



# Prevalence and Associated Risk Factors of Hypertension Among Assosa Town

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## Abstract

**Background:** Hypertension, the leading global risk factor for mortality and the third leading risk factor for disease burden, is an increasing public health problem in sub-Saharan Africa. This study aims to evaluate the prevalence & associated risk factors of hypertension among Assosa town.

**Objective:** To assess the prevalence of hypertension and its associated factor and to increase awareness of controlling hypertension among study subjects.

**Methods and Materials:** Institutional based cross sectional study design with quota non-probability sampling technique was conducted among patients visited OPD units of AGH and AHC from March to June 2018. All outpatients were included. Data was collected by face to face interviews using pre-tested structured questionnaire. SPSS version -20 software was used to enter and analyze data. Descriptive statistics like frequency table, chi-square test of independence and logistic regression was used to characterize disease and associated factors.

**Result:** The study was conducted among 194 participants (152 from AGH and 42 from AHC) with 102 males and 92 females. Prevalence of hypertension among patients visited outpatient units of Assosa General Hospital and Assosa Health Center was 17.5%, and was slightly highest in male than female. Independent risk factors for hypertension among patients visited OPD units of AGH and AHC was family history of hypertension (CI=95% and COR=4.497 (1.133-17.844) and being private employee (CI=95% and COR=0.0017 (0.001-0.407).

**Conclusion and Recommendation:** Prevalence of HTN was low and influenced by some risk factors like work status and previous family history of hypertension. Even if usual usage of salt and using vegetable oil was not associated factor, being non-government employee was independent factor of HTN. Further study is needed to investigate it. To increase preventative methods of HTN, health education supported by mass media, different posters and another strategy are essential at every government and non government work sector.

**Keywords:** Prevalence; Hypertension; OPD; AGH; AHC

## Abbreviations

AGH: Assosa General Hospital; AHC: Assosa Health Center; AOR: Adjusted Odd Ratio; B/G/R: Benishengul-Gumuz Region; CI: Confidence Interval; COR: Crude Odd Ratio; CVD: Cardio Vascular Disease; DM: Diabetes Mellitus; HTN: Hypertension; JUSH: Jimma University Referral Hospital; LMIC: Low Middle Income Countries; MMD: Major Depression Disorder; mmhg: Millimeter of Mercury; MRFIT: Multiple Risk Factor Intervention Trial; OPD: Out Patient Department; PHO: Public Health Officer; STEPs: Step wise approach to surveillance; USA: United States of America; WHO: World Health Organization

## Introduction

Hypertension is an important public health challenge worldwide because of its high prevalence and concomitant increase in risk of disease. According to the 2010 global non-communicable disease status report, the number of people with the condition rose from 600 million in 1980 to 1 billion in 2008. It is estimated that nearly one billion people are affected by hypertension worldwide, and this figure is predicted to increase to 1.5 billion by the year 2025 [1]. Compared to the high income countries, Hypertension is more prevalent in Low- and Middle Income Countries (LMIC). Globally nearly 9.4 million peoples dies every year due to high blood pressure, and it is one of the most important causes of premature death [2]. Complications and burden from raised blood pressure is also growing worldwide, affecting approximately one billion people, a figure that

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is predicted to increase, especially in low, lower middle income countries than high income countries [3]. Across the WHO regions, the prevalence of raised blood pressure was highest in Africa, where it was 46% for both sexes combined. Blood pressure is described by two values, pressure during systole (top value) and pressure during diastole (bottom value). Normal blood pressure is between 90/60 mmHg and 120/80 mmHg.

