

# Factors Associated with Medication Adherence among Hypertensive Adults in the North West Region of Cameroon

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## Abstract

**Introduction:** Hypertension is a primary risk factor for cardiovascular disease, premature morbidity and mortality worldwide. The World Health Organization (WHO) estimates a global prevalence of approximately 1 billion adults and projects an increase to 1.7 billion by 2025. Global hypertension is on a steady rise in developing countries. The use of anti-hypertensive medications has been shown to produce significant gains; however, non-adherence remains a global health problem. This study examines factors associated with medication adherence among hypertensive adults in the North West Regions of Cameroon. The study framework was guided by Bandura's theory of self-efficacy.

**Methods:** This project utilized a descriptive cross-sectional survey design. Data was collected by self-administered questionnaires with a convenience sample of established patients in two hospitals. Two surveys included the demographic tool (15 items) and the Modified Medication Adherence Scale (MMAS-8). The Cronbach alpha is .83 [1].

**Results:** The total sample (n=200) completed the surveys. 47% (n = 94) reported a normal blood pressure. The mean systolic blood pressure was 141mm/Hg and diastolic blood pressure was 85mm/Hg. Mean adherence score was 6.33, SD=2.089. Adherence scores findings showed 31% (n = 63) low adherence, 32% (n= 64) medium adherence and 36% (n=73) high adherence. A significant weak negative correlation was found with adherence and blood pressure in systolic BP ( $r(198) = -.204, p<.05$ ) and in diastolic BP ( $r(198) = -.237, p<.01$ ). The higher the blood pressure, the lower the adherence scores. Education and alcohol were shown to be statistically associated with medication adherence.

**Conclusions:** The long-term reduction strategy of acute cardiovascular events associated with high medication adherence to antihypertensive treatment underscores its importance to hypertension control. Efforts focused on early antihypertensive treatment initiation and customized intervention programs may likely improve patient outcome and provide major benefits in global hypertension control efforts.

## Introduction

The World Health Organization (WHO) reported that there are 1 billion adults diagnosed with hypertension globally and that estimate is projected to increase by approximately 1.7 billion (60%) by 2025 [2]. Increase in global hypertension has been attributed to a steady increase in hypertension in developing countries [2]. A systematic review of literature [3] on hypertension prevalence in Sub-Saharan Africa found hypertension to be more prevalent in urban than rural areas. This was attributed to a population shift from rural to urban areas, increased consumption of processed foods, obesity and physical inactivity. Hypertension is defined as an average systolic blood pressure of greater or equal to 140 mm/Hg or a diastolic blood pressure of greater than or equal to 90 mm Hg [4,5].

Uncontrolled blood pressure is one of the primary risk factors for cardiovascular diseases, stroke, premature morbidity and mortality worldwide [2,6,7]; and has been identified as the third leading cause of disability worldwide [5,8].

In the Sub-Saharan Africa, much attention over the past few decades have been primarily on the prevention of communicable diseases [2] such as the Human immunodeficiency virus/acquired immunodeficiency syndrome (HIV-AIDS). However, non-communicable diseases, such as hypertension is emerging in the Sub-Saharan Africa region as major population health crises [3,8]. Cameroon, a country in the Sub-Saharan African region is also experiencing a public health emergency with increasing number of hypertensive patients. A 2007 study [9] examined hypertension

burden and related risk factors (smoking, obesity, alcohol consumption and sedentary lifestyle) among adults in Cameroon. The researchers reported that in 1994, the prevalence rate of hypertension and diabetes was approximately 8% and 1% respectively. In 1998, hypertension prevalence increased to 18% and diabetes to 6%. The increase in the number of hypertensive patients is thought to be related to a population shift from rural to urban areas, increased consumption of processed foods, obesity, and physical inactivity [9].

Treatment with anti-hypertensive medications has been shown to reduce disease related complications such as cardiovascular disease, stroke, kidney disease and sudden death, yet non-adherence remains a significant global health problem [5,6,18]. Despite numerous studies that have identified factors associated with medication non-adherence in developed countries [10-12], no studies have been published in Cameroon to address this problem. Therefore, further exploration for this study was necessary. The purpose of this study was to investigate factors associated with medication adherence among hypertensive adults in the North West Region of Cameroon.

