ASSESSMENT OF CAPACITY FOR CONTROL OF CARDIOVASCULAR DISEASES AND DIABETES IN URBAN KERALA.

K. Sandeep

Dissertation submitted in partial fulfilment of the requirements for the award of the degree of Master of Public Health

Achutha Menon Centre for Health Science Studies

Sree Chitra Tirunal Institute for Medical Sciences and Technology

Thiruvananthapuram, Kerala, India.

2002.

This research was funded by

Initiative for Cardiovascular Health Research in the

Developing Countries,

T-7 Green Park Extension, New Delhi- 110016

Declaration

I here by certify that the work embodied in this dissertation entitled "Assessment of capacity for control of cardiovascular diseases and diabetes in urban Kerala" is the result of original research and has not been submitted for obtaining any degree in any other University or Institutions.

Dr K Sandeep

Trivandrum
15th May 2002

Certificate

This is to certify that the dissertation titled, "Assessment of capacity for control of cardiovascular diseases and diabetes in urban Kerala." is an authentic record of work carried out and submitted by Dr K Sandeep to Achutha Menon Centre for Health Science Studies, Sree Chitra Tirunal Institute for Medical Sciences and Technology, Trivandrum, in partial fulfillment of the requirements for the Degree of Master of Public Health, under our supervision and guidance.

Guide

Dr K R Thankappan
Associate Professor and
Head of AMCHSS,
Sree Chitra Tirunal Institute for
Medical Sciences and Technology
Trivandrum, Kerala

Co-guide

Dr C C Kartha
Professor, Division of Cellular and
Molecular cardiology and Dean
Sree Chitra Tirunal Institute for
Medical Sciences and Technology
Trivandrum, Kerala

Dated: 15th May 2002

Acknowledgements

The research for this project has proved an immense undertaking and my respected teachers Dr K R Thankappan and Dr C C Kartha have ably guided me. I am thankful to them for their keen interest and supervision without which this thesis would not have taken its present form.

I would also like to thank Dr D Varatharajan, Dr Mala Ramanathan, Dr V Mohanan Nair, Dr Sukanya and Dr P Sankara Sarma for their constant support and help. My thanks are also due to Dr S Sivasankaran for his valuable inputs during the course of my research. The kind assistance and support extended to me by Mr. Sundar Jayasingh in the field of administrative and academic programme requires special mention at this moment.

I am also like to thank Dr Srinath Reddy and Dr Arima Tripathy, All India Institute of Medical Sciences, New Delhi for their efforts in delivering the technical and financial support for this study.

I am thankful to Dr V K Rajan, Director of Health Services, who encouraged me to join this Master of Public Health programme.

The administrators, doctors and other health staff in different hospitals helped me a lot by providing the necessary data, I am grateful to their contribution also.

Dr. K Sandeep.

Contents

ASSESSMENT OF CAPACITY FOR CONTROL OF CARDIOVASCULAR DISEASES AND DIABETES IN URBAN KERALA.

Abstract

Introduction

During the past two to three decades cardio vascular diseases has attained epidemic proportions in developing countries. By 2020, developing countries will also have ischemic heart disease as the most frequent cause of death and disease burden. Ischemic heart disease, Hypertension, Stroke and Diabetes Mellitus are known to have multifactorial causation and share the risk factors, and diabetes is a risk factor for coronary heart disease and hypertension. The capacity for control of cardiovascular diseases and diabetes in urban Kerala has not been assessed previously.

Objectives

The objective of the study was to assess the capacity for control of cardio vascular diseases and Diabetes in urban Kerala in terms of policy, programmes, infrastructure and manpower and appraise the efforts being made to build the required capacity.

Methodology

The methods involved several steps, sequentially linking qualitative and quantitative research. I conducted focus group discussions with community representatives, multipurpose workers and doctors, cross sectional survey for available treatment facilities in Trivandrum city, interview with physicians, interview with community members, and interview with patients, which included patients with hypertension, ischemic heart disease, stroke or diabetes.

Results

Most of the physicians, health workers and community members were aware of the high prevalence of cardiovascular diseases and diabetes in Trivandrum city. Physicians stressed the need of a standard protocol and algorithms for the diagnosis and management of cardiovascular diseases and diabetes. Doctors were not routinely using aspirin as an emergency measure before referring the patient to higher institution. Capacity of health care delivery system in urban Trivandrum was not sufficient to cater to the needs related to cardiovascular disease burden. There was no preventive health services in Trivandrum city due to lack of urban primary health centres.

Conclusion

The current capacity to control cardiovascular diseases and hypertension in Trivandrum city was not adequate. Compared to private sector public sector hospitals had lot of inadequacies. The deficiencies identified in this study highlight the need of additional investment in human resources and equipment in the Government sector.

ASSESSMENT OF CAPACITY FOR CONTROL OF CARDIOVASCULAR DISEASES AND DIABETES IN URBAN KERALA.

1. INTRODUCTION

1.1 *Cardiovascular diseases*

Cardiovascular diseases include a spectrum of diseases affecting heart or vascular system. These include coronary heart diseases, hypertension, diseases of heart valves, congenital heart diseases, cardiomyopathy, conduction defects of heart, arrhythmias and stroke etc. Coronary heart disease, hypertension and stroke are the most important cardiovascular diseases, so the scope of study was limited to theses diseases only. Diabetes is a risk factor for coronary heart disease and hypertension, so it is also included in the study.

Coronary heart disease (CHD) is defined as "impairment of heart function due to inadequate blood flow to the heart compared to its needs, caused by obstructive changes in the coronary circulation. It causes 25-30 percent deaths in most industrialized countries. Coronary heart disease also reduces life expectancy and the incidence increases with age. In females, coronary heart disease is rare before menopause, but incidence increases significantly in the post- menopausal years. High-density lipoprotein (HDL) cholesterol levels decreases gradually after menopause [1]. Over the past decades, there was a trend towards a decrease in cardiovascular disease mortality in North America and Western Europe. This reduction in cardiovascular diseases and mortality was due to primary prevention by modification of risk factors and improvement in medical treatment and secondary prevention of myocardial infarction [2].

