UNIVERSITY OF DAR ES SALAAM

THE PREVALENCE OF HYPERTENSION AND RELATED FACTORS IN ADULTS IN SAYU SAYU VILLAGE OF SHINYANGA REGION, TANZANIA

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BY

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JUNE 1985

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DECLARATION

I declare that this dissertation has never been submitted for a diploma or degree in any other University.

June 1985

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ABSTRACT

The main objective of this study was to determine the point prevalence of hypertension and prevalence of relevant risk factors in adult males and females of Sayu Sayu Village in Shinyanga Region, Tanzania.

A survey of 773 individuals revealed a point prevalence of 6.2%. The hypertensives included all persons with diastolic blood pressures ≥ 95 mm Hg and or systolic blood pressure ≥160 mm Hg. The study showed a significant increase in hypertension with increasing age, but there was no overall sex difference in its prevalence. The most important risk factors found in the study population were age, obesity, glycosuria, tobacco, and alcohol usage.

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CHAPTER 1

1.1 INTRODUCTION TO THE PROBLEM

The term arterial hypertension indicates a chronically elevated systolic and or diastolic arterial blood pressure. The definition of hypertension however remains flexible because any point separating normal from elevated blood pressure is arbitrary; thus based on the arbitrary choice of cutt-off point from a continuous distribution of the pressure readings. The WHO has recommended an arbitrary cutt-off point of 160/95 mm Hg. to be used as a dividing line. Hence hypertension in adults has been defined as systolic blood pressure of 160mm Hg. or more or a diastolic blood pressure of 95 mm Hg or more or both (American Heart Association 1960, WHO 1962). In simple terms systolic pressure is the pressure of the blood in the arteries when the heart is contracting. Systolic blood pressure undergoes fluctuations i.e. excitement or exercises increase it, whilst rest or sleep decrease it. In high blood pressure it can remain constantly elevated and do much harm

to various organs of the body. Diastolic pressure is the pressure of blood in the arteries when the heart is relaxing. Diastolic blood pressure undergoes much less fluctuations in health and remains within a limited range. The severity of hypertension is graded from both systolic and diastolic pressure. It indicates the constant load against which the heart has to work. The blood pressure depends on how hard blood is pumped by the heart into the arteries and on how wide these arteries are. The smaller arteries are sheathed in a spiral muscle which can make them wider or narrower according to the needs of the body. In people with high blood pressure, something goes wrong with the control of this system. The heart beats too hard and the arteries are too tight.

High blood pressure in itself is not classically a disease, but rather cause of several serious diseases; mainly coronary heart diseases, stroke, kidney damage, retinal damage, and occlusion of arteries of lower extremeties. Unless it has already caused these diseases, high blood pressure rarely causes symptoms. Hypertension can be

classified according to the causes.
Hypertension can be divided into Primary or Essential hypertension and Secondary hypertension. Primary or essential hypertension is a purely arbitrary segregation of those having high blood pressure and having no disease to which these high blood pressure can be attributed. In simple terms the exact cause is not known. This is the most common type of hypertension. About 90% of all hypertensives belong to this category. The major factors and predispositions are age, sex, hereditary, body built, Diabetes mellitus, emotion and stress, diet, smoking, and alcohol drinking. The onset of essential hypertension is usually between ages twenty five and fifty five. It is uncommon below twenty. Below forty years, males are more prone than females; thereafter the position is reversed. People with family history of stroke, heart attack, heart failure, sudden death are at a greater risk of getting hypertension. Fat and obese people are at a much greater risk of getting hypertension. Blood pressure fluctuates widely in response to emotional stress, especially anger, resentment and frustration. Large amount of salt in food can

cause hypertension. High fatty diet predisposes to hypertension and other heart diseases especially coronary heart diseases. Diabetes Mellitus disease predisposes one to get hypertension. Smoking and alcohol also predisposes to hypertension and heart diseases

Secondary hypertension is rather uncommon. It is mostly seen in young people. The elevated blood pressure here is due to a definite underlying disease. The common diseases which cause this type of hypertension are kidney diseases, endocrine disorders, diseases of pregnancy fre-eclampsia and eclampsia, and some congenital malformations of major arteries or heart. The elevated blood pressure of people belonging to this group can be brought under control if the underlying disease is sufficiently treated. Secondary hypertension can be caused by drugs like steroids, oral contraceptives, and some antidepressant drugs. Hypertension usually comes to control on stopping those drugs.

Primary hypertension is usually symptomless until complications develop. In fact the

majority of the people come to know that they have high blood pressure only when they go for routine medical check up or for some other disease to their health care taker. It is quite common to see a person with moderate hypertension walking around without any complaints whatsoever. Headache due to hypertension occurs when the blood pressure is really high. Most other symptoms like dizziness, flushed facies, fatigue, bleeding from the nose appear when hypertension is complicated and organs like the heart, lungs, kidney, brain and eyes have been involved. Complications of hypertension arise mostly from the damage done to the arteries and the organs to which they supply due to the constant high pressure with which the blood flows through them. Brain stroke causes hemiplegia and sometimes with loss of speech. Brain haemorrhage due to rupture of brain arteries causes severe headache, confusion, blurred vision convulsions and coma. Ischaemic heart attacks could lead to sudden death. Heart failure, heart arythmia could be also fatal. Kidney damage leads to renal failure. Retinal damages lead to blurred vision and partial or

complete blindness. Nasal damage causes epistaxis. Complications in the lungs cause difficult in breathing and haemoptysis Occlusion of the arteries of the lower extrementies could lead to gangrene and amputation.

Arterial hypertension is a frequent health disorder prevalent in both developed and developing countries. Prevalence in the latter for example African populations is similar to that in European or other technically developed societies. With prevalence ranging from 10% up to 20% and with the resulting cerebrovascular, cardiac and renal risks, arterial hypertension is clearly a major public health problem (WHO 1983).

Preventive measures for hypertension are weight reduction, salt restriction, stop drinking alcohol and smoking cigarettes, and doing exercises. If ones blood pressure cannot be controlled by the above then treatment with drugs must be started by a doctor. Like any other drugs, antihypertensive drugs have their side effects and these can be detected early if one visits a doctor regularly. No drugs can cure hypertension permanently so treatment

must be continued for many years and usually for life. Once started it must be continuously maintained. The benefits of early treatment of asymptomatic hypertension are the prevention of deaths and disability due to strokes. Disadvantages include tiredness, depression, doctor-dependence and male importence. There is a very high dropout rates from most treatment programmes. This means that our interest has to be focused on primary prevention of high blood pressure. Primary prevention can be defined as all measures designed to reduce the incidence of disease in a population by reducing the risk of onset. The at risk approach may be appropriate when there is still uncertainity as to whether the relationship between the risk factor and a disease is casual, and when the risk factor occurs with very low prevalence in the population. By contrast the mass approach is directed at the whole population irrespective of individual risk levels. I wish to study the prevalence of hypertension and factors predisposing to the development of hypertension in a Tanzanian rural community. A point prevalence study would show the magnitude of

the problem, and risk factors prevalence will provide a scientific base for effective and efficient primary preventive action. No such community survey has been done in Shinyanga region of Tanzania before.

In most African populations, most hospital studies have suggested that hypertension is common (Vaughan, 1977). Most community blood pressure surveys have found that mean blood pressure levels at different ages are similar to these for Europeans (Abrahams et al, 1960).

Hypertension, congestive heart failure and valvular heart disease are frequently seen among hospital inpatients in Tanzania. An analysis of discharge diagnosis from Tanzania hospitals for 1966 - 1968 showed that hypertension accounted for 0.4% of all admissions. (Vaughan, 1977).

There are few community studies done in Tanzania. Community studies are necessary for estimation of the magnitude of the problem as well as for future evaluation of control measures.

1.3 REVIEW OF LITERATURE

Review of literature shows that before 1944 hypertension was unknown in East Africa (Donnison, 1929, Williams, 1944).

Donnison, (1929) reported that the blood pressure of Kenyans remained normal and did not seem to rise with age. His study suggested that the blood pressures actually fell in all age groups after the age of forty years.

Vint, (1936 - 1937) studied one thousand autopsies of Kenyans in 1936 and reported that hypertension did not contribute as a cause of death in fifty six deaths due to cardiovascular disease.

Jex-Blake, (1934) had reviewed two hundred cases of essential hypertension in Nairobi and found that all his cases were Europeans and Asians.

In 1941 Williams, (1941 - 1942) conducted a blood pressure survey in Uganda. He studied 456 men and women aged 21 to 50 years and found that their blood pressure levels remained normal throughout adult life. However their blood pressure did not fall as Donnison had

suggested in 1929. He found that in thirteen men in his study population, blood pressure rose slightly with age. They had diastolic pressure just above 90 mm Hg. These were the first East African borderline hypertensives.

Williams, (1944) was the first to record undoubted cases of essential hypertension in East Africans. The diastolic pressures in 23 subjects he had examined during the previous four years rose above 95 mm Hg. However, there was still no report of malignant hypertension in East Africans.

Ten years later Williams, (1954) noted that of 167 patients admitted to Mulago hospital, Kampala, with cardiac diseases, 32 had moderate hypertension.