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## Theoretical Framework - Social Cognitive Theory of Self Efficacy

This study utilized Bandura's theory of self-efficacy. Self-efficacy theory is developed from social cognitive theory that suggests that behavior, cognition and environment have interacting influences among each other [13]. Self-efficacy, "refers to beliefs in one's capabilities to organize and execute the courses of action required to manage prospective situations" [14]. The principle behind self-efficacy is that, the ability to modify a behavior is influenced by expected outcome gained from that modification and the ability to self-motivate to maintain the desired outcome [13]. It is the confidence one feels about performing a task, the confidence in overcoming the barriers to achieve the given task and the outcome expected.

Self-efficacy has been recognized as a predictor of health behavior [15]. Individuals with chronic diseases who perceive high levels of self-efficacy are more likely to adhere to treatment recommendations than individuals with low efficacy [16]. Therefore, the belief that blood pressure can be controlled by adhering to medication regimen may become a stimulus to trigger a hypertensive patient to adhere to treatment recommendations. It was reported that patients with high self-efficacy would have higher adherence to treatment recommendations than those with low self-efficacy [15,16]. Factors examined in this study, e.g. demographic characteristics have been associated with the outcome of medication adherence [21].

### Operational definition of terms

#### Hypertensive patient

This is a patient with blood pressure readings greater than or equals to 140/90mm/Hg [4,5] and is currently taking one or more anti-hypertensive medications.

#### Medication Adherence

Adherence was defined as the extent to which a person's behavior i.e., taking medication, following a diet, and/or executing lifestyle changes corresponds with agreed recommendations from a health care provider [18]. Adherence is the endurance from the practice and maintenance of desired health behaviors and is the result of active participation and shared decision making between patients and health care providers [19,20].

#### Factors associated with hypertensive medication

It was defined as variables found in the literature associated with treatment adherence. This would be measured by the self-reported responses to the 15-items on demographic questionnaire. Twelve items were adopted from a study [21] and three additional items are specific to the study population. Variables included age, gender, marital status, education level, occupation, monthly household income, smoking, alcohol consumption, perceived health status, number of hypertensive medication used, duration on antihypertensive drugs, and distance from home to clinic, methods of transportation, and traditional medicines use.

#### Research Design

A descriptive cross-sectional research design utilized two self-administered questionnaires collected between July 31 and August 31 2014. This design was chosen because it is quick, economical, and

provided the researcher with information relating to the relationships and associations between variables of interest, as they exist in the natural state.

#### Population and Setting

This study was conducted at two hospitals in the North West Region of Cameroon. The first hospital: Bamenda Regional Hospital is own and operated by the government. The second hospital, St. Monica Hospital - Ndog is a small rural hospital about 30 Km from Bamenda and is own and operated by the Catholic Mission. The North West region was chosen because it is the second largest and most densely populated region among Cameroon's ten regions [22].

A convenience sample of adult males and females, who were established patients at the outpatient hypertension clinics at both hospitals were eligible to participate in the study.

#### Inclusion criteria for sample selection:

1. Eighteen (18) years and above
2. Diagnosed with hypertension for at least 6 months
3. Speaks and understand English or Pidgin English
4. Currently taking at least one antihypertensive medication for the past 6 months

#### Exclusion Criteria:

1. Pregnant women
2. Patients with mental illness
3. Patients needing emergency care
4. Patients who were critically ill.

#### Ethical Considerations

Approval to conduct this study was obtained from William Paterson University Institutional Review Board Committee, Bamenda Regional Hospital and St. Monica Hospital. All participants were informed of the study purpose and a verbal consent was obtained. Confidentiality and anonymity of each participant was maintained.

#### Instruments and data collection methods

Data was collected using two self-administered surveys. A standardized demographic questionnaire was adapted from the study by Lee et al. [21] and modified to the population of interest. This questionnaire included demographic variables: age, gender, marital status, education, occupation, income, smoking, alcohol, number of antihypertensive medication used and duration on antihypertensive medication. Distance from home to clinic, traditional medicines use, method of transportation, and perceived health status was added to provide a better caption of the population of interest.

