SURVIVAL ANALYSIS OF TIME TO ACHIEVE NORMAL BLOOD PRESSURE IN HYPERTENSIVE PATIENTS IN SOUTHWEST NIGERIA.

BY

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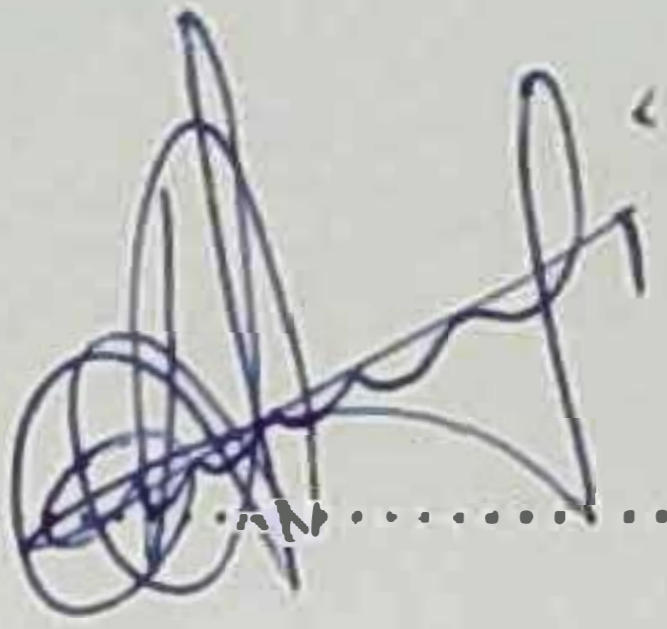COLLEGE OF MEDICINE

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APRIL, 2014.

CERTIFICATION

This to certify that **Fatoki, Tinuola Olapeju** carried out this project in the Department of Epidemiology and Medical Statistics, Faculty of Public Health, College of Medicine, University of Ibadan, Ibadan.

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i

DEDICATION

This project work is the dedicated my King, my Helper, my Provider and LORD. The ALMIGHTY he controls the affair of all mankind. You are my EVERYTHING and I will forever give you Thanks, Glory and Adoration.

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TABLE OF CONTENTS

CHAPTER ONE

INTRODUCTION

CHAPTER TWO

LITERATURE REVIEW

CHAPTER THREE

METHODS

CHAPTER FOUR

RESULTS

CHAPTER FIVE

DISCUSSION, CONCLUSION AND RECOMMENDATION

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

Hypertension is one of the leading health problems in the world with serious and costly complications. Excess mortality attributable to hypertension has, in the past decade, caused more deaths than all wars combined. It is a major cause of morbidity and mortality in many developing countries, Nigeria inclusive. It is important that people are aware and informed about hypertension and other health related issues. Understanding the true state of the survivorship of hypertensive will be of great benefit to patients, physicians, government and other related agencies in checking the scourge of this disease. This study was designed to investigate the survivorship of hypertensive patients and factors affecting the survivorship of hypertensive patients.

Data from the case notes of hypertensive patient receiving treatments in Ajeromi General Hospital, Ajegunle (AGHA), Lagos and Ringroad State Hospital, Adeoyo (RSHA), Ibadan from January, 2000 to December, 2012 were used. Survival analysis (SA) techniques were explored to determine the survivorship of hypertensive patients where the attainment of normal blood pressure is the event of interest. Cox proportional hazard model was used to estimate the factors affecting the survivorship of hypertensive patients.

The composition of hypertension by Gender was 39.2% in Male patients and 60.8% in Female patients. The median survival of hypertensive patient receiving treatment in Ajeromi was 35 months (95% C I: 32-38 months), the 107 months (95% C I: 95-119 months) in Adeoyo. The median survival time of male respondent was 74 months (95% CI: 63-85 months) and in female respondent was found to be 99 months (95% C I: 84-114 months). However, we found that the overall median survival time was 87 months (95% C I: 78-100 months).

The study concluded that Location, Occupation and Gender affected the survivorship of hypertensive patient using Cox Hazard Proportional Regression. The time to attainment of normal blood pressure shorter in hypertensive patients in Ajeromi General Hospital, Ajegunle compared patients in Ringroad State Hospital, Adeoyo

Key words: Hypertension, Hypertensive patients, Survival analysis, Cox proportional hazard model.

Word count: 332 words

CHAPTER ONE
INTRODUCTION

1.1   Background

Blood pressure is the force of blood flow inside the blood vessels and when blood moves through the vessels with too much force results in high blood pressure. This force of blood against artery walls makes the heart to be overworked than it should and this is similar to forcing water through a narrow hose. Hypertension cannot be diagnosed by just looking at someone and also that a number of people with high blood pressure (HBP) does not feel sick at first because it does not give any warning sign. Blood pressure is measured in millimetres of mercury (mmHg) and it is recorded as two numbers systolic BP is when the heart beats and the diastolic blood pressure is when the heart relaxes between beats. For example a BP of 140/90mmHg is interpreted as: the systolic BP is 140 while the 90 is for the diastolic BP. Normal blood pressure is when the systolic BP is above 120 ($\leq$120) and when the diastolic BP is above 80 ($\leq$80) measured in mmHg ($\leq$120/80mmHg). However, with the accessibility of sphygmomanometer one can easily check ones BP anytime anywhere. (American Diabetes Association, 2009).

Certain food intake and lifestyle can raise one's blood pressure. Such foods are food with too much salt, fatty food, drinking alcohol and life styles like being obese, smoking, not doing regular exercise. The DASH (Dietary Approaches to Stop Hypertension) research findings, illustrated how to follow its eating plan and adopt a better lifestyle and also one should ensure that one's blood pressure (BP) are measured using the sphygmomanometer (American Diabetes Association, 2009). The complications of hypertension have been reported to include diabetes mellitus, stroke, blindness, heart failure and that high blood pressure is common in Africa Americans down to the black race. (Ogunlana Micheal O. et al., 2011).

The prevalence of high blood pressure is rapidly increasing and its impact is affecting the globe economically in donation of fund to this crisis. (Ogunlana Micheal O. et al., 2011). In Nigeria, the overall prevalence of high blood pressure is within the range 8% - 46.4% depending on the type of measurements, cut off value used as definition of hypertension and target population with the prevalence in men has been put at 7.9%-50.2% and women (3.5%-68.8%), in the urban (8.1%-42.0%) and rural setting (13.5%-46.4%). (Ogah Okechukwu S. et al, 2012). In 2007, however, a team of epidemiologist published that the prevalence of

1

hypertension founded it to be higher in female patients than in male. (Ogah Okechukwu S. et al, 2012). Lu Zhensui et.al (2009) also found that the prevalence of hypertension is higher among men compared to women.

The median survival time of hypertensive patients were high in African countries and that women under medication were more likely to attain normal blood pressure faster compared to men. (Osterlund P., et. al, 2010). The association between hypertension and socio-demographic characteristics with clinical diagnosis, adherence to medication, developed diabetes mellitus has been found to be strong across rural-urban locations, among male and female and within various occupations. (Selassie Anbesaw et.al, 2011) It has also being observed that there are several factors that affect the survivorship of hypertensive patients. First, Osterlund P. et.al (2010) revealed that the predictive factors of hypertensive patients in their study were line of treatments, metastatic sites, age, and types of chemotherapy. Secondly, the findings of Schuster Cornelia et.al (2012) concluded that the factor that affected survivorship of hypertensive patients were treatment used and age.

The result of the study conducted by Selassie Anbesaw et.al (2011) showed that the factors affecting the survivorship of hypertensive patients were age, baseline blood pressure measurements (systolic and diastolic), overweight, obesity, and diabetes mellitus. Hypertension is relatively common in societies with affluent lifestyle and increasing age, occupation, and gender are the major determinants which is responsible for the large differences in prevalence while hypertension is considered a disease of the rich in poor countries while in rich countries; it is believed to be a disease of the poor. It is however clear that both the rich and the poor are suffering from hypertension. A study by Zachariah M.G, et.al (2008) to investigate the Clinical profile of hypertension at a University Teaching Hospital in Nigeria founded that there is co-infection of diabetes mellitus and hypertension and this was investigated in this study.

1.2   Problem Statement

Hypertension is one of the leading health problems in the world with serious and costly complications. Excess mortality attributable to hypertension has, in the past decade, caused more deaths than all wars combined. It is a major cause of morbidity and mortality in many developing countries, Nigeria inclusive. It is important that people are aware and informed about hypertension and other health related issues. Understanding the true state of the

2

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2

survivorship of hypertensive will be of great benefit to patients, physicians, government and other related agencies in checking the scourge of this disease.

According to American Diabetes Association (2009) at least 1 out of every 3 adult has high blood pressure and 2 out of every 3 diabetes patients have hypertension. Despite the fact that Africa has the increasing prevalence in hypertension and its impact is affecting the globe economically in donation of fund to this crisis (Ogunlana Micheal O. et al., 2011) with the overall prevalence of high blood pressure which is within the range 8% - 46.4% (Ogah Okechukwu S. et al, 2012) some steps need to be taken to stem this tide.

It is thus important to know the estimate of the current and future burden of hypertension and its status in order to allocate community health resources and to emphasize the reality of attaining normal blood pressure and encourage measures to counteract trends for increasing prevalence of hypertension.

1.3 Justification

Due to the scarcity of data on the survivorship of hypertensive respondents and factors affecting the survivorship of hypertensive respondents in Nigeria and in the south-west Nigeria in particular, findings from this study will go a long way in providing a database on monitoring the disease which can ultimately enhance its treatment control and the awareness of survivorship of hypertensive patients provides information that serves several purposes. First, to determine survivorship of hypertensive patients and variables (factors) affecting the survivorship of hypertensive respondents. It can also help to explore co-infection of hypertension and diabetes, and also to plan programs for control and prevention of the disease. Such data can serve as a guide in planning biomedical research and in developing programs to promote health services.

Also, prevalence of hypertension in male and female determines the amount of clinical workload due to hypertension and can be used to estimate the magnitude of resources in hospital and outpatient facilities, nutritional and patient education services, and trained medical specialists required to care for hypertensive respondents. Lastly, the median survival times of hypertensive respondents can be used to estimate the time they will achieve normal blood pressure, to place this disease in its proper perspective compared with other competing

3

priorities/ complications and to determine the appropriate allocation of resources for hypertension.

1.4 Broad Objective of the Study

The broad objective of this study is to determine the survivorship of hypertensive patient from time of presentation to the clinic to the time they achieved normal blood pressure.

1.5 The Specific Objectives of this study

The specific objectives of this study are to

- Determine the survivorship of hypertensive respondent from the time they presented to the clinic and to the time they achieved normal blood pressure.
- Explore the factors affecting the survivorship of hypertensive respondents.
- Assess the co-infection of hypertension and diabetes mellitus.

1.6 Research Questions

- What is the survivorship pattern of hypertensive respondent from time of presentation to the clinic and to the time they attained/achieved normal blood pressure?
- What are the factors that affected the survivorship of hypertensive respondents?
- t is the level/rate of co-infection of hypertension and diabetes?

1.7 Research Hypotheses

1 There is no change in the survivorship pattern of hypertensive respondents from the time they presented to the clinic and to the time they achieved normal blood pressure.
2 There is no change in the factors that affected the survivorship of hypertensive respondents.
3 There is no co-infection of hypertension and diabetes.

4

CHAPTER TWO
LITERATURE REVIEW

2.1 Definition of Hypertension

Hypertension is a disease that happens when the blood pressure is high and the heart is working harder than it should when blood is moving to all parts of the body (National Heart, Lung and Blood Institute, 2010). Blood pressure rises and falls throughout the day but when it is elevated over time it is called Hypertension. Normal blood pressure is attained when the systolic BP is above 120 ($\leq$120) and when the diastolic BP is above 80 ($\leq$80) measured in mmHg ($\leq$120/80mmHg). (National Heart, Lung and Blood Institute, 2010). Hypertension is when the heart is overworked, and the high force of the blood that is flowing can damage arteries and organs such as the heart, kidneys, brain, and eyes. (National Heart, Lung and Blood Institute, 2010). Hypertension so many times does not give any warning signs or symptoms but once it takes place, it usually lasts a life-time because it cannot be cure but can only be controlled. Thereby causing heart attack, kidney failure, stroke, and blindness. (National Heart, Lung and Blood Institute, 2010).

The prevalence of high blood pressure is rapidly increasing and its impact could be felt across the globe economically in respect to the donations of fund to this alarming crisis (Ogunlana Micheal O. et al., 2011). The overall prevalence of high blood pressure is within the range of 8% - 46.4% depending on the type of measurements, cut off value used as definition of hypertension and target population with the prevalence in men (7.9%-50.2%) and (3.5%-68.8%) in women, in the urban (8.1%-42.0%) and in the rural setting, the prevalence is 13.5%-46.4%. (Ogah Okechukwu S. et al, 2012). From the finding of American Diabetes Association (2009) at least 1 out of every 3 adult has high blood pressure and 2 out of every 3 diabetes patients has hypertension

2.2 Epidemiology/Drug Resistance

One in five hypertensive patients has drug resistant and blood pressure (BP) remains the goal of this study by Ronald G et al (2010) and that despite concurrent treatment of hypertension with three antihypertensive drugs of different classes, resistant hypertension is the most common reason for referral to a hypertension specialist. Multiple hypertensive mechanisms

5

(neural hormonal, vascular and renal) are often engaged simultaneously in resistant hypertensive and this has resulted in multi-drug regimens (three to five complementary agents) which are almost always needed to achieve the recommended stretched blood pressure goal of <130/80 mmHg (Ronald G et al, 2010). In many cases, hypertension specialists must also identify and address underlying conditions that are the source of high blood pressure, including chronic kidney disease (CKD), primary aldosteronism, obstructive sleep (apnea) and renovascular hypertension.

Some common causes of secondary hypertension include pheochromocytoma, Cushing's disease, hyperparathyroidism, aortic coarctation and intracranial tumors (Ronald G et al, 2010). Only about 20% in more than 50 million Americans with uncontrolled hypertension have truly exhibited drug-resistant to hypertension of which most of them have pseudo resistance from improper blood pressure measurement technique, white-coat reaction, non-adherence of medication, and ingestion of pressor substances/an inadequate blood pressure regimen (Ronald G et al, 2010). Non-adherence of medication explains why half of the hypertensive Americans had cases of uncontrolled hypertension (Ronald G et al, 2010). This study discussed that those patients who developed drug resistant to hypertension was successfully addressed by revamping the regimen of blood pressure medications. (Ronald G et al, 2010). Classically, the severity of the hypertensive retinopathy changes is graded from grade I–IV, although the milder types may be difficult to distinguish from each other and that ophthalmoscopy findings may also give some indication as to how long one has been hypertensive (Wong T et al, 2007).

