

Hypertension self-management and associated factors among patients attending clinics in referral hospitals in Dar-Es-Salaam, Tanzania

Ruchius Philbert³, Ashabilan A Ebrahim⁶, Pius Temba^{1,2}, Fredirick Mashili^{5,6}

Affiliations:

¹Muhimbili University of Health and Allied Sciences, School of Nursing, Dar-es-salaam, Tanzania

²Muhimbili University of Health and Allied Sciences, Department of Clinical Nursing, Dar-es-salaam

³Muhimbili National Hospital, Department of Paediatric and Child Health, Dar-es-salaam, Tanzania

⁴Muhimbili University of Health and Allied Sciences, Department of Physiology, Dar-es-salaam

⁵Muhimbili University of Health and Allied Sciences, School of Medicine, Dar-es-salaam, Tanzania

Abstract

Background: Hypertension is a growing risk for cardiovascular disease affecting more than 1.13 billion people worldwide. Rapid urbanization and associated lifestyle changes which are currently happening in low- middle-income countries are known to drive the growing prevalence of hypertension. With lifestyle factors playing a major role in its pathogenesis, lifestyle interventions are crucial for the management of the disease. To a large extent, lifestyle interventions are done by individual patients hence self-management practices are a key component. This study aims to elucidate and describe self-management practices for hypertension among adults attending a referral hospital in Dar-es-salaam, Tanzania.

Methods: A hospital-based cross-sectional study, involving 330 hypertensive patients was done in three regional referral hospitals in Dar-es-salaam. All eligible patients completed an interviewer-administered questionnaire consisting of a tool for the assessment of self-management practice, a modified and validated "hypertension evaluation of lifestyle and management scale" in Swahili and additional patient and healthcare-related data. Descriptive and logistic regression analyses were then conducted using SPSS version 20.

Result: The overall prevalence of good self-management practice was found to be 19.7%. Education level, having a family member that suffered hypertensive complications, and self-management knowledge level were significantly associated with good self-management practices [$p < 0.05$]. The independent predictor for good practice was having good knowledge [OR = 0.209, 95% CI = 0.060-0.727].

Conclusion: Despite being one of the key components in Hypertension management, self-management is inadequately practised among the studied patients. Awareness, knowledge and experience seem to influence self-management practices hence approaches to improve them should be incorporated into hypertension management regimes.

Keywords: Self-management, Hypertension, Tanzania

Introduction

The world health organization reported that the number of deaths from Non-communicable diseases [NCDs] is increasing, with current trends showing that NCDs are the leading cause of death worldwide [WHO, 2018]. In the year 2018, NCDs contributed to about 36 million deaths out of 57 million deaths worldwide [WHO, 2018].

Corresponding author: Ruchius Philbert, E-mail: ruchiusphilbert@yahoo.com

The increased burden of NCDs is reflected globally with a disproportionate effect on low- and middle-income countries [LMICs] which account for nearly 85% of deaths [WHO, 2018]. In Tanzania, NCDs are estimated to account for 33% of deaths mainly from cardiovascular disorders (13%) followed by cancer, chronic respiratory diseases, and diabetes accounting for 7%, 2% and 2% respectively [WHO, 2018]. The situation is compounded by the lack of community awareness on prevention, poor health care facilities and lack of long-term comprehensive care [Grady et al., 2014].

Among the NCDs, hypertension is common with an estimated 1.13 billion cases worldwide in the year 2015. Out of these, two-thirds are found in LMICs with an estimated prevalence of 27% in Africa [WHO, 2019]. A review of the literature on the prevalence of hypertension across developing countries revealed a higher prevalence of hypertension in Tanzania when compared to many other countries [Ibrahim et al., 2012]. According to the Ministry of Health, Community Development, Gender, Elderly and Children [MoHCDGEC] the overall prevalence of hypertension in Tanzania was found to be 26% [MoHCDGEC, 2016]), however, the prevalence has been found to vary in different regions in Tanzania. In Ruvuma for example, the reported prevalence was 20.4% [Mwita et al., 2020], a slightly lower figure compared to the prevalence of 28.0% which was reported from a community-based study done in the northern part of Tanzania [Galson et al., 2017].