In 1958 a study of renal disease and hypertension in Uganda, reported on 66 patients aged between 5 and 75, the majority being males. It was noted that in the second and third decades, glomerulonephritis and phyelonephritis were important causes of hypertension (Akinkugbe, 1972).

In 1958 and 1961 Williams carried out blood pressure surveys in Kikuyu men and women aged 20 - 80 years in the rural communities of Kiambu and Fort Hall districts of Kenya. His findings showed that systolic pressure rose in older age groups in both men and women, but it did so more in men than women. He further noted that diastolic pressures did not rise with age in either group.

In early 1960's, essential hypertension was a prominent cause of morbidity. In East Africa many reports have since indicated that hypertension is common in East African communities (Williams, 1969).

Postmorten figures from Uganda indicated that the effects of arterial hypertension were common. Davies, (1968) found hypertension to be the commonest cause of congestive heart failure in the African native, accounting for rather more than a third of all cardiac deaths.

Some recent studies however, seem to indicate the existence of the so called low-blood-pressure communities in East Africa where the arterial blood pressure does not appear to rise with age. The example was a study done by

Shaper et al (1969) in which they studied three pastrol normadic tribes of Northern Kenya and found that no increase in blood pressure occured with advancing years.

According to Ikeme's view (1974), principally two types of population exist regarding the behaviour of the blood pressure in African communities; those in whom the mean blood pressure rises with age and those in whom the mean blood pressure is low and there is no significant increase with age.

There is evidence that in a population in which blood pressure does not rise significantly with age, the incidence of hypertension is lower than in those in whom the blood pressure increases with age, (Williams, 1969, Barnicot et al 1972).

"Most of the published studies however, have shown that arterial blood pressure to be higher, and to increase more rapidly with age, in populations that have been more exposed to the way of life as found in industrialized countries, but the nature of these environmental influences is poorly understood and the relative contributions of such physical factors

as diet salt intake, body build, and exercise on the one hand, and psychological and economical factors on the other, remain to be measured". (Vaughan, and Miall, WHO Bulletin 1979).

Knowledge of Causation

No essential etiological agent is known for essential hypertension. There are however, factors shown to be classically associated with the development of hypertension, particularly interraction of several factors which are both endogenous and environmental.

Inheritance

Although the precise mode of inheritance in arterial hypertension has not yet been demonstrated in man, it appears most likely to be a polygonic (W.H.O. 1983).

Population studies have shown that blood pressure values are distributed in a unimodal continuous manner. This suggests that blood pressure is multifactorially determined (WHO Tech. Rep. 1983).

Several animals models of hypertension, established by selective breeding during the past three decades, have contributed to studies on genetics, gene-environment interraction or risk factors, pathogenic mechanisms and detection of genetic disposition (W.H.O. 1978).

Diet

It was postulated since 1904 by Ambard and Beaujard that hypertension could be caused by an excess of Sodium Chloride in the diet. Further evidence of an association have come from studies in Japanese, American, and Eskimo populations (Dahl, 1962).

Another evidence is that several communities whose intake of Sodium Chloride is low, have been found to have low average blood pressures and show little tendancy for pressures to rise with age. When people migrate from such communities to areas where the daily salt intake is higher, at least one study has shown blood pressure to increase (W.H.O. 1978).

In the past, a typical East African rural diet consisted of home grown lightly processed vegetables. Due to general lack of salt some tribes like the Kikuyu made a salt substitute

by burning swamp plants. Williams, (1969) suggested that as salt became available in shops the incidence of hypertension shot up (Williams, 1969).

A similar view may be given by Kung Bushmen of Botswana where salted food is still uncommon and blood pressure seem to remain low throughout life (Sunday News 28/10/84).

The Samburu of Kenya exhibit a certain degree of cardiovascular fitness on their traditional diet of milk, blood and meat. When some of the Samburu men joined the army and changed their way of life, they began eating salted, processed food. Studies in the 1970's showed that their weight rose in the first year, their blood pressure rose in the second year and increased progressively for each year they spent in the army (Shaper et al 1960).

An excess energy diet intake which leads to high Cholesterolaemia has been shown to be a major predisposing factor for development of hypertension. The Masai herdsmen of East Africa with a meat, milk, blood, protein diet and whose Cholesterolaemia is low,

appears virtually immune to high blood pressurea as long as they stay in the countryside (Foli, Whittle, 1976).

Age and Sex

Blood pressure changes with age are based mainly on cross-sectional studies. Virtually all surveys including those done in Africa, Latin America, India have shown a rise in blood pressure with age in both men and women; this phenomenon being more marked in women after the age of fifty. The increase in systolic pressure appears to continue throughout life, whereas there is a tendency for diastolic pressure to level off at around age of 50 to 60 (W.H.O. 1983).

In a few communities there is little evidence of increasing blood pressure with age, for example Melanesians of Australia (W.H.O. 1983), and pastrol hormadic tribes of Northern Kenya (Shaper, 1967).

Body Weight

In many cross-sectional observational studies, it appears that blood pressure and relative weight levels are highly correlated, not only in adults but also in youngs (W.H.O. 1978).

In prospective observational studies, it is found that persons who gain weight show a greater rise in blood pressure over time than those who maintain their weight, while pressure falls with weight loss (The Framingham Study 1967).

Starvation and malnutrition cause dramatic fall in arterial pressure, best documented for the period of famine in Netherlands in 1944 (Lupus and Francke, 1947).

Physical Activity

The relationship between physical activity and blood pressure has been little studied in large well controlled population samples. In Framingham study no significant relationship was detected (W.H.O. 1983).

In studies in Gothenburg relationships were not found between either leisure time or occupational activity and blood pressure and also there was no association between activity level and change of pressure with time (Wilhelmsen, et al 1976).

Alcohol

Many cross-sectional studies in different populations have shown a positive relationship between blood pressure and reported alcohol consumption. Association between hypertension and high intake of alcohol has been indicated in Scotland (Ramsay L.E. 1977, Beevers, 1977) and in the U.S.A. (Klatsky, et al 1977).

Studies of the dose-response relationship have given conflicting results; it appears that alcohol consumption raises systolic pressure more than diastolic. Saounders et al (1981) studied 132 alcoholic patients whose daily consumption exceeded 80 gm. They found a significant correlation between blood pressure and mean daily alcohol intake, and also between the level of blood pressure and the severity of

alcohol withdrawl symptoms. On most subjects blood pressure fell to normal after abstinence, and remained so for at least a year in those who continued to abstain, but rose in those who started to drink again.

Tobacco

Studies have shown a small relationship between the amount smoked and arterial pressure, but only in those smoking twenty five or more cigarettes a day. At first this was attributed to an indirect effect of weight, but differences in physique are poorly correlated with amounts smoked and do not fully explain this difference in arterial pressure (Berglund and Wilhelmsen, 1975).

Diabetes Mellitus

There is a special link between diabetes mellitus and hypertension. The strongest evidence is that of Pell and D'Alonzo in 1967. On the basis of routine examination of 662 diabetic employees of the Du Pont Co. in U.S.A., whom they compared with an equal number of age, sex, employment status matched non-diabetic employees, they concluded that the prevalence

of hypertension at cutt-off point of 160/95 mm Hg was 54% higher in the diabetics. The increased prevalence of hypertension among the diabetics occured indipendently of overweight.

In a Framingham study the mean systolic blood pressure of the diabetics was significantly higher than in matched diabetics.

Twenty percent of the diabetics of Muhimbili Medical Centre Diabetic Clinic in Dar es Salaam have hypertension (Swai, 1984).

Prevalence Studies

Prevalence studies on hypertension in African countries are summerized on Table 1 on the next page. There is considerable variation from study to study ranging from 1.2% to 20.3%. This is possibly due to both differences in methodology e.g. cutt-off points as well as environmental differences.
The average prevalence is 8.4%.

TABLE 1: Summary of papers reporting similar studies of hypertension in some black populations of Africa and developing countries.

Country of Survey	Authors	Year of Publication	Study Pop.	Hypertensives	Prevalence
St. Kitts West Indies	Schereckloth R.E. Stuart K.L. Corcoran A.C. Moore P.E.	1962	1575	245	15.5%
Ethiopia	Parry E.H.O.	1967	2678	190	9.7%
Ibapana District, Nigeria	Akinkugbe O.O.	1967	3602	367	20.3%
Buganda, Uganda	Shaper A.G. Saxaton G.A.	1967	900	28	3.1%
Nyeri District, Kenya	Gachihi G.S. Lyonga W.J.	1982	2100	227	10.8%
Bukumbi, Tanzania	Forsyth D.M.	1966	1816	21	1.2%
Handeni, Tanzania	Vaughan P.	1977	608	12	2%
Total			14283	1117	7.8%

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From: 1. High blood pressure in the African by Akinkugbe O.O, Churchil (1972).

2. Bulletin of the WHO 57(1)89 (1979)

3. A symposium on blood pressure and Hypertension in Africa Edited by Shaper, A.G. East African Medical Journal Vol.46 No.5 (1969).