2.3 Sign, Symptoms and Care of Hypertension

Hypertension a non-communicable disease has symptoms such as severe headache, anxiety, nosebleeds, and feeling short of breath (panting for breath) (National Heart, Lung and Blood Institute, 2010). The National Heart, Lung and Blood Institute (2010) concluded high blood pressure often has no warning signs or symptoms but if it is uncontrolled, it can lead to heart and kidney disease, stroke, and blindness. It is maintained that hypertension is rarely accompanied by any symptoms, and its identification is usually through screening, or when seeking healthcare for a related/unrelated problem. Higher proportion of hypertensive patients reported headaches (particularly at the back of the head and in the morning), as well as light-headedness, vertigo, tinnitus (buzzing or hissing in the ears) and altered vision. (Karriem-Norwood Varnada, 2012).

6

Hypertension can be controlled if these precautions are taken such as maintaining a healthy weight, be moderately physically active on most days of the week, follow a healthy eating plan (like eating foods with low salt, if you drink alcoholic beverages do so in moderation or avoid it completely), hypertensive respondents should take prescribed medication as directed by the physician (National Heart, Lung and Blood Institute, 2010) and also one should ensure that one's blood pressure (BP) is measured using the sphygmomanometer from time to time.

These symptoms however are more likely to be related to associated-anxiety than the high blood pressure itself, so when physical examination is done to an hypertensive patient, hypertension may be suspected on the basis of the presence of hypertensive retinopathy detected by examination of the optic fundus found in the back of the eye using ophthalmoscopy (Wong T et al, 2007). American Diabetes association (2009) revealed that as many as 2 out of 3 adults with diabetes have high blood pressure and high blood pressure affects more than 65 million people but 1 in 3 American adults is hypertensive. About 28% of American adults ages 18 and above, or about 59 million people have prehypertension and this condition increases the chance of heart disease and stroke. (National Heart Lung and Blood Institute, 2010).

2.3 Survival Analysis

Survival analysis examines and models the time it takes for an event to occur with the prototypical of such event as death and that the name survival analysis and some of its terminology are derived alongside. (John Fox, 2002). The ambit of application of survival analysis is much broader than one can imagine (John Fox, 2002). Essentially, the same methods are employed in a variety of disciplines under various rubrics for example, event-history analyses in sociology, survival analysis which focuses on the distribution of survival times and survival rates, although there are well known methods for estimating unconditional survival distributions, that most interesting survival modelling examines the relationship between survival and one or more predictors (factors/variables/ covariates affecting the survival of an observed event) in the survival-analysis (John Fox, 2002).

Survival analysis is a collection of statistical procedures for data analysis, for which the outcome variable of interest is timed until an event occurs and we can say that it is the study

7

of time between entry into the study and when a subsequent event occur/is observed (Ritesh, 2011). In 2011, Ritesh a biostatistician revealed that the term Survival analysis came to existence from initial studies, where the event of interest death was explored and recently, the scope of survival analysis has become widely used and scientists are using it for time until onset of disease, time until stock market crash, time until equipment failure, time until earthquake, and so on. Common events that could be studied using SA include death, disease, relapse, recovery. etc.

Survival time is the time an individual survived an observed event over some follow-up period in a study and survival rate is the percentage of people who survive a disease such as cancer for a specified amount of time. For example, if the 5-year survival rate for a particular cancer is 34%, this means that 34 out of 100 people initially diagnosed with that disease would be alive after 5 years but survival rate does not indicate if a cancer is cured or if treatment is completed (Kleinbaum, 2000). In biostatistics, survival rate is a part of survival analysis, indicating the percentage of people in a study or treatment group who are alive for a given period of time after diagnosis while survival rates are important for prognosis for example, whether a type of cancer has a good or bad prognosis can be determined from its survival rate (Kleinbaum, 2000).

Patients with a certain disease can die directly from that disease or from an unrelated cause such as a car accident and when the precise cause of death is not specified, this is called the overall/observed survival rate, doctors often use mean overall survival rates to estimate the patient's prognosis and this is often expressed over standard time periods, like one, five, and ten years, e.g. prostate cancer is much higher in one year overall survival rate than pancreatic cancer, and thus has a better prognosis (Kleinbaum, 2000). Overall survival is often used as an endpoint in clinical trials and median overall survival time is usually expressed in months.

Median survival time is the amount of time after which 50% of people have died and 50% are still alive. Survival function S (t) is defined as the probability that the survival time is greater than or equal to t. S (t) = P (T>=t) = 1 - F(t) (Collect D., 1994). Hazard function H (t) is the probability that an individual dies at time t, conditional on he or she having survive to that time (Collect D., 1994).

8

Examples of studies where this statistical tool has been included and used; leukaemia patient, time in remission, time to develop a heart disease for normal individuals, elderly population and time until death, and heart transplants and time until death (Ritesh, 2011). A total of one hundred and one (101) patients with metastatic colorectal cancer and base line hypertension were treated with standard chemotherapy combined with bevacizumab and dose of 2.5mgkg−1 per week was administered in a single centre and the overall survival time was 18.9 months (95% C I: 15.1−22.7 months). (Osterlund P.et. al, 2010). Three hundred (300) hypertensive patients were invited to participate in this study, out of which two hundred and sixty-five (265) participated thus giving a response rate of 85.3%. (Ogunlana Micheal O.et al, 2009).

CHAPTER THREE
METHODOLOGY

3.1 Study Design

This is a retrospective analytical study of hypertensive patients receiving treatments using secondary data. It used data collected (retrieved) from the case notes (files) of hypertensive patient receiving treatments in Ajeromi General Hospital, Ajegunle, Lagos and Ringroad State Hospital, Adeoyo, Ibadan from January, 2000 to December, 2012.

3.2 Study Area

Ajeromi is a part of Ajeromi – Ifelodun Local Government (Ajegunle) popularly known as the ghetto city of Lagos State. An urban area located in the southern part of Lagos which covers a land mass of 12 km² and Density 57,276.3 inch/km². It has a population of about 687,316 people and 335 streets with Latitude 6.46499 and Longitude 3.32557. It is bordered on the west by Apapa Wharf and Tincan, two of Nigeria's biggest sea ports from where over 70% of imported goods come into the country. It comprises of the young, the elderly, the rich and poor, the middle class and varieties of tribes with Igbo, Yoruba and Esan as major ethnic groups.

Also Adeoyo is a part of Ibadan South-West Local Government which is a developing area, out sketch of Ringroad. It is populated with few young people and a lot of older people that are either retired to collecting pension or trading. It has a population of about 54,677 and 234 streets with Latitude 7.397706 and Longitude 3.913364. The residents have few rich, average numbers in the middle class and a lot of poor people. It is predominantly a homogenous society and carefully populated by Yoruba speaking people of the South West zone of Nigeria. The study areas were chosen because it is well planned which made sampling and logistics for the study easier. Secondly, it contains a fair representation of different strata of occupation in this study.

3.3 Unit of Enquiry

The unit of enquiry in this study will be men and women aged 18years and above that are hypertensive patients of general out- patient of Ajeromi General Hospital, Ajegunle. Lagos and Ringroad State Hospital, Adeoyo, Ibadan. The samples from these target groups were selected by taking patients case files receiving treatment with blood pressure measurement at

10

almost all the visitations in the records office/library of the hospital. The start time is January 2000 and the end time is December, 2012.

Eligibility Criteria:

Inclusion Criteria- Hypertensive patients within the adult age 18 years and above were eligible to be used in the study with cut-off of hypertension which was >120/80mmHg.

Exclusion criteria- Adult age of 18years and above who have not taken drugs for about one month at the time the study were excluded in the study.

3.4 Sampling Technique

The sampling technique used was all inclusive for hypertensive patients meeting the eligible criteria within the study period. All hypertensive patients on medication (drug) that had presented to the clinic with their case files were collected from the record departments/library. They have been followed up by checking their blood pressure measurement at visitations to the hospital and giving them additional prescription of drugs to improve their quality of life and re-checking their blood pressure measurement.

3.5 Kaplan Meier and Cox Proportional Hazard Regression

Kaplan-Meier Survival Analysis is a descriptive procedure for examining the distribution of time-to-event variables. Additionally, it can compare the distribution by levels of a factor variable or produce separate analyses by levels of a stratification variable. (Hosmer, D. W., and S. Lemeshow, 2000)

The Cox Regression procedure is useful for modelling the time to a specified event, based upon the values of given covariates. It is a robust tool in survival analysis because it can be used to evaluate so many covariates at the same time. (Hosmer, D. W., and S. Lemeshow, 2000)

The basic model offered by the Cox Regression procedure is the proportional hazards model, which can be extended through the specifications of a strata variable or time-dependent covariates. The proportional hazards model assumes that the time the event occurred and the covariates are related through the following equation. (Hosmer, D. W., and S. Lemeshow, 2000)

11

$$h_i(t) = \{[h_0(t)] \exp(b_0 + b_1 x_{i1} + \dots + b_p x_{ip})\}$$

where

$h_i(t)$ is the hazard rate for the ith case at time t

$h_0(t)$ is the baseline hazard at time t

p   is the number of covariates

b_j is the value of the jth regression coefficient

x_{ij} is the value of the ith case of the jth covariate

The hazard function is a measure of the potential for the event to occur at a particular time t, given that the event did not yet occur and larger values of the hazard function indicate greater potential for the event to occur. The baseline hazard function measures this potential independently of the covariates. The shape of the hazard function over time is defined by the baseline hazard, for all cases and the covariates simply help to determine the overall magnitude of the function. (Hosmer, D. W., and S. Lemeshow, 2000).

3.6 Data Collection and Processing

These hospitals have on the average about a hundred thousand patients and from previous studies the average sample size used was between 350 – 400 hypertensive patients.

The data that was collected during the retrieval of case notes/files underwent initial data processing, which consisted of office editing, coding of open-ended questions, data entry and editing computer-identified errors.

SPSS version 15.0 was used to analyse the data. Descriptive statistics was used to explore the prevalence of hypertension in male and female and its socio-demographic characteristics while all variables with a p-value <0.05 will be considered statistically significant and described as having influenced the outcomes of hypertensive patient.

Survival analysis techniques were used to explore the survivorship of hypertensive patient from time of presentation to the clinic to the time they attained normal blood pressure with the overall survival time. Cox proportional hazard model was used to explore the factors affecting the survivorship of hypertensive patients.

12

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3.7 The following variables were collected from the case files of the respondents.

- Date of presentation to the clinic
- Presented diabetes
- Adherence to medication
- Systolic blood pressure with dates
- Diastolic blood pressure with dates
- Age
- Tribe
- State of origin
- Religion
- Occupation
- Marital status
- Sex

3.8 Limitations

There was lost to follow-up of respondents in this study. Poor record keeping of hypertensive patients reduced the number of valid case notes that was used.

3.9 Ethical Consideration

For this study, approval to use the case files was given by the hospital board of directors in their notice board in Ajeromi General Hospital, Ajegunle, Lagos and Ministry of Health, Oyo State for Ringroad State Hospital, Adeoyo and Ibadan with dates.

CHAPTER FOUR

RESULTS

This chapter contains the statistical analysis of the collected data, which include the demographic characteristics of hypertensive patients involved in this study, their systolic and diastolic blood pressure measurement with dates, drugs administered to the patients at presentation to the end of the study etc. Univariates and bivariate analysis were performed to determine the association between the outcome variable and the independent variables; ANOVA was used to determine the drug effectiveness in hypertensive patients. Survival analysis was performed to investigate the survivorship of hypertensive patients from the time of presentation to the clinic and to the time they attained normal blood pressure using Kaplan Meier. Cox proportional hazard regression was used to determine the factors that affected the survivorship of hypertensive patients. Also the respective survival plots (curves) were constructed for the statistically significantly differences of independent variables.

4.1 Demographic Characteristics of Hypertensive Patients.

The socio-demographic characteristics of hypertensive patients in this study are shown in Table 4.1 below. Almost two-third (68.3%) were receiving treatments at Adeoyo clinic while a little above one-third (31.7%) were in Ajeromi clinic. Nearly half (46.9%) of the patients fall in the age bracket of 60 and above, 30.8% of the patients were in age group 50-59 and 22.3% of the patients were younger than 50years. Majority (91.9%) of the patients were currently married compared to 8.1% of the patients who were not currently married. About 2 of every 5 hypertensive patients were Male while over half (60.8%) were Female hypertensive patients. The hypertensive patients were predominantly Yorubas (84.8%).

Across the Occupations, about half (47.7%) of the hypertensive patients were Traders, fewer proportion (16.1%) of the patients were Civil servants, 13.4% of the patients were Pensioners, 13.9% of the hypertensive patients were Housewives while 8.9% of the patients were Artisans. Almost two-third (64.9%) was Christians compared to 35.1% of the patients who were practicing Islam or other religions.

Table 4.1: Distribution of Socio-demographic Characteristics of the Respondents

Variables	Frequency(n)	Percentage (%)
Location		
Ajeromi	210	31.7
Adeoyo	453	68.3
Age groups		
Below 50	148	22.3
50-59	204	30.8
60+	311	46.9
Marital Status		
Currently married	609	91.9
Not currently married	54	8.1
Gender		
Male	260	39.2
Female	403	60.8
Tribe		
Yoruba	562	84.8
Others	101	15.2
Occupation		
Trader	316	47.7
Civil servant	107	16.1
Artisan	59	8.9
Pensioner	89	13.4
Housewife	92	13.9
Religion		
Christianity	430	64.9
Islam and Others	233	35.1
Total	663	100.0

In Table 4.2 below, majority (72.4%) of hypertensive patients did not develop Diabetes mellitus compare to 27.6% of the patients that had the disease, 67.7% of hypertensive

patients adhered to medications while 32.3% of the patients did not adhere to medications. The co-infection of Hypertension and Diabetes mellitus was 27.6% while 37.7% of hypertensive patients achieved normal blood pressure and 62.3% of the patients did not achieve normal blood pressure.