Hypertension is an important public health problem in developed countries as well as developing countries. It is a common disease, usually asymptomatic, readily detectable, comparatively easily treatable, and often leads to lethal complications if left untreated.

Stroke is a heterogeneous disease and comprises at least three main types namely subarachnoid hemorrhage, cerebral hemorrhage and cerebral infarction. Each type of stroke may have a different etiology and may have different risk factors [3].

1.2 *Diabetes*

Ayurvedic texts have the oldest descriptions of Diabetes and this can be traced back to 1500 BC. Sushruta, an Ayurvedic surgeon of ancient times who studied Diabetes, described it as a disease characterized by increased amount of sweet urine. Ayurvedic textbooks have described ten different types of diabetes.

Diabetes was extensively studied in the last century by many researches. Diabetes is one of the major independent predictors of long-term mortality after surgery [4]. Hypertension occurs in type-2 diabetes and by the age of 50 years, more than 40% of patients with type-2 diabetes are hypertensive, and the proportion rises to 60% by the age of 75 years [4]. Inadequate hypoglycemic control also predicts micro vascular complications including coronary heart disease in diabetic patients. Heart failure, a chronic condition, which is closely linked to diabetes, is increasing in the United States and tight glycemic control may reduce the incidence of heart failure [5].

According to WHO criteria diagnosis of diabetes requires the detection of fasting plasma glucose level of 140 mg/dl or more or two-hour glucose level greater than or equal to 200 mg/dl after a 75 mg oral glucose load. Patients on Insulin or oral

hypoglycemic drugs were classified as diabetic regardless of their glucose tolerance test result [6].

1.3 Global problem

1.3.1 *Cardiovascular diseases*

Cardiovascular diseases (DVD) constitute the most important cause of morbidity and mortality in developed countries. Coronary heart disease (CHD) is one of the most important causes of death in Developed countries [7]. In United States, the epidemic of Coronary heart diseases began in 1920s and became one of the major causes of mortality. For the United States as a whole, the mortality from Coronary Heart Disease has been declining since the late 1960's [8]. In many developed countries, CHD still poses the largest public health problem. The recent decline in mortality due to coronary heart disease in USA is due to decline in the incidence of myocardial infarction in the population and also due to advances in the medical care [9].

During the past two to three decades cardio vascular diseases has attained epidemic proportions in developing countries [13]. It has been estimated that 5.3 million deaths attributable to CVD occurred in the developed countries in 1990 [10]. Coronary heart diseases and stroke are currently responsible for 12 million deaths. Seven million deaths are due to CHD and 5 million to stroke, with another 6 million due to other causes of CVD in 1999 [11]. Projections of mortality based on population increase and increase in life expectancy suggest that CVD will be the leading cause of mortality in most parts of the world by the year 2020 [12]. The burden of cardiovascular disease varies by region. In East Asian countries stroke is more common than coronary heart diseases [13].

More than 800 million people or 20 percent of adult people of the world are considered to have hypertension [14]. In developing countries, the rate of control of hypertension is worse than that of developed world.

1.3.2 *Diabetes*

Diabetes is one of the leading causes of death in developed countries. The prevalence is 2 to 5 percent in many developed countries [15]. The new data shows that the prevalence of diabetes type-2 is much higher than previously thought. It is estimated that there are about 150 million people with diabetes worldwide and their number is expected to double by the year 2025 [16]. According to WHO criteria, the prevalence of impaired glucose tolerance in the US population in the age range of 20-74 years in 1987 was 11.2% [17].

American Diabetic Association estimated direct medical expenditure due to diabetes and the disease's indirect social cost at approximately $ 98 billion in 1997. Direct medical cost included blood tests, insulin and treatment for diabetes related illness. Indirect cost included lost productivity caused by morbidity and premature death [18].

Several reports have been published during past few years, indicating a high prevalence of diabetes in communities in the developing world, and in the ethnic minorities in the industrialized countries [19].

1.4 India

1.4.1 *Cardiovascular diseases*

In India, prevalence of coronary heart disease is high. The prevalence in Chandigarh was 6.54% and 4.78 % among males and females in 1968. A study conducted

in a village in Hariyana in 1974 showed that the prevalence was 2.2% and 1.7% male and female population respectively [20].

1.4.2 *Diabetes*

Epidemiological studies conducted in India revealed that the prevalence of Diabetes was 1 to 2 percent in 1975 and the prevalence was higher in urban areas compared to rural areas. Diabetes increases the incidence of coronary heart diseases also. In India, type-2 diabetes occurs in individuals a decade earlier compared to west [21]. Diabetes has a genetic basis and life style also plays a role in expression of the disease.

Prevalence of Diabetes in rural population of South India in 1988 was 2% for females and 4% for males [19]. Prevalence of Diabetes for all ages in Madras urban area in 1998 was 2.9% and 10.5% for those aged 40 years or more [22].

Prevalence of Diabetes in Dombili town near Mumbai was 7.5% in the above 30 year age group and prevalence of diabetes was seen to increase with age [23].

1.5 Scenario in Kerala

1.5.1 *Cardiovascular diseases*

In Kerala, prevalence of coronary heart disease is high [24]. In a study conducted in rural Trivandrum district 36 persons per 1000 had ECG changes of coronary heart disease, of which 14 had definitive evidence of coronary heart disease [25]. Hypertension is identified as a major risk factor for coronary heart disease. The prevalence of hypertension in elderly people (60 years and above) of Trivandrum city was 69% [26].

Serum lipid levels are found to be high in Trivandrum city population. Mean total cholesterol levels are higher than those reported from northern India, and the cholesterol

levels are comparable to that in the US population in the early seventies, when US had peak incidence of coronary heart disease [27].

1.5.2 *Diabetes*

According to available information, the prevalence of self-reported Diabetes, in Kerala was 4% in 1993 [25]. A study conducted in Trivandrum city revealed that 16.3% of all adults over 19 years of age had type 2 diabetes [28]. The prevalence of Diabetes in rural Neyyatinkara taluk in Trivandrum district was found to be 6.7% [29]. The prevalence of diabetes was very high in urban areas compared to rural areas.