1.2 PURPOSE OF THE STUDY

Broad Objectives

This study was undertaken with a broad objective to determine the prevalence of hypertension and related risk factors in adults in Sayu Sayu Village of Shinyanga Tanzania.

Specific Objectives

The specific objectives of this cross-sectional survey were:-

(i) To determine the blood pressures of all adults of Sayu Sayu Village

(ii) To determine weights, heights, urine sugar levels, family history and symptoms of hypertension, drinking of alcohol and tobacco use habits of all adults of Sayu Sayu Village.

(iii) To determine the distribution of blood pressures in the study population by age and sex.

(iv) Obtaining an estimate of the point prevalence of hypertension is the study population.

(v) Determining the blood pressure distribution by weight and height.

(vi) Determining the blood pressure distribution by habits of drinking alcohol and use of tobacco.

(vii) Determining the blood pressure distribution by glycosuria.

CHAPTER 2

METHODOLOGY

DESCRIPTION OF THE SAYU SAYU VILLAGE AND ITS PEOPLE

The research was carried out in Sayu Sayu Village in Maswa District of Shinyanga Region in Northern Tanzania. The village is located twenty kilometres west of the district headquaters of Maswa (Appendix II and III). The population and its distribution by age and sex is given under study population in page 30.

Physical Features

The village lies within a typical East African savanna woodland without mountains. It has an elevation of 5000 - 7000 feet above sea level. The soil is sandy mixed slightly with clay. The vegetation is typical of savanna woodland.

Climate

There are two seasons; a rainy season lasting from November to April and dry season lasting from May to October. From 20 to 50 inches of rain fall each year. Except for months of June and July the temperatures vary from 21°C to 27°C. In June and July the temperature is around 15°C.

Water

During wet season people use rain water which collects in dug wells and ditches or few springs. This water is not salty although it is likely to be contaminated. The availability of water remains the major daily concern of most of inhabitants during the dry season. Salty water is obtained from dug holes in the sandy beds of dry streams.

Communication

The village is crossed by a small gravel road in poor condition. The road is extending from the District headquaters Maswa in the East to Malampaka which is a railway station on Mwanza - Tabora line in the West. Communication is by truck or bus to the district headquaters, and by bicycle or ox cart within the village.

The people and their activities

The population of Sayu Sayu is composed of Sukuma tribe of Bantu ethnic group.

Both men and women are engaged in different aspects of cultivation and cattle rearing. Cultivation is done by ploughing. The main food crops are millet, rice, sweet potatoes, and groundnuts. The only cash crops is cotton. The economy is vulnerable to the effects of draught and rainy seasons. After severe famine of last year 1984, harvests have improved this year. Since the foundation of the Ujamaa Village, in 1974 the villagers operate one block farm in which work and profit are pooled. The village development committee supervises the work and sharing and spending of the profits. Apart from the block-farm each household has its own small farm.

The villggers eat a stiff porridge made from millet with green vegetables or meat, and drink milk. But meat is eaten most often when cattle die or when slaughtered on special occasions. Rice is eaten also

occasionally. Salt is used always.

Christianity has become the most widespread religion in the village accounting more than 90% of the village population. This is due to the Roman Catholic Missionary work which has been carried out for a very long time since 1910.

The formal rule for the conclusion of marriage is that common to many African Societies; the elders of the bridegroom must pay brideprice to the parents of the bride after a formal negotiation in advance.

Burial ceremonies have large attendences. When a villager dies, three days are dedicated for mourning his burial.

Recreational activities include playing "BAO" a game similar to chess in Europe and traditional dancing and singing. Drinking is also common. The common type of brew is a local one made from millet. Village government has restricted drinking to Sundays only. There is only one "pombe" (alcohol) shop in the village where one can drink and nowhere else.

Most of the people go to pray on Sunday in the Catholic Church in the village. Most of the children attend the only primary school in the villgge. There are few businessmen involved in buying and selling cattle.

Time and Duration of the Study

The survey was carried out in Sayu Sayu Village in Shinyanga Region in Tanzania in the period between 21st May 1985 and 12th June 1985.

3.1 PILOT STUDY

Six months before the commencement ofthe study the author conducted a pilot study in Sola Village in Shinyanga Region. Pilot study was done in December 1984 and the main aims were to test the questionnaires and feasibility study. The author got a letter from the Party District headquater. The letter was addressed to the Sayu Sayu Village government and its aim was to inform the villagers of the survey to be done in May 1985. Their cooperation was requested (Appendix 1).

3.2 MATERIALS AND TECHNIQUES USED

The study examination consisted of:-

(a) An interview about personal particulars, medical and family history, personal

habits of drinking alcohol and using tobacco.

(b) A Physical examination, urine examination for sugar, measuring and recording blood pressures, and measuring and recording weights and heights.

(c) Observations during field-work concerning the life and environment of the Village and the people.

(d) Discussions with elders about the local events.

The instruments used during the field study were :-

(a) The questionnaires for interview

(b) A mercury Sphygmomanometer for measuring blood pressures.

(c) A bathroom balance for weighing

(d) A meter tape for measuring heights

(e) Clinistix for urine sugar tests

3.3 STUDY POPULATION

The study population comprised of all adults of Sayu Sayu Village in Shinyanga Region Tanzania. The village was arbitrary selected for the convenience of the author. Adults considered were those aged fifteen years and above. No sampling was done because the whole village was investigated. The age distribution of the population according to the 1978 Census showed predominance of children typical of developing countries with over 45% under the age of fifteen years. Total population of the village was 2144 people. The population of persons of age fifteen years and above was 1048, of which 437 were males and 611 were females. There were 32 ten cell leaders and 320 households were visited. The survey was done from house to house under the company of one ten cell leader.

3.4 MEASUREMENT AND RECORDING

Blood Pressure

The blood pressure were taken in home sorroundings in a siting position after at least five minutes rest or interval. Measurements were made during day time from 0900 to 1900 hours. A portable mercury Sphygmomanometer with cuff size 14 x 50 cm was used. The same observer (the author) carried out all the measuring and recording of the blood pressure readings.

The systolic pressure was read at the first appearance of sound on slow deflation. The diastolic was read at the point where the sounds disappeared (diastolic phase V). Two readings at an interval of five minutes were taken from each individual. Two readings were recorded to the mearest 5 mm Hg. The criterion for hypertension was taken to be any diastolic blood pressure of 95 mm Hg and above and or systolic pressure 160 mm Hg and above. Those individuals who were found to be hypertensives were referred to Maswa Hospital

for further investigations and management. A special form was used for the referral (Appendix VIII). Other minor complaints and illnesses encountered in the field were managed on the spot. A rural medical aider assisted the author for medications.

Weight and Height

A portable bathroom balance was used for weighing. The weight was based on weighing in clothes but without shoes. Clothing varied from a cotton loin cloth to conventional western light clothing. Weights were recorded to the nearest one pound.

A meter tape was used to measure the heights. The height was measured without shoes. Heights were recorded to the nearest one inch.

Urine Sugar

Urine specimen were examined for sugar (glucose) by using clinistix. Subjects with urine positive for sugar were referred to Maswa Hospital for further investigations management.

Physical Examination

Physical examinations were done and findings were recorded by the author. Signs and symptoms of hypertension were looked for.

Age Verification

In most situation a birth certificate was not presented, hence the accurate age was not known. Some young people had baptism certificates. For these who had no baptism certificates, an estimae of the age was made by correlating with important dates of historical events both local and national. Calenders of some important historical events both local and national were used (Appendix VI and VII).

3.5 INTERVIEWS

The questionnaire gathered information on the family history of hypertension, stroke, personal particulars and habits of alcohol drinking and use of tobacco.

3.6 LOCAL DISCUSSIONS AND OBSERVATIONS

I held informal discussions with several elders, leaders, the priest, sisters, teachers, youths, other village members, and traditional healers. The aims were to get knowledge about the life and environment of the village and its people, the history of the village, and the awareness of people about hypertension. It is through these discussion that I discovered the local name for hypertension as being "CHEMBA MOYO". It is also through these discussion that I discovered and talked to a traditional healer known as "MAMA NJIMIKA" who treats successfully hypertension by using herbs.

Validity of data and constrains

In this household survey, it was not easy to make contact in families where some members went out to work and to do business. There was no sufficient time to go again in the evening because the survey was continuous day by day. Although medical examinations and urine samples collection made the process too long, no frank refusal was encountered. There was more cooperation in the interview and most of the interviewed could speak Swahili the national language.

Answers to questions on alcohol consumption are not always reliable. It is known that a few alcoholics tend not to paricipate in such surveys, and are therefore not included.

Ujamaa villagisation (since 1974) created a compact community so affording the opportunity to examine such a large number of people within a short period.

Blood pressure readings to the nearest 5 mm Hg carried a disadvantage that more measurements tended to be recorded at "tens" than at "fives".

Clothing varried from a cotton loin cloth to convertional western light clothing "mitumba" and no correction factor was applied to the recorded weight. Weight and height measurements were converted into metric system inorder to calculate body mass index.

CHAPTER 3

RESULTS

Response Rate

The population of persons of age fifteen years and above was 1048 of which 437 were males and 611 were females.