A second questionnaire was the Modified Medication Adherence Scale (MMAS-8) [1]. The MMAS-8 has been used in numerous studies measuring hypertension medication adherence [23,21]. This instrument has a Cronbach alpha = 0.83.

The researcher who was familiar with the region approached established patients who presented at the clinics for scheduled appointments. The purpose of the study was explained and the

questionnaires were read in English and Pidgin English. Pidgin English is a local language spoken by many in this region. Reading the questionnaires in English and Pidgin was necessary to increase sample size and thus generalizability of the study. Participants who provided verbal consent were given the demographic and the MMAS-8 questionnaires to complete. The researcher was present to answer questions.

### Data analysis

Data was analyzed using the Statistical Package for the Social Sciences for Windows 11.0 [24]. Descriptive statistics was computed for patient's characteristics. Chi-square testing was calculated to determine relationships between socio-demographic variables and medication adherence. A Pearson correlation was used to examine statistically significant relationships between the research variables and medication adherence and to determine if there were any statistically significant correlation between blood pressure readings and medication adherence.

### Results

#### Demographic variables

##### Questionnaires distribution

Two hundred and ten questionnaires were distributed and collected by the researcher at two hospital-based clinics in the North West Region of Cameroon. Two hundred and six (206) were completed and returned (response rate of 98%). Six questionnaires had missing data and were removed. The total sample (N = 200) included patients from regional hospital clinic (n = 164), and a rural hospital clinic (n = 36). No significant differences were identified between these groups so the samples were aggregated.

##### Sample

A convenience sample of adult hypertensive patients from two local hospitals (N = 200) who were 18 years or older and who met research criteria participated in this study.

In Table 1, the majority of the respondents (45.5%, n = 91) were between the ages of fifty-five and sixty nine years, with nearly twice as many females to males (65.5%, 34.5%) respectively. There was no

	Total N = 200	Male n = 67 (34.5%)	Female n = 133 (65.5%)
Variable			
Age			
≤39 years	7 (4.5%)	3 (4%)	4 (3%)
40-54 years	49 (24.5%)	21 (32%)	28 (21%)
55-69 years	91 (45.5%)	27 (40%)	64 (48%)
70 years and above	53 (26.5%)	16 (24%)	37 (28%)
Marital status			
Married	128 (64.0%)	61 (91.0%)	67 (50.3%)
Single/divorce/cohabit	8 (4.0%)	3 (4.5%)	3 (2.3%)
Widow	64 (32.0%)	3 (4.5%)	63 (47.4%)

Table 1: Age and Marital Status.

statistically significant difference in the mean age for males or females. Sixty four percent (n = 128) of participants indicated "married" as their marital status with no significant difference in gender. However, approximately forty seven percent of widow were females (n = 63).

#### Education, occupation and income

In Table 2, the majority of participants had primary or below primary educational preparation (66.5%). Eight percent (8%) reported earning a university degree. The majority reported their occupation as a housewife (35%), followed by being employed (30.5%). When analyzed by gender, the (52%) of females were housewives (n = 69) and the majority (40%) of males were employed (n = 27), with an equal percent (26%) of females employed outside of the home (n = 34). Twenty three percent of the participants were retired (n = 46). Computation for monthly income indicated that the majority of the participants (65%) had a monthly income less than 50,000 Francs (\$100.00). A quarter of the participants earned over 100,000 Francs (\$200.00). A statistically significant difference was found in earnings between genders (r (198) = -.367, (p<.05), with women likely making less money than men do.

	Total N = 200	Male n = 67 (34.5%)	Female n = 133 (65.5%)
Variable			
Education			
Primary/below	133 (66.5%)	29 (43.0%)	104 (78.0%)
Secondary	27 (13.5%)	15 (23.0%)	12 (9.0%)
High/Technical	24 (12.0%)	12 (19.0%)	12 (9.0%)
University	16 (8.0%)	11 (16.0%)	5 (4.0%)
Occupation			
Employed	61 (30.5%)	27 (40.0%)	34 (26.0%)
Unemployed	23 (11.5%)	9 (13.0%)	14 (10.0%)
Housewife	70 (35.0%)	1 (2.0%)	69 (52.0%)
Retired	46 (23.0%)	30 (45.0%)	16 (12%)
Income			
<50,000 Francs	130 (65.0%)	27 (40.0%)	103 (77.0%)
51-100,000 Francs	18 (9.0%)	9 (7.0%)	9 (7.0%)
>100,000 Francs	52 (26.0%)	31 (47.0%)	21 (16.0%)

Table 2: Education, Occupation, Income.