The socio-economic impacts of hypertension on the health care system and patients in LMICs are often detrimental. It causes individual financial burdens for treating complications, reduces productivity and increases the overall economic dependency ratio. Economic dependency is further augmented by the increasing health expenditure due to high management costs [Grady et al., 2014]. This creates a vicious cycle where poverty exposes people to a poor lifestyle and in turn, the resulting disease may become an important driver to the downward spiral that leads families towards poverty [Brenyah, 2018, Islam et al., 2014].

Despite the high prevalence of hypertension, management of the disease is still challenging [Parati. G, Lombardi. C, Pengo.M, Bilo. G, Ochoa. J.E., 2021]. A study done in northern Tanzania revealed that of 57% of hypertensive patients using antihypertensive medications, only 20.6% achieved reasonable blood pressure control [Muhamed Hussein et al., 2016]. Controlling Blood Pressure [BP] is likely to lower its complications like stroke, coronary artery disease, congestive heart failure, end-stage renal disease, peripheral vascular disease, and mortality [Burns et al., 2018]. Failure to achieve reasonable BP control is an alarming problem in most LMICs hence there is a dire need to explore other hypertension control measures.

One possible approach that has been shown to work is the implementation of “self-management”, an effective method of translating medical recommendations to practice by empowering patients to manage their disease [Van de Velde et al. 2019]. Self-management, as one of the domains in the Chronic Care Model [CCM], offers the opportunity for patients to actively engage in managing their illness for better outcomes. Self-management has been defined as “a dynamic and active process requiring knowledge, attitude, discipline, determination, commitment, self-regulation, empowerment and self-efficacy” [Balduino AFA et al., 2013]. In addition to adherence to pharmacological treatment, the self-management practice involves additional lifestyle modification [Grady et al. 2014; Kim KB et al., 2014; Van de Velde et al. 2019]. For hypertension, self-management involves regular physical activity, keeping clinic appointments for follow-up, regular blood pressure monitoring and adherence to medication and specific dietary recommendations such as Dietary Approach to Stop Hypertension [DASH] [James et al. 2014].

Following appropriate lifestyle modifications have been linked to lower blood pressure. Diets rich in fruits and vegetables have been shown to decrease the systolic blood pressure [SBP] by up to 5.5mmHg while restricting sodium intake to no more than 2.4 g per day can lower SBP by up to 8mmHg

[Chobanian et al., 2009; Sacks et al., 2001; Vollmer et al., 2001]. In addition, an experimental study that was done to assess the temporal effects of dietary sodium restriction on systolic blood pressure showed significant improvements in SBP after salt restriction [Bagrov et al., 2004]. Performing regular aerobic physical activity of at least 30 min daily and 150 min per week would significantly reduce systolic blood pressure. A 50% reduction in daily alcohol consumption would also lower systolic blood pressure by 2–9mmHg [Whelton et al., 2002; Roerecke et al., 2017]. Additionally, reducing weight to maintain a normal body mass index [18.5–24.9 Kg/m²] was also shown to lower systolic blood pressure [Stevens et al., 2001].

Despite these self-management benefits, and the growing burden of hypertension, very few studies have comprehensively addressed this area. For this reason, data on hypertension self-management in Tanzania is still limited and non-conclusive. This study was designed to address this gap using the Health-Promoting Self-Care System Model [HPSCSM]. This model proposes that demographics, social factors, environmental factors, perceived health state, and health care expenditure influence an individual's performance of health-promoting self-care [Simmons SJ., 1990]. Based on this, the study assessed the association between the factors outlined by the HPSCM to determine the extent and gaps of knowledge and practice of patient self-management.

Methods

Study design

This was a hospital-based cross-sectional study conducted in three referral hospitals in Dar-es-salaam, Tanzania namely: Amana Regional Referral Hospital (Dar-es-salaam City Council – Ilala District), Temeke Regional Referral Hospital [Temeke District] and Mwananyamala Regional Referral Hospital [Kinondoni District]. We used an interviewer-administered structured questionnaire. Ethical approval was obtained from Muhimbili University of Health and Allied Sciences

[MUHAS], Directorate of Research and Publications, and permission to conduct the study were obtained from Dar-es-salaam Regional Commissioner Office and then individually from each of the mentioned hospitals. A total of 330 participants, with a 98% response rate, consented and were recruited from one of the three referral hospitals in Dar-es-salaam from August to October 2020. The sample size was determined using a single population proportion formula based on the following assumptions: A 95% confidence level, 5% margin of error, 60.6% population proportion and a 10% non-response rate. Study participants were finally recruited using a convenient sampling technique with the patients' follow-up clinic registration list serving as a sampling frame in each hospital. Patients were included in this study only if they met the following criteria: 30 years of age or more, diagnosed with hypertension and attending the clinic, with at least 12 months post-diagnosis of the disease condition and who have attended the outpatient clinic for not less than 6 months. Patients were excluded if they were seriously ill at the time of data collection, those with communications problems and unable to read and write within-Swahili or English speakers.