Blood pressure between 120/80 mmHg and 139/89 mmHg is called pre-hypertension, and a blood pressure of 140/90 mmHg or above is considered high. An elevation of the systolic and/or diastolic blood pressure increases the risk of developing heart disease, kidney disease, hardening of the arteries, eye damage, and a stroke. These complications of hypertension are often referred to as end-organ damage because damage to these organs is the end result of chronic high blood pressure. Most of the time hypertensive people show no symptoms in the early stages, symptoms only manifest after end-organ damage. That is why hypertension is described by some clinicians as a 'silent killer'. Symptoms that may occur include chest pain, confusion, ear buzzing, irregular heartbeat, nosebleed, tiredness, and headache and vision changes. These symptoms are usually a result of end-organ damage and the presentation depends on the organ that is affected [4]. Although the list of causes of hypertension is endless, in more than 90% of people with hypertension, the causes are not known and is defined as 'essential hypertension' (which means the cause of hypertension cannot be identified) [5]. Hypertension is the major risk factor for Cardiovascular Diseases (CVD) which is the major cause of death in the developed countries. Multiple Risk Factor Intervention Trial (MRFIT) in the United States data showed that the relative risk for coronary heart disease mortality varied from 2.3 to 6.9 times higher for persons with mild-to-severe hypertension compared to persons with normal blood pressure and the relative risk for stroke ranged from 3.6 to 19.2. The population attributable risk percentage for coronary artery disease varied from 2.3 to 25.6%, whereas the population-attributable risk for stroke ranged from 6.8 to 4.

Contrary to common perception, non-communicable diseases affect developing countries more than developed countries, World Health Organization estimates that about 80% of chronic disease deaths occur in low and middle income countries [6] and in Sub-Saharan countries, hypertension causes to 7.5 million deaths, among about 12.8% of the total annual deaths [7].

In high income countries, numerous studies have been conducted to estimate the prevalence of hypertension but in the low income countries like Ethiopia, due to the fact that high priority is given to the investigation of communicable disease, there is scarcity of data on prevalence and associated factors of hypertension in general population and particularly among vulnerable groups who are predisposed to hypertension and other cardiovascular disorder than general population. Previously, there was no study conducted on the Assosa General Hospital (AGH) and Assosa Health Center (AHC) to represent Assosa town population with the same topic. Thus the purpose of this study is to assess the prevalence and associated risk factors of hypertension among Assosa town.

## Materials and Methods

### Study setting

This study was conducted in AGH have been serving population of more than 750,000 and AHC which have been serving more than 30,000 populations. Since these health institutions are the

only governmental health institutions that are found in Assosa town, capital city of Benishangul-Gumuz regional state, they were purposely selected to represent prevalence and associated risk factors of HTN among Assosa town population. Assosa town is located on the North Western of Ethiopia by the 675 km distance from Addis Ababa, capital of the Ethiopia.

AGH has now 22 Medical doctors, 96 nurses, 15 midwives, 4 IESOs, 2 Anesthesia's, 2 Psychiatric, 12 Pharmacists and 3 General Specialists. And it has 4 wards namely, Medical ward (30 beds), Surgical ward (24 beds), Pediatric ward (25 beds) and Maternity ward (26 beds). It has also 13 OPDs which are serving averagely 300 to 500 outpatients daily. AHC has 31 Nurses, 9 Midwives, 5 PHOs, 3 Pharmacists and 3 Medical doctors with 10 OPDs.

Study design and sample size an institution based cross sectional study was conducted at Assosa General Hospital & Assosa Health Center. Sample size was determined by using statistical formula,  $n = Z^2 Pq / \Delta^2$  taking confidence interval 95% (1.96), Proportion of hypertension 13.2% (0.132) which was taken from hospital based cross sectional study conducted on JUSH [8] and margin of error as 0.05 and assuming non-response rate as 10%, the final sample size would become,  $n = 176 + 17.6 = 194$ .

### Sampling methodology

Proportional allocation was made for each health institution and quota non-probability sampling technique was used to include all patients visiting outpatient units of AGH and AHC to represent entire population of the town.

Assosa General Hospital and Assosa Health Center have 23,867 and 6,608 registered patients respectively within three months of the past year which have highest patient flow. Since 194 samples are required for this study, 152 samples from AGH and 42 from AHC were randomly selected using quota Non-probability sampling methods from all OPDs according to their willingness and eligibility criteria. Since all outpatients have different appointment duration.