Total of 773 individuals who were examined, 340 were males and 433 were females. Overall response rate was 73.8%. Males response rate was 77.8%, and females response rate was 70.9%. These appeared to be no significant differences with regard to age and sex ($p = 0.63$).

Table 2 shows the age and sex composition of the study population.

Table 2: Age and Sex distribution of the study population

Age groups	Males	Females
15 -	126 (37.1%)	167 (38.6%)
25 -	92 (27.1%)	124 (28.6%)
35 -	41 (12.1%)	42 (9.7%)
45 -	37 (10.9%)	42 (9.7%)
55 -	17 (5.0%)	16 (3.7%)
65 +	27 (7.9%)	42 (9.7%)
Total	340 (100%)	433 (100%)

Figures in brackets show the response rate in percentage of each age group and sex.

Distribution of Blood pressure in the study population

Frequency distribution

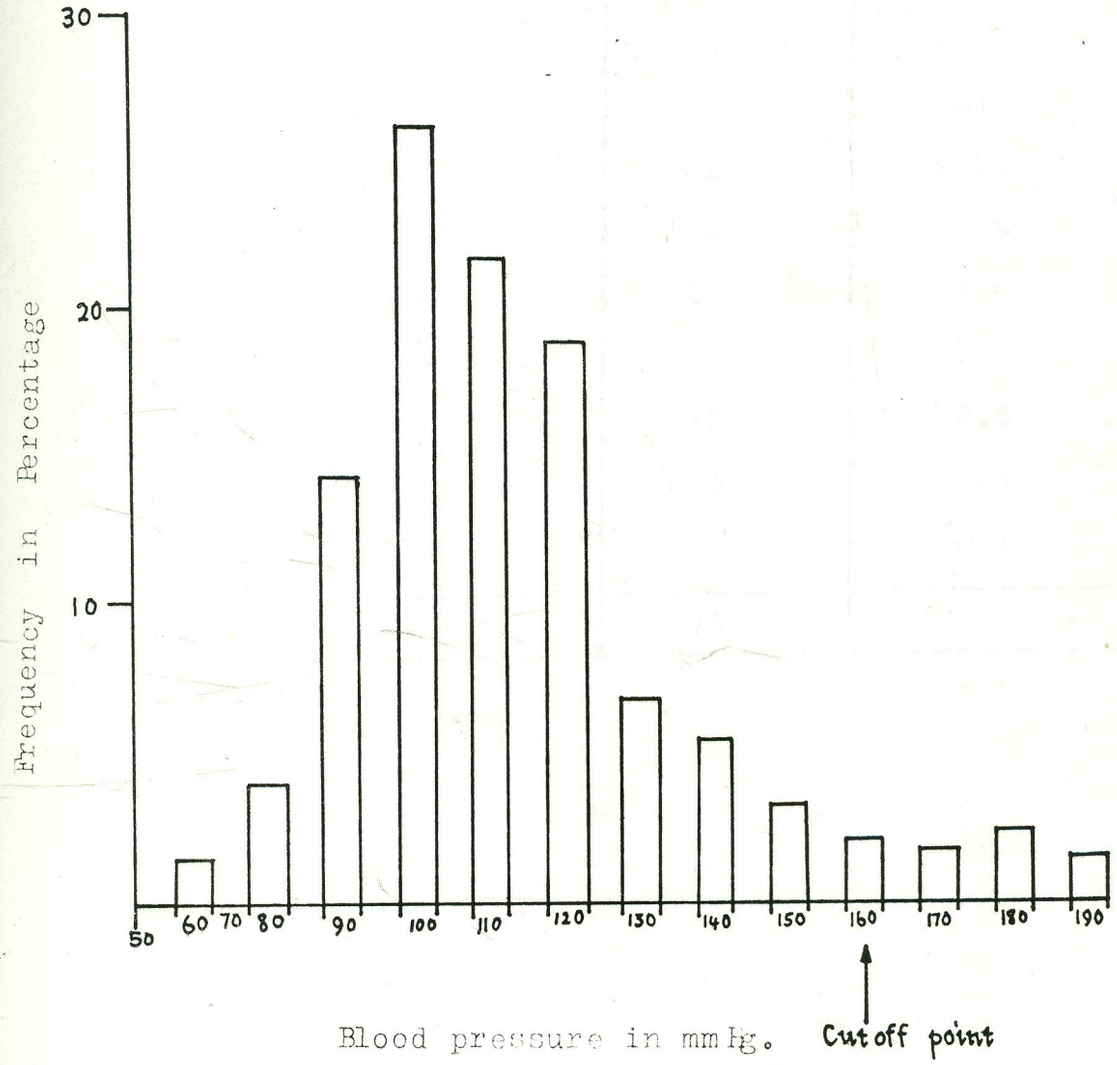
The frequency distribution of the blood pressures of the study population are given in Tables 3 to 8 and figures 1 and 2.

Table 3: Frequency distribution of the systolic blood pressure for overall study population.

Groups /mm Hg.	Frequency	Percentage
60-	2	0.3
70-	0	0
80-	25	3.2
90-	115	14.9
100-	197	25.5
110-	161	20.8
120-	142	18.4
130-	43	5.6
140-	40	5.2
150-	22	2.8
160-	14	1.8
170-	3	0.4
180-	7	0.9
190-	2	0.3
Total	773	100

Figure 1:

The frequency distribution of the systolic blood pressure for overall study population by 10 mm Hg groupings.



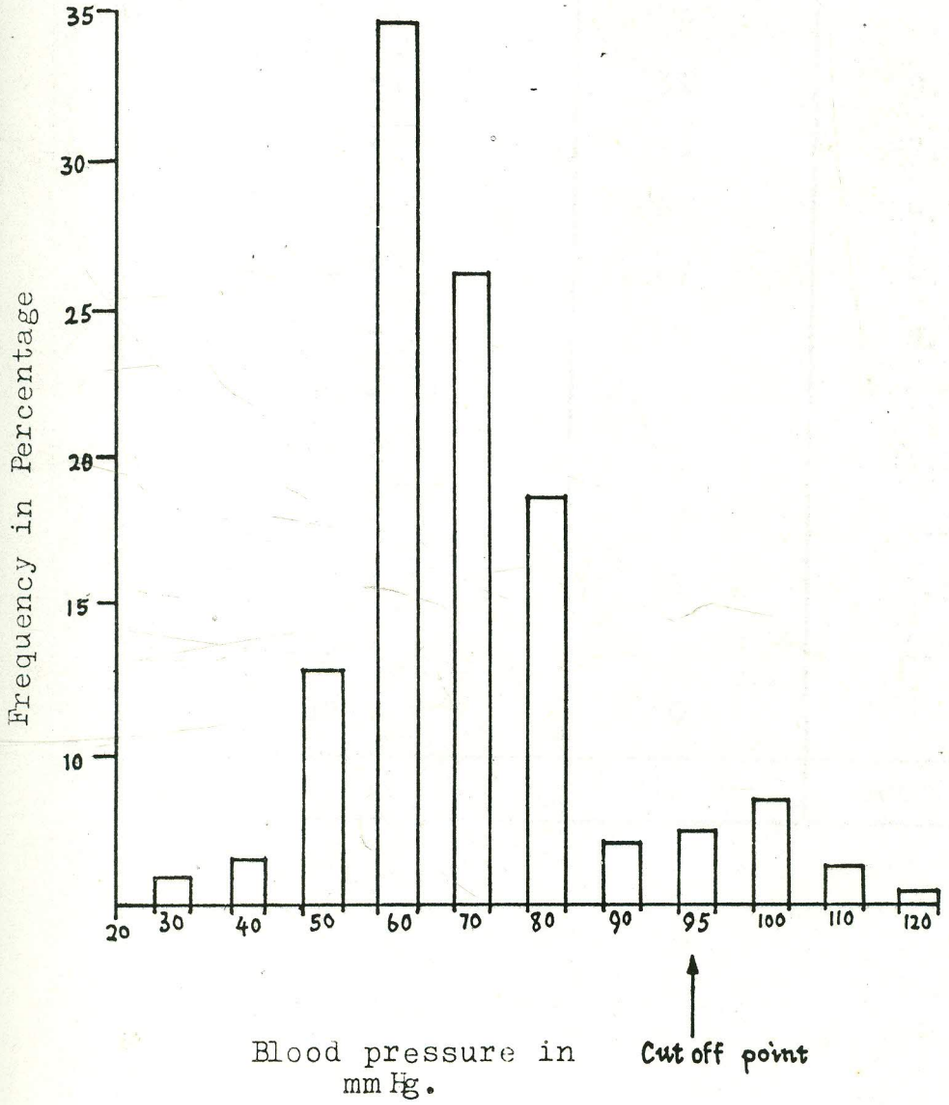
n = 773
Mean = 111.82
SD = 18.96 SE = 0.68
160 mm Hg or more = 3.4%

Table 4: Frequency distribution of the diastolic blood pressure for overall study population.