Measurements

Sociodemographic information such as age, sex, marital status, and educational status was collected using a structured interviewer-administered questionnaire. Knowledge of hypertension and management was obtained using a validated and modified hypertension evaluation of lifestyle and management (HELM) [Schapira et al., 2012]. The tool contains three domains namely general hypertensive knowledge, knowledge on lifestyle modifications as well as medication management and treatment goals. An average of 75% [10 or more] correct items was used as a cutoff point where the higher point represents good knowledge and vice versa. Assessment of self-management practice was

done using a 12-item questionnaire adopted and modified from a study done in West Bengal [Dasgupta et al., 2018]. The modification included phrasing some items to reflect the recommended self-management behaviours in the management of hypertension.

A scoring system was used to decide the level of practice whereby each favourable response was assigned a score of 2 while a less favourable score was 1 and an unfavourable score was 0. The total score obtainable was 24 and a cut-off point of 18 was used to imply good self-management and less than 18 meant poor practice. Information on the presence of hypertension complications and comorbidities, family history of hypertension and complications resulting from hypertension, duration since diagnosis, source of information about hypertension self-management, how often they saw a cardiovascular specialist and means of healthcare payment were also collected.

Data analysis

Data were entered into the Statistical Package for Social Sciences [SPSS] version 20 and then checked and cleaned. Descriptive statistics were done to describe the characteristics of the participants. Variables were divided into sociodemographic, patient-related, and healthcare-related factors, and analyzed for their association with good self-management practice with a p-value of < 0.05 set for significance. Data were first analyzed using the chi-square/Fisher's exact test and the statistically significant associations were selected for a multiple logistic regression analysis using a dichotomized practice score; good and poor self-management practice. Statistically significant associations between variables were determined using odds ratios with a 95% confidence interval [CI] and p-value < 0.05.

Ethics statement

The data collection was conducted for patients who provided the informed content. Patients who were recruited in the study and provided informed consent are the ones who participated in the study during data collection activities, no individual out of the study population was involved in project implementation. The ethical review board of the Muhimbili University of Health and Allied Sciences [MUHAS] reviewed the study and approved it [Ref. No.DA.282/298/01.C/]

Results

Participants' profile

A total of 330 participants aged 30 years and above met the inclusion criteria and were enrolled on the study. The mean age was 60.2 ±11.9 years with a minimum age of 30 years and maximum age of 94 years; the majorities were female, [n = 250 75.8%]. [n = 166; 50.3%] were married, and only 9.7% of participants had secondary, college and higher education levels. Most study participants 190 [57.6%] were unemployed [Table 1].

Table 1: Participants' profile

Variable		Frequency(N=330)	Per cent %
Sex	Male	80	24.2
	Female	250	75.8
Age	25 - 34	3	0.9
	35 -44	30	9.1
	45 - 54	74	22.4
	55 - 64	90	27.3
	65 -74	94	28.5
	75 - 84	31	9.4
	85 - 94	8	2.4
Marital	Single	18	5.5

status	Married	166	50.3
	Cohabiting	12	3.6
	Divorced	15	4.5
	Widow/widower	119	36.1
Education level	Never went to school	85	25.8
	Primary education	213	64.5
	Secondary education	24	7.3
Employment	College and above	8	2.4
	Unemployed	190	57.6
	Self employed	127	38.5
	Employed in private sector	10	3.0
	Employed in government sector	3	.9

Self-management practice

The prevalence of adequate self-management practice was found to be 19.7%. High-salt foods were occasionally avoided by 19.7% of participants while 13% reported avoiding adding extra salts to foods. Only 27% of the participants regularly avoided the consumption of fatty foods and even fewer participants consumed more fruits and vegetables [11.5%]. Only 4.2% of the participants consistently reduced/ abstained from alcohol use since their first diagnosis. On the other hand, about 28% measured their BP at least twice a month and 41% performed physical exercise like walking, running or swimming at least 30 minutes a day for 4 days a week in an attempt to maintain ideal body weight. Nearly half of the participants [45.9%] reported defaulting on their medication at one point in their treatment. Of those who defaulted, the unaffordability of the medication [31 %] and feeling better [11.1%] were the common reasons.