#### Smoking and alcohol use

In Table 3, the majority of participants (96.5%) did not smoke cigarette and did not drink alcohol (63.5%). However, when analyzed by gender, there was a statistically significant association with males who smoked cigarettes (r (198) = .265, p< .05), men were more likely to smoke cigarettes than women. No statistically significant association was found with gender and alcohol use.

#### Variables related to hypertension

Systolic & diastolic Blood Pressure, number of anti-hypertensive medications taken, duration on anti-hypertensive medication and traditional medicine.

	Total (n = 200)	Male (n = 67)	Female (n = 133)
Variable			
Smoking			
Yes	3.5	7 (10%)	0
No	96.5	60 (90%)	133 (100%)
Alcohol			
Yes	36.5	37 (55%)	36 (27%)
No	63.5	31 (45%)	96 (73%)
Distance to Hospital			
<10 Km	150 (75%)	52 (76%)	99 (74%)
>10 Km	50 (25%)	15 (24%)	34 (26%)
Method of Transportation			
Walk	36 (18%)	10 (15%)	26 (20%)
Taxi	100 (50%)	33 (49%)	67 (50%)
Drive	16 (8%)	9 (14%)	7 (5%)
Other	84 (24%)	15 (22%)	33 (25%)
Health Perception			
Good	36 (18%)	10 (15.0%)	26 (20%)
Fair	100 (50%)	33 (49.0%)	67 (50%)
Poor	16 (8%)	9 (14.0%)	7 (5%)
	84 (24%)	15 (22.0%)	33 (25%)

Table 3: Smoking and Alcohol use.

In Table 4, approximately 47% (n = 94) of the participants had a normal blood pressure readings. The mean systolic blood pressure was 141mm/Hg (SD = 20.1723) and the mean diastolic blood pressure

	Total N = 200	Male n = 67 (34.5%)	Female n = 133 (65.5%)
Variable			
Blood Pressure			
<140/90 mm/Hg	94 (47.0%)	32 (48.0%)	62 (47.0%)
≥140/90 mm/Hg	106 (53.0%)	35 (52.0%)	71 (53.0%)
Number of Anti-hypertensive medications			
1	109 (54.5)	38 (57.0%)	71 (53.0%)
2-3	61 (35.5%)	20 (30.0%)	51 (38.0%)
>4	20 (10.0%)	9 (13.0%)	11 (9.0%)
Duration on Anti-hypertensive medications			
6 months – 11 months	31 (15.5%)	12 (18.0%)	19 (14.0%)
12 months – 5 years	62 (31.0%)	20 (30.0%)	42 (32.0%)
>5 years	107 (53.5%)	35 (52.0%)	72 (54.0%)
Traditional medicine use			
Yes	27 (13.5%)	9 (13.0%)	18 (14.0%)
No	173 (86.5%)	58 (87.0%)	115 (86.0%)

Table 4: Blood pressure, number of antihypertensive medicines, duration on antihypertensive medicines and traditional medicine use.

was 85mm/Hg (SD = 12.175). Approximately 55% (n = 109) reported taking one anti-hypertensive medication. The majority of participants (53.5%) reported taking antihypertensive medications for over five years. When asked about traditional medicines used for hypertension, 86.5% (n = 173) reported that they do not take any traditional medications.

### Medication adherence behaviors

Medication adherence, distance to hospital, method of transportation and health perception.

In Table 5, adherence score ranged from “0” to “8”, Low (< 6), medium (6 - < 8) and high (=8) adherence (Morisky et al., 2007). The total mean score was 6.33, SD = 2.089. Approximately 31%, (n = 63) achieved a low medication adherence, 32%, (n = 64) medium adherence and 36% (n = 73) were found to be at high adherence. Approximately 68% (n = 137) of participants achieved a score greater than six and were considered adherent to antihypertensive medications.