And time of this study is short; probability sampling method was not used. Prior to starting study question, the importance of the study was deeply informed and if they found difficult to participate they excluded from the study. If randomly selected patient was ineligible or not volunteer to participate, the next available patient was selected based on inclusion criteria until required sample size was met. The further illustration of used sampling methodology is shown (Figure 1).

### Selection of study subjects

**Inclusion criteria:** All out patients aged 18 years or older attending the outpatient department of Assosa General Hospital and Assosa Health Center for various reasons during the study period was enrolled in to study consecutively based on their willingness and eligibility to participate in the study.

**Exclusion criteria:** All out patients with severe and critical illnesses, acute life-threatening conditions, mental disorder and severe injury, including patients with head injuries, were excluded from the study.

### Tools and techniques of the study

Face to face questionnaire was composed of open-ended and close-ended a question which was administered to collect data of socio-demography life style, genetic and family related factors &

**Table 1:** Classification of blood pressure.

| Classification   | Systolic value | Diastolic value |
|------------------|----------------|-----------------|
| Hypotension      | <90            | <60             |
| Normal BP        | 90-119         | 60-79           |
| Pre hypertension | 120-139        | 80-89           |
| HTN stage 1      | 140-159        | 90-99           |
| HTN stage 2      | ≥ 160          | ≥ 100           |

presence of other medical diseases or condition. The questionnaire was prepared by the English language and then translated to Amharic version as the most respondents are speaker of Amharic language. Questions included in the questionnaire are adapted from World Health Organization STEP wise approach to surveillance (STEPS) instrument for collecting data on chronic diseases and their risk factors. After the interview, the study participant was allowed to rest (relax) for 15 min then two blood pressure measurements were taken three minutes apart in a sitting position and the average of the two reading was taken. The blood pressure was measured on the left upper arm. The participant was positioned in such a way that the left upper arm was at the same level with the heart. To minimize measurement and inter observer variability, digital BP machine was used throughout the study and all blood pressure measurements were done by one qualified person.

### Ethical considerations

This study was conducted after getting ethical clearance from Assosa University, college of health sciences, research coordinator. Support letter was obtained from Assosa University to B/G/R health bureau, Assosa, Benishangul-Gumuz region and from B/G/ health bureau to the respective Woreda Health Office and AGH and then to health center. In addition, informed consent was obtained from study participants to confirm willingness for their participation after explaining the objective of the study. For the respondents it was notified that they have the right to refuse or terminate at any point of data collection. The information provided by each respondent was kept confidential.

### Definitions used

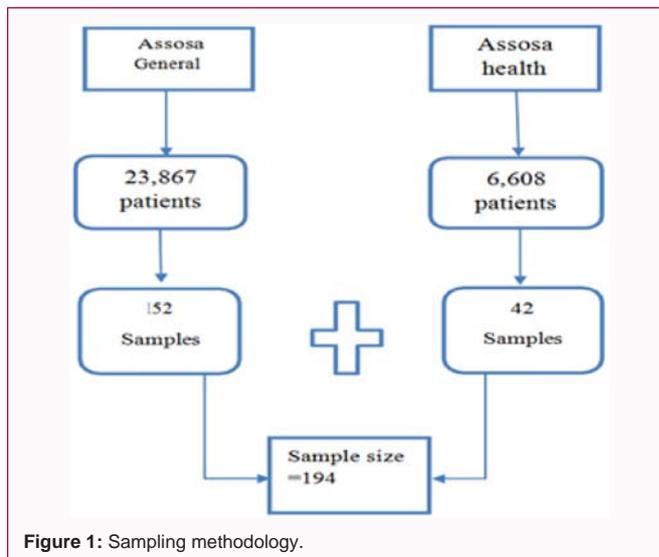
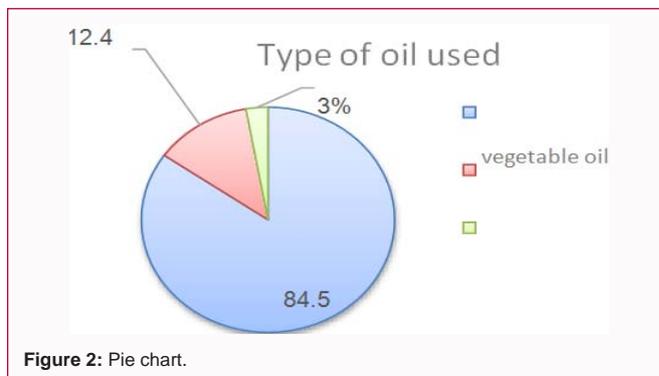
**Hypertension:** Is a condition in which arterial blood pressure is increased beyond it's normal value i.e. above 140/90 mmhg and measured by mmhg (Table 1).