Table 4.2: Distribution of Clinical Diagnosis of Hypertensive Respondents

Variables	Frequency	Percentage n(%)
Developed Diabetes Mellitus		
Yes	183	27.6
No	480	72.4
Adherence to Medication		
Yes	449	67.7
No	214	32.3
Co-infection of Hypertension and Diabetes Mellitus		
Co-infection	183	27.6
No co-infection	480	72.4
Blood pressure		
Normal	250	37.7
Not normal	413	62.3
Total	663	100.0

4.2 Determining the Association between Blood Pressure and Independent variables

In Table 4.3, a higher proportion (42.4%) of hypertensive patients from Ajeromi had normal blood pressure compared to patients from Adeoyo (35.5%), P-value >0.05. Considering age group, normal blood pressure was found among patients aged 60+ to be (40.5%); patients in age group 50-59 were 36.8% while 37.0% of the patients aged 50 below achieved normal blood pressure. About two-fifth (40.4%) of the male patients attained normal blood pressure while 36.0% of female patients attained normal blood pressure.

Sixty-two per cent (62.4%) of the currently married patients attained the normal blood pressure while 37.6% of the patients did not attain normal blood pressure. Among the hypertensive patients who were Yoruba, 37.0% of the hypertensive patients attained normal blood pressure. About 35.8% of the hypertensive patients who were Traders achieved/attained normal blood pressure, 40.2% among hypertensive Civil servants, 39.0% among hypertensive Artisans, 36.0% of the hypertensive Pensioners and 42.4% of the hypertensive Housewives also attained normal blood pressure. Considering religion, normal blood pressure was found among patients who were Christians to be 36.3% while almost half (40.3%) of the patients practising Islamic and other religion achieved normal blood pressure. It was only the P-value of the Location that was less than 0.05 (P< 0.05) while other independent variables had P-value that was greater than 0.05 (P>0.05). Hence, Location is statistically significant among hypertensive patients in this study.

Table 4.3: Association between Blood Pressure Status and Socio-demographic Characteristics

Variables	Blood pressure Normal n(%)	Not Normal n(%)	Total	χ^2	P-value
Location					
Ajeromi	89(42.4)	121(57.6)	210		
Adeoyo	161(35.5)	292(64.5)	453	2.858	0.091
Age group					
Below 50	60(40.5)	88(59.5)	148		
50-59	75(36.8)	129(63.2)	204	0.653	0.721
60+	115(37.0)	196(47.5)	311		
Gender					
Male	105(40.4)	155(59.6)	260		
Female	145(36.0)	258(64.0)	403	1.305	0.253
Marital status					
Currently married	229(37.6)	380(62.4)	609		
Not currently married	21(38.9)	33(61.1)	54	0.035	0.852
Tribe					
Yoruba	208(37.0)	354(63.0)	562		
Others	42(41.6)	59(58.4)	101	0.762	0.383
Occupation					
Trader	113(35.8)	203(64.2)	316		
Civil servant	43(40.2)	64(59.8)	107		
Artisan	23(39.0)	36(61.0)	59	1.807	0.771
Pensioner	32(36.0)	57(64.0)	89		
Housewife	39(42.4)	53(57.6)	92		
Religion					
Christianity	156(36.3)	274(63.7)	430		
Islam	94(40.3)	139(89.3)	233	1.063	0.303

Table 4.4 showed that 44.8% of the hypertensive patients that developed diabetes mellitus achieved normal blood pressure while over half (55.2%) that developed diabetes mellitus did not attain normal blood pressure. About 20.6% of hypertensive patients who adhered to medication attained normal blood pressure. Almost half (44.8%) of the Hypertensive patients who attained normal blood pressure had co-infection with Diabetes mellitus compare with 35.0% among hypertensive patients without co-infection (P<0.05).

Table 4.4: Association between Blood Pressure Category and Clinical Diagnosis.

| Variable | Blood pressure | | | | |
	Normal n(%)	Not Normal n(%)	Total	χ^2	P-value
Developed Diabetes Mellitus					
Yes	82(44.8)	101(55.2)	480		
No	168(35.0)	312(65.0)	183	5.427	0.020
Adherence to medication					
Yes	44(20.6)	170(79.4)	214		
No	206(45.9)	243(54.1)	449	39.553	0.000
Co-infection of Hypertension and Diabetes Mellitus					
Co-infection	82(44.8)	101 (55.2)	183		
No co-infection	168(35.0)	312(65.0)	480	5.427	0.020

4.3 Survivorship of Hypertensive patients.

Table 4.5: Median Time of Hypertensive Respondents by Location.

In Table 4.5 below, among the two hundred and ten (210) Hypertensive patients receiving treatments in Ajeromi, 43.8% of the patients achieved normal blood pressure while 56.2% did not achieve normal blood pressure (censored) with median survival time of 35 months (95% C I: 32-38 months). Out of four hundred and fifty-three (453) patients receiving treatments in Adeoyo, 35.5% of the patients achieved normal blood pressure with the median survival time of 107 months (95% C I: 95-119 months).

Table 4.5: Median Survival Time of Return to Normal BP of Hypertensive Respondents by Location.

Location	N(%)	Achieved normal BP (%)	Did not achieve normal BP (%)	Median survival time (95% C I)
Ajeromi	210(31.6)	89(43.8)	121(56.2)	35(32-38)
Adeoyo	453(68.4)	161(35.5)	292(64.5)	107(95-119)
TOTAL	663(100)	250	413	87(78-100)

Figure 1: Survival curve of Return to Normal BP of hypertensive patients by Location (Ajeromi and Adeoyo)
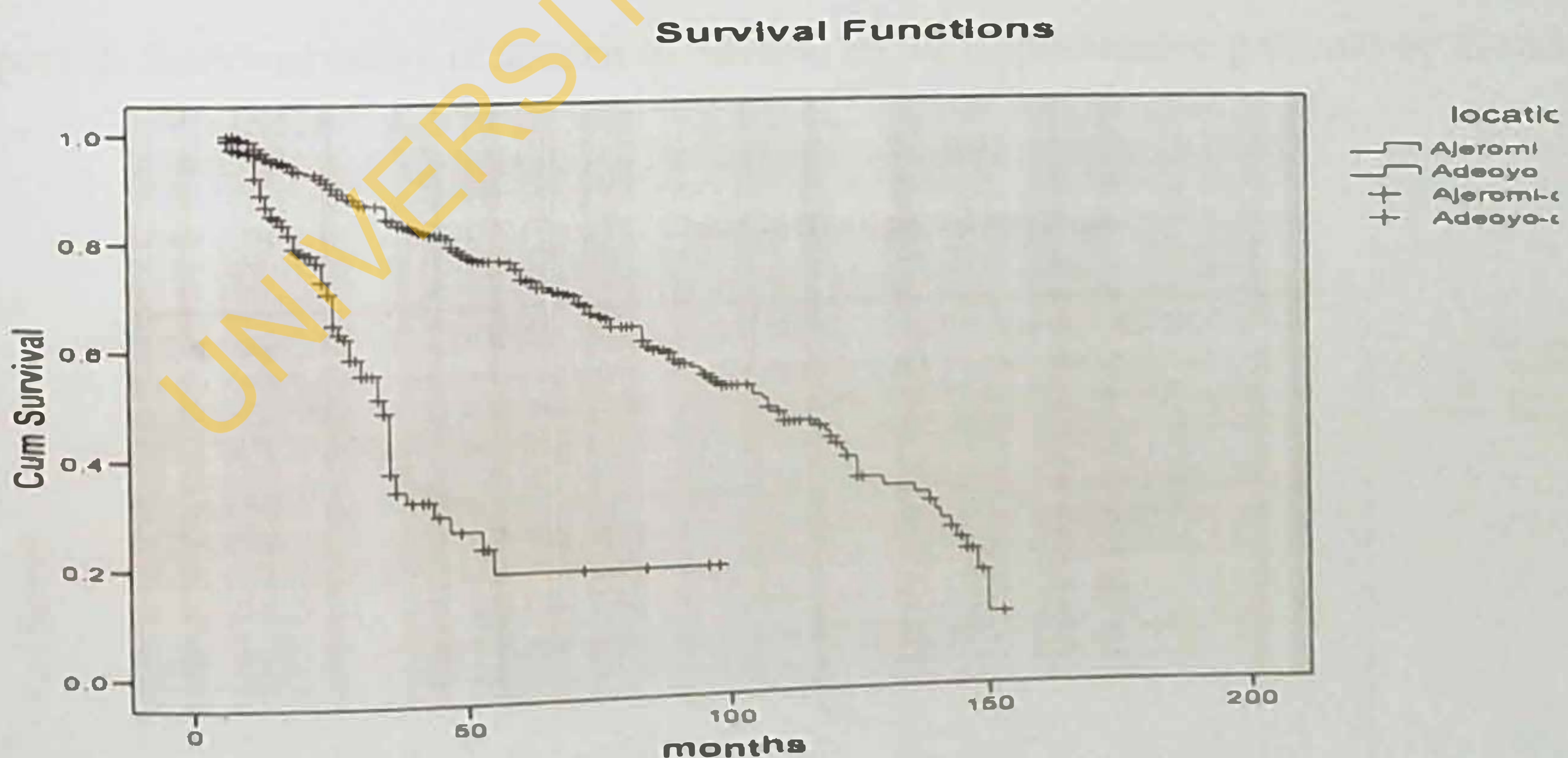
Figure 1, shows the survival curves of hypertensive patients who attained normal blood pressure in Ajeromi and Adeoyo clinics. The curves were Steepy and they crossed each other. This showed that the survivorships of patients in Ajeromi and Adeoyo are statistically significantly different.

Table 4.6 showed that nearly half of the Male patients (40.3%) achieved normal blood pressure while about three-fifths (59.7%) of the male hypertensive patients did not attain normal blood pressure (censored) with median survival time of 74 months (95% CI: 63-85 months). Among the four hundred and three (403) Female Hypertensive patients, one-third (35.9%) of the patients achieved normal blood pressure with median survival time of 99 months (95% C I: 84-114 months).

Table 4.6: Median Survival Time of Return to Normal BP of Hypertensive Patients by Gender.

Gender	N(%)	Achieved normal BP (%)	Did not achieve normal BP (%)	Median survival time (95% C I)
Male	260(39.2)	105(40.3)	155(59.7)	74(63-85)
Female	403(60.8)	145(35.9)	258(64.1)	99(84-114)
Total	663	250	413	87(78-100)

Figure 2: Survival curve of Return to Normal BP of Hypertensive patients by Gender
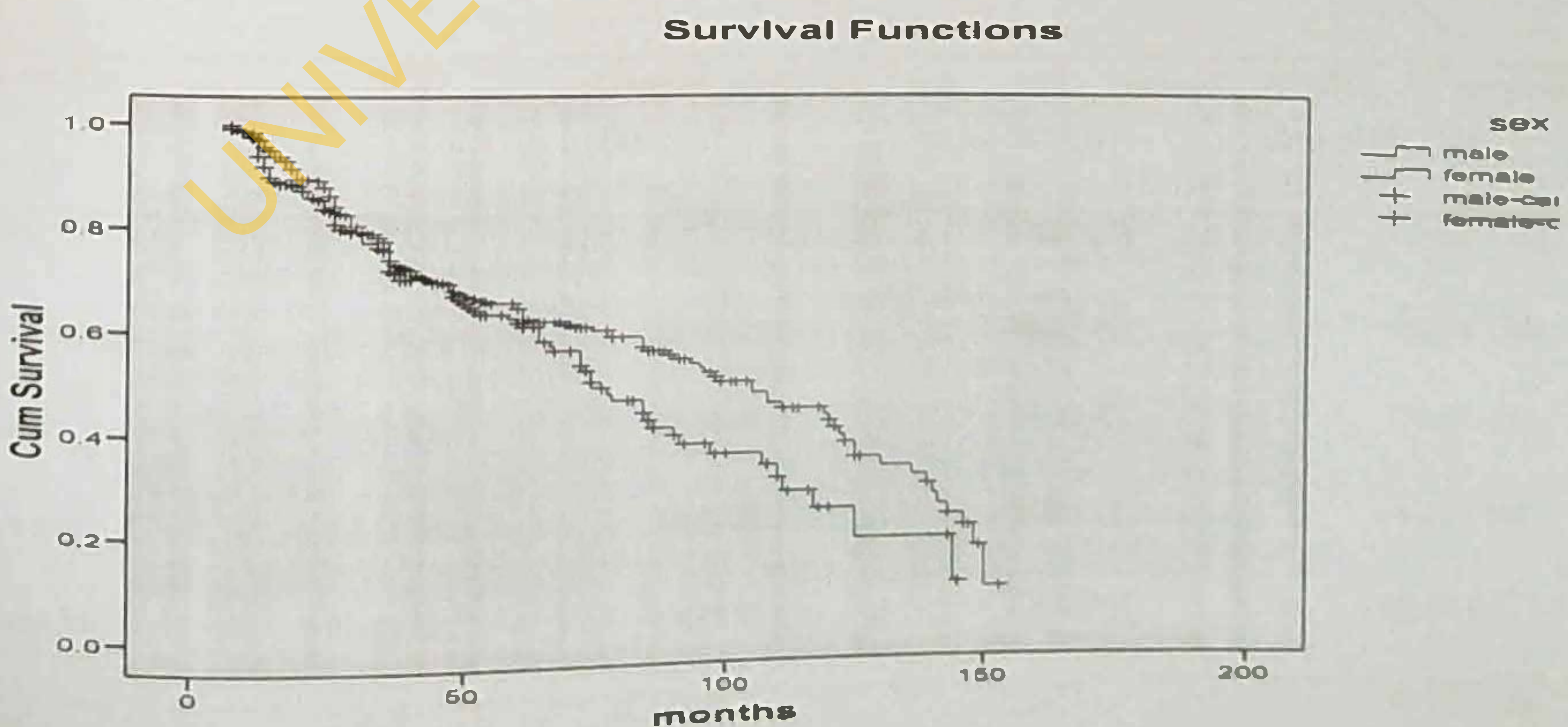

Survival Functions

Figure 2, shows the survival curves of Male and Female hypertensive patients who attained normal blood pressure. The curves were steepy and they crossed each other. This showed that the survivorships of the Male and Female patients are statistically significantly different.