In addition, in Table 5, 75% (n = 150) of the participants lived under 10 Km, with half of the respondents (n = 100) reported using taxis for their method of transport. When asked about perceived health status, the majority (46.5% n = 93) perceived their health status to be “fair” with no significant difference in gender.

	Total N = 200	Male n = 67 (34.5%)	Female n = 133 (65.5%)
Variable			
Morisky Score			
Low Adherence (<6)	63 (31.5%)	22 (32.0%)	41 (31.0%)
Medium Adherence (6 to <8)	64 (32.0%)	23 (36.0%)	41 (31.0%)
High Adherence (=8)	73 (36.5)	22 (32.0%)	51 (38%)

Table 5: Morisky score, Distance to Hospital, Method of Transportation and Health Perception.

### Statistical analysis

The chi-square test of independence was conducted to determine whether each independent variable, measured as either continuous or categorical, were contingent on medication adherence. Two statistically significant chi square test results were found: alcohol use and level of education.

A chi-square test of independence was calculated to test whether or not the alcohol use was independent of medication adherence. A statistically significant interaction was found ( $X^2 = 10.226$ ,  $df = 2$ ,  $p < .05$ ).

A chi-square test of independence was calculated to test whether or not level of education was independent of medication adherence. A statistically significant chi square result was also found ( $X^2(1) = 17.760$ ,  $df = 6$ ,  $p < .05$ ). Participants who reported their educational level to be primary or below primary were more likely to have lower medication adherence than participants who reported a higher education level.

### Relationship between blood pressure and medication adherence

In Table 6, a Pearson correlation coefficient was calculated to determine any association between systolic blood pressure and medication adherence. A weak negative correlation was found ( $r(198) = -.204, p < .05$ ), indicating a statistically significant inverse relationship between the two variables. The higher the systolic blood pressure, the lower the adherence scores.

A Pearson correlation coefficient was calculated to determine any association between diastolic blood pressure and medication adherence. A weak negative correlation was also found ( $r(198) = -.237, p < .05$ ), indicating a statistically significant inverse relationship between the two variables. The lower the diastolic blood pressure, the higher the adherence scores.

Pearson Correlations				
	BP Systolic	BP Diastolic	Morisky Scale	
BP Systolic	Pearson Correlation	1	.520**	-.204**
	Sig. (2-tailed)		.000	.004
	N	200	200	200
BP Diastolic	Pearson Correlation	.520**	1	-.237**
	Sig. (2-tailed)	.000		.001
	N	200	200	200
Morisky Scale	Pearson Correlation	-.204**	-.237**	1
	Sig. (2-tailed)	.004	.001	
	N	200	200	200

Table 6: Blood Pressure and Medication Adherence.

\*\*  $P < .05$

### Summary of Results and Discussions

The purpose of this study was to investigate factors associated with medication adherence among hypertensive adults in the North West Region of Cameroon. The study was guided by Bandura's theory of self-efficacy. Self-efficacy is "the belief in one's ability to organize and execute any courses of action required to manage a situation [14]. The principle behind self-efficacy is that, behavior is influenced and could be modified by expected gained from that modification. Therefore, the belief that blood pressure could be controlled by adhering to medication regimen could become the stimulus to trigger a hypertensive patient to adhere to medication. Self-efficacy has been recognized as a predictor of health behavior [15]. Patients with high self-efficacy have been found to have higher adherence rate than those with low self-efficacy [17]. In this study patients were considered efficacious when the adherence score was greater than 6 [1] and accompanied with a normal blood pressure i.e.  $BP < 140/90$  [25,4,26]. Approximately 68.5% of participants ( $n=137$ ) had adherence score  $>6$  and considered adherent - the higher the adherence score, the lower the blood pressure reading. This findings support the concepts of self-efficacy and medication adherence.