**Physical activity:** A condition in which body is move at least 10 minutes continuously to increase breathing rate and heart beat.

**Prevalence:** The number of all new and old cases of a disease or occurrences of an event during a particular period. Prevalence is expressed as a ratio in which the number of events is the numerator and the population at risk is the denominator.

**Risk factor:** Is a variable associated with an increased risk of disease or infection. Sometimes, determinant is also used, being a variable associated with either increased or decreased risk.

**Data processing and analysis:** Data was entered, cleaning & analyzing by using SPSS version-21. The raw data was handled carefully from loosing of valuable data using computer password. Data cleaning was performed by running frequency of each variable to check accuracy, inconsistency and missed value of the data. Before analysis of the data, recoding of variables was conducted to make easy for analysis.

**Figure 1:** Sampling methodology.**Figure 2:** Pie chart.

Descriptive statistics like frequency mean and media with standard deviation to all variables which are related to the objective of the study was computed. Binary logistic regression model was used to test association between dependent and independent variables. The degree of association between dependent and independent variables was assessed using odds ratio with 95% CI or with respective to  $p < 0.05$ . Finally, data was presented in the form of text, tables and figures.

Averages of two systolic and diastolic blood pressure measurements was calculated and will used as variables in the analysis.

## Results

### Socio demographic characteristics

Out of the 194, 102 (52.6%) are male and 92 (47.4) are females. Only 41 (21%) was below 25 year age and 79% are above 25 year age with maximum and minimum age of 72 years and 19 years respectively. Median of the age is 33 years, mean age for the male and female are 39 years and 34 years respectively with the total mean of 37 years. Most study participant (58.8%) was married with the greater number of female (51.8%). All finding of socio- demographic was described (Table 2).

### Lifestyle

a) **Alcohol consumption:** Prevalence of alcohol consumption was 24.2% (47) with 33 males (70.2%) and 14 females (29.8%). Median number of standard alcoholic drinks consumed per drinking occasion was 1. Number of participants who had at least one heavy drinking

**Table 2:** The socio-demographic characteristics sitting among patients visited outpatient units of Assosa General Hospital and Assosa Health Center (n=194).

| S. No | Variable               | Frequency                            | Percent |      |
|-------|------------------------|--------------------------------------|---------|------|
| 1     | Education level        | 1-8                                  | 6.7     |      |
|       |                        | 9-12                                 | 20      |      |
|       |                        | University degree                    | 22.7    |      |
|       |                        | Masters degree                       | 5.67    |      |
|       |                        | Above masters degree                 | 2       |      |
|       |                        | None                                 | 42.8    |      |
| 2     | Religion               | Orthodox                             | 35.6    |      |
|       |                        | Protestant                           | 30.4    |      |
|       |                        | Catholic                             | 5.2     |      |
|       |                        | Muslim                               | 28.9    |      |
| 3     | Sex                    | Male                                 | 52.6    |      |
|       |                        | Female                               | 47.4    |      |
| 4     | Monthly Income in birr | 100-1000                             | 20.6    |      |
|       |                        | 1100-2000                            | 24.2    |      |
|       |                        | 2100-3000                            | 27.8    |      |
|       |                        | 3100-4000                            | 14.4    |      |
|       |                        | 4100-5000                            | 7.2     |      |
|       |                        | >5000                                | 5.7     |      |
|       |                        |                                      |         |      |
| 5     | Marital Status         | Single                               | 21.6    |      |
|       |                        | Married                              | 58.8    |      |
|       |                        | Divorced                             | 12.9    |      |
|       |                        | Separated-coexisted                  | 5.7     |      |
|       |                        | Widowed                              | 1       |      |
| 6     | Work status            | Gov't employee                       | 18      |      |
|       |                        | Non-Gov't employee Self              | 13.9    |      |
|       |                        | Employee House wife<br>Peasant Other | 42      | 21.6 |
|       |                        |                                      | 34      | 17.5 |
|       |                        |                                      | 27      | 13.9 |
|       |                        |                                      | 29      | 14.9 |
| 7     | Age                    | 18-25                                | 21.1    |      |
|       |                        | 26-33                                | 29.4    |      |
|       |                        | 34-41                                | 16      |      |
|       |                        | 42-49                                | 12.4    |      |
|       |                        | ≥ 50                                 | 21.1    |      |