2. REVIEW OF LITERATURE

2.1 Risk Factors for cardiovascular diseases

2.1.1 *Smoking*

Tobacco consumption is an established risk factor for coronary heart disease. Smoking habit is increasing in developing countries compared to developed countries where it is decreasing. There are about 1.1 billion smokers in the world, of which 800 million are living in the developing countries [30]. There is an increasing trend in the prevalence of smoking in women [31]. Increasing cigarette consumption lowers HDL cholesterol levels [1]. Smoking is associated with an increase in the prevalence of atheromata and smoking exerts its athorogenic effects by inducing an elevation in blood fibrinogen concentration, enhancing platelet activity and increasing blood viscosity. Nicotine present in the tobacco increases vascular tone. Free radicals present in cigarette smoke promote oxidation of LDL cholesterol. According to one hypothesis, monoclonal proliferation of vascular smooth muscle occurs as a result of smooth muscle cell transformation induced by components of cigarette smoke or its metabolites [32].

2.1.2 *Hypertension*

Hypertension increases the chance of coronary heart disease. Mildly raised blood pressure in young adults is associated with increased cardiovascular disease morbidity and mortality over the subsequent 50 years [33]. The onset of CHD risk begins long before middle age, and preventive measures may be more effective if applied earlier in the course of the disease [34].

Hypertension is a major risk factor for the development of stroke and is also a major determinant of Left Ventricular hypertrophy. The recent reports from Euro stroke study confirm the increased risk of stroke associated with Left ventricular hypertrophy [35].

2.1.3 *Saturated Fat consumption*

Increased consumption of saturated fat is associated with increased incidence of coronary heart disease. The global availability of cheap vegetable oils and fat has resulted in increased fat consumption among low-income countries. Dietary fiber is protective to coronary heart diseases. Consumption of junk food reduces the dietary fiber and complex carbohydrates.

Increased plasma cholesterol, increased Low Density Lipoprotein (LDL), increased plasma Triglycerides (TG) and decreased plasma High Density Lipoprotein (HDL) are risk factors for hypertension and coronary heart disease.

Recent epidemiological data demonstrate a link between elevated LDL cholesterol and ischemic stroke. However, other observational studies demonstrate that low cholesterol may be associated with hemorrhagic stroke. This factor may dilute the association between serum cholesterol and total stroke, when strokes are not sub typed in to hemorrhagic shock and ischemic shock [36].

2.1.4 *Obesity*

Sedentary habits are also associated with occurrence of hypertension and coronary heart disease. Stress can also lead to hypertension and coronary heart disease. Mismatch between energy intake and energy output can result in a pandemic of obesity. Obesity is definitely associated with increased risk of hypertension and coronary heart disease.

2.1.5 *Diabetes*

Diabetes is also a risk factor for coronary heart disease. The Framingham study shows that diabetes increased the relative risk of coronary heart disease by 66% in men and 203% in women followed up for 20 years [4].

2.1.6 *Alcohol*

The relation between small amount of alcohol intake and heart disease is a controversial issue. There is a strong positive relationship between binge drinking and heart disease. Binge drinking can cause sudden cardiac death [37]. Heavy alcohol consumption has a direct toxic effect on the myocardium resulting in alcoholic cardiomyopathy [38]. The heavy use of alcohol is associated with an increased overall mortality and an increased occurrence of stroke [39]. An increased level of γ–glutamyltransferase has been suggested to be a reasonable marker of alcohol consumption. Euro-stroke project reported that an increased γ–glutamyltransferase is associated with an increased risk of stroke [40].

2.1.7 *Genetic factors*

Genetic factors also plays an important role in the development of CVDs. Common variations in genes, which are called polymorphisms are associated with the

risk of CHD. New evidence indicates that genetic variations can increase or decrease the effect of environmental factors [41].

2.1.8 *Nutritional status during intrauterine period*

The fetal origin of cardiovascular diseases hypothesis states that adverse intrauterine influences such as poor maternal nutrition lead to impaired fetal growth, resulting in low birth weight, short birth length and small head circumference. These adverse influences are postulated to program the fetus to develop adaptive metabolic and adaptive response that facilitates survival. These responses may lead to disordered response to environmental challenges as the child grows, with increased risk of glucose intolerance, hypertension, dyslipidemia and cardio vascular disease in later life as a consequence [42]. Insulin resistance and other cardiovascular risk factors in the childhood are related to low birth weight. Infant of a diabetic mother, who had fetal over nutrition also, has increased future risk of diabetes and cardiovascular diseases. So there is a U-shaped relationship between intrauterine growth and adult disease [43].

A large number of studies have reported that higher age, smoking, diabetes mellitus, previous stroke, history of hypertension and increased diastolic pressure are associated with an increased risk of stroke [43].

2.2 Risk Factors for Diabetes

Subjects with impaired glucose tolerance are at higher risk for the development of diabetes mellitus and micro-vascular diseases. The prognosis of those with impaired glucose tolerance is variable; less than half progress to diabetes mellitus within 10 years and in the majority glucose tolerance reverts to normal or remains unchanged [17]. The risk of progression to Type 2 diabetes is related directly to the degree of glucose intolerance.

Diets high in saturated fat with limited intake of fruits and vegetables also incriminated in the development of Diabetes. Smoking can cause insulin resistance and there is a positive association between the number of cigarettes smoked per day and the incidence of diabetes mellitus in both men and women [44]. Some investigations have showed that cigarette smoking increases insulin resistance by altering distribution of fat or by exerting a direct toxic effect on the pancreas. A chemical component of cigarette may alter the intracellular glucose transport [45].

2.3 By 2020

By 2020, low and middle-income countries will also have ischemic heart disease as the most frequent cause of death and disease burden. This may be due to decrease in death and morbidity due to infectious diseases, increased longevity and also due to exposure to risk factors like high blood pressure, increased intake of saturated food and decreased physical activity [46].

2.4 Control of Cardiovascular Diseases

Control of Cardiovascular diseases includes prevention of diseases at Primordial, Primary, Secondary and Tertiary levels.

2.4.1 *Primordial prevention*

Primordial prevention is a population-based strategy to prevent the emergence of risk factors rather than their amelioration in individual patients. Primordial prevention aims at improving health status of people by promoting healthy life style. It focuses on preventing the emergence of major risk factors for containing the toll of CVD. Primordial and primary preventions are complimentary. Their essence is the promotion of healthier

lifestyles for entire populations. In primordial prevention, efforts are directed towards discouraging children from adopting harmful life styles. The main intervention in primordial prevention is through individual and mass education.