In Table 4.7, the median survival time among hypertensive Traders who attained normal blood pressure was 97 months (95% C I: 82-112 months), 35.7% of the patients attained normal blood pressure and more than half (64.3%) did not attain normal blood pressure (censored). Out of one hundred and seven (107) hypertensive patients who were Civil servants, majority (59.9%) of the patients did not attained normal blood pressure (censored) while 40.1% of the patients achieved normal blood pressure with median survival time of 96 months (95% C I: 78-114 months). Among fifty-nine (59) Artisans, 38.9% of the patients achieved normal blood pressure while 61.1% of the patients did not attain normal blood pressure (censored) with median survival time of 77 months (95% C I: 53-100 months). Pensioners constituted 13.4% of all hypertensive patients, majority (64.1%) of the patients did not achieve normal blood pressure (censored), almost half (35.9%) of the patients achieved normal blood pressure with median survival time of 84 months (95% C I: 64-100 months). Among ninety-two (92) hypertensive patients who were Housewives, over half (57.7%) of the patients did not attain normal blood pressure (censored) while 42.3% of the patients achieved normal blood pressure with median survival time of 36 months (95% C I: 32-40 months).

Table 4.7: Comparison of The Median Survival Time of Return to Normal BP of Hypertensive respondents by Occupation.

Occupation	N(%)	Achieved normal BP (%)	Did not achieve normal BP (%)	Median survival time (95% C I)
Trader	316(47.6)	113(35.7)	203(64.3)	97(82-112)
Civil servant	107(16.1)	43(40.1)	64(59.9)	96(78-114)
Artisan	59(8.8)	23(38.9)	36(61.1)	77(53-100)
Pensioner	89(13.4)	32(35.9)	57(64.1)	84(64-104)
Housewife	92(13.8)	39(42.3)	53(57.7)	36(32-40)
Total	663	250	413	87(78-100)

Figure 3: Survival Curve of Return to Normal Blood Pressure of Hypertensive Respondents by Occupation
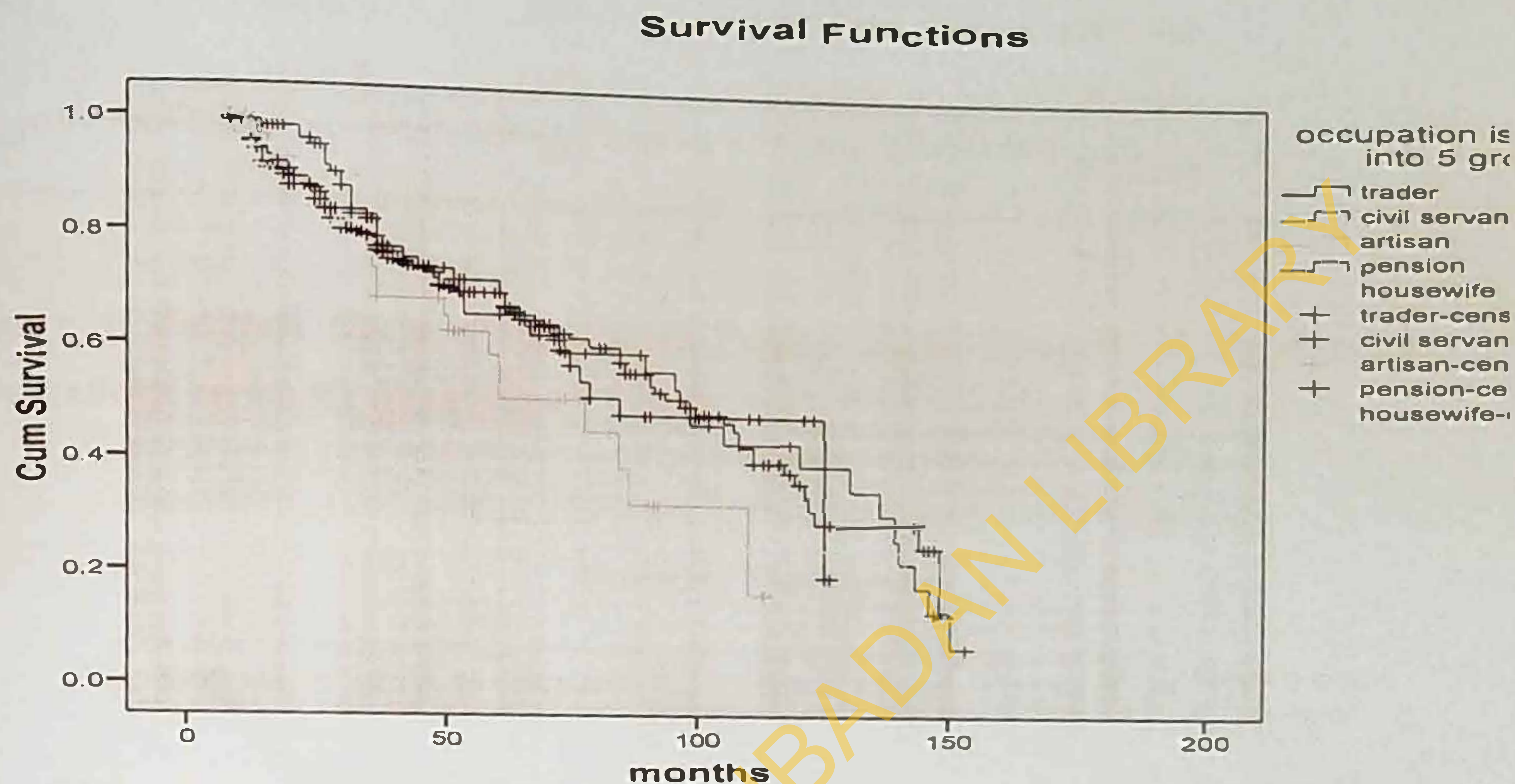

Survival Functions

Figure 3, shows the survival curves of hypertensive patient across the Age groups 60+, 50-59 and younger than 50, who achieved normal blood pressure. The curves were steepy and they crossed each other. This showed that the survivorships of patient aged 60+, among patients aged 50-59 and among patients younger than 50years are statistically significantly different.

Table 4.8 showed that 40.5% hypertensive patients achieved normal blood pressure among one hundred and forty-eight (148) in age group below 50 with median survival time of 90 months (95% C I: 67-113 months). Out of the two hundred and four (204) hypertensive patients in age group 50-59, majority (63.3%) of the patients did not attain normal blood pressure while 36.7% of the patients attained normal blood pressure with the highest median survival time of 108 months (95% C I: 79-136 months). The median survival time of hypertensive patient aged 60+ was 78 months (95% C I: 66-90 months), higher proportion (63.1%) of the patients did not achieve normal blood pressure (censored) while 36.9% achieved normal blood pressure (observed).

Table 4.8: Age Comparison of the Median Survival Time of Return to Normal BP of Hypertensive Respondents.

Age	N (%)	Achieved normal BP (%)	Did not achieve normal BP (%)	Median survival time (95% C I)
Below 50	148(22.3)	60(40.5)	88(59.5%)	90(67-113)
50-59	204(30.7)	75(36.7)	129(63.3)	108(79-136)
60+	311(46.9)	115(36.9)	196(63.1)	78(66-90)
Total	663	250	413	87(78-100)

Figure 4: Survival Curve of Return to Normal Blood Pressure of Hypertensive Respondents across the Age groups

Survival Functions
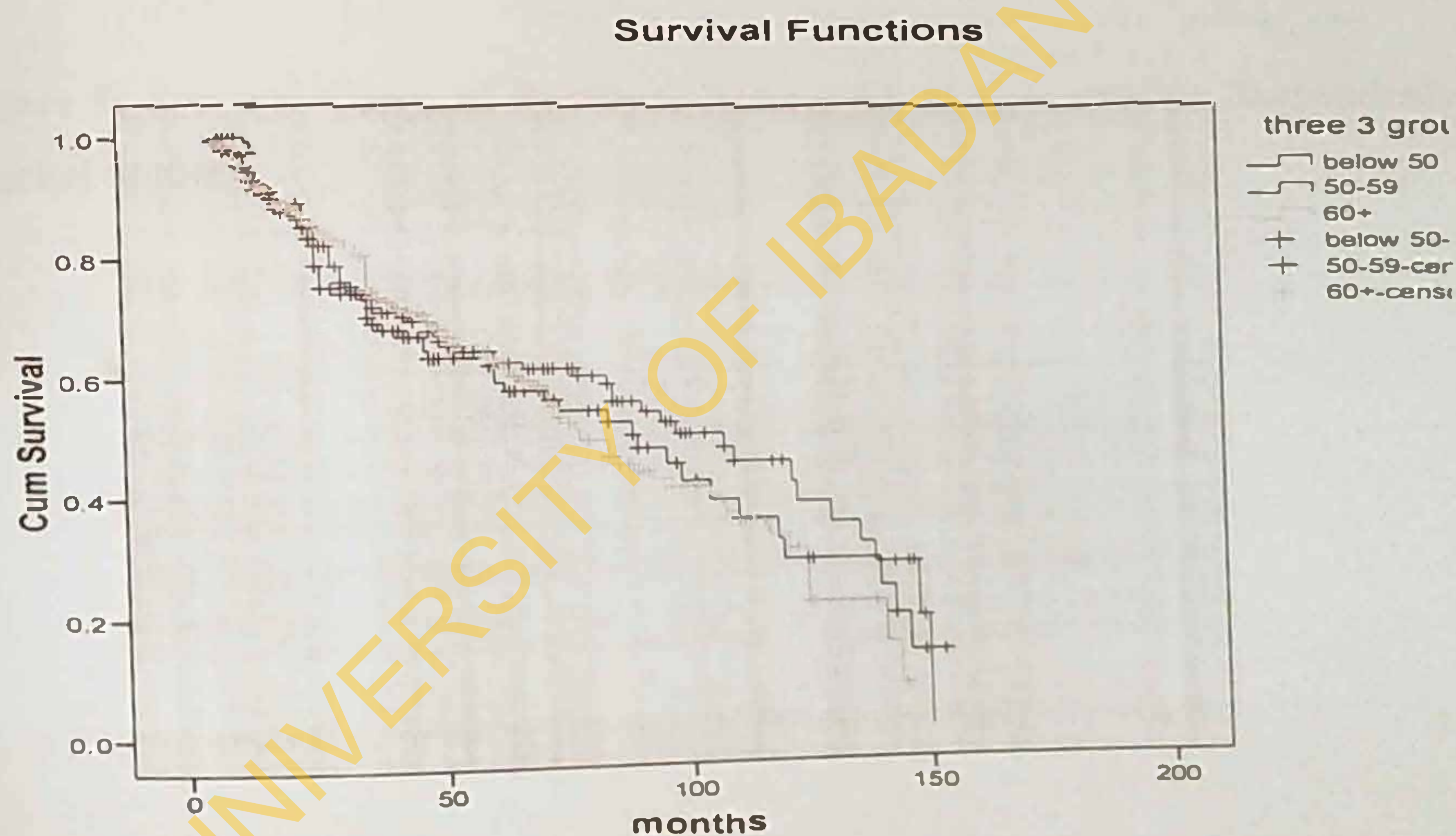
Figure 4, shows the survival curves of hypertensive patient across the age groups (60+, 50-59 and below 50) who achieved normal blood pressure. The curves were steepy and they crossed each other. This showed that the survivorships of patients who were aged 60+, among patients aged 50-59 and patients younger than 50years are statistically significantly different

In Table 4.9, among the 91.8% of hypertensive patients who were currently married, higher proportion (62.4%) of the patients did not attain normal blood pressure while 37.6% of the

patients attained normal blood pressure with median survival time of 86 months (95% C I: 75-97 months). The median time of not currently married was 119 months (95% C I: 22-216 months) and 38.8% of the patients achieved normal blood pressure (observed) while majority (61.2%) of the patients did not attain normal blood pressure (censored).

Table 4.9: Comparison of Median Survival Time of Return to Normal Blood Pressure of Hypertensive Respondents by Marital Status

Marital Status	N(%)	Achieved normal BP (%)	Did not achieve normal BP (%)	Median survival time (95% C I)
Currently married	609(91.8)	229(37.6)	380(62.4)	86 (75-97)
Not currently married	54(8.2)	21(38.8)	33(61.2)	119(22-216)
Total	663	250	413	87(78-100)

Figure 5: Survival Curve of Return to Normal BP of Hypertensive Respondents by Marital Status.

patients attained normal blood pressure with median survival time of 86 months (95% C I: 75-97 months). The median time of not currently married was 119 months (95% C I: 22-216 months) and 38.8% of the patients achieved normal blood pressure (observed) while majority (61.2%) of the patients did not attain normal blood pressure (censored).