episodes/month ( $\geq 5$  standard drinks/day in males or  $\geq 4$  in females) was 31 (66%) and median number of heavy drinking episodes per month was 2. The frequency of drinking alcohol was generally low.

**b) Smoking:** Prevalence of smoking was 2.6%. All current smokers were males. For current smokers, the median duration of smoking was 3 years and the median number of duration of smocking was 1 h. All current smokers (5(2.6%)) was mostly using cigars.

**c) Physical inactivity:** The overall prevalence of current physical inactivity was 49.5% (96), with 45 (46.9%) in male and 51 (53.1%) in female. Among 98 (50.5%) that was physically active, 57 (58.2%) was male and 41 (41.8%) was female. Those 98 current physical active was doing vigorous intensity activity that increases heart rate such as carrying or lifting heavy loads digging or construction work, moderate intensity activity such as, walking or carrying light loads for

**Table 3:** Daily duration of time spent by sitting among patients visited outpatient units of AGH & AHC (n=194).

| Total daily duration of time spent by sitting in hour | Frequency | Percent (%) |
|---|-----------|-------------|
| 1   | 27        | 13.9        |
| 2   | 75        | 38.7        |
| 3   | 69        | 35.6        |
| 4   | 15        | 7.7         |
| 5   | 1         | 0.5         |
| 6   | 2         | 1           |
| 7   | 3         | 1.5         |
| 8   | 2         | 1           |

**Table 4:** Frequency of daily eating both fruit and vegetable among patients visited outpatient unit of AGH and AHC (n=194).

| S. No | Variable                               | Daily frequency    | Frequency | Percent |
|-------|--|--------------------|-----------|---------|
| 1     | Daily frequency of eating table sat    | <1 time/day        | 6         | 3       |
|       |  | 1 time/day         | 65        | 33.5    |
|       |  | 2 time/day         | 120       | 61.9    |
|       |  | $\geq 3$ times/day | 3         | 1.5     |
| 2     | Number of days that table salt is used | Always             | 175       | 90.2    |
|       |  | Not eat            | 19        | 9.8     |

at least 10 min per day continuously.

These physical activities were practicable during both regular work and recreation. Daily duration of the time spent was shown on the Table 3.

**d) Diet:** Majority of the participant 120 (61.9%) was eating fruits and vegetables 2 times/day. Prevalence of adding salt to the food was 90.2% (92 male) and (83 female). Regarding the type of usually using oil, prevalence of usually using vegetable oil was high (63.9%). Frequency and percentage of diet with its type was described by the following table and pie chart (Table 4).

According to following pie chart, 164 participant or 84.5% of them were used vegetable oil, but 12.4% or 24 of them used both vegetable oil and butter but, only 6 of them or 3% used only butter (Figure 2).

### Family history

Prevalence of family history of HTN was 35.1 (68%) and prevalence of family history of DM was 17.1% (33). The following table shows prevalence and complication of Hypertension in the family (Table 5).

