married	185	48.3
	Divorced	6	1.6
Can read and write	Yes	251	65.5
	No	132	34.5
Education level	None	105	27.4
	Primary	212	55.4
	Secondary	53	13.8
	University	13	3.4
Occupation	No job	78	20.4
	Agriculture	229	59.8
	Business	38	9.9
	Employed	38	9.9
Religion	Protestants	271	70.8
	Catholic	94	24.5
	Adventists	16	4.2
	Muslims	2	0.5

Table 2: Prevalence of hypertension among the participants

Variable		Frequency (n)	Percentage (%)
Blood pressure above normal ranges	Yes	67	17.5
	No	316	82.5
Total		383	100

Table 3: History of blood pressure measurement and perceived benefits

Variable		Frequency (n)	Percentage (%)
Have you ever been tested before for blood pressure?	Yes	205	53.5
	No	178	46.5
Do you plan to get tested regularly?	Yes	369	96.3
	No	14	3.7
Is getting tested beneficial?	Yes	365	95.3
	No	18	4.7

3.4 Perceived susceptibility and seriousness of the disease

A good number of the respondents, 248 (64.8%) perceived themselves susceptible to get hypertension, while 135 (35.2%) did not (Table 4). The majority, 366 (95.6%) perceived hypertension as a serious and threatening disease while 17 (4.4%) did not.

Table 4: Perceived susceptibility and seriousness of the disease

Variables		Frequency (n)	Percentage (%)
Can you get hypertension?	Yes	248	64.8
	No	135	35.2
Is hypertension a serious disease?	Yes	366	95.6
	No	17	4.4

3.5 Sources of information

The Table 5 shows that the main sources of information on hypertension screening and management were radios and television (TV) (89.6%), followed by health care staff (79.4%), mass campaigns (73.1%), Community Health Workers (CHWs) (67.1%), and the neighbors (57.7%).

Table 5: Sources of information on hypertension screening and management

Variables		Frequency (n)	Percentage (%)
CHWs sensitized us	Yes	257	67.1
	No	126	32.9
We get information from radio and TV	Yes	343	89.6
	No	40	10.4
We get information from health care staff	Yes	304	79.4
	No	79	20.6
We get information from mass campaigns	Yes	280	73.1
	No	103	26.9
We get information from neighbors	Yes	221	57.7
	No	162	42.3

3.6 Reported barriers and enablers for hypertension screening uptake

The Table 6 shows that the main barriers to hypertension screening uptake included the lack of necessary information (87.5%), the delay of health insurance (79.1%), the lack of readiness of the health care staff to help (75.7%), perceived poor health care delivery at health facility levels (52.2%), and the perceived cost for screening (46.5%).

Table 6: Reported barriers on hypertension screening uptake

Variables		Frequency (n)	Percentage (%)
Is hypertension screening expensive?	Yes	178	46.5
	No	205	53.5
Is the lack of necessary information a barrier to screening uptake?	Yes	335	87.5
	No	48	12.5
Is the lack of readiness of health care staff a barrier to screening?	Yes	290	75.7
	No	93	24.3
Is the poor health care delivery at HC a barrier to screening?	Yes	200	52.2
	No	183	47.8
Is the delay of health insurance a barrier to hypertension screening?	Yes	303	79.1
	No	80	20.9

3.7 Factors associated with hypertension screening uptake

As summarized in Table 7, the findings of the survey showed that having been screened for hypertension before the time of the survey was associated with gender (Chi-square 7.82, $p=0.004$), age (Chi-square 8.35, $p=0.01$), and occupation (Chi-square 19.53, $p<0.000$). The perceived susceptibility of getting hypertension was associated with the perceived severity of hypertension (Chi-square 33.510, $p<0.000$), community sensitization by the health staff (Chi-square 5.526, $p=0.019$), and the perception of being tested as beneficial (Chi-square 9.08, $p=0.003$).

4. Discussion

The findings of this survey showed that the prevalence of hypertension was 17.5%, and this is less than the overall prevalence of hypertension rates in Africa, which was estimated at 30.8% in 2010 (Adeloye & Basquill, 2014). However, this prevalence was higher than 15.3%, the overall prevalence of hypertension found in Rwanda (Nahimana, *et al.*, 2017). This prevalence was also higher than the prevalence of hypertension found in a recent study conducted in Tanzania, which was 8.0% (Mosha, *et al.*, 2017) and less than the prevalence found in a study conducted in Tanzania, which was 19.6% (Kibret & Mesfin, 2015). Evidence showed that cardiovascular diseases are the leading cause of morbidity and mortality across the globe and 80% of these deaths happen in lower-and-middle-income countries (LMICs) (Mills, *et al.*, 2016; Todowede & Sartorius, 2017).

Evidence showed that one of the major issues to combat hypertension and related morbidity and mortality is the lack of awareness among the people across many countries in general and in LMICs in particular (Mills, *et al.*, 2016; WHO, 2013). The majority of the respondents in the current survey (87.5%) confirmed that they do not have necessary information on hypertension and its screening, which was considered a hindrance to screening uptake. This confirms the findings from a larger study conducted in Africa on hypertension and awareness, which estimated that people with necessary information of hypertension in Africa are only 33.7% (Adeloye & Basquill,

2014). A study conducted in Tanzania showed that the level of awareness on hypertension was very low at less than 10% (Mosha, *et al.*, 2017). Evidence showed that proper knowledge and awareness of hypertension plays major role in the screening uptake and this can be made possible if key interventions are initiated at the community level where people live, since hypertension is a silent killer and the people will seek health care when it is generally too late (Pilleron *et al.*, 2017; WHO, 2013).