Groups/mm Hg.	Frequency	Percentage
30 -	2	0.3
40 -	4	0.5
50 -	98	12.7
60 -	264	34.2
70 -	201	26.0
80 -	150	19.4
90 -	11	1.4
95 -	17	2.2
100 -	23	2.8
110 -	3	0.4
120 -	1	0.1
Total	773	100

Figure 2:

The frequency distribution of the diastolic blood pressure for overall study population by 10 mm Hg. groupings.



n = 773

Mean = 68.36

SD = 12.48 SE = 0.45

95 mm Hg or more = 5.5%

Table 5: Frequency distribution of the systolic blood pressure for males

Groups/mm Hg.	Frequency	Percentage
60 -	2	0.6
70 -	2	0.6
80 -	9	2.6
90 -	31	9.1
100 -	93	27.4
110 -	67	19.7
120 -	67	19.7
130 -	28	8.2
140 -	20	5.9
150 -	11	3.2
160 -	7	2.1
170 -	1	0.3
180 -	4	1.2
190-	0	0
Total	340	100

Table 6: Frequency distribution of the systolic blood pressure for females

Groups/mm Hg.	Frequency	Percentage
60 -	0	0
70 -	0	0
80 -	16	3.7
90 -	84	19.4
100 -	54	12.5
110 -	44	10.2
120 -	75	17.3
130 -	15	3.5
140 -	20	4.6
150 -	3	0.7
160 -	7	1.6
170 -	2	0.5
180 -	3	0.7
190 -	2	0.5
Total	433	100

Table 7: Frequency distribution of the diastolic blood pressure for males

Groups/mm Hg.	Frequency	Percentage
30 -	2	0.6
40 -	0	0
50 -	36	10.6
60 -	121	35.6
70 -	97	28.5
80 -	53	15.6
90 -	15	4.4
100 -	13	3.8
110 -	3	0.9
120 -	0	0
Total	340	100

Table 8: Frequency distribution of the diastolic blood pressure for females

Groups/mm Hg	Frequency	Percentage
30 -	0	0
40 -	4	0.9
50 -	62	14.3
60 -	143	33.0
70 -	104	24.0
80 -	97	24.4
90 -	13	3.0
100 -	9	2.1
110 -	0	0
120 -	1	0.2
Total	433	100

Mean distribution

Mean distribution of systolic and diastolic blood pressures in the population by age and sex are shown in Table 9 and 10.

These results are expressed graphically in figures 3 to 6, where the average systolic and diastolic pressures of each 10 year age group have been plotted.

Table 9: Mean blood pressure levels of males at various age groups.

Age Group	No. Exam.	Systolic		Diastolic	
		Mean	S.D.	Mean	S.D.
15 -	126	108.9	19.4	49.6	11.6
25 -	92	106.6	16.6	73.2	10.4
35 -	41	118.7	17.9	71.5	10.2
45 -	37	116.1	17.8	74.7	12.3
55 -	17	133.9	16.3	84.0	10.7
65+	27	118.4	23.5	75.0	15.2
Total	340	113.8	18.9	68.9	12.9

Table 10: Mean blood pressure levels of females at various age groups.

15 -	167	106.3	14.1	66.9	11.9
25 -	124	93.3	16.9	67.7	11.3
35 -	42	95.2	24.3	68.9	11.4
45 -	42	99.7	27.8	64.7	13.5
55 -	16	120.9	26.5	71.3	12.8
65+	42	122.4	15.3	68.6	12.6
Total	433	110.3	18.9	67.9	12.1

Figure 3:

A graph showing Mean systolic blood pressure by age and sex.

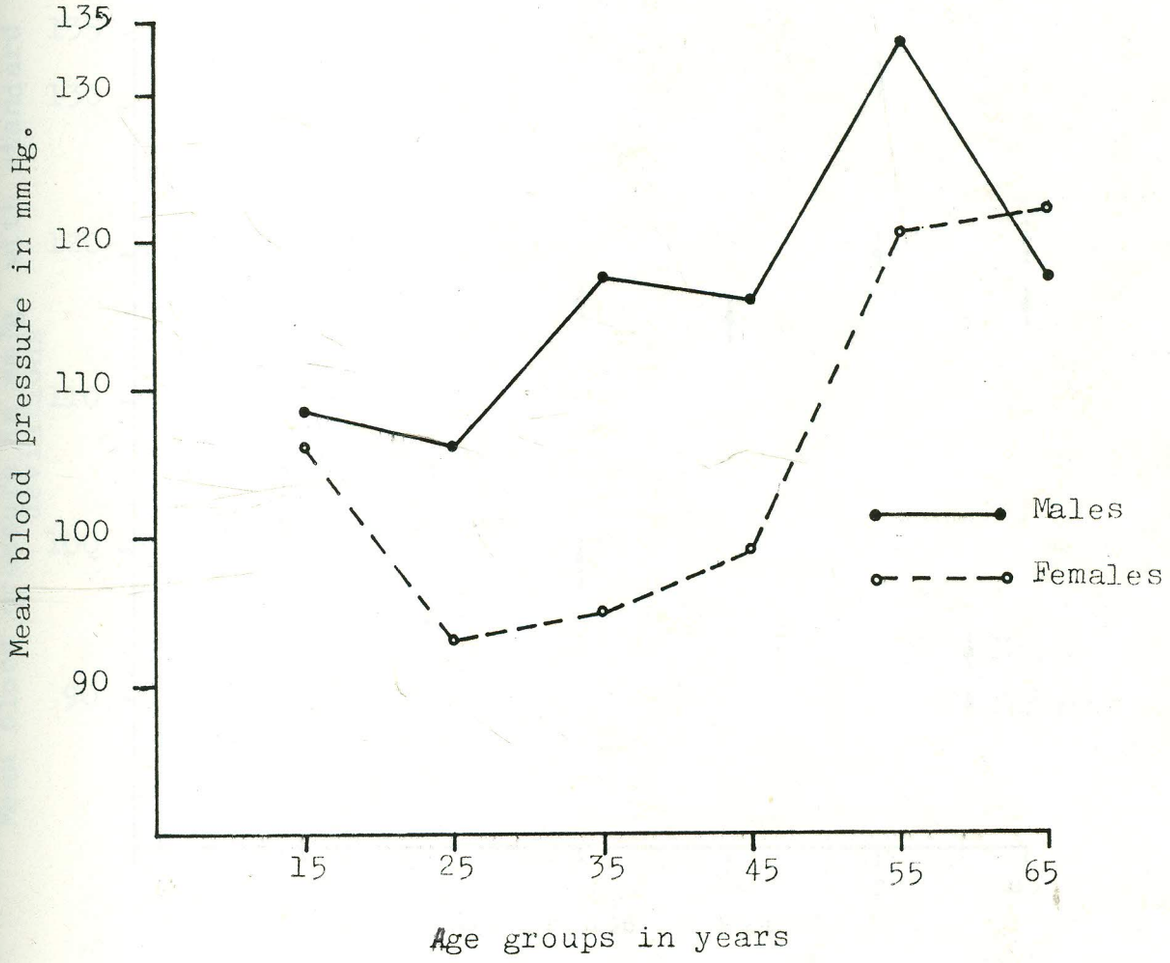


Figure 4:

A graph showing Mean systolic blood pressure by age and sex with standard deviations