### Prevalence of hypertension

Prevalence of hypertension was 17.5%. Of these 17.5%, 18 (52.9%) were male and 16 (47.1%) were a female. 22 (64.7%) were diagnosed two years back, 8 (23.5%) were diagnosed three years back and 4 (11.77%) were diagnosed in this year. Among hypertensive patients, Prehypertension stage 1 HTN and stage 2 HTN accounted 64.7%, 20.5% and 14.7% respectively. Out of these 34 (17.5) hypertensive patients 12 (35%) had some disease complication as follows. Two of them or 1% have complication of heart failure, another 2 of them had type 1 diabetic complication, and 6 of them (3%) had complication of acute gastritis. One patient had also complication of asthma and another 1 patient have psychotic disorder of Major Depression Disorder (MDD) which was assessed from medical chart of the patient.

**Table 5:** Prevalence of family history of HTN, complication of HTN in the family and prevalence of family history of DM among patients visited outpatient unit of Assosa General Hospital and Assosa Health Center 2018 (n=194).

| S. No            | Variable                              | Frequency         | Percent |      |
|------------------|---------------------------------------|-------------------|---------|------|
| 1                | Family history of HTN                 | Yes               | 68      | 35   |
|                  |                                       | No                | 126     | 64.9 |
| 2                | Complication of HTN in the family     | Yes               | 23      | 11.9 |
|                  |                                       | No                | 171     | 88   |
| 3                | Family history of DM                  | Yes               | 33      | 17   |
|                  |                                       | No                | 161     | 83   |
| 4                | Presence of Complication              | HF                | 13      | 6.7  |
|                  |                                       | Stroke            | 2       | 1    |
| 5                | Diseases of HTN in the family         | Kidney disease    | 7       | 3.6  |
|                  |                                       | Other             | 1       | 0.5  |
|                  |                                       |                   |         |      |
|                  | Family member who have history of HTN | Father            | 14      | 7.7  |
|                  |                                       | Mother            | 21      | 11.2 |
|                  |                                       | Sibling of father | 15      | 8.2  |
|                  |                                       | Sibling of mother | 11      | 6.2  |
|                  |                                       | Child             | 1       | 0.5  |
|                  |                                       | Parent of father  | 5       | 3.1  |
| Parent of mother | 1                                     | 0.5               |         |      |

### Risk factors for hypertension

Multivariate association between socio-demography, genetic & family related factors, life style and comorbidity among patients visited outpatient unit of AGH and AHC, (n=194) (Table 6).

### Discussion

The prevalence (17.5%) of hypertension among Assosa town was higher than the prevalence reported in Cameroon 12.1% but comparable to Tanzania which has prevalence of 23.7% [9]. This may be due to family history of hypertension. Regarding the sex difference, Like Mozambique and unlike Turkey, prevalence of hypertension was higher in the male than in the female which was 52.9% this slight difference may be due to physical activity [10]. Among Outpatients visited Assosa General Hospital and Assosa Health Center, the prevalence of hypertension increased with age. This was the same as Turkey where prevalence of hypertension was found to be strongly linked to age, with 16.9% and 84.4% of the age groups 20 to 29 years and 60 to 69 years respectively being hypertensive [11]. Similar pattern was seen in Egypt in which the youngest age group (25 to 34 years) hypertension was present in 7.8% of the population, whereas the prevalence rate was 59.4% in the 65 to 74 years age group [12]. The increasing prevalence of hypertension with age represents the biological effect of increased arterial resistance due to thickening arterial wall that comes with age. In this study, being private employee was one of the significant factors for hypertension which may be related to high monthly income which will be estimated to cause high consuming of vegetable oil and table salt. Private employees were 0.0017 times likely to be hypertensive than government employee but in this study, high salt intake, consuming vegetable oil and high monthly income were not statistically significant. Hence, there may be some linkage factors behind high work status and prevalence of hypertension. It should need another study. Even though it was not statistically significant, being married is another risk factor for HTN. This suggests that there may be other factors that were not measured

in this study such as psycho-social and stress which may need to be explored by another study.