Factors associated with the self-management practice.

Apart from hypertension, the majority [78%] of the participants reported not having any other NCDs, with about half [51%] reporting having had hypertension for more than three years. More than half [55.2%] had no history of complications related to hypertension; among those who reported hypertension complications, heart diseases were common [33%]. The majority of participants [58%] had no relatives with hypertension and for those who had, nearly half [41.8%] of their relatives suffered from complications related to hypertension. Families, healthcare providers and patients themselves were collectively mentioned to be responsible for the management of hypertension by most [54.8%] of the participants. More than half of the participants [55.5%] paid directly with cash to access medical services; out of these about 31% could not afford their medication regularly. About 62% of the participants reported having heard of self-management, and most [51%] said they received this information from the health facility. However, more than two-thirds of the participants [71%] reported having never seen a cardiovascular specialist [Table 2].

A robust proportion of studied participants [96.4%] had poor knowledge of hypertension with only 7.9% of them correctly defining hypertension. The majority [69%] stated that it was not possible to tell when a person had high blood pressure; however, headache and palpitation were mentioned as common symptoms of hypertension by 37% and 36% of the participants respectively. Stroke and renal failure were correctly identified as complications of hypertension by 39% and 16%, of participants respectively. Nevertheless, diabetes [6.7%], high cholesterol [1.5%] and lung cancer [1.5%] were also mentioned as complications that could occur from hypertension. While about 34% of participants could not identify any hypertension complication [Table 2].

Specifically, regarding the knowledge of self-management of hypertension, only 16% of participants correctly identified the target blood pressure levels. Concerning lifestyle modification recommendations, 70% of participants correctly identified the recommended exercise regime. As for the diet, the majority [94%] correctly stated the importance of fruit and vegetables in managing hypertension. About 70% of the participants agreed that hypertension medication was to be taken at the same time every day, while only [8.2%] could correctly identify the blood pressure measurement technique.

The bivariate analysis revealed a significant association between knowledge of hypertension and its management. The good self-management practice was significantly higher in the group with better self-management knowledge [P= 0.01]. Other factors included education level [P= 0.004], having a relative that suffered from complications related to hypertension [P= 0.02] and having seen a cardiovascular specialist [p = 0.04] [Table 2]. The binary regression showed that Individuals with at least secondary education level were twice as likely to adhere to self-management practice as those with primary or never went to school [Odds Ratio OR 2.663 95% CI 1.173 - 6.045]. Those who knew hypertension and its management were four times more likely to adhere to self-management compared to those with poor knowledge [Odds Ratio OR = 4.252 95% CI 1.259 - 14.362] [Table 3].

Table 2: Factors associated with the self-management practice.

		Practice level			P-value
		Poor practice	Good practice	Total	
Socio-demographic factors					
Age	25 - 34	3	0	3	0.332
	35 -44	24	6	30	
	45 - 54	54	20	74	
	55 - 64	79	11	90	
	65 -74	74	20	94	
	75 - 84	26	5	31	
	85 - 94	7	1	8	
Sex	male	59	21	80	0.061
	female	208	42	250	
Marital status	single	15	3	18	0.379
	married	133	33	166	
	cohabiting	10	2	12	
	divorced	11	4	15	
	widow/widower	98	21	119	
Highest level of education	never went to school	77	8	85	0.004*
	primary education	170	43	213	
	secondary education	15	9	24	
	College and above	5	3	8	
Employment status	unemployed	153	37	190	0.423
	Self-employed	102	25	127	
	employed in private sector	10	0	10	
	employed in government sector	2	1	3	
Patient factors					

Hypertensive complications	yes	119	29	148	0.834
	No	148	34	182	
Suffering from other NCDs	Yes	60	13	73	0.752
	No	207	50	257	
Relative suffering from hypertension	Yes	107	31	138	0.186
	No	160	32	192	
Relative with HTN complication	Yes	41	17	58	0.029*
	No	226	46	272	
Duration of diagnosis	Less than three years	131	32	163	0.805
	More than three years	136	31	167	
Ever heard about self-management of HTN	Yes	166	38	204	0.785
	No	101	25	126	
Health care-related factors					
How often do you see cardiovascular specialist/ year	Never seen	184	50	234	0.047*
	Less than three times	80	11	91	
	Three times and above	2	2	4	
Number of pills taken	One	44	10	54	0.898
	More than one	222	53	275	
Knowledge level	Poor	261	57	318	0.014*
	Good	6	6	12	