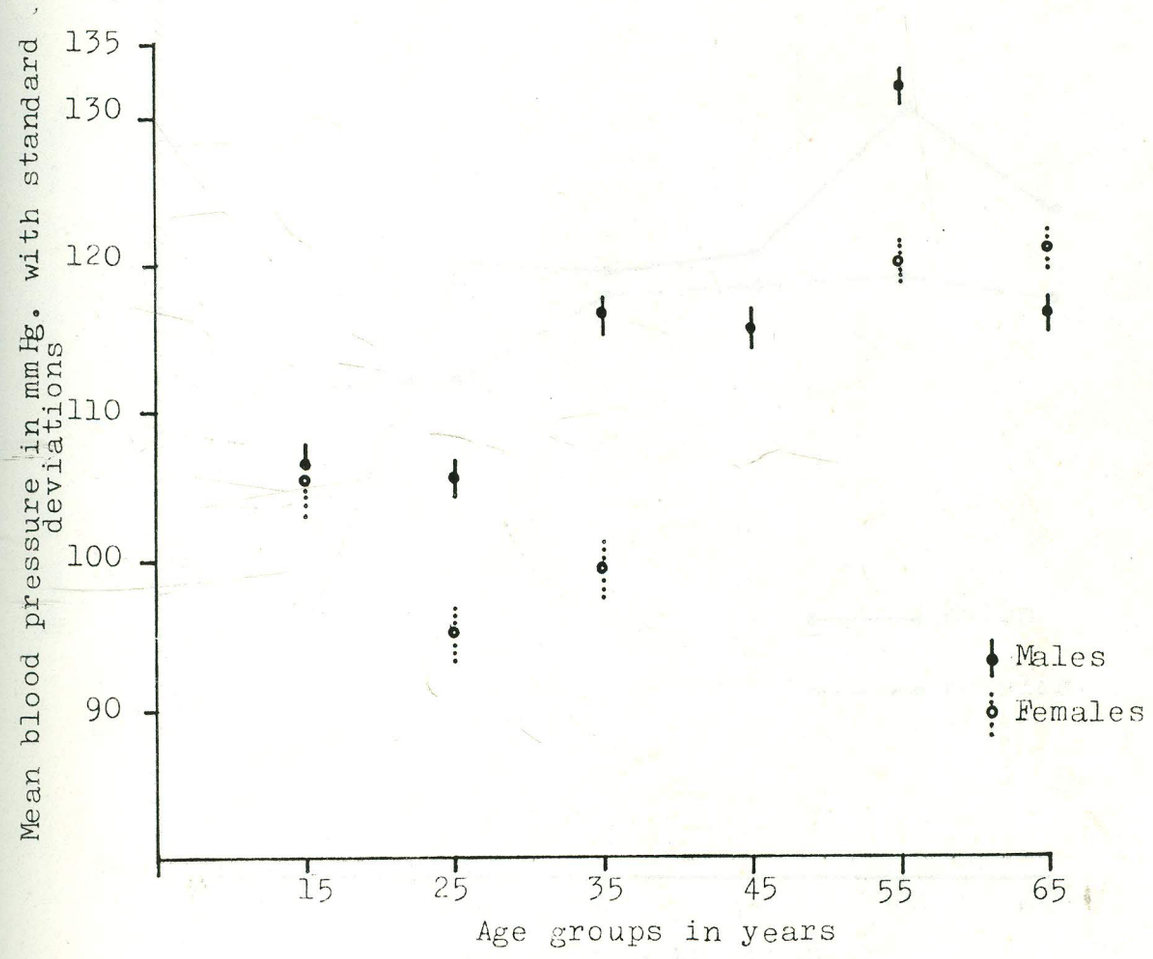


Figure 5:

A graph showing Mean diastolic blood pressures by age and sex.

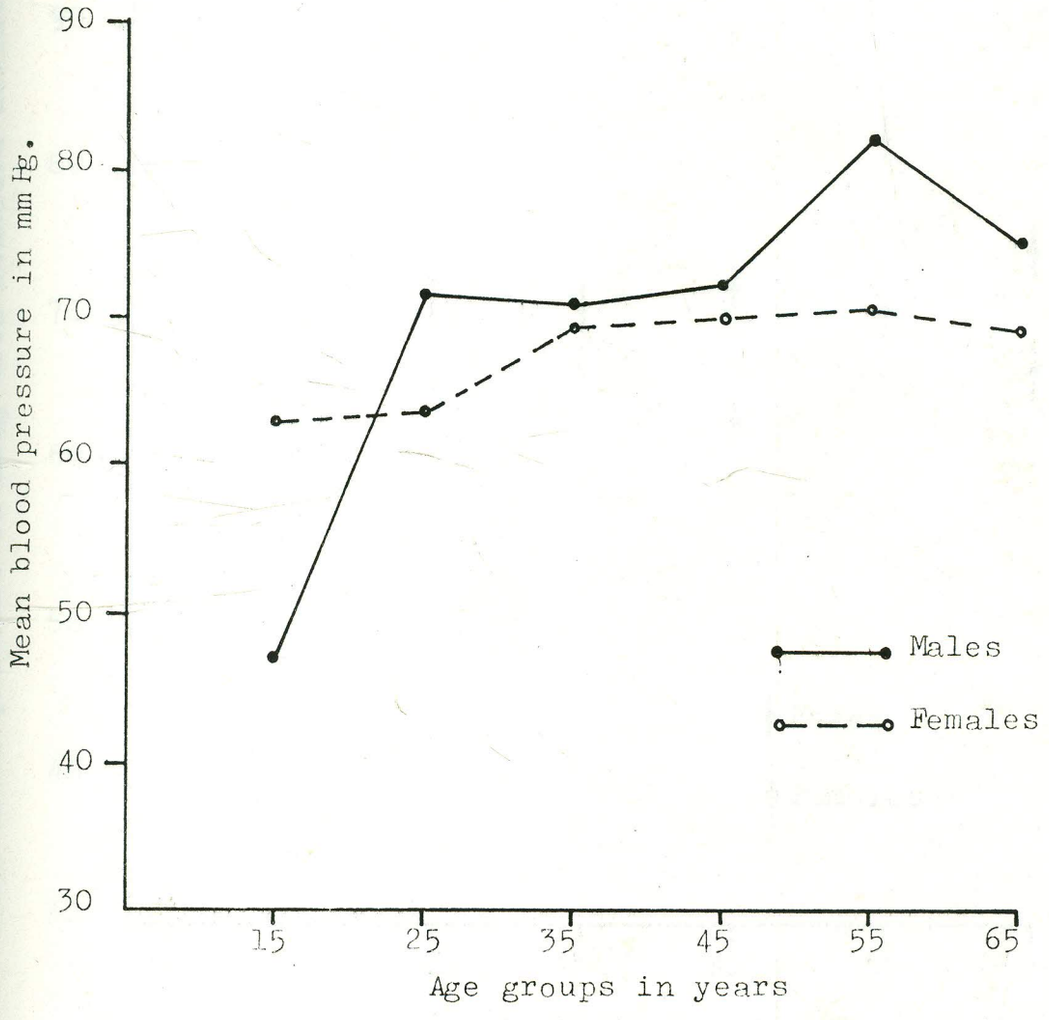
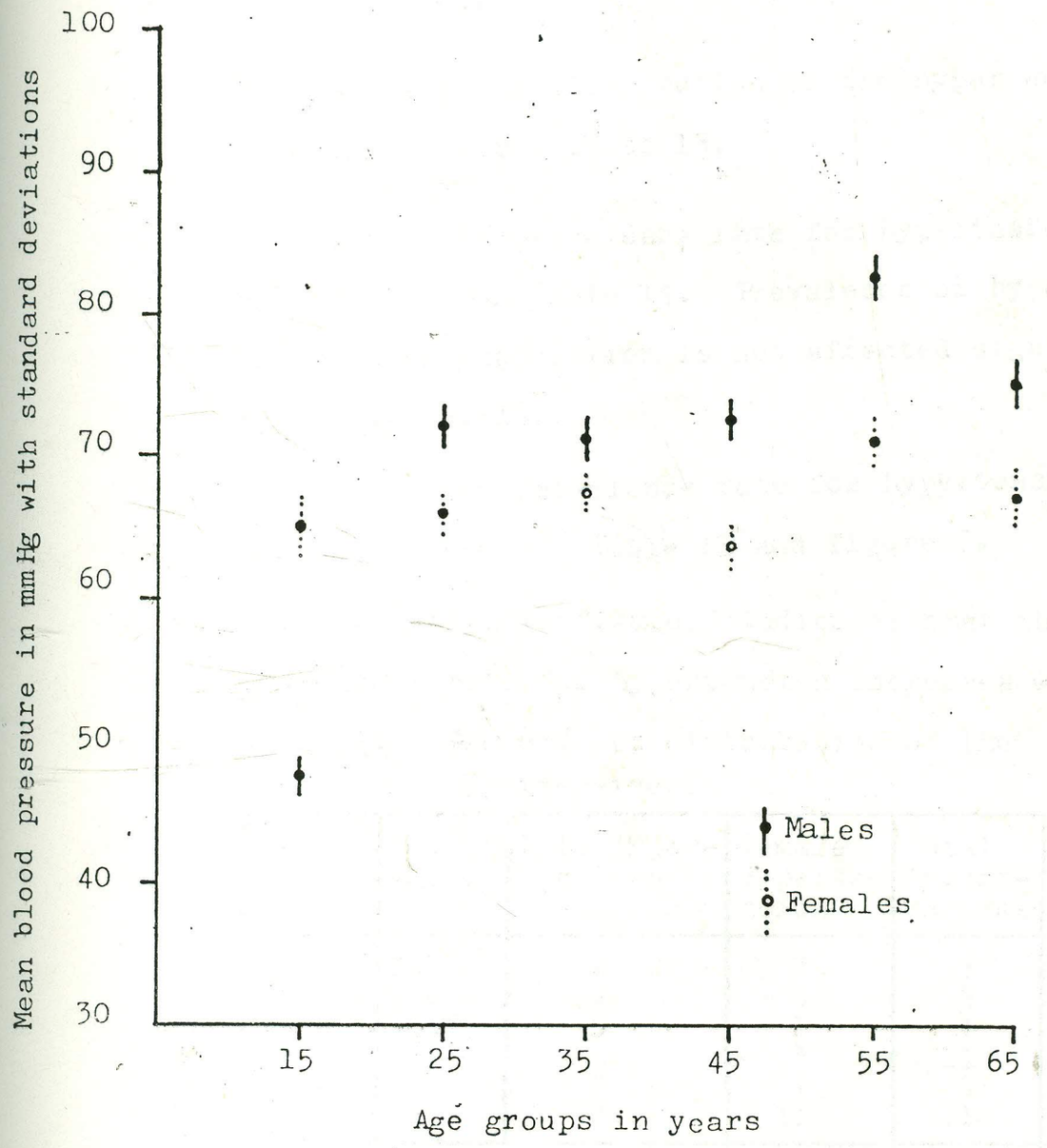


Figure 6:

A graph showing Mean diastolic blood pressure by age and sex with standard deviations



Prevalence of Hypertension

If the cut-off point for hypertension was taken to be 160/95 mm Hg. then only 48 (6.2%) of the 773 subjects were hypertensives. Of a total of 340 males, 24 (7.1%) had hypertension, similary 24 (5.5%) females out of 433 were hypertensives.