2.4.2 *Primary prevention*

Primary prevention is avoidance of risk factors of cardiovascular diseases. The high risk strategy focuses on individual people at high risk of diseases. Many risk factors to coronary heart diseases are related to the modern life style, sedentary habits, hyperlipidemia, obesity, smoking etc [25]. The preventive strategy should be high-risk group based. Increase in coronary heart disease was associated with an increase in the intake of saturated fat and cholesterol and with a decrease in physical activity [7]. Control of tobacco industry is an important measure to combat smoking. Tobacco taxation is a powerful means to reduce consumption of tobacco in developing countries [47].

Primary prevention focuses on population and on high risk groups. The interventions in high-risk group are cessation of smoking, increased physical activity, weight regulation, blood pressure control, lipid regulation and management of Diabetes[48]. A reduction in the population mean of systolic blood pressure of 8 mm will reduce the prevalence of hypertension by 50%. The American Heart Association has classified obesity as a major modifiable risk factor for CHD. Abdominal body fat is highly correlated with mortality and morbidity for CVD, and Diabetes. Obesity as measured by body mass index is an important risk factor for CHD [49].

The relative younger age of CVD victims in developing countries has an economic impact not only in terms of lost productivity but also in caring of the orphans

left behind. Prevention of such deaths is a moral imperative and a more cost effective option than treating CVD after it is established [50].

There are also some other possible choices to prevent or decrease the incidence of coronary heart diseases in old age. Practically every relatively healthy person over 65 years has significant atherosclerosis and would benefit from lipid lowering therapy[51]. Another method is to provide lipid lowering therapy to older age group, who are at greater risk of developing atherosclerosis or to those with diabetes, hypertension and or to cigarette smokers.

2.4.3 *Secondary prevention*

Secondary prevention is defined as action, which halts the progress of a disease at its incipient stage and prevents complications. It also includes early detection of cases and their treatment. Multiple clinical trials have established that treating hypertension reduces the chance of coronary heart disease. Subjects surviving first coronary event have a higher risk of another coronary event than healthy people and require special resources from health services [52].

2.4.4 *Tertiary prevention*

Tertiary prevention is defined as a measure available to reduce or limit impairment and disabilities, minimize suffering caused by existing departures from good health and to promote patients adjustment to irremediable conditions. Tertiary prevention is also important in coronary heart disease. Cardiac rehabilitation is indicated for patients who had acute myocardial infarction, coronary revascularization, or those with chronic stable angina. Cardiac rehabilitation and secondary prevention are to prevent disability resulting from coronary disease and to prevent subsequent coronary events,

hospitalization, and death from cardiac causes through a program of prescribed exercise, other interventions and drugs designed to modify coronary risk factors. Trials of exercise combined with nutritional counseling have demonstrated a slowing of the atherosclerotic process and decreased rates of subsequent coronary events and hospitalization [53].

Increase in cardiovascular diseases will make health planning more difficult in India and other developing countries [54].

2.5 Control of Diabetes

The chance of developing diabetes is high in individuals, whose parents or close relatives are diabetic. The risk of developing diabetes in an individual with positive family history of diabetes varies with age. If a parent is diabetic, the chance of developing diabetes increases by two to four folds [55]. In genetically predisposed individuals, several environmental factors precipitate the onset of diabetes. They are obesity, physical inactivity, repeated pregnancies, infections, physical and psychological stress and some drugs. Environmental factors play a major role in the development of diabetes in genetically predisposed individuals. Genetic factors are fixed and it is not possible to change it with present technology, but environmental factors can be effectively controlled.

Persons with higher level of physical activity were 25-50% less likely to have diabetes mellitus [56]. Physical activity can increase insulin sensitivity and also there is a reduction in obesity. The facility for detection of Diabetes varies from place to place. Rarity of earlier symptoms, poor health awareness and inadequate facilities can delay diagnosis.

3. RELEVANCE OF THE STUDY

India is currently in a phase of epidemiological transition. The disease pattern, disability and mortality are shifting from infectious diseases and nutritional deficiencies to chronic life style related diseases. India faces the double burden of infectious diseases as well as chronic life style related diseases. The prevalence of non-communicable diseases is expected to rise from 29% to 57% by the year 2020. Within the spectrum of cardiovascular diseases, the epidemiological transition shows a decline in rheumatic heart diseases and a rise in coronary heart diseases [57]. Prevalence of heart disease increases with age; so an aging population will contribute to a substantial increase in health utilization and cost [58]. One important factor for the increase in CVD prevalence is the rising life expectancy. The emerging global pandemic of cardiovascular diseases will have its impact most decisively on poor and developing countries [59]. Rapid and chaotic urbanization with changes in life styles will increase the CVD further in India and other developing countries.

3.1 Demographic data of Kerala

Kerala is the southern most state in India and Trivandrum is the state capital. Kerala is in the late phase of demographic transition. The population growth rate was 0.94% in 2001 compared to 2.63% in 1971. Total population of the state was 31.8 million in 2001 and population density, 819 persons per square kilometer. Adult literacy rate was 90.9%; for females, it was 87.86% and for males, it is 94.2% [60].

The state covers an area of 38863 square kilometer, which includes high lands, mid lands and coastal areas. There are 4431 hospitals, 53 dispensaries, 105 community

health centers and 944 primary health centers in the state. There are 29656 registered doctors and 60760 nurses in the state [60].

Trivandrum city covers an area of 141 square kilometer that includes 81 wards. The total population was 741307 according to 2001 census, which includes 363704 male and 377603 females. Population density is 5230 persons per square kilometer.

4. AIM AND OBJECTIVE

4.1 Aim

The aim of this study was to assess the capacity for control of cardio vascular diseases and Diabetes in urban Kerala in terms of policy, programmes, infrastructure and manpower and appraise the efforts being made to build the required capacity.