Table 3: Predictors of self-management practices

Predictors	P-value	OR	95% C.I.	
Never went to school	0.018*			
Primary education	0.056	0.192	0.035	1.047
Secondary education	0.416	0.525	0.111	2.480
College and above	0.937	1.074	0.187	6.180
Relative with HTN Hypertensive complication	0.071	1.902	0.946	3.826
Good level of knowledge	0.014*	0.209	0.060	0.727
Never seen a specialist	0.412	0.581	0.159	2.126
Less than three times	0.084	0.287	0.070	1.180
More than three times	0.648	1.742	0.161	18.88

Discussion

The study explored self-management practice and associated factors in hypertensive patients attending clinics at three regional referral hospitals in Dar-es-salaam. They found that 19.7% of all the recruited participants had adequate self-management practices. This prevalence is more or less similar to what has been observed in two different studies conducted in Ethiopia where 23% and 20.3% of study participants were reported to have adequate self-management practices [Tibebu et al., 2017,

Gebremichael et al., 2019]. Falling under LMICs categories, Tanzania and Ethiopia are likely to have similar practice levels reflecting gaps in their health systems and hence challenges in self-management practices. Studies done in India, another LMIC, have reported higher rates (60.6%) compared to what has been observed in the current study [Joseph et al., 2016]. Despite being categorized as LMICs, India has a better healthcare system and more experience with NCDs than most Sub-Saharan African [SSA] countries [WHO, 2018]. More experience and expertise in managing NCDs could explain the higher prevalence of adequate self-management in India when compared to Tanzania and Ethiopia. This could also be explained by socio-cultural influences on the lifestyle of the participants, sample size differences and differences in the components of self-management practice assessment tools used.

Several studies have reported age, sex, and education level as having key roles in determining the adequacy of self-management practice [Gebremichael et al., 2019; Qu, Z et al., 2019; Choi, H.M et al., 2017; Akhter, N., 2010]. They also noted that education level influenced self-management practice, with those with at least primary level education having better self-management practice. This matches with the findings of studies from other settings that showed a lack of education as a risk factor for poorer self-management practices [Crowley et al., 2012; Anowie et al., 2015]. Likewise, the Ethiopian study showed that those with some basic education had better practice than those without [Ademe et al., 2019]. However, we found no significant differences in self-management practices based on age and sex.

Furthermore, poor knowledge regarding the disease and medication-related issues such as dosing and taking too many drugs were noted to lead to a lower level of self-management practice [Kvarnström, K et al., 2018; Galson et al., 2017]. However, they found no significant association between the number of antihypertensive drugs the participant was taking and self-management practice; also no significant association between practice level and previous complications from hypertension. They saw that participants who had a relative that had suffered from complications related to hypertension had significantly better practice than those without. As many Tanzanians still live-in extended families, the family unit acts as a primary agent for socialization [Manyama, W., 2017]. This could mean that participants' exposure to the negative outcomes of uncontrolled hypertension, affected positively their self-management practice. Although no significant association was found between the duration of diagnosis and the practice level, it may have been due to the relatively shorter periods chosen for the study. A similar study done in Bangladesh used a cut-off of 6 years or more to indicate a long duration compared to our study which used a cut-off of 3 years to indicate duration [Akhter N., 2010]. The aforementioned study found that participants with a longer duration of diagnosis had better self-management practices.

About healthcare-related factors, it was noted that seeing a specialist was significantly associated with the better self-management practice. This finding is similar to a trial done in America where hypertensive patients treated by specialists achieved a greater reduction in BP compared to those seen by a primary care physician [Rader F et al., 2013]. This may be because those treated by specialists received rational BP medications and different classes [Rader F et al., 2013].

They found that 4% of participants knew hypertension in terms of the meaning of the disease, its risk factors, signs and symptoms, complication as well as self-management practices towards blood pressure management. These findings are similar to those reported in Pakistan where the knowledge of hypertension, medical and self-management practices was found to be 4.4%. This could be because both countries have low public education programs on NCDs prevention and treatment. On other hand, our findings were contrary to those observed in Ethiopia and South Sudan where 45.6% and 52.4% of participants were knowledgeable about hypertension and its management [Gebremichael et al., 2019; Abu et al., 2018, Joseph et al., 2016]. This discrepancy may be due to differences in the tool used, participants' profiles and environments where studies were implemented.