This study utilized the 8 item self-reported Morisky Medication Adherence Scale (MMAS-8) questionnaire to investigate factors associated with medication adherence among hypertensive adults in the North West Region of Cameroon. Adherence scores were assessed as low ( $< 6$ ), medium ( $6 - < 8$ ) and high ( $= 8$ ) [1]. Patients with scores greater than six (6) were considered adherent to anti-hypertensive medications. In comparison with other studies, adherence in this study was found in 68.5% of participants, which was higher than WHO global adherence estimates of 48-50% [18]. This finding is similar to adherence rates (67%) reported among hypertensive adults in a recent cross sectional survey conducted in Palestine using the MMAS-8 scale [27]. Similar adherence rates of 41% - 71% have been reported in other studies using the MMAS-8 [27,21,28,29]. While others have also reported similar adherence rates of 51% - 60% from other developing countries [30- 32].

Numerous studies have evaluated demographic variables associated with medication adherence among hypertensive adult specifically, age, gender, marital status, occupation, income, education [31,21,33,34,35] using different adherence measures. The authors in this study found a statistically significant ( $X^2(1) = 17.760, df = 6, p < .05$ ) association between level of education and medication adherence. The more educated the participants the higher the adherence score. Karakurt et al. [31] found similar results among hypertensive adults in Turkey - education level was significant at ( $X^2 = 20.815, SD = p < 0.01$ ). Ironically, approximately 67% of participants recorded their education level to be primary (6th grade) or below primary education.

Education and literacy has a direct impact on adherence [36]. Mancuso & colleagues [37] conducted a longitudinal study examining health literacy and asthma outcomes; the researchers reported that low health literacy was associated with poor asthma outcome. While individuals with limited health literacy or education may come from many walks of life, the problem of limited health literacy is often greater among older adults who are more likely to have limited education, and English proficiency [38]. In this study, the mean age was approximately 62 years. Among participants who were considered adherent (68.5%,  $n=137$ ), the majority (45%,  $n=62$ ) were between 55-69 years. Our finding was similar with a previous study in a Palestine population using the MMAS-8 [39]. In that study, 46% of participants reported education, level of primary or below and mean adherence score was 4.5-8.

The ability to read and understand medication labels and treatment recommendations is crucial in improving adherence, it is therefore important for health care providers to provide instructions to patients at the grade level that is understood by the patients.

With regards to alcohol consumption, approximately 64%, ( $n = 127$ ) reported that they did not drink alcohol. We assessed only history of drinking habit - "Do you drink alcohol" and possible response were either "yes" or "no". A statistically significant inverse relationship was found ( $X^2 = 10.226, df = 2, p < .05$ ). As alcohol use increases, medication adherence rate decreases.

Studies, which have reported relationship between alcohol and adherence, have been primarily on HIV medications [40,41]. A recent systematic review of literature by Grodensky [41] failed to identify that none of the HIV studies addressed alcohol use and medication adherence. The researchers suggested that there is a need for further rigorous studies in the HIV diseases.

Problems with drinking alcohol also has significant implications for clinicians in terms of medication adherence because of potential for alcohol and drugs interactions, and high probability of patients forgetting to take their medication due to alcohol intoxication. In this study, though there was a statistically significant interaction in alcohol and medication adherence ( $X^2 = 10.226$ ,  $df = 2$ ,  $p < .05$ , the percentages of people who reported drinking alcohol was relatively small. An anecdotal reason for this may be because patients are reminded, on a routine basis, at every clinic visit to refrain from drinking alcohol while on medications.

## Conclusion

Medication adherence is an essential population health strategy in addressing worldwide epidemic of chronic diseases and related complications associated with non-adherence. These complications include but not limited to cardiovascular diseases, kidney diseases, stroke, premature morbidity and mortality. Though medication has been shown to slow disease progression, non-adherence remains a major global health problem [18,26]. This study results showed that majority (68 %,  $n = 137$ ) reported a higher medication adherence rate among hypertensive adults in North West Region Cameroon. Though many variables have been found to be contributory to medication adherence in the western region, only education and alcohol were shown to be at the statistically significant level ( $p = .05$ ) in this study.

Long-term reduction strategy focused in identifying factors associated with medication adherence might underscore its important in hypertension control. Efforts focused on customized intervention programs may likely improve patient outcome and provide major benefits in global hypertension control efforts.

## Competing Interests

The authors declare that they have no competing interests.

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