Table 4.9: Comparison of Median Survival Time of Return to Normal Blood Pressure of Hypertensive Respondents by Marital Status

Marital Status	N(%)	Achieved normal BP (%)	Did not achieve normal BP (%)	Median survival time (95% C I)
Currently married	609(91.8)	229(37.6)	380(62.4)	86 (75-97)
Not currently married	54(8.2)	21(38.8)	33(61.2)	119(22-216)
Total	663	250	413	87(78-100)

Figure 5: Survival Curve of Return to Normal BP of Hypertensive Respondents by Marital Status.
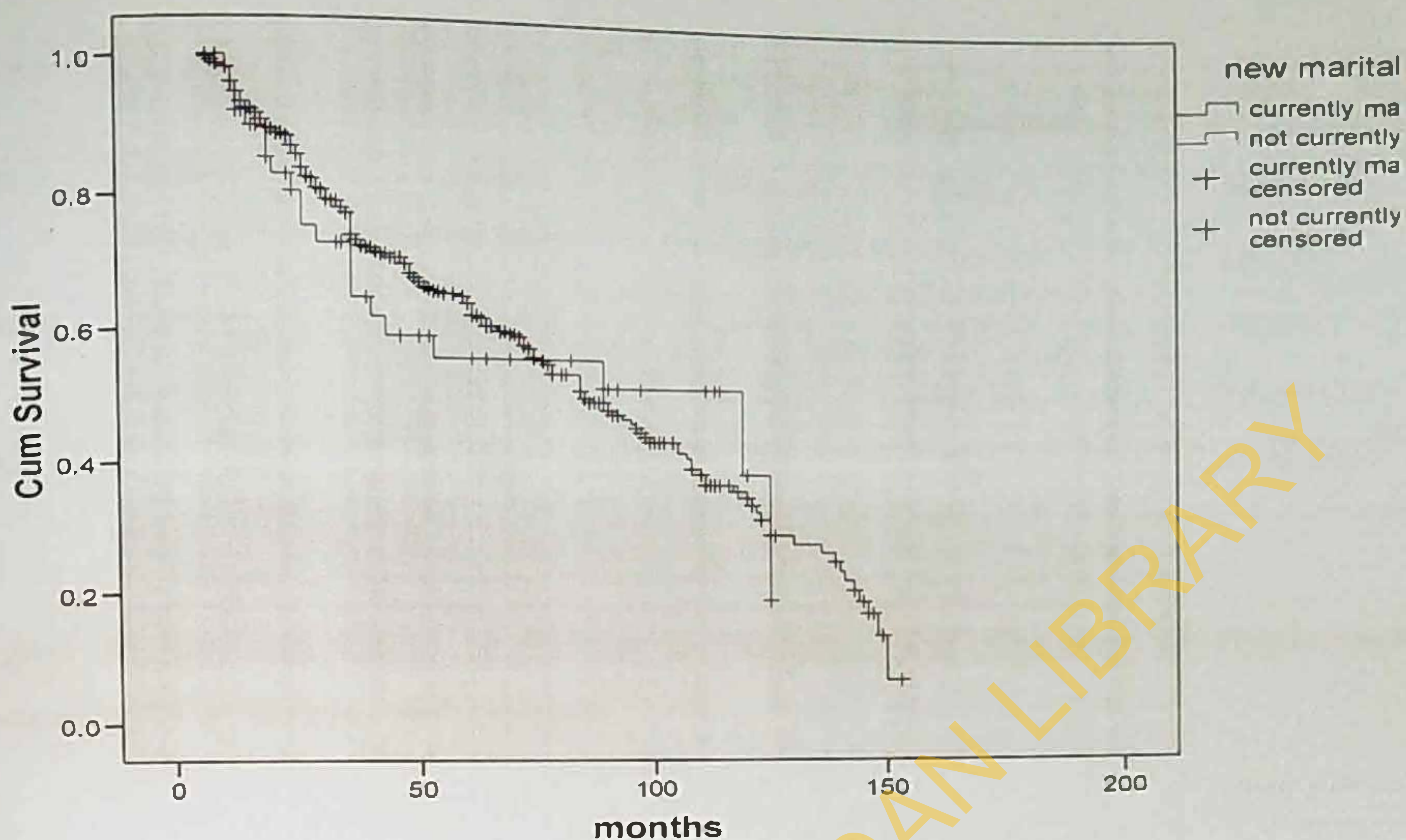
Survival Functions

Figure 5, shows the survival curves of currently married and not currently married of hypertensive respondents who achieved normal blood pressure. The curves were steepy and they crossed each other. This showed that the survivorships of currently married and not currently married are statistically significantly different.

Table 4.10 reveals that in Ajeromi, out of the sixty-six (66) male hypertensive respondents, higher proportion (56.1%) of the patients did not attain normal blood pressure (censored) while 43.9% of the patients attained normal blood pressure with median survival time of 36 months (95% C I: 28-44 months), among the one hundred and forty-four (144) female patients, over half (58.4%) of the patients did not attain normal blood pressure while about two-fifth (41.6%) of the patients achieved normal blood pressure with median survival time of 84 months (95% C I: 71-97 months). In Adeoyo, among the two-hundred and fifty-nine (259) female hypertensive patients, majority (67.2%) of the patients did not achieve normal blood pressure while 32.8% of the patients achieved normal blood pressure with median survival time of 121 months (95% C I: 109-133 months) , out of almost two-hundred (194) male hypertensive patients, 39.1% achieved normal blood pressure with median survival time of 84 months (95% C I: 71-97 months).

Table 4.10: Comparison of Median Survival Time of Return to Normal BP of Hypertensive Respondents by Location and Gender.

Gender	Location	N (%)	Achieved normal BP (%)	Did not achieve normal BP (%)	Median survival time/ (95% C I)
Male	Ajeromi	66(9.9)	29(43.9)	37(56.1)	36(28-44)
	Adeoyo	194(29.3)	76(39.1)	118(60.9)	84(71-97)
Female	Ajeromi	144(21.7%)	60(46.1)	84(58.4)	35(32-38)
	Adeoyo	259(39.1)	85(32.8)	74(67.2)	121(109-133)
Total		663	250	413	87(78-100)

Figure 6: Survival Curve of Return to Normal Blood Pressure of Hypertensive Respondents by Gender and Location

Survival Functions

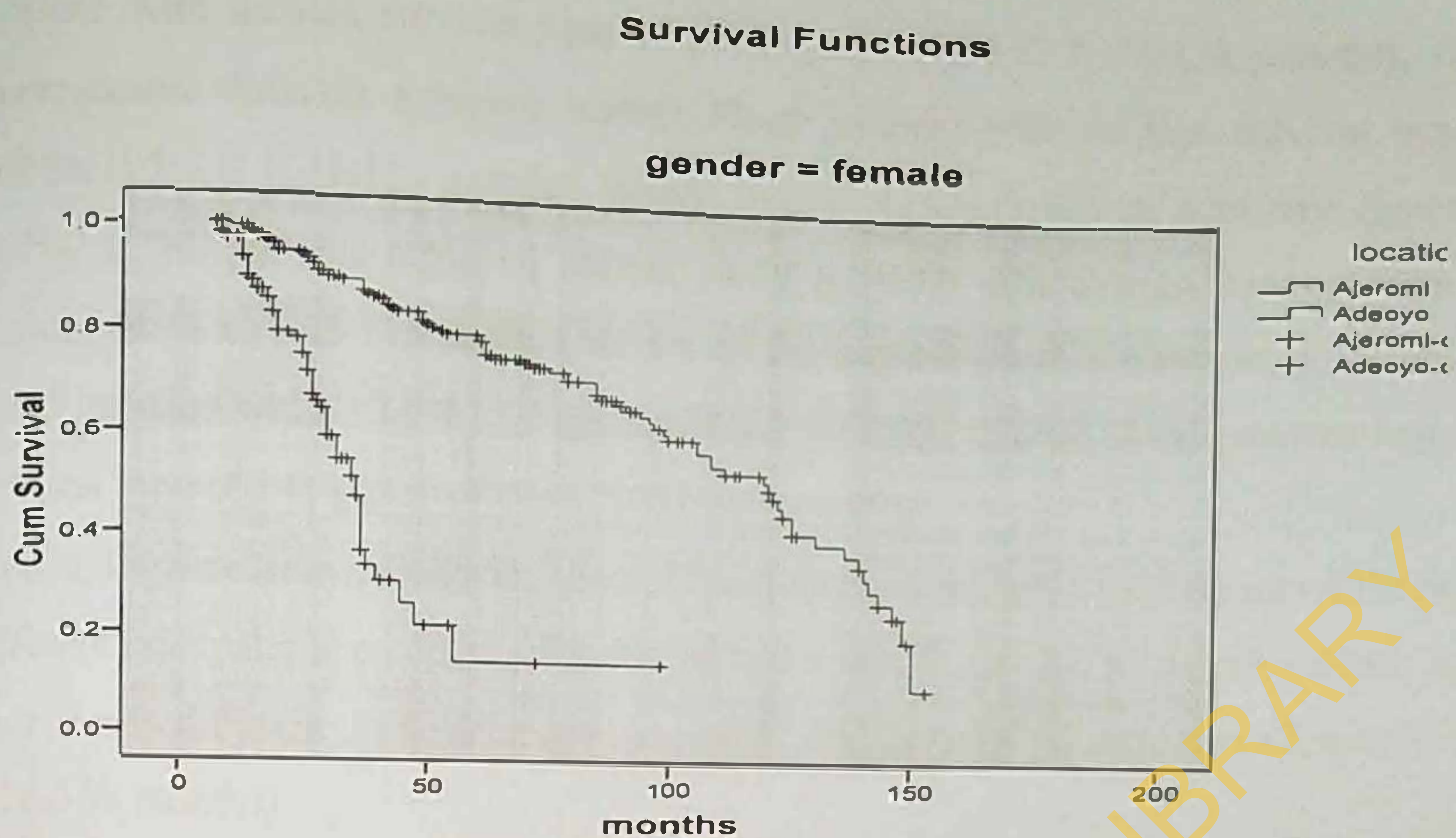gender = male

Survival Functions

gender = female
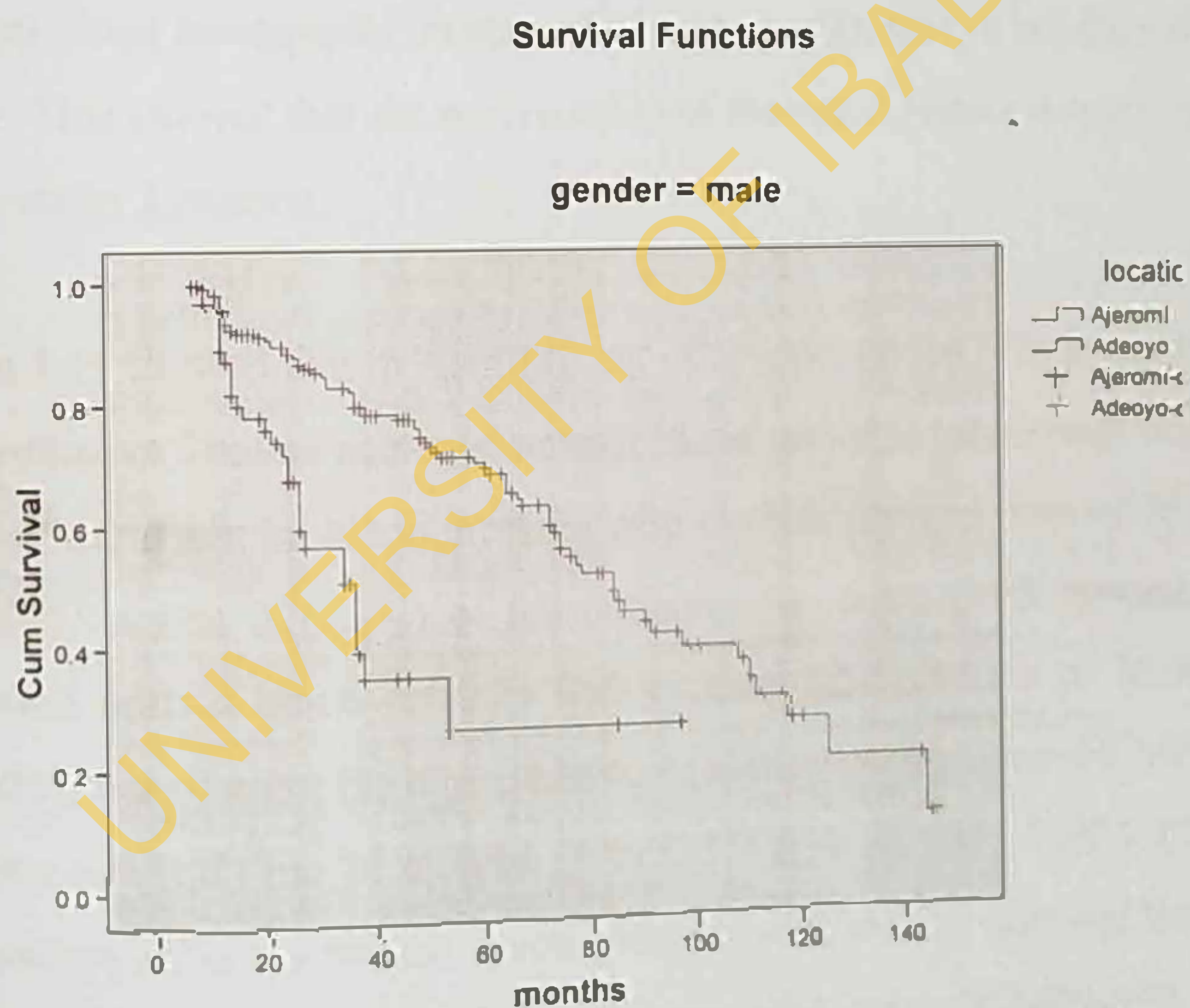
Figure 6, shows the survival curves of Male and Female hypertensive patients who achieved normal blood pressure by location. The curves were steepy but they did not crossed over each other. This showed that the survivorship of male and female are not statistically significantly different by Location.

Table 4.11 showed that in Ajeromi, out of seventy-seven (77) hypertensive patients, 37.6% of Hypertensive Traders achieved normal blood pressure (observed) while 62.4% of the patients did not attain normal blood pressure with median survival time of 36 months (95% C I: 27-45 months), among 22(3.3%) of the patients who were Civil servants, exactly half 11(50%) achieved normal blood pressure with median survival time of 36 months (95% C I: 29-43 months), out of eight (8) hypertensive Artisans 4(50%) achieved normal blood pressure with median survival time 24 months (95% C I: 12-36 months), half 12(50%) of the hypertensive Pensioners achieved normal blood pressure with median survival time of 34 months (95% C I: 28-40 months), 41.7% of the patients who were Housewives achieved normal blood pressure while 58.3% of the patients did not attain normal blood pressure with median survival time 35 months (95% C I: 31-39 months).

In Adeoyo, among the two-hundred and thirty-nine (239) Hypertensive Traders, majority (64.9%) did not achieve normal blood pressure while 35.1% of the patients attained normal blood pressure with median survival time of 107 months (95% C I: 93-121 months), among

eighty-five (85) Hypertensive Civil servants, 37.6% of the patients achieved normal blood pressure with median survival time of 105 months (95% C I: 72-138 months), 37.2% of Hypertensive Artisans achieved normal blood pressure with median survival time of 77 months (95% C I: 41-113 months), among sixty-five (65) Pensioner who were hypertensive, 30.7% of the patients achieved normal blood pressure with median survival time of 125 months (95% C I 95-115months), 46.1% of the hypertensive Housewives achieved normal blood pressure while 53.9% of the patients did not attain normal blood pressure with median survival time of 141 months (95% C I: 42-239 months).

Hence, hypertensive patients in Ajeromi had a much more better median survival time across different occupations compare with that of hypertensive patients in Adeoyo which was very poor across different occupation and the overall median survival time was 87 months (95% C I: 78-100 months)

Table 4.11: Comparison of Median Survival Time of Return to Normal Blood Pressure of Hypertensive Respondents by Occupation and Location.