The current study showed that people perceived themselves susceptible to hypertension and perceived it a major health threat and together with community sensitization, these factors played major role in hypertension screening uptake. Also it was found that the lack of necessary information (87.5%), the delay of health insurance (79.1%), the lack of readiness of the health care staff (75.7%), perceived quality of health care delivery at health facility levels (52.2%), and the perceived cost for screening (46.5%) were the major barriers to hypertension screening. Although there is paucity of studies which focused on individual barriers to hypertension screening, these findings reiterate recommended need to provide necessary information to the people through community-based and decentralized awareness and screening programs and use of community health workers, health care providers, community sensitization campaigns, and media among many other strategies (Adeloye & Basquill, 2014; Kibret & Mesfin, 2015; Mosha, *et al.*, 2017).

Table 7: Bivariate analysis of the factors associated with hypertension screening uptake

Demographic characteristics versus having been screened before		Yes (%)	No (%)	Chi-square	P-value
Gender	Female	137 (35.7)	94 (64.3)	7.824	.004*
	Male	68 (44.7)	84 (55.3)		
Age	Between 18-34 Years	50 (42.7)	67 (57.3)	8.351	.01*
	Between 35-49 Years	85 (56.2)	66 (43.8)		
	Between 50 +	70 (60.8)	45 (39.2)		
Education level	None	64 (60.9)	41 (39.1)	7.716	.052
	Primary	102 (48.1)	110 (51.9)		
	Secondary	29 (54.7)	24 (45.3)		
Marital Status	University	10 (76.9)	3 (23.1)	.180	.914
	Single	101 (52.6)	91 (47.4)		
	Married	101 (54.5)	84 (45.5)		
Occupation	Divorced	3 (50)	3 (50)	19.535	.000*
	No job	56 (71.7)	22 (28.3)		
	Agriculture	103 (44.9)	126 (55.1)		
	Business	25 (65.7)	13 (34.3)		
Religion	Employed	21 (55.2)	17 (44.8)	5.166	.16
	Protestants	142 (52.3)	129 (47.7)		
	Catholic	49 (52.1)	45 (47.9)		
	Adventists	13 (81.2)	3 (18.8)		
	Muslims	1 (50)	1 (50)		
Perceived susceptibility: Can you get diabetes?					
	Is hypertension a severe disease?	366 (95.5)	17 (4.5)	33.510	.000*
	CHWs sensitize us	144 (56)	61 (44)	1.973	.098
	Media: radio and TV	343 (89.5)	40 (10.5)	4.611	.32
	Health staff sensitization	304 (73.1)	79 (26.9)	5.526	.019*
	Neighbors sensitization	221 (57.7)	162 (42.3)	1.936	.164
	Is being tested beneficial?	365 (95.3)	18 (4.7)	9.08	.003*
	Poor services delivery	199 (51.9)	184 (48.1)	4.861	.088

Significance level: $p < 0.05$ * at 95%CI

5. Conclusion

Hypertension prevalence was higher than the national estimates. Community sensitization, perceived susceptibility to get hypertension, and demographic characteristics including the age, gender and occupation were the key factors influencing hypertension screening uptake. Community-based interventions aiming to

increase awareness and screening of hypertension are highly recommended.

Conflict of interest

We declare that there is no conflict of interest with this work.

Acknowledgement

We would like to acknowledge the contribution of the Department of Nursing and Midwifery staff for the hard work throughout all the steps in conducting this study, from its conception, data collection, data analysis and the results dissemination. We thank Kibogora Polytechnic for allowing the study to be done, availing the staff and cover financial needs.

References

- Adeloye, D., & Basquill, C. (2014). Estimating the prevalence and awareness rates of hypertension in Africa: a systematic analysis. *PLoS One*, *9*(8), e104300.
- Kibret, K. T., & Mesfin, Y. M. (2015). Prevalence of hypertension in Ethiopia: a systematic meta-analysis. *Public Health Reviews*, *36*(1), 14.
- Lobstein, T., & Brinsden, H. (2014). Symposium report: the prevention of obesity and NCDs: challenges and opportunities for governments. *Obes Rev*, *15*(8), 630-639. doi: 10.1111/obr.12193
- Mabaso, R. G., & Oduntan, O. A. (2016). Knowledge and practices related to diabetes mellitus among adults with diabetes in the Mopani District, Limpopo Province, South Africa. *African Vision and Eye Health*, *75*(1), 6 pages.
- Mills, K. T., Bundy, J. D., Kelly, T. N., Reed, J. E., Kearney, P. M., Reynolds, K., . . . He, J. (2016). Global disparities of hypertension prevalence and control. *Circulation*, *134*(6), 441-450.
- 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.
- 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]
- 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., Abovans, 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: 10.1111/jash.2017.04.013
- Rosenstock, I. M. (2005). Why People Use Health Services. *The Milbank Quarterly*, *83*(4). doi: 10.1111/j.1468-0009-2005.00425.x
- 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/e2014007epih-36-e2014007 [pii]
- Todowede, O. O., & Sartorius, B. (2017). Prevalence of metabolic syndrome, discrete or comorbid diabetes and hypertension in sub-Saharan Africa among people living with HIV versus HIV-negative populations: a systematic review and meta-analysis protocol. *BMJ Open*, *7*(7), e016602. doi: 10.1136/bmjopen-2017-016602bmjopen-2017-016602 [pii]
- WHO. (2010). Global recommendations on physical activity for health. WHO Website 2010. apps.who.int/iris/bitstream/10665/44399/1/9789241599979_eng.pdf (accessed December 04, 2015).
- WHO. (2013). A global brief on hypertension: silent killer, global public health crisis: World Health Day 2013.