4.2 Objectives

1. To assess the current capacity in Trivandrum, Kerala, India in terms of Policy, Programmes and Infrastructure relevant to the present needs of cardiovascular diseases and diabetes control.
2. To assess the capacity required to meet the anticipated needs during the period 2000-2020 and to appraise the efforts being made to build that capacity.
3. To find out perceptions of community members, doctors, multipurpose workers and patients on prevalence, facilities for management and available preventive services for cardiovascular diseases and diabetes.

5. METHODOLOGY

The methods involved several steps, sequentially linking qualitative and quantitative research. Quantitative research was expected to provide information on the deficiencies in the current capacity for CVD and diabetes control. Qualitative research was expected to provide information on why such deficiencies exist. Quantitative research would help to spell out the incremental needs in capacity over the next 20 years and qualitative research would aim to identify the barriers and opportunities that exist in developing that capacity.

5.1 Study area

The study area was the urban area of Trivandrum City.

5.2 Sample size

The data was collected from health care providers, which included hospitals and other treatment facilities in urban Trivandrum. The data was also collected from community members, physicians and patients.

Group discussion with community members	: 3
Group discussion with Multipurpose workers	: 2
Group discussion with doctors	: 1
Cross sectional survey of Hospitals	: 43
Interview with Physicians	: 62
Interview with community members	: 100
Interview with patients	
Coronary Heart disease patients	: 17
Stroke patients	: 13
Diabetes mellitus patients	: 52
Hypertensives	: 40

5.3 Study Design

5.3.1 First phase

Focus group discussions

Qualitative data was collected by focus group discussions involving community representatives, multipurpose workers and doctors.

Issues covered in the focus group discussion included perceptions on major cardiovascular diseases and diabetes regarding national health priority, current surveillance system, trend of diseases in the future, need of public health programme in the prevention and control and present community empowerment in terms of information, skills and supportive environment. The group discussion also covered the role of the government and the health professionals in the control of cardiovascular disease and diabetes.

During group discussions opinion on cardiovascular diseases and diabetes regarding present infrastructure for the diagnosis, care and counseling, skills, facilities and motivation of primary health care providers and current referral linkages was collected. Opinions regarding health care providers in tertiary settings in terms of number and facilities also were collected.

Other data that was collected during group discussion were information regarding present and proposed regulation and legislation related to tobacco control, nutrition policy, urban planning and transport, environment policy, media policy and education policy.

Opinions regarding adequacy or inadequacy of training programmes on cardiovascular diseases and diabetes for physicians, nurses, technicians, health workers specialist physicians and surgeons and nutritionists were also collected.

5.3.2 Second phase

Secondary data collection- Cross sectional survey for available treatment facilities

Through a cross sectional survey of hospitals in the city area of Trivandrum, the facilities available for diagnosis and treatment of cardiovascular diseases and diabetes were collected. The list of hospitals in the Trivandrum city was collected from Corporation office. The hospitals were classified broadly in to multi-specialty hospitals and primary level hospitals. The multi-specialty hospitals included hospitals with many specialty services and inpatient facility with one or more specialty clinics. Primary level hospitals included dispensaries, hospitals run by a single doctor or general practitioner or small hospitals with less than 10 beds.

Information regarding promotive, preventive and curative services in cardiovascular diseases and diabetes were collected using a structured checklist, which was developed after discussion with Cardiologists, Public health experts, practicing physicians, nurses and multipurpose workers. This was indented to collect information on existing capacity of health care delivery system in terms of utilization of out patient and inpatient facilities, availability of infrastructure, manpower, drugs and equipment.

5.3.3 Third phase

Interview with Physicians

It included a cross sectional survey based on a pre-structured and self-administered interview schedule for practicing physicians. This questionnaire was

prepared after holding a series of discussions and interviews with a small group of Cardiologists, physicians, surgeons, public health experts, nurses, multipurpose workers and community members. Health care providers were identified randomly from a list of Government employees, Indian Medical Association membership list and hospital staff lists.

5.3.4 Fourth phase

Interview with Community members

A two-stage cluster sampling identified the community members. Trivandrum city was the study area, and wards in the Trivandrum city corporation were identified. It was divided in to two groups of coastal wards and non-coastal wards. Random sampling identified two wards from coastal area and eight from other non-coastal area. Ten community members from each ward were identified using a cluster sampling technique. They were interviewed with a pre-tested structured questionnaire.

5.3.5 Fifth phase

Interview with patients

Patients were identified from the outpatients and inpatiens departments of hospitals, and from the community.

Questionnaires were designed separately for each group based on the items recommended by experts in the field of public health, cardiology, neurology, general medicine and on the items generated by group discussions. The patient groups included patients with hypertension, ischemic heart disease, stroke or diabetes.

5.4 Study tools

5.4.1 *Focus group discussions*

The main tool for qualitative data collection was focus group discussions (FGD). The guidelines for FGD were prepared by separate discussions with social scientists, public health specialists, cardiologists, physicians and nurses. Even though the tool is same for qualitative data collection from community members, physicians and multipurpose workers, the guidelines were separate for different groups.

5.4.2 *Structured questionnaire*

Data were collected from community members, physicians and patients with hypertension, ischemic heart disease, stroke or diabetes, using structured questionnaire for quantitative analysis.

5.4.3 *Structured check list of facilities*

A structured checklist of facilities available for cardiovascular disease management in terms of manpower, materials, equipments and infrastructure was used for the collection of secondary data from hospitals in the Trivandrum city.

5.5 Duration of study

Questionnaire development and evaluation	3 months
Data collection	2 months
Analysis and reporting	2 months

6. RESULTS

The data obtained from the interview with community members, physicians, and patients with hypertension, ischemic heart disease, stroke and/or diabetes were entered in

Microsoft Excel worksheet. Secondary data collected from hospitals using checklist of facilities were also entered in Microsoft Excel worksheet. SPSS software was used to analyze the data. Qualitative data obtained from group discussion was analyzed and interpreted accordingly.

6.1. Study sample characteristics

6.1.1 *Community sample*

The sample of 100 community representatives consisted of 63% male and 37% females. Subjective assessments of economic status of the community members were done. Among those community members, 33% were from low, 46% from middle and 21% from high economic class. Majority of the members in the sample were married (83%). The educational statuses of members were listed in the table 1.