Occupation	Location	N (%)	Achieved normal BP (%)	Did not achieve Normal BP (%)	Median survival Time (95% C I)
Trader	Ajeromi	77(11.6)	29(37.6)	48(62.4)	36(27-45)
	Adeoyo	239(36.0)	84(35.1)	155(64.9)	107(93-121)
Civil servant	Ajeromi	22(3.3)	11(50)	11(50)	36(29-43)
	Adeoyo	85(12.8)	32(37.6)	53(62.4)	105(72-138)
Artisan	Ajeromi	8(1.2)	4(50)	4(50)	24(12-36)
	Adeoyo	51(7.6)	19(37.2)	32(62.8)	77(41-113)
Pensioner	Ajeromi	24(3.6)	12(50)	12(50)	34(28-40)
	Adeoyo	65(9.8)	20(30.7)	45(69.3)	125(95-115)
Housewife	Ajeromi	79(11.9)	33(41.7)	46(58.3)	35(31-39)
	Adeoyo	13(1.9)	6(46.1)	7(53.9)	141(42-239)
Total	Ajeromi	210(31.6)	89(43.8)	121(56.2)	35(32-38)
	Adeoyo	453(68.4)	161(35.5)	292(64.5)	107(95-119)

Figure 8: Survival Curves of Return to Normal BP Hypertensive patients By Location and Occupation.

Survival Functions

occupation5 = trader

Survival Functions

occupation5 = civil servant

Survival Functions

occupation5 = artisan

Survival Functions

occupation5 = pension

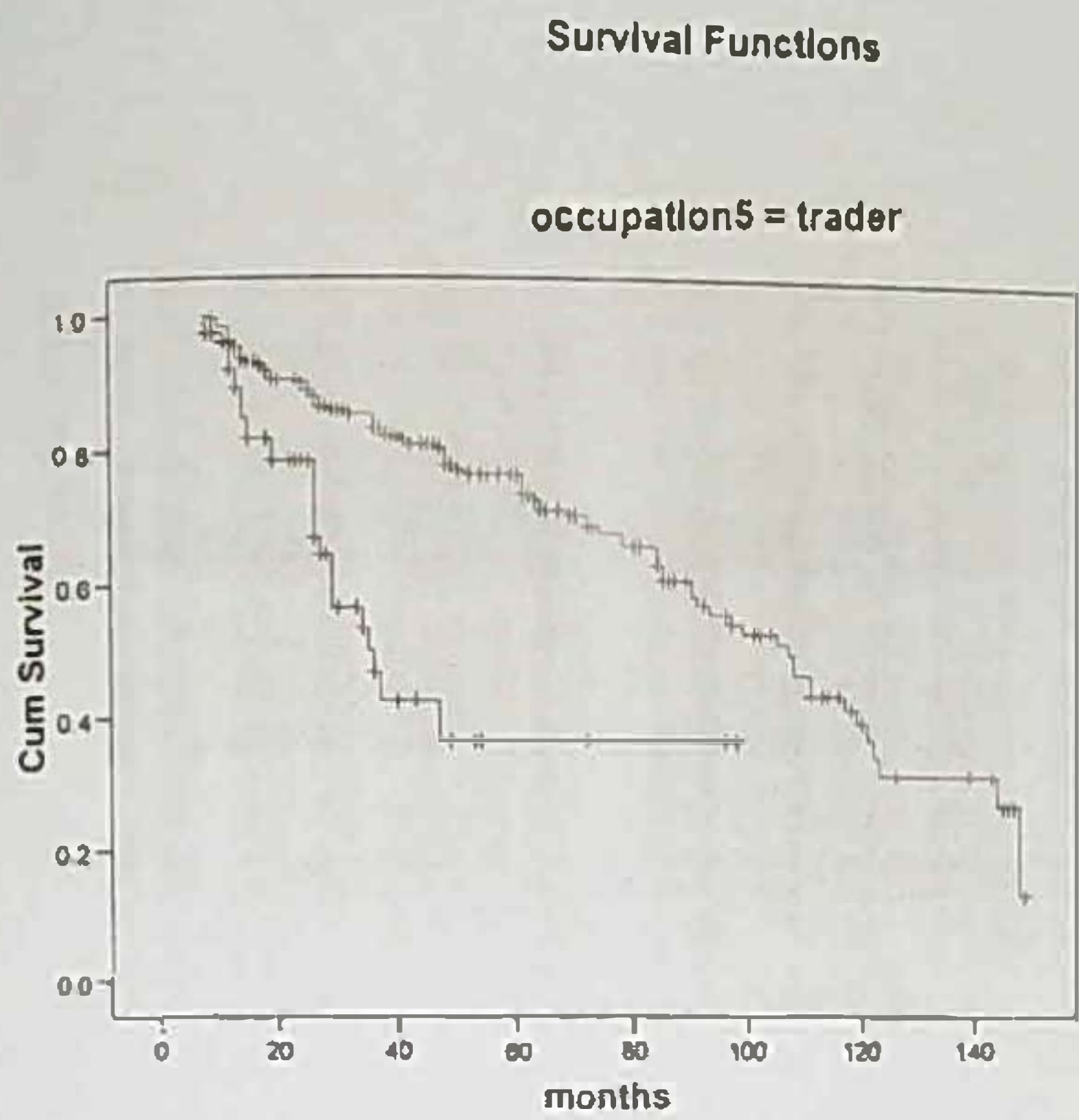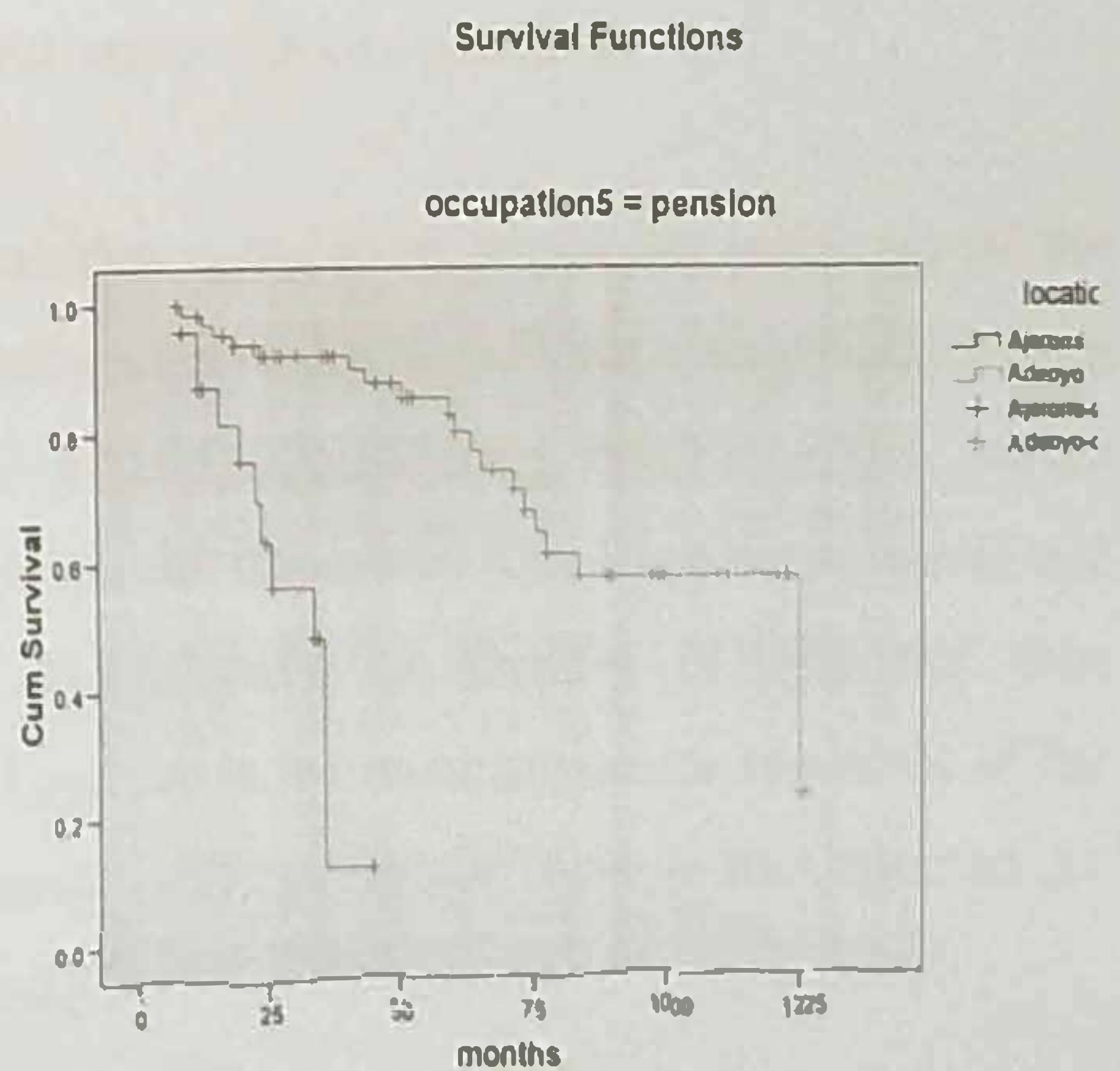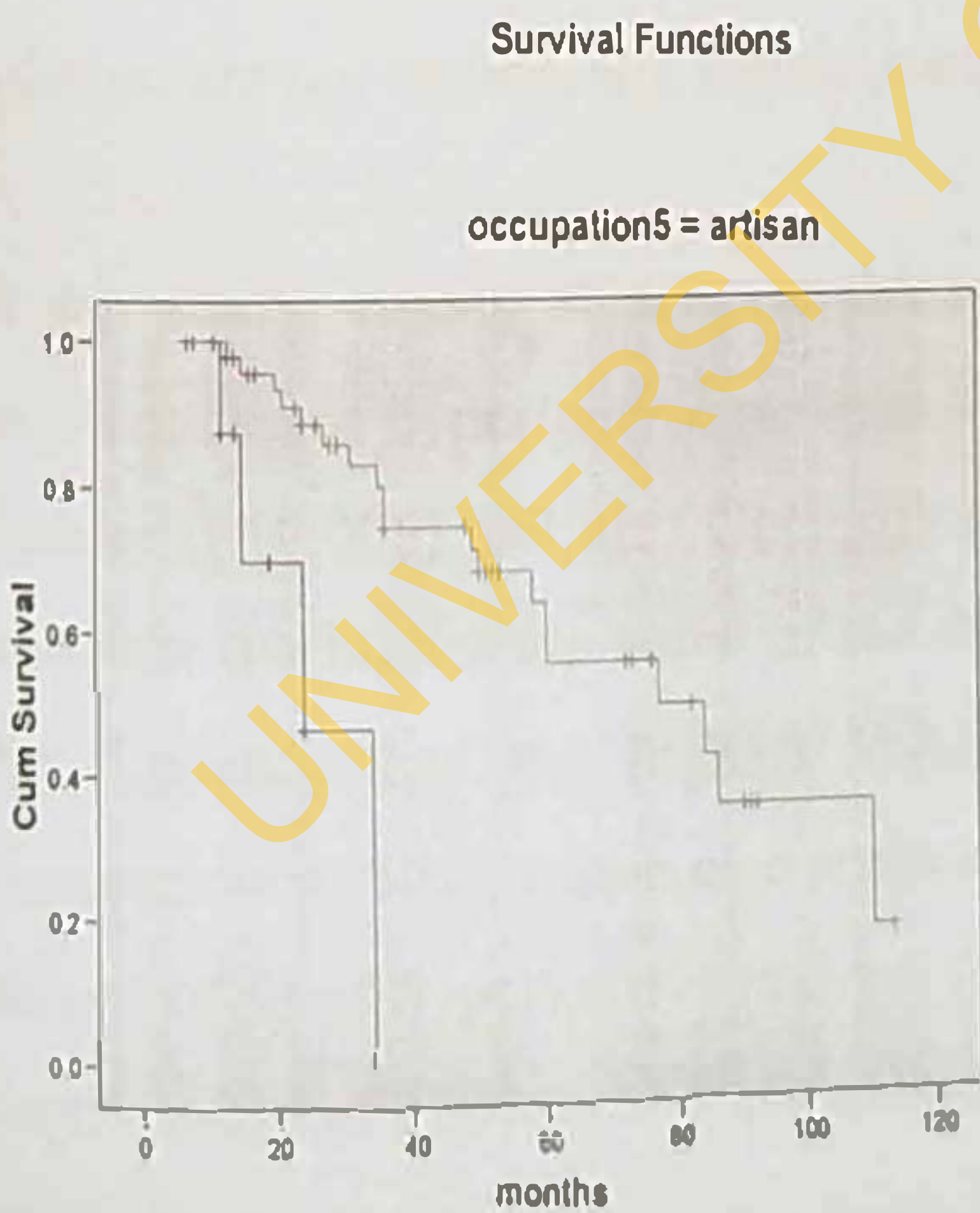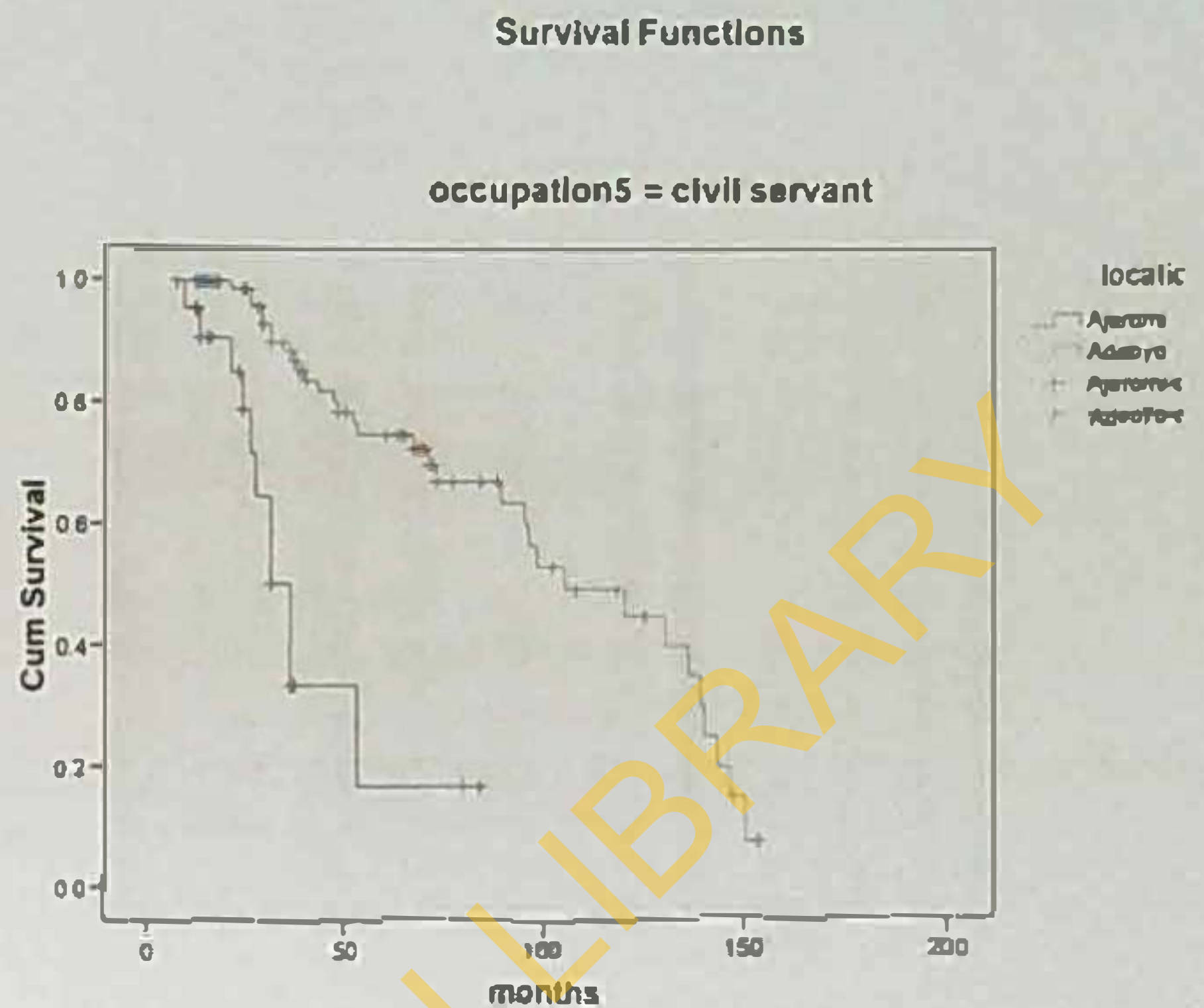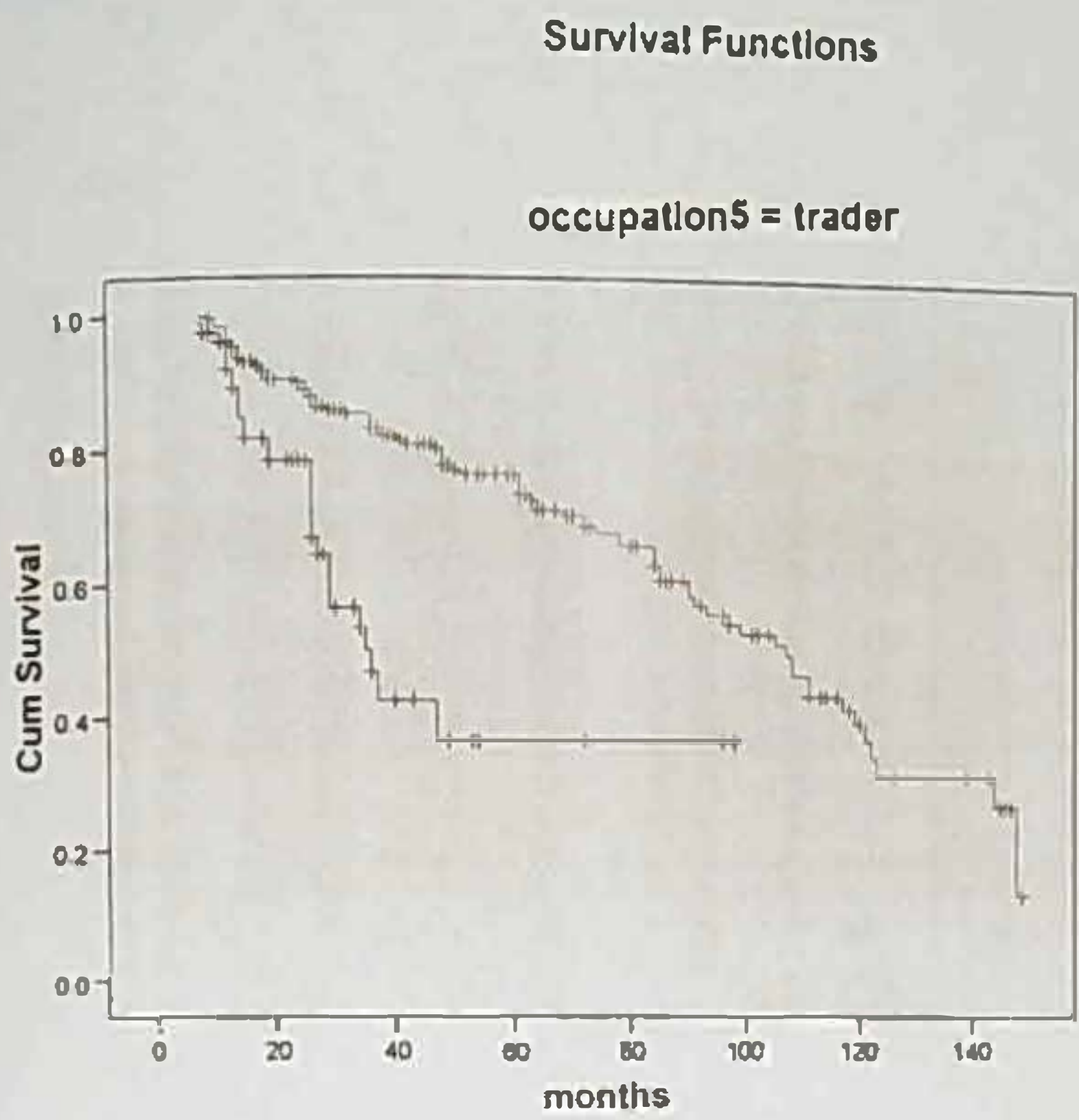# Figure 8: Survival Curves of Return to Normal BP Hypertensive patients By Location and Occupation.