Age and sex distribution of the hypertensive is shown on Table 11 to 13.

The point prevalence rate for hypertnsion by sex is shown on Table 14. Prevalence of hypertension in the study population is not affected significantly by sex ($p = 0.61$).

The point prevalence rate for hypertension by age is shown on Table 15 and figure 7.

The graph in figure 7 indicates that the prevalence rate for hypertension increases with age.

Table 11: Age and sex distribution of the hypertensives.

Age group	No. Exam.	Male Hyper-tensives	Female Hyperte-nsion	Total Hypert-ensives	Percent. of hyper-tensives
15 -	293	2	3	5	1.7
25 -	216	4	5	9	4.2
35 -	83	3	1	4	4.8
45 -	79	8	3	11	13.9
55 -	33	7	1	8	24.2
65+	69	0	11	11	15.9
Total	773	24	24	48	6.2

Table 12: Male Hypertensives: Number of males with raised diastolic or systolic or both diastolic and systolic pressures by age.

Age Group	No. in Group	Systolic ≥ 160	Diastolic ≥ 90	Systolic ≥ 160 and Diastolic ≥ 90
15 -	126	0	0	2
25 -	92	0	2	2
35 -	41	0	2	1
45 -	37	1	4	3
55 -	17	0	3	4
65+	27	0	0	0
Total	340	1	11	12
% Hyper tensives		0.3	3.2	3.5

Table 13: Female hypertensives: Number of females with raised diastolic or systolic or both diastolic and systolic pressures by age.

Age Group	No. in Group	Systolic ≥ 160 regardless diastolic	Distolic ≥ 90 regardless systolic	Systolic ≥ 160 and diastolic ≥ 90
15 -	167	0	3	0
25 -	124	0	3	2
35 -	42	0	1	0
45 -	42	0	2	1
55 -	16	1	0	0
65+	42	3	1	7
Total	433	4	10	10
% Hyper tensives		0.9	2.3	2.3

Table 14: Prevalence of hypertension by sex

Sex	Normal	Hypertensive	Total	Rate in Percent.
Males	316	24	340	7.1
Females	409	24	433	5.5

p = 0.61

Table 15: Point prevalence rate for hypertension by age. With advancing years an increasingly higher percentage of the population in each age group had hypertension. There is a positive linear correlation between age and prevalence rate ($p < 0.001$). The correlation is clearly demostrated on a graph (figure 7).

Age Group	No. Examin.	No. of Hyper-tensives	Point preva-lence rate
15 -	293	5	1.7
25 -	216	9	4.2
35 -	83	4	4.8
45 -	79	11	13.9
55 -	33	8	24.2
65	69	11	15.9

X^2 value for testing for linear trend 41.6813 on 1 d.f., $p < 0.001$.

Figure 7:

A graph showing point prevalence rate for hypertension by age, Sayu Sayu Village, May - June 1985.



Blood pressure and prevalence of risk factors

Blood pressure and prevalence of risk factors are shown on Table 16 to 25.

No attempt was made to estimate the prevalence rate of family history of hypertension and stroke because only two and one person respectively were found to be positive.

Table 16: Hypertension by age

	HYPERTENSION		
Age	+	−	Total
≥45 yrs.	30	151	181
<45 yrs.	18	574	592
Total	48	725	773

Chi-square = 43.5969 with IDF, p<0.0001
Prevalence of the risk factor (age≥ 45 years) = 23.5%.

Table 17: Hypertension by sex. The prevalence of hypertension in the study population is not affected significanty by sex (p=0.61)

	HYPERTENSION		
Sex	+	−	Total
Males	24	316	340
Females	24	409	433
Total	48	725	773

Blood pressure by weight (Body mass Index)

According to the WHO Criteria; females with BMI $\geq$ 25.0 and males with BMI $\geq$ 27.0 are considered to be obese. BMI was calculated by the formula weight in Kg/height^2 in cms x 1000.

Table 18: Classification of the obese persons

Serial Number	BMI Value	Sex	Hypertension
91	25.6	F	Not present
450	27.3	M	Not present
515	32.3	M	Present
543	27.3	F	Present
564	26.7	F	Present
572	27.3	F	Present
886	28.1	M	Not present

Table 19: Hypertension by obesity. There is an association between obesity and hypertension

	HYPERTENSION		
Obesity	+	−	Total
+	4	3	7
−	44	722	766
Total	48	725	773

$p < 0.0001$, Chi-square = 31.4653 with 1 d.f.
Prevalence of the risk factor (obesity) = 0.9%

Blood pressure of tobacco use habit

Table 20: Frequency of tobacco use in the study population.

Tobacco use	Frequency	Percentage
1. Yes	153	19.8
2. No	619	80.1
3. Missing	1	0.1
4. Total	773	100

Table 21: Tobacco use and hypertension

	HYPERTENSION		
Tobacco	+	—	Total
+	17	136	153
—	31	588	619
Total	48	724	772

Significance level $0.01 > P > 0.001$
Chi-Square = 7.8363 with 1 d.f.
Prevalence of risk factor (tobacco use) = 19.8%
There is an association between tobacco use and hypertension.

Blood pressure by alcohol drinking habit

Table 22: Frequency of Alcohol drinking in the study population.

Alcohol drinking	Frequency	Percentage
1. Yes	162	21.0
2. No	611	79.0
3. Missing	-	-
4. Total	773	100

Table 23: Alcohol drinking habit and hypertension

	HYPERTENSION		
Alcohol	+	—	Total
+	17	145	162
—	31	580	611
Total	48	725	733

Significance level $0.05 > P > 0.01$
Chi-Square = 6.45927 with 1 d.f.
Prevalence of risk factor (alcohol drinking) = 22.1%
There is an association between alcohol drinking habit and hypertension.

Blood pressure by glycosuria

Table 24: Frequence of glycosuria in the study population.

Glycosuria	Frequency	Percentage
1. Yes	9	1.2
2. No	764	98.8
3. Missing	-	-
4. Total	773	100

Table 25: Glycosuria and hypertension

	HYPERTENSION		
Glycosuria	+	—	Total
+	3	6	9
—	45	719	764
Total	48	725	773

Significance level $P \leq 0.001$
Chi-Square = 11.5029 with 1 d.f.
Prevalence of risk factor (glycosuria) = 1.2%
There is an association between glycosuria and hypertension.

CHAPTER 4

DISCUSSION

The survey village had a population which was typical of rural area of Shinyanga Region of Tanzania. The response rate was sufficiently high with no evidence of bias in the non-respondeers with regard to age and sex ($p > 0.05$). The survey methods followed recommended standard techniques published by W. H. O. as number 56 in their monograph series "Cardiovascular survey methods (Rose and Blackburn 1968). These factors suggest that the survey results can be compared.

Distribution of blood pressure in the population

The frequency distributions of systolic and diastolic blood pressures for overall study population were essentially normal. The skew to the left is slight but is more marked for systolic than for diastolic blood pressure. Hypertension is found in the upper tail of the distribution histograms.

The mean diastolic pressures does not rise progressively with age in either sex.

The mean diastolic pressures are higher in men than women up to age maximum age group except in the youngest group.

In the present survey a rise in systolic blood pressure with age occured in males and females. Age was found to be the most important explanatory variable in this cross-sectional study.

This is similar to the findings by Williams (1969) among Kikuyu people of Kenya, Akinkugbe (1969) in Nigeria, Shaper and Saxaton (1969) among Baganda tribe of Uganda, and Parry (1969) in Ethiopia.

The mean distribution of blood pressure in the study population is not different from other populations in Africa. Thus the Sukuma people are not different from the Kikuyu of Kenya, Yomba of Nigeria, the Baganda of Uganda and Ahamaic of Ethiopia as far behaviour of blood pressure is concerned.

Evidence af a different kind emerged when Shaper (1967) surveyed some nomadic pastoral tribes in northern Kenya and showed that no increase in blood pressures occurred with advancing years in both sexes. According to Ikeme, principally two types of populalations have been described as regards the behaviour of the blood pressure in African communities; those in whom the mean blood pressure rise with age and those in whom the mean blood pressure is low and there is no significant increase with age.

A survey done by Vaughan (1977) in Handeni Tanzania instead showed that a rise in the mean blood pressure occurred only in women and even this rise was a comparatively small one. The most probable explanation for this is that samples are different. This means that in Tanzania we have some populations in whom the blood pressure does not appear to rise with age.

A difference in the average blood pressure of males and females is appearent in this survey;

thus higher in males than in females. It would be interesting to correlate physical and reproductive activity in women with blood pressure if it were practible. In the study population most of the cultivation is done by women. In African societies women have high parities in general. Abrahams et al (1960) however, found a difference between Yoruba men and women to be less apparent. Mtango and Makwaya (1984) studied the elderly Tanzanians and found out that the mean blood pressure was higher in women than in men. Ikeme et al (1974) studied cardiovascular status of middle aged and elderly Ugandan Africans and found similar findings.