Table.1

Educational status of community members

Sl no	Education	Male % (n = 63)	Female % (n = 37)	Total % (n = 100)
1	Primary	7.9 (5)	8.1 (3)	8 (8)
2	High school	38.1 (24)	48.6 (18)	42 (42)
3	Pre degree	14.3 (9)	27 (10)	19 (19)
4	Degree	33.3 (21)	10.8 (4)	25 (25)
5	Post graduate	6.3 (4)	5.4 (2)	6 (6)

6.1.2 *Physicians sample*

Perceptions of physicians on various aspects of cardiovascular diseases were collected from 62 doctors working in Trivandrum city. In the sample, 40.9% of doctors were working in general clinics and 59.7% were working in specialty clinics. Postgraduate degree holders were 41.9%, postgraduate diploma holders were 29% and

graduate degree holders were 29% in this sample. The lowest age in the sample was 29 years and highest was 65 years (Mean 41.3 years). The experience in clinical practice of doctors varied from 3 years to 40 years (Mean 14.8 years). Male doctors constitute 75.8% and female doctors 24.2% in the sample. The data was collected from doctors during monthly meeting and from hospitals. Male doctors generally attended meetings and there fore there were an increased number of male responders in the sample.

6.1.3 *Hospital survey*

Out of 43 hospitals in Trivandrum city area, 26 (60.5%) were private hospitals and 17 (39.5%) were Government hospitals. There are about 1848 doctors working in different hospitals in Trivandrum city and there are 7156 beds in different hospitals in the city. Doctor population ratio was, one doctor for 401 people in the city, which was higher than state average of one doctor for 1073 people.

6.1.4 *Patients with hypertension*

Majority of patients with hypertension were above 50 years of age and males constitute 60% of sample. Fifteen percentages of patients in this sample were from higher economic class, 77.5% from middle economic class and 7.5% from low economic class. This classification was based on the self-declared family income of the patient. Total samples size of patients with hypertension was 40. Mean age of the patients was 57.4 years and mean duration of illness was 8.5 years.

6.1.5 *Patients with ischemic heart disease*

Seventeen patients with Ischemic heart disease were interviewed with a structured questionnaire. Thirteen patients (76.6%) were male and four patients (23.5%) were female patients. The ages of patients were between 31 years and 72 years (Mean age 52 years).

6.1.6 *Patients with stroke*

Thirteen patients with stroke were interviewed with a structured questionnaire. Sixty-nine percent of stroke patients were males and 31% were females. The ages of the patients were between 41 and 80 years (Mean age 56.7 years).

6.1.7 *Patients with diabetes*

Male constitutes 76.9% of the sample and females 23.1%, and majority of the patients were above 50 years of age. Higher economic class patients, in the sample were 34.6%, middle economic class 53.8% and low economic class 11.5%. This classification was based on the self-declared family income of the patient. The age of the patients varied between 42 to 80 years and mean age was 59.6 years. Duration of illness varied from less than a year to 45 years and mean duration of illness was 8.5 years.

6.2. Perceptions on cardiovascular disease morbidity and mortality

The results of interview with physician using a structured questionnaire showed that 51.6% of physicians opined that cardiovascular diseases are becoming common in Kerala. Forty three percent of doctors also said that Diabetes is also becoming a common disease among adults. Most of the doctors (90.3%) agreed that cardiovascular disease is a major health problem.

6.2.1 *Hypertension*

Community survey revealed that self reported hypertension in Trivandrum city area was 20% (N=20). Prevalence of Hypertension in males was 20.6% (N=13) and in females was 18.9% (N=7). Significantly a high prevalence of hypertension (46.2%) was reported among diabetic patients (P=0.011).

Similar results were obtained in the interview with physicians using a structured questionnaire. The result also revealed that commonest age group was 40-50 years and 23% of all patients attending the out patient clinics were hypertensive.

The perceptions of physicians, multipurpose workers and community members on the magnitude of cardiovascular diseases were similar in Focus Group Discussions (FGD). According to focus group discussions, hypertension and diabetes are now becoming a common problem in Trivandrum and the common age group of cardiovascular disease is 40-50 years.

Results of interview with hypertensive patients reveled that 65% of patients were diagnosed as hypertensive during medical check up subsequent to some symptoms of high blood pressure. A quarter of patients were diagnosed during regular screening check up and others were diagnosed in response to symptoms of other diseases.

Table 2

Detection of high blood pressure

Sl no	Variable	Male %	Female %	Total %
1	Screening check up	41.7	25	35
2	Check up as a response to symptoms	58.3	75.0	65

The symptoms, present at the time of detection of hypertension, were Headache 30%, Giddiness 52.5%, swelling 20%, irritation 30% and anxiety 5%.

6.2.2 *Ischemic Heart disease*

Among the cardiovascular diseases, Physicians in the city perceived that, angina is the commonest, followed by heart attack, stroke and rheumatic heart disease. During the past many years, rheumatic heart disease is in the decline.

During the Focus group discussions, all participants said that there is an increase in heart disease during the recent years. Doctors and Multipurpose workers also agreed that there is a recent increase in the incidence of heart diseases.

6.2.3 *Stroke*

During the focus group discussions community members said that they are aware that cases of paralysis were present in the past and those cases might have been instances of paralytic strokes. They felt that incidence of stroke is also increasing during recent years.

Ninety percent of patients with hypertension said that hypertension can lead to stroke. Only 12.5% said that hypertension highly increases risk for stroke, 45% said that hypertension moderately increases the risk for stroke and 32.5% said that hypertension slightly increases the risk for stroke. Source of information were friends and relatives (40%), media (25%), doctor (22.5%) and self-perception (10%). It is important to note that none of the patient said that source of information was paramedical staff.

6.2.4 *Diabetes*

Self reported diabetes among the community members of Trivandrum city was 13% (N=13). Significantly, high prevalence of diabetes (30%) was reported among hypertensive patients (P=0.011).

6.3. Diagnosis of cardiovascular diseases

6.3.1 *Existing facilities*

The diagnostic facilities available for the diagnosis of CVD in different hospitals are listed in table 3.

Table 3

Diagnostic facilities available at different hospitals in Trivandrum city.