Survival Functions

occupation5 = housewife
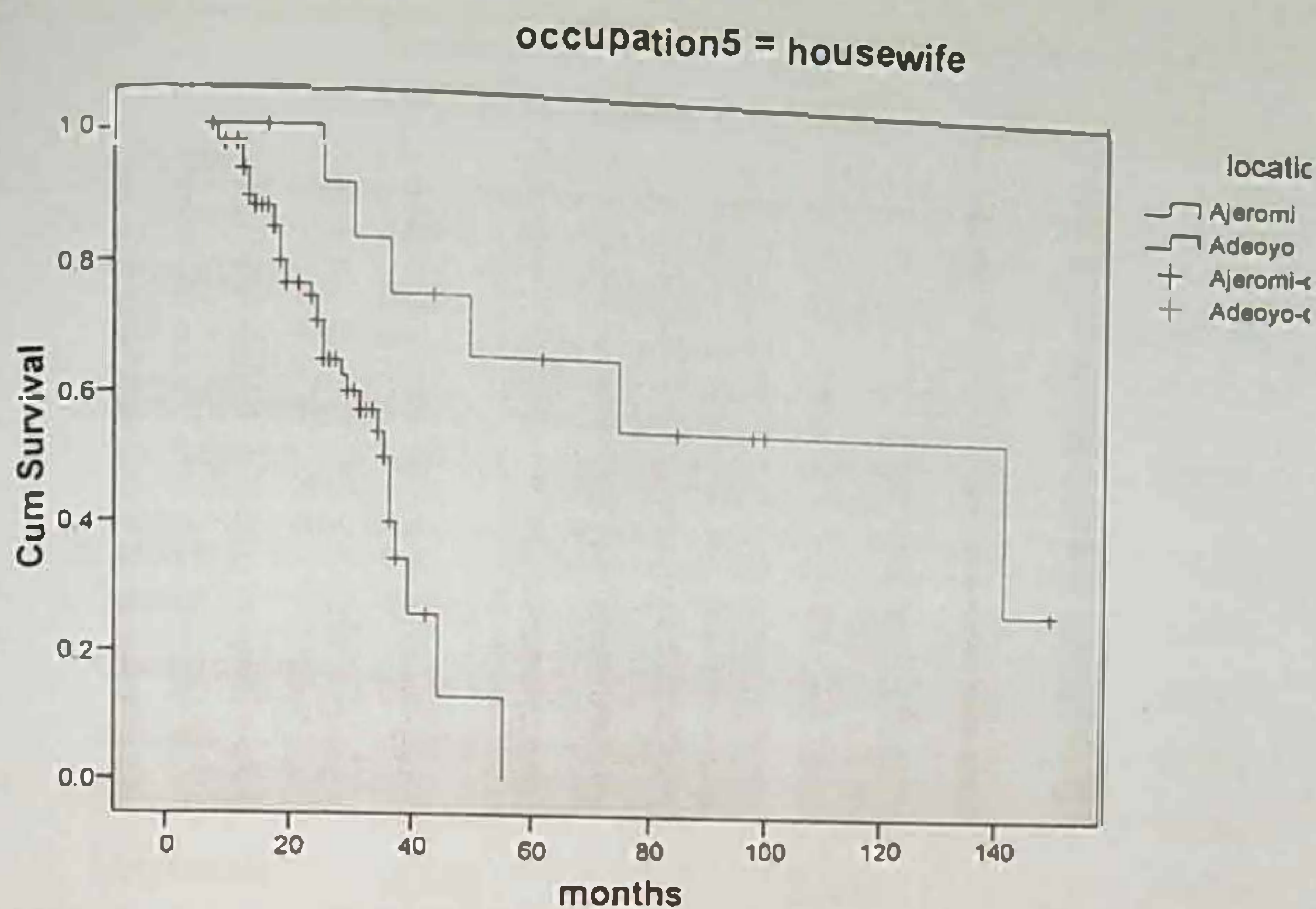
Figure 8 shows that all the survival curves of hypertensive patients across the Occupations (Traders, Civil servants, Artisan, Pensioners and Housewives) that attained normal blood pressure by Location (Ajeromi and Adeoyo). The curves were steepy but they did not crossed over one another. This showed that the survivorships of hypertensive patients in Ajeromi and Adeoyo are not statistically significantly different across the Occupations.

In this study, among all the variables used, Location is the most important predictor of the survivorship of hypertensive patients as it is highly statistically significant with p=0.000, then Gender (p=0.006) and also Occupation (0.034) (p<0.05). Considering Wald statistics, which says that the higher the value of the factor/variable, the important it is a predictor, we found that Location has the highest value (169.499), followed by Gender (5.542) and then Occupation (0.502), which also supported that Location is the most important Predictor of the survivorship of hypertensive patients (i.e. the most significant factor/variable that affected the survivorship of hypertensive patients) in this study.

Hence, the variables that the affected the survivorship of hypertensive patients in this study according to their level of statistical significance were Location, Gender and Occupation and that hazard is not proportional from the survival curves.

Table 4.12: Factors/Variables Affecting the Median Survival Time to Return to Normal BP of Hypertensive.

Variable	Hazard ratio (B)	SE	Wald	Df	Sig.	Exp(B)	95.0% C I for Exp (B)	
							Lower	Upper
Sex Male	1.000							
Female	0.205	0.087	5.542	1	0.019	1.227	1.035	1.455
Location Ajeromi	1.000							
Adeoyo	1.349	0.104	169.499	1	0.000	3.854	3.146	4.722
Occupation Trader	1.000		10.404	4	0.034			
Civil servant	-0.124	0.132	0.883	1	0.347	0.883	0.681	1.145
Artisan	-0.253	0.155	2.669	1	0.102	0.777	0.573	1.052
Pensioner	0.249	0.188	1.750	1	0.186	1.283	0.887	1.856
Housewife	-0.118	0.167	0.502	1	0.479	0.889	0.641	1.232

Respondents.

4.4 Drug Combination and Their Effectiveness on Hypertensive Patients.

Only 2.5% of the hypertensive patients that took mono-therapy had an average blood pressure of 175.00/100.38mmHg at presentation to the clinic and by the end of the study, it had dropped to 148.46/89.62mmHg. About 7.3% took bi-therapy with mean blood pressure that fell from 171.70/104.15mmHg at presentation to 149.15/86.17mmHg by the end of the study. Hypertensive patients who took three drugs only were found to be 16.5% with mean blood pressure falling from 175.41/103.68mmHg at presentation to 153.18/88.09mmHg at the end of the study. Among the one hundred and twenty-nine (129) of patients who used four drug combinations their blood pressure was reducing from 173.76/102.13mmHg at presentation to 153.72/89.96mmHg at the end of the study.

Majority (20.5%) of the hypertensive patients who took penta-therapy had blood pressure reduction from 177.87/104.71mmHg at presentation to 150.70/87.98mmHg at the end of the study. Almost seventeen per cent (16.8%) of the hypertensive patients who took Sex-therapy had blood pressure falling from 174.06/102.63mmHg at presentation to 157.90/90.36mmHg at the end of the study. Over ten per cent (10.2%) of the hypertensive patients who used seven drug combinations had blood pressure reduction from 174.71/102.87mmHg at presentation to 152.06/87.43mmHg at the end of the study. Eight drug combinations were taken by 6.3% of hypertensive patients and their blood pressure reduced from 170.60/100.12mmHg at presentation to 150.19/90.24mmHg at the end of the study.