Additionally, caution must be exercised when interpreting the level of knowledge of hypertension. In Zimbabwe for example it was found that despite the majority appearing to be knowledgeable of the disease, about 64.8% believed that stress is the commonest cause of hypertension and 51% believed in the use of traditional remedies to cure diseases [Chimberengwa et al., 2019]. The participants in our study who were found to have adequate self-management knowledge had significantly better self-management practices.

Conclusion

The level of practice of self-management was poor, with only 19.7% of participants showing good practice. The knowledge of self-management of hypertension among hypertensive patients in the regional referral hospitals in Dar-es-salaam was also low with less than 10% of the patients suffering from hypertension having adequate knowledge of self-management of the disease. The independent predictor of good practice following logistic regression was having good knowledge regarding self-management. As participants who knew more about the disease had better practice, therefore they recommend better integration of the patients' role, community and health system in hypertension management including a stronger focus on educating patients about self-management practice.

Results from this study can be incorporated into developing patients' education schemes, equipping them with the tools which will help to take their healthcare into their own hands. This would likely result in better management, better treatment outcomes, a healthy lifestyle, fewer patient admissions and ultimately less morbidity and mortality. However, knowledge of the practice may not be enough to maintain self-management behaviours hence one may often require further motivation, support, and resources hence apart from simply advocating for increased self-management education in health systems or communities. They also propose closer monitoring of the factors that may affect this practice.

Limitations

As this is a cross-sectional design, could not infer causality, and the length of the various exposures was not explored therefore prospective and experimental studies may be necessary. Furthermore, blood pressure measurements would have proved a useful indicator that self-management behaviour is associated with improved health outcomes (Controlled blood pressure). They were not able to measure them due to a lack of resources to purchase standardized measurement apparatus. They relied on Hospital-based blood pressure measurements although were not enough/reflective to give a full picture of blood pressure control to use as an indicator to evaluate health outcomes.

Conflict of interest disclosures

The authors declare no conflicts of interest. This article has not been published previously nor is not being considered for publication in other journals.

Author contributions

All authors contributed to the writing of the final report. All authors have approved the final version to be submitted.

Data sharing statement

We will provide any primary data access to the Tanzania Journal of Health Research anytime when requested during the review process or for editorial decisions.