Sl no	Facilities	Government % (N 17)	Private % (N 26)	Total % (N 43)	P Value
1	ECG Machine	47.1 (8)	92.3 (24)	74.4 (32)	0.001
2	Echocardiography	11.8 (2)	23.1 (6)	18.6 (8)	0.351
3	Treadmill	11.8 (2)	19.2 (5)	16.3 (7)	0.517
4	Cardiac catheter lab	11.8 (2)	3.8 (1)	7 (3)	0.319
5	X ray	52.9 (9)	73.9 (1)	65.1 (28)	0.176

P value is based on chi-square value of the proportions in government and private sector.

Laboratory facilities available in different hospitals in the city are listed below in Table 4.

Table 4

Laboratory facilities in different hospitals

Sl no	Lab Facilities	Government % (N 17)	Private % (N 26)	Total % (N 43)	P Value
1	Blood sugar	52.9 (9)	100 (26)	81.4 (35)	<0.001
2	Routine Urine	64.7 (11)	100 (26)	86 (37)	0.001
3	GTT / GCT	35.3 (6)	92.3 (24)	69.8 (30)	<0.001
4	Lipid profile	23.5 (4)	92.3 (24)	65.1 (28)	<0.001
5	Enzyme assay	17.6 (3)	46.2 (12)	34.9 (15)	0.055
7	Blood-TC, DC, ESR, Hb	52.9 (9)	96.2 (25)	79.1 (34)	0.001
8	Microbiology	23.5 (4)	34.6 (9)	30.2 (13)	0.439
9	ASO	23.5 (4)	50 (13)	39.5 (17)	0.083

P value is based on chi-square value of the proportions in government and private sector.

6.3.2 *Government sector*

In focus group discussions, all doctors said that diagnostic and treatment facilities in the government hospitals were inadequate. Doctors from Health service department said that there was no cardiologist in the government hospitals with the exception of the

Medical College. ECG facilities were absent in most of the government hospitals and all suspected cases of heart diseases were referred to Medical College hospital. Even in the Medical College Hospital, there were not enough staffs or facilities to manage all cardiac patients. In Government hospitals drug supply were irregular and the patient had to buy drugs from out side stores, when drugs were in inadequate supply. The poor patients cannot buy costly medicines from private medical stores. Doctors from Government Health Services strongly felt that there were no treatment facilities for heart diseases available in health service sector.

6.3.3 *Private sector*

From the perception of community members during focus group discussions, there were adequate treatment facilities for cardiovascular diseases in many private hospitals. In the private sector, the whole health care was commercialized. Private hospitals are equipped with all essential drugs, ambulance and modern instruments for diagnosis as well as treatment of diseases. There were adequate number of beds in the intensive care units and inpatient wards for the treatment of heart diseases in private sector. These facilities are beyond the reach of people belonging to poor socioeconomic class and middle class according to the community members.

Physicians also expressed similar view regarding the private hospitals in the city during focus group discussions. Treatment facilities in private hospitals in the city were adequate. Treatments for heart disease in the Private hospital were very costly, which was out of reach of the poor.

Focus group discussion with community members revealed that most of them are not aware of health insurance schemes available in India. No participants in the community survey had any type of health insurance. In FGD with community members,

it was found that all participants were unaware of health insurance schemes present in India.

6.3.4 *Hypertension*

All hospitals in the city had apparatus for measuring the blood pressure. According to seventy one percent (N=44) of doctors, they regularly check blood pressure for all adult patients. Perceptions of doctors in the importance of checking blood pressure in all adult patients are given in the table 5.

Table 5

Perception of doctors in the importance of checking blood pressure.

Sl no	Variable	Percentage of doctors with the opinion (N 62)
1	Very important	54.8 (34)
2	Important	41.9 (26)
3	Not important	3.2 (2)

Fifty four percent of community members said that doctor measured blood pressure every time they visited a doctor. Seven percent said that blood pressure was checked only on request, 18% said that blood pressure was measured occasionally only and 21% said that blood pressure was never measured during their previous visit to a doctor.

Seventy three percent of the community members checked their blood pressure at least once during the past one year. Thirty two percent of community members checked their cholesterol at least once during the past.

6.3.5 *Heart disease and stroke*

Majority of physicians (88.7%) had the opinion that it is possible to detect stroke and heart attack early. They suggested many facilities and manpower to facilitate early

detection of stroke and ischemic heart disease (IHD). Their suggestions are listed in the table 6.

Table 6

Facilities suggested by the physician for the early detection of Stroke and IHD

Sl no	Facilities	Percentage of Physician suggesting the facility (N 55)
1	CT Scan or Angiogram	61.8 (34)
2	Specialist	20.0 (11)
3	TMT	21.8 (12)
4	Lab facilities like enzyme, Lipid profile	34.5 (19)
5	ECG	45.5 (25)

6.3.6 *Diabetes*

Only 37.1% of physicians said that they check for diabetes in all adult patients, 41.9% of physicians check for diabetes only on symptomatic patients and 6.5% physicians check for diabetes in elderly patients only.

Majority (65.4%) of diabetic patients was diagnosed by medical checkup and investigation in response to specific symptoms of diabetes and 34.6% of patients were diagnosed during regular medical checkup or by chance. The symptoms reported during diagnosis were thirst (36.5%), frequent urination (30.8%), weakness (57.7%), increased appetite (7.7%) and delayed wound healing (13.5%).

Seventy one percent of community members reported that, they checked their urine for sugar at least once during the past. Fifty nine percent of community members measured their fasting blood sugar in the past, at least one time.

6.4. Nature and Efficacy of Treatment of CVD

In physicians' view, (82.3%) there is an increase in death rate due to cardiovascular disease in recent years. Increase in death due to cardiovascular disease in recent years is the result of lack of facilities for the treatment (37.1%) and poor quality or care (15.7%). Most of the doctors (71%) check blood pressure in all adult patients and others (29%) check blood pressure only in selected patients.

6.4.1 *Facilities for treatment in different hospitals*

There are 10 (23.3%) hospitals in the city, which have intensive coronary care unit, of which 4 are in Government hospitals and 6 are in private hospitals. There are total of 97 beds in different ICU in Trivandrum city, 47 beds in the Government hospitals and 50 beds in the private hospitals. Thrombolytic therapy is administered in 4 (23.5%) Government hospitals and 6 (23.5%) private hospitals. Only 10 (23.5%) hospitals in the city have the facility for thrombolytic therapy.