People who drink alcohol excessively (over two drinks per day) have a one and a half to two times increase in the frequency of high blood pressure (hypertension). The association between alcohol and high blood pressure is particularly noticeable when the alcohol intake exceeds five drinks per day [13]. In this study alcohol consumption was protective against hypertension though not statistically significantly. It is well known that moderate alcohol intake reduce the risk of cardiovascular diseases but excessive alcohol intake carries a risk of developing obesity, and subsequent cardiovascular events. Because of the small number of people who consumed alcohol in this study, it was not possible to stratify the amount of alcohol consumed and explore the effects of the different quantities consumed on blood pressure. The causal relation between habitual dietary salt intake and blood pressure has been established through experimental, epidemiological, migration, and intervention studies [14], high although salt intake a risk factor on bivariate analysis in this study; it was not an independent predictor for hypertension. This may be because hypertensive patients were given advice to reduce salt intake and as a result current salt intake may not be a good indicator. Even if salt content of the food prepared at home can be reduced, it is estimated that about 80% of salt intake is in the form of processed food. Hence, measurement of salt intake may not have been accurate and resulting in misclassification of salt intake. Though physical inactivity was not statistical significance of this study, more than half of physically inactive outpatients visited AGH and AHC was hypertensive. Accordingly, since prevalence of physical inactivity was greater than of male, it may be estimated that future prevalence of hypertension in female will be greater than of male in that population.

In this study, family history of hypertension was strongly associated with hypertension. Those who have history of hypertension in their family were 4.497 more likely to be hypertensive than those who have not family history of HTN. This indicates the importance of familial and genetic factors in susceptibility to hypertension and the need for regular screening in this high risk group [15]. The commonly reported family member were the mother of participants and on stratified analysis, the association of hypertension and family history of hypertension was stronger in males than males suggesting that inheritance of susceptibility to hypertension might be linked to sex. However in hypertension prevention programs, more emphasis should be put on behavioral factors which can be modified and yield greater impact than concentrating on familial and genetic factors.

### Conclusion and Recommendations

The prevalence of hypertension among Assosa town was consistency with nearly one-fourth of that of USA, nearly half of that of urban Varanasi, Hindia and of that of Gondor and also twice of that of Southern Ethiopia [9,16-28]. Prevalence was higher in males than females and increased with age. The risk factors for hypertension were family history of hypertension and work status like being private employee.

The following recommendations were given to the Benishangul-Gumuz region and Assosa town health bureau health bureau to provide the following services in corporation with Assosa General Hospital and Assosa Health Center.

- To conduct further study to identify associated factors that increase susceptibility of high work status employee to be

**Table 6:** Multivariate association between Socio-demography, genetic & family related factors, life style and comorbidity among patients visited outpatient unit of AGH and AHC, (n=194).