Received 16th January 2023

Revised 27th February 2023

Accepted 10th March 2023

References

- WHO. [2003] International Society of Hypertension Writing Group. 2003 statement on management of hypertension. *Journal of hypertension*. 1;21[11]:1983-92
- Barlow, J., Wright, C., Sheasby, J., Turner, A., & Hainsworth, J. [2002]. Self-management approaches for people with chronic conditions: a review. *Patient education and counselling*, 177-187.
- Lorig, K. R., & Holman, H. R. [2003]. Self-management education: history, definition, outcomes, and mechanisms. *Annals of behavioral medicine*, 26[1], 1-7
- Grady, P. A., & Gough, L. L. [2014]. Self-management: a comprehensive approach to the management of chronic conditions. *American Journal of Public Health*, 104[8], e25-e31.
- WHO. [2018]. Non communicable Diseases [NCD] Country Profiles. Non communicable diseases
- WHO. [2021]. Hypertension diseases: Fact Sheet
- MoHCDGEC. [2016]. Strategic and action plan for the prevention and control of non-communicable diseases in Tanzania 2016 – 2020
- Ibrahim, M. M., & Damasceno, A. [2012]. Hypertension in developing countries. *The Lancet*, 380(9841), 611-619.
- Mwita, J. M., Nyawale, H. A., & Mghanga, F. P. [2020]. The burden of hypertension and its associated factors among adults in Ruvuma, Southern Tanzania. *SSMJ*, 12.
- Galson, S. W., Staton, C. A., Karia, F., Kilonzo, K., Lunyera, J., Patel, U. D., ... & Stanifer, J. W. [2017]. Epidemiology of hypertension in Northern Tanzania: a community-based mixed-methods study. *BMJ open*, 7[11], e018829.
- Brenyah, J. K. [2018]. *Social, Economic and Political Influences on Risk Factors of Non-Communicable Diseases in Ghana* [Doctoral dissertation, University of Ghana].
- Islam, S. M. S., Purnat, T. D., Phuong, N. T. A., Mwingira, U., Schacht, K., & Fröschl, G. [2014]. Non-Communicable Diseases [NCDs] in developing countries: a symposium report. *Globalization and health*, 10[1], 81.
- Parati, G., Lombardi, C., Pengo, M., Bilo, G., Ochoa, J.E., [2021]. Current Challenges for Hypertension management: From better hypertension diagnosis to improve patients' adherence and blood pressure control. *International Journal of Cardiology*. Volume 331, 2021. Pages: 262-269.
- Muhamedhusein, M. S., Nagri, Z. I., & Manji, K. P. [2016]. Prevalence, risk factors, awareness, and treatment and control of hypertension in Mafia Island, Tanzania. *International journal of hypertension*, 2016.
- Burns, J., Persaud-Sharma, D., & Green, D. [2019]. Beyond JNC 8: implications for evaluation and management of hypertension in underserved populations. *Acta cardiologica*, 74[1], 1-8.
- Van de Velde, D., De Zutter, F., Satink, T., Costa, U., Janquart, S., Senn, D., & De Vriendt, P. [2019]. Delineating the concept of self-management in chronic conditions: a concept analysis. *BMJ open*, 9[7], e027775.
- Balduino AF, Mantovani MF, Lacerda MR, Marin MJ, Wal ML. Experience of hypertensive patients with self-management of health care. *J Adv Nurs*. 2016 Nov;72[11]:2684-2694. doi: 10.1111/jan.13022. Epub 2016 Jun 13. PMID: 27206159.
- Han, H. R., Lee, H., Commodore-Mensah, Y., & Kim, M. [2014]. Development and validation of the

- hypertension self-care profile: a practical tool to measure hypertension self-care. *The Journal of cardiovascular nursing*, 29[3], E11.
- James, P. A., Oparil, S., Carter, B. L., Cushman, W. C., Dennison-Himmelfarb, C., Handler, J., & Smith, S. C. [2014]. 2014 evidence-based guideline for the management of high blood pressure in adults: report from the panel members appointed to the Eighth Joint National Committee [JNC 8]. *Jama*, 311[5], 507-520.
- Chobanian AV. The hypertension paradox—more uncontrolled disease despite improved therapy. *New England Journal of Medicine*. 2009 Aug 27;361[9]:878-87.
- Sacks FM, Svetkey LP, Vollmer WM, Appel LJ, Bray GA, Harsha D, Obarzanek E, Conlin PR, Miller ER, Simons-Morton DG, Karanja N. Effects on blood pressure of reduced dietary sodium and the Dietary Approaches to Stop Hypertension (DASH) diet. *New England journal of medicine*. 2001 Jan 4;344[1]:3-10.
- Vollmer WM, Sacks FM, Ard J, Appel LJ, Bray GA, Simons-Morton DG, Conlin PR, Svetkey LP, Erlinger TP, Moore TJ, Karanja N. Effects of diet and sodium intake on blood pressure: subgroup analysis of the DASH-sodium trial. *Annals of internal medicine*. 2001 Dec 18;135[12]:1019-28.
- Bagrov AY, Lakatta EG. The dietary sodium-blood pressure plot “stiffens”.
- Whelton PK, He J, Appel LJ, Cutler JA, Havas S, Kotchen TA, Roccella EJ, Stout R, Vallbona C, Winston MC, Karimbakas J. Primary prevention of hypertension: clinical and public health advisory from The National High Blood Pressure Education Program. *Jama*. 2002 Oct 16;288[15]:1882-8.
- Roerecke M, Kaczorowski J, Tobe SW, Gmel G, Hasan OS, Rehm J. The effect of a reduction in alcohol consumption on blood pressure: a systematic review and meta-analysis. *The Lancet Public Health*. 2017 Feb 1;2[2]:e108-20.
- Stevens VJ, Obarzanek E, Cook NR, Lee IM, Appel LJ, Smith West D, Milas NC, Mattfeldt-Beman M, Belden L, Bragg C, Millstone M. Long-term weight loss and changes in blood pressure: results of the Trials of Hypertension Prevention, phase II. *Annals of internal medicine*. 2001 Jan 2;134[1]:1-1.
- Simmons SJ. The Health-Promoting Self-Care System Model: directions for nursing research and practice. *Journal of Advanced Nursing*. 1990 Oct;15[10]:1162-6.
- Schapira, M. M., Fletcher, K. E., Hayes, A., Eastwood, D., Patterson, L., Ertl, K., & Whittle, J. (2012). The development and validation of the hypertension evaluation of lifestyle and management knowledge scale. *The Journal of Clinical Hypertension*, 14[7], 461-466.
- Dasgupta, A., Sembiah, S., Paul, B., Ghosh, A., Biswas, B., & Mallick, N. [2017]. Assessment of self-care practices among hypertensive patients: a clinic-based study in rural area of Singur, West Bengal. *Int J Community Meclinic-basedlth*, 5[1], 262-7.
- Tibebu, A., Mengistu, D., & Negesa, L. [2017]. Adherence to recommended lifestyle modifications and factors associated for hypertensive patients attending chronic follow-up units of selected public hospitals in Addis Ababa, Ethiopia. *Patient preference and adherence*, 11, 323.
- Gebremichael, G. B., Berhe, K. K., Beyene, B. G., & Gebrekidan, K. B. [2019]. Self-care practices and associated factors among adult hypertensive patients in Ayder Comprehensive Specialized Hospital, Tigray, Ethiopia, 2018. *BMC research notes*, 12[1], 489.
- Joseph, N., Chiranjeevi, M., Sen, S., Singh, P., Saini, M., & Beg, S. [2016]. Awareness of hypertension and its self-management practices among hypertensive patients attending outreach clinics of a medical college in South India. *Kathmandu Univ Med J*, 55[3], 202-9.
- Qu Z, Parry M, Liu F, Wen X, Li J, Zhang Y, Wang D, Li X. Self-management and blood pressure control in China: a community-based multicentre cross-sectional study. *BMJ open*. 2019 Mar 1;9[3]:e025819.
- Choi HM, Kim HC, Kang DR. Sex differences in hypertension prevalence and control: analysis of the