Table 4.13 Drug Effectiveness at Presentation to the Clinic and at the End of The Study.

rug combination	N (%)	At presentation to the clinic		At the end of the study	
		Mean BP Systolic	Mean Diastolic BP	Mean Systolic BP	Mean Diastolic BP
ono-therapy	17(2.5)	175.00	100.38	148.46	89.62
i-therapy	49(7.3)	171.70	104.15	149.15	86.17
ri-therapy	110(16.5)	175.41	103.68	153.18	88.09
etra-therapy	129(19.4)	173.76	102.13	153.72	89.96
enta-therapy	136(20.5)	177.87	104.71	150.70	87.98
ex-therapy	112(16.8)	174.06	102.63	157.90	90.36
epta-therapy	68(10.2)	174.71	102.87	152.06	87.43
cta-therapy+	42(6.3)	170.60	100.12	150.19	90.24
-ratio		0.619	0.624	1.044	0.399
- value		0.740	0.736	0.912	0.497

Table 4.14: Anova Table At Presentation To The Clinic

		Sum of Squares	df	Mean Square	F	Sig.
Systolic blood pressure	Between Groups	2710.665	7	387.238	.619	.740
	Within Groups	405834.388	649	625.323		
	Total	408545.053	656			
Diastolic blood pressure	Between Groups	1056.956	7	150.994	.624	.736
	Within Groups	157088.098	649	242.046		
	Total	158145.053	656			

Table 4.15: Anova Table At The End Of The Study

		Sum of Squares	df	Mean Square	F	Sig.
Systolic blood pressure	Between Groups	4830.583	7	690.083	1.044	.399
	Within Groups	428950.306	649	660.940		
	Total	433780.889	656			
Diastolic blood pressure	Between Groups	1141.363	7	163.052	.912	.497
	Within Groups	116084.512	649	178.867		
	Total	117225.875	656			

The difference in the systolic and diastolic blood pressure of hypertensive patients at presentation and at the end of the study on the basis of drug combination taken during the

follow-up showed that the systolic and the diastolic blood pressure are not statistically significantly different (P>0.05).

CHAPTER FIVE

DISCUSSION, CONCLUSION AND RECOMMENDATION

5.1 Discussion

5.1.1 Survivorship of Hypertensive Patients

This study investigated the survivorship of hypertensive patients from time of presentation to the clinic and to the time they achieved normal blood pressure. The findings of this study showed that the overall median survival time of Hypertensive patients was 87 months (95% C I: 78- 100 months) which was contrary to the findings of Schuster Cornelia et.al (2012) that the overall median survival time of hypertensive patients was 9 months (95% C I: 1.12–49 months) and the findings of Osterlund P. et.al (2010) that the overall median survival of hypertensive patients was 18.9 months (95% C I: 15.1–22.7 months). This was possible in other studies because the patients embraced a good lifestyle of maintaining a moderate weight, reduced intake of salt, doing regular exercises.

5.1.2 Factors Affecting the Survivorship of Hypertensive Patients.

From the findings of this study, the factors that affected the survivorship of hypertensive respondents were Location, Gender and Occupation. This was in contrast with the findings of Osterlund P. et.al (2010) which revealed that the predictive factors of hypertensive patients were line of treatments, metastatic sites, age, and types of chemotherapy. The findings of Schuster Cornelia et.al (2012) showed that the factor that affected survivorship of hypertensive respondents was treatment used, the result of Selassie Anbesaw et.al (2011) showed that the factors affecting the survivorship of hypertensive respondents were age, baseline blood pressure measurements (systolic and diastolic), overweight, obesity, and diabetes mellitus which was contradicting to the findings from this study.

In this study, level and doses of medications were insignificant to the survivorship of hypertensive respondents that could be the reason why we found a longer median survival time of 87 months (95% C I: 78- 100 months) compared with the findings of Osterlund P. et.al (2010) which was 18.9 months (95% C I: 15.1–22.7 months)

5.1.3 Assessing the Co-Infection of Hypertension and Diabetes Mellitus.

From the findings of this study, the co-infection of diabetes mellitus and hypertension was 27.6%. This was corroborated by the findings of Zachariah M.G et.al (2008) that the co-infection of diabetes mellitus and hypertension was 21.5%.

5.2 Conclusion/ Recommendation

All the hypertensive respondents were under medication, Similar to the documentation in other studies (Tomeckova M. et. Al (2000), Zachariah M.G et.al (2007), Schuster Cornelia et.al (2012)). But the medications were not significant to attainment of normal blood pressure among the respondents in this study.

Despite the increasing prevalence of hypertension across the globe, little or no awareness has taken place to curb future occurrence of hypertension especially in Nigeria. The Nigerian government should try to create awareness and encourage people on dietary control like low salt intake; eat more fruits/vegetables, doing exercise and curb smoking in the public.

In other to effectively control/manage this silent killer "hypertension" and it consequences such as Diabetes mellitus, stroke, blindness and the likes further studies should be done and checks need to be put in place like regular blood pressure checks at home or in the clinics/ at social workers places. Similarly, Mass media should lay more emphasis to avoid hypertension and its complications.

Programs that focus on avoiding hypertension and encouraging hypertensive respondents that normal blood pressure can be achieved if certain precautions are taken should be done. In fact, it can be concluded that programs should aim to avoid hypertension and encourage the achieving of normal blood pressure by focusing on all these identified predictor so as to improve people's quality of life. Awareness, treatment and control of hypertension were generally low with attendant high burden of hypertension related complications.

The study concluded that Location, Occupation and Gender affected the survivorship of hypertensive patient using Cox Hazard Proportional Regression. The time to attainment of normal blood pressure shorter in hypertensive patients in Ajeromi General Hospital. Ajegunle compared patients in Ringroad State Hospital, Adeoyo

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SURVIVAL ANALYSIS OF TIME TO ACHIEVE NORMAL BLOOD PRESSURE IN HYPERTENSIVE PATIENTS IN SOUTHWEST NIGERIA.

Serial number   ....

Hospital number   ....

SOCIO-DEMOGRAPHIC AND SOCIO-ECONOMIC CHARACTERISTICS

1. Age at presentation
2. Gender
3. State of origin/Residential area
4. Tribe
5. Religion
6. Occupation
7. Marital status.

CLINICAL DIAGNOSIS

1. Adherence to medication?

   a. Yes   b. No

2. What kind of medication?

   a. Drug   b. Life style   c. Both   d. None

   b. Did you develop diabetes?

   c. Systolic blood pressure I at presentation and date

   d. Diastolic blood pressure I at presentation and date

   e. Systolic blood pressure II with date

   f. Diastolic blood pressure II with date

   g. Systolic blood pressure III with date

   h. Diastolic blood pressure III with date

   i. Systolic blood pressure IV with date

   j. Diastolic blood pressure IV with date

   k. Systolic blood pressure V with date

   l. Diastolic blood pressure V with date

   m. Do you take any of this anti-hypertensive drugs

        a. Aldoment   b. Moduretic   c. Vasoprin   d. Lisopril   e. Lexotan

40

SURVIVAL ANALYSIS OF TIME TO ACHIEVE NORMAL BLOOD PRESSURE IN HYPERTENSIVE PATIENTS IN SOUTHWEST NIGERIA.
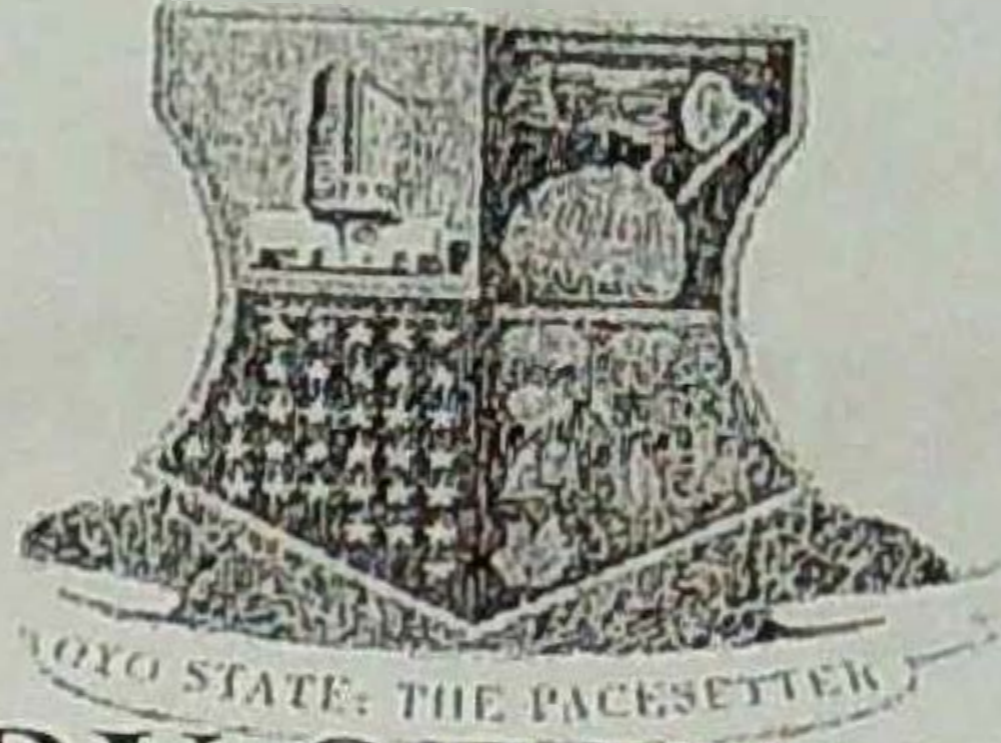
Serial number ....

Hospital number ....

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   d. Diastolic blood pressure I at presentation and date

   e. Systolic blood pressure II with date

   f. Diastolic blood pressure II with date

   g. Systolic blood pressure III with date

   h. Diastolic blood pressure III with date

   i. Systolic blood pressure IV with date

   j. Diastolic blood pressure IV with date

   k. Systolic blood pressure V with date

   l. Diastolic blood pressure V with date

   m. Do you take any of this anti-hypertensive drugs

   a. Aldoment b. Moduretic c. Vasoprin   d. Lisopril   e. Lexotan

MINISTRY OF HEALTH
DEPARTMENT OF PLANNING, RESEARCH & STATISTICS DIVISION
PRIVATE MAIL BAG NO. 5027, OYO STATE OF NIGERIA

Your Ref. No. ....

All communications should be addressed to

the Honorable Commissioner quoting

Our Ref. No.   AD 13/ 479/ 433   25ᵗʰ June, 2013

The Principal Investigator,
Department of Epidemiology and Medical Statistics,
Faculty of Public Health,
College of Medicine,
University of Ibadan,
Ibadan.

Attention: Fatoki Tinuola .O.

<u>Ethical Approval for the Implementation of your Research Proposal in Oyo State</u>

This acknowledges the receipt of the corrected version of your Research Proposal titled: "Survival Analysis Of Time To Achieve Control Of Reduced Or Normal Blood Pressure Of Hypertensive Patients."

2.   The committee has noted your compliance with all the ethical concerns raised in the initial review of the proposal. In the light of this, I am pleased to convey to you the approval of committee for the implementation of the Research Proposal in Oyo State, Nigeria.

3.   Please note that the committee will monitor closely and follow up the implementation of the research study. However, the Ministry of Health would like to have a copy of the results and conclusions of the findings as this will help in policy making in the health sector.

4.   Wishing you all the best.
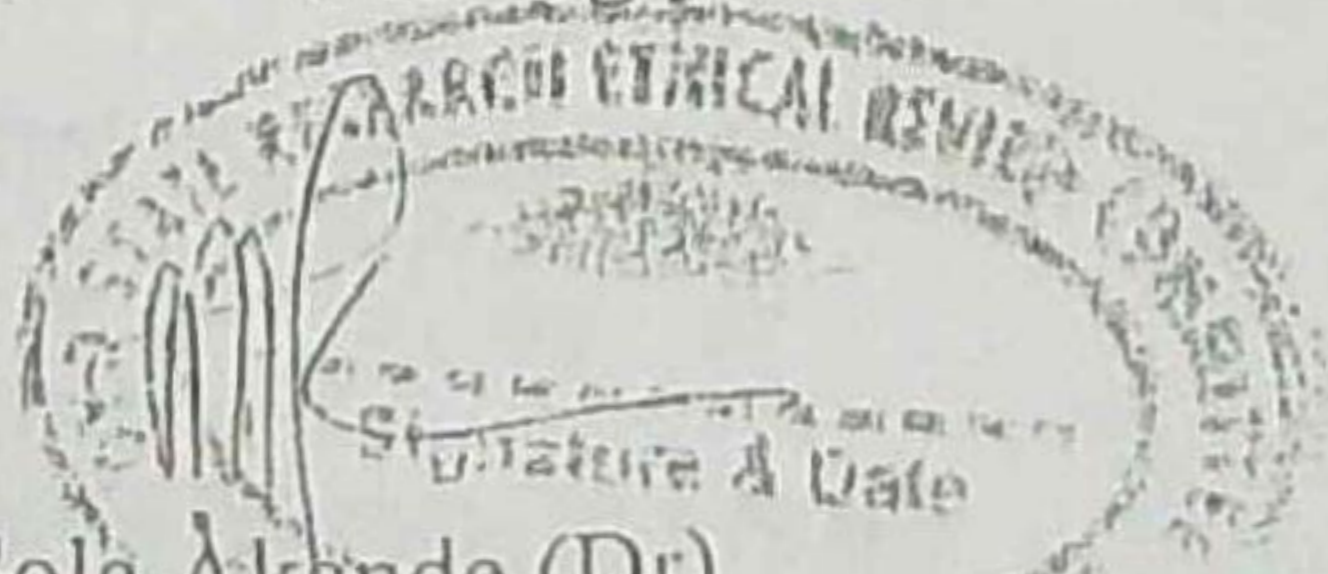
Sola Akande (Dr)
Director, Planning, Research & Statistics
Secretary, Oyo State, Research Ethical Review Committee

LAGOS STATE GOVERNMENT

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Ref No: AGHA/166/VOL.1/50

Date: 3rd March, 2014.

Fatoki Tinuola .O. - Master Student at University of Ibadan
The Medical Director
Ajeromi General Hospital
Ajegunle

PERMISSION TO UNDERTAKE A SURVEY

I write to convey to you the permission of the management to carry out a survey on **survival analysis of time to achieve Normal Blood Pressure in Hypertensive patients** in our facility as requested.

You are advised to stay within the confines of the ethics of the medical Profession and Research.

Thank you.

Yours faithfully,

AJEROMI GENERAL HOSPITAL
AJEGUNLE
....
DR. O.A. OREBANJO
DEPUTY MEDICAL DIRECTOR

To Provide Prompt, Affordable, Adequate and Qualitative Health Care Services For All Patients In A Clean and Healthy Environmen