The prevalence of hypertension

The overall prevalence of hypertension in the study population is 6.2%. The 6.2% prevalence for hypertension in this study is higher compared to that done by Vaughan (2%) in Kandeni district of Tanzania. The prevalence is however, low compared with other surveys in Africa such as 20.3% in Ibapara district in Nigeria (Akinkugbe 1967), 10.8% in Nyeri district in Kenya (Gachimi and Lyonga 1982). The prevalence is close to that found in Zanzibar (4.9%) by Forsyth (1968). There is evidence that in communities in

which the blood pressure does not rise significantly with age, the incidence of hypertension is lower than those in whom the blood pressure increases with age (Williams 1969 and Barnicot et al 1972). It is known however, that even among populations in which the blood pressure behaved in a similar manner with increasing age, divergent rates of hypertension may be found.

With advancing years, an increasingly higher percentage of the population in each age group had hypertension. The study indicates that the prevalence rate for hypertension increases with age up to 65 years. From the age of 65 years onwards the pattern changes by dropping. This is probably because most of the hypertensives die before the age of 65 years. There is a positive linear correlation between age and prevalence rate (Chi-Square test for linear trend = 41.6813 on 1 d.f., $p < 0.001$). In this study prevalence rates in general are not affected significantly by sex ($p = 0.61$). Similar result were found in Nyeri district

in Kenya by Gachihi and Lyonga (1982) when they did a prevalence survey. They found that prevalence rates increased with age and were not affected by sex.

In this study, only three of the 48 found to be hypertensives, were on medical treatment. Hypertension accounts for 0.4% of all admissions in Tanzania (Vaughan 1977). Assuming a point prevalence of 6.2%, it shows that most of the people in the study population are not aware of their problem and do not receive medical treatment. This is due to the fact that symptoms of hypertension are usually vague. This therefore calls for more emphasis on screening for hypertension in all health facilities. Of all hypertensives referred to Maswa hospital only twelve (26.5%) reported to the hospital for medical care.

The study shows that the hypertension pattern in the study population is not different from that reported in Western societies. Assuming that hypertension was not present in East Africa in 1920 (Donnison), a prevalence of 6.2% indicates that it is an increasingly problem. Hypertension is hence a fairly common problem in Shinyanga Region. I would say

hypertension is a community problem and hence a public health hazard. Community control of hypertension is required. A decision to control hypertension on a community basic must however, recognise the problems of finance, personnel, compliance and economics of drug treatment expected in a country like Tanzania. Data should be collected inorder to show the feasibility of a community approach to the control of hypertension.

Risk Factors

Age:

The highest prevalence rate is found in the age group 55 - 64. Taking age of $\geq$ 45 years as a risk factor it is clearly demonstrated that there is a significant relationship between old age and hypertension ($p < 0.0001$).

Sex

The prevalence of hypertension in the study population is not affected significantly by sex ($p = 0.61$). This is similar to the findings by Gachini et al (1982) in Nyeri district, Kenya.

Weight

Of factors which should be considered in this study to have a bearing on blood pressure, body mass index is one that is measurable and individually consistent. In this survey a degree of association between obesity and hypertension is suggested on Table 19 ($p < 0.001$). But many influences contribute to the physical build of individuals. Height though a fixed anatomical character in adults may reflect an earlier environmental factor of nutrition in childhood; in old age its measurement is affected by posture. Weight a labile character is continuously subject to influence by nutritional and pathological factors at all ages, and by the process of ageing. The observation of Shaper et al (1969) on Samburu men at home and in the army is retevant.

Tobacco

Just an avoidable major risk is smoking or use of tobacco. There is a strong association between smoking or tobacco use and hypertension ($0.01 > p > 0.001$). This might be attributed to the type of cigarettes smoked.

The cigarettes which are not factory processed, without filters, have high contents of nicotine.

Alcohol

In this study an association between hypertension and alcohol intake was found ($0.05 > p > 0.01$). Association between alcohol intake and hypertension has been indicated in developed countries such as Scotland by Ramsy et al (1977), and USA by Klatsky et al (1977). In rural areas of developing countries including Sayu Sayu Village, the rate of drinking alcohol has increased in the recent areas. Alcohol drinking due to stress can be a predisposing factor in the development of hypertension.

Glycosuria

The prevalence of glycosuria (diabetes mellitus) in this study is 1.2%. A fasting blood sugar test would have probably eliminated a few false positives. It was not possible to carry on fasting blood sugar tests in field conditions in this study. There is an association between glycosuria and hypertension ($p < 0.01$). This agrees with a study done by (Pell and D'Alonzo (1967) in the U.S.A. This study is one more to the few studies to show an association between glycosuria and hypertension.

More screening must be done in other communities to detect risk factors because there is a range of environmental, cultural, and dietary differences within Tanzania. It is necessary to define the risk factors before embarking on an adequate public health education.

CONCLUSION

By applying the WHO criteria, the point prevalence for hypertension in the study population is 6.2%. The study shows that there is a significant increase in hypertension with increasing age, but there is no overall sex difference in its prevalence.

The frequency distribution of systolic and diastolic blood pressures for the study population is essentially normal. The mean distribution of systolic blood pressures show that the mean systolic pressures rise with advancing age in both males and females. The mean systolic pressure are higher in males than in females except in the oldest group. The mean distribution of diastolic blood pressures show that the mean diastolic pressures do not rise significantly with advancing age in both males and females. The mean diastolic pressures are higher in males than in females except in the youngest group of the study population.

Risk factors for hypertension have been determined in the study population. The following are the risk factors found in order of importance; age equal to or above forty five years, obesity, glycosuria, tobacco use, and alcohol drinking.

RECOMMENDATIONS

Similar studies should be done in other rural communities in Tanzania in order to gain an overall picture of hypertension. A national coordinating team could be formed comprising of Epidemiologist, physician, statistician, sociologist to ensure that studies are conducted by using standard recommended methods.

Since the symptoms of hypertension are usually vague, more emphasis should be put on screening for hypertension in all health facilities. The health personal in all health centres and dispensaries should be encouraged to take blood pressure routinely on all adult patients aged 40 years and above and treat those who are found to be hypertensives. All dispensaries should have good working Sphygmomanometer and compentent RMAs in measuring blood pressure. Estimation of fasting blood sugar is useful for all those with glycosuria or a family history of diabetes, and those who are obese.

An effort must be made by the mass media to educate the people in the nature of smoking, alcohol, and over-weight risk with hypertension. It is essential to get across about effective and entirely natural ways of reducing the risks of hypertension.

A national control programme for hypertension is highly recommended. The control of hypertension, if not tackled at this time, it may be difficult to do so later on.

APPENDIX IA

TRUE COPY OF PERMIT LETTER

NAKALA HALISI

CHAMA CHA MAPINDUZI
OFISI YA WILAYA, S.L.P. 39, MASWA, TANZANIA
SIMU NO. 234

Barua zote zipelekwe kwa Katibu wa Wilaya
Jalada Na. CCM/MS*/U.25/2/ Tarehe 26/12/1984

Katibu Tawi (CCM)
Tawi la Sayu Sayu
MASWA

Ndg. P.G. Tubeti

Mtajwa hapo juu ni Daktari ambaye sasa yuko kwenye mafunzo ya juu yahusuyo uganga huko Muhimbili Medical Centre.

Ndugu Tubeti atakuwa na shughuli za utafiti kwa magonjwa ya moyo kwa wananchi waishio hapa Sayu Sayu mwezi wa Mei Mwaka 1985. Kwa maana hiyo atakuwa anafanya uchunguzi katika kila Kaya ya hapo kijijini.

Barua hii ni kumtambulisha mumpe msaada wowote atakao-uhitaji ili afanikishe swala hili la utafiti. Pia wafahamishe viongozi wenzako wa hapo tawini.

"KIDUMU CHAMA CHA MAPINDUZI"

(imesainiwa J.P. Ngatimwa
k.n.y. KATIBU WA CCM WILAYA
MASWA

JPN/NT.

Nakala: Katibu Kata
BUCHAMBI

APPENDIX IB

TRUE TRANSLATED COPY OF THE PERMIT LETTER IN ENGLISH

TRUE COPY

CHAMA CHA MAPINDUZI

District Office, P.O. Box 39, Maswa, Tanzania.
Phone No. 234.

Ref. No. CCM/MSW/U.25/2/ Date 26/12/1984

The Party Secretary
Sayu Sayu Branch
MASWA

P.G. Tubeti

The above mention is persuing postgraduate studies in field of Medicine in Muhimbili Medical Centre.

Ndugu Tubeti will be carrying on a survey of hypertension in villagers of Sayu Sayu in May 1985. It will be a house to house survey.

The purpose of this letter is to introduce him to you and request for maximum cooperation so as enable him accomplish his mission. Kindly please inform other village leaders about this.

"LONG LIVE CHAMA CHA MAPINDUZI"

(Signed J.P. Ngatimwa)
for DISTRICT CCM PARTY SECRETARY
MASWA

JPN/NTW
Copy to: Ward Executive Officer
BUCHAMBI

APPENDIX II

Map of Tanzania indicating
Shinyanga Region