- 2010-2014 Korea National Health and Nutrition Examination Survey. *PloS one*. 2017 May 25;12[5]:e0178334.
- Akhter N. Self-management among patients with hypertension in Bangladesh [Doctoral dissertation, Prince of Songkla University].
- Crowley MJ, Grubber JM, Olsen MK, Bosworth HB. Factors associated with non-adherence to three hypertension self-management behaviors: preliminary data for a new instrument. *Journal of general internal medicine*. 2013 Jan 1;28[1]:99-106.
- Anowie F, Darkwa S. The knowledge, attitudes and lifestyle practices of hypertensive patients in the cape coast metropolis-Ghana. *Journal of scientific research and reports*. 2015 Sep 6:1-5.
- Ademe S, Aga F, Gela D. Hypertension self-care practice and associated factors among patients in public health facilities of Dessie town, Ethiopia. *BMC health services research*. 2019 Dec;19[1]:1-9.
- Kvarnström, K., Airaksinen, M., & Liira, H. [2018]. Barriers and facilitators to medication adherence: a qualitative study with general practitioners. *BMJ open*, 8[1], e015332.
- Galson, S. W., Stanifer, J. W., Hertz, J. T., Temu, G., Thielman, N., Gafaar, T., & Staton, C. A. [2019]. The burden of hypertension in the emergency department and linkage to care: A prospective cohort study in Tanzania. *PloS one*, 14[1].
- Manyama W. Dynamics in Family Patterns in Tanzania: The Case of Kijitonyama Ward, Kinondoni District, Dar-es-Salaam Region, Tanzania. *Journal of Sociology and Social Work*. 2017 Jun;5[1]:68-79.
- Rader F, Elashoff RM, Niknezhad S, Victor RG. Differential treatment of hypertension by primary care providers and hypertension specialists in a barber-based intervention trial to control hypertension in Black men. *The American journal of cardiology*. 2013 Nov 1;112[9]:1421-6.
- Abu, H. O., Aboumatar, H., Carson, K., Goldberg, R. J., & Cooper, L. [2018]. Hypertension knowledge, heart healthy lifestyle practices and medication adherence among adults with hypertension.
- Chimberengwa, P. T., Naidoo, M., & cooperative inquiry group. [2019]. Knowledge, attitudes and practices related to hypertension among residents of a disadvantaged rural community in southern Zimbabwe. *PloS one*, 14[6], e0215500.