| S. No | Variable              | Hypertension           | Non-Hypertensive | 95% CI COR | 95% CI AOR            | P-values             |       |
|-------|-----------------------|------------------------|------------------|------------|-----------------------|----------------------|-------|
| 1     | Work Status           | Gov't employee         | 5                | 30         | 1                     | 0.0017 (0.001-0.407) | 0.415 |
|       |                       | Non-gov't employee     | 2                | 25         | 2.083 (0.377-11.676)  |                      |       |
|       |                       | Self-employee          | 11               | 31         | 0.470 (0.146-1.5141)  |                      |       |
|       |                       | Housewife              | 6                | 28         | 0.778 (0.213-2.836)   |                      |       |
|       |                       | Peasant                | 5                | 22         | 0.733 (0.189-2.846)   |                      |       |
|       |                       | Private employee       | 5                | 24         | 0.800 (0.207-3.088)   |                      |       |
| 2     | Family history of HTN | Yes                    | 20               | 48         | 0.300 (0.204-1.178)   | 4.497(1.133-17.844)  | 0.033 |
|       |                       | No                     | 14               | 112        | 1                     |                      |       |
| 3     | Marital Status        | Single                 | 3                | 39         | 1                     |                      | 0.251 |
|       |                       | Married                | 23               | 91         | 0.304 (0.086-1.073)   |                      |       |
|       |                       | Divorced               | 5                | 20         | 0.308 (0.067-1.420)   |                      |       |
|       |                       | Separated & coexisting | 2                | 9          | 0.346 (0.050-2.386)   |                      |       |
|       |                       | Widow                  | 1                | 1          |                       |                      |       |
| 4     | Educational status    | 1-8 grade              | 9                | 44         | 1                     |                      | 0.996 |
|       |                       | 9-12 grade             | 2                | 37         | 3.784 (0.769-18.618)  |                      |       |
|       |                       | 1 <sup>st</sup> Degree | 9                | 35         | 0.795 (0.285-2.217)   |                      |       |
|       |                       | 2 <sup>nd</sup> degree | 4                | 7          | 0.385 (0.086-1.484)   |                      |       |
|       |                       | >masters degree        | 1                | 3          | 0.614 (0.057-6.591)   |                      |       |
|       |                       | Illiterate             | 9                | 34         | 0.773 (0.277-2.157)   |                      |       |
| 5     | Monthly income        | 100-1000               | 5                | 35         | 1                     |                      | 0.531 |
|       |                       | 1100-2000              | 9                | 38         | 0.603 (0.184-1.974)   |                      |       |
|       |                       | 2100-3000              | 9                | 45         | 0.714 (0.220-2.322)   |                      |       |
|       |                       | 3100-4000              | 3                | 25         | 1.190 (0.260-5.446)   |                      |       |
|       |                       | 4100-5000              | 3                | 11         | 0.524 (0.108-2.552)   |                      |       |
|       |                       | >5000                  | 5                | 6          | 1.171 (0.038-0.778)   |                      |       |
| 6     | Age                   | 19-25                  | 3                | 38         | 1                     |                      | 0.819 |
|       |                       | 26-33                  | 4                | 53         | 1.046 (0.221-4.997)   |                      |       |
|       |                       | 34-41                  | 9                | 22         | 0.193 (0.47-0.787)    |                      |       |
|       |                       | 42-49                  | 5                | 19         | 0.300 (0.065-1.3991)  |                      |       |
|       |                       | ≥ 50                   | 13               | 28         | 0.170 (0.044-0.654)   |                      |       |
| 7     | Using Sat             | Yes                    | 20               | 155        | 21.700 (7.604-66.680) |                      | 0.996 |
|       |                       | No                     | 14               | 5          | 1                     |                      |       |
| 8     | Smoking               | Yes                    | 2                | 3          | 0.306 (0.049-1.904)   |                      | 0.127 |
|       |                       | No                     | 32               | 157        | 1                     |                      |       |
| 9     | Alcohol drinking      | Yes                    | 11               | 36         | 0.607 (0.270-1.363)   |                      | 0.909 |
|       |                       | No                     | 23               | 124        | 1                     |                      |       |
| 10    | Family history of DM  | Yes                    | 9                | 24         | 0.490 (0.204-1.178)   |                      | 0.563 |
|       |                       | No                     | 25               | 136        | 1                     |                      |       |

hypertensive.

- To provide health education on preventative methods of hypertension like decreasing salt in the food, not using smoking and having regular body exercise.
- To set up a surveillance system for risk factors of hypertension which will be used to monitor and evaluate health education and promotion activities.
- To provide the community recent information and update

preventative strategy using various methods.

- Combining with the local NGO, to focus on the problem and initiate employees of every sectors of work to direct their attention on associated risk factors of to prevent HTN and other related cardiovascular diseases and complication disease.

### Limitations of the Study

- Causal associations of variables were not examined as it is cross sectional study.

- Lack of resource as previous conducted study on the same area with the same title is unavailable.
- Number of alcohol drinkers and cigarette smokers were not large enough to compare with dependent variable.
- Magnitude of complication disease of HTN was not large enough to compare with prevalence of HTN.

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