Two hospitals in Government sector and two hospitals in private sector have the facility for coronary bypass surgery. Two hospitals in government sector and one in private sector have the facility for coronary angiogram and angioplasty.

In Government sector, 5 (29.4%) hospitals and in private sector 8 (30.8%) hospitals are managing cardiac emergencies. Other hospitals refer the cardiac patients to higher institutions. In focus group discussions physicians said that they provide a sorbitrate tablet for sublingual administration before referring the patient to other hospitals. According to doctors, aspirin was not routinely used as an emergency drug before referring the patient to a higher institution. In government hospitals, ambulance will not be available in most of the time, due to various reasons.

The facilities available in different hospitals in the city for the management of cardiac emergencies are listed in the table 7.

Table 7

Facilities available in hospitals

Sl no	Facilities	Government % (N 17)	Private % (N 26)	Total % (N 43)	P Value
1	Cardiac defibrillator	35.3 (6)	53.8 (14)	46.5 (20)	0.233
2	Oxygen	70.6 (12)	96.2 (25)	86 (37)	0.018
3	Ambu bag	47.1 (8)	88.5 (23)	72.1 (31)	0.003
4	Oxygen mask	47.1 (8)	96.2 (25)	76.7 (33)	0.001

P value is based on chi-square value of the proportions in government and private sector.

Forty six percent of the community members have the opinion that treatment facilities for treatment and prevention of heart disease are very poor in the city.

6.4.2 *Hypertension*

Only 58.4% of doctors said that it is very important to check blood pressure of all adult patients. The perceptions of doctors on the reasons of uncontrolled hypertension are given in table 8.

Table 8

Perceptions of physician on reasons for uncontrolled hypertension

Sl No	Reason for uncontrolled hypertension	Percentage of doctors with the opinion (N 62)
1	Inadequately treated	37.1 (23)
2	Non compliance to treatment	29.0 (18)
3	Diagnosed but untreated	24.2 (15)
4	Poor diagnostic facilities	8.1 (5)
5	Impossible to control hypertension in all patients	1.6 (1)

Most of the doctors (82.3%) were treating hypertensive patients and 88.7% of doctors were treating diabetic patients. Different categories of drugs used by physicians are listed in the table 9.

Table 9

Different categories of anti hypertensive drugs used by physicians

Sl no	Category of antihypertensive drugs	Percentage of Physicians using that drug (N 52)
1	Calcium channel blockers	98.1 (51)
2	Beta blockers	92.3 (48)
3	Diuretics	67.3 (35)
4	ACE inhibitors	46.2 (24)
5	Other drugs	7.7 (4)

Thirty eight percent of patients received treatment from government hospital and 25% from private hospital and 37% from general practitioners' clinic. Only 53.3% of doctors used guidelines for the treatment of hypertension, of which 36.2% followed WHO guidelines, 20.4% followed AHA and others followed JNC, BMC or a combination of all guidelines. Most of the doctors (96.8%) think that standard guidelines and algorithms are important in the prevention and management of CVD and diabetes.

6.4.3 *Ischemic heart disease and stroke*

Availability of drugs in different hospitals, for cardiac emergencies and diabetes are listed in Table 10.

Table 10

Availability of drugs in different hospitals

Sl no	Facilities	Government % (N 17)	Private % (N 26)	Total % (N 43)	P Value
1	Aspirin	94.1 (16)	96.2 (25)	95.3 (41)	0.757
2	Sorbitrate	88.2 (15)	96.2 (25)	93.0 (40)	0.319
3	Beta-blocker	52.9 (9)	88.5 (23)	74.4 (32)	0.009
4	Ca+ channel blockers	100 (17)	96.2 (25)	97.7 (42)	0.413
5	Statins	29.4 (5)	57.7 (15)	46.5 (20)	0.069
6	Streptokinase	23.5 (4)	26.9 (7)	25.6 (11)	0.803
7	Insulin	76.5 (13)	100 (26)	90.7 (39)	0.009
8	Oral hypoglycemic drugs	82.4 (14)	96.2 (25)	90.7 (39)	0.128

P value is based on chi-square value of the proportions in government and private sector.

6.4.4 *Diabetes*

Majority of physicians (88.7%) were treating diabetic patients. The drugs used by physicians are given in Table 11.

Table 11

Different categories of drugs used by Physicians for Diabetes

Sl no	Categories of Anti diabetic drugs	Percentage of Physicians using the drugs (N 55)
1	Oral anti diabetic drugs	100 (55)
2	Insulin	72.7 (55)

In the Government sector, 7 (41.2%) hospitals are managing diabetic emergencies, and in private sector, 19 (73.1%) hospitals are managing diabetic emergencies. Surgical treatment for diabetes was available in 6 (35.3%) government hospitals and 17 (65.4%) private hospitals. Separate diabetic clinic were present only in 11 (25.6%) of hospitals, and majority 9 (81.8%) of them were in the private sector.

6.5. Knowledge of risk factors

Interview with Physicians revealed that hypertension is the most important risk factor for cardiovascular diseases. The other important risk factors are listed in the table 12 in decreasing order.

Table 12

The risk factors of cardiovascular diseases in decreasing order.

Number	Risk factors
1	Hypertension
2	Smoking
3	Diabetes mellitus
4	Obesity
5	Food
6	Stress
7	Physical activity
8	Family history
9	Alcohol use

Majority of doctors are of the opinion that preventive services in the community for diabetes and cardiovascular diseases are inadequate. Thirty nine percent of the doctors had the perception that smoking prevention clinics are present in the community. Forty four percent of physicians had the perception that alcohol de-addiction clinics are present in the community. Forty percent had the opinion that exercise facilities are available in the city and 56.5% of physicians had the opinion that life style counseling clinics are available for the community.

Only 27.4% of doctors know exactly what Body Mass Index (BMI) is, and 21% of doctors check the weight and height of all patients.

6.5.1 *Biological Risk Factors*

During focus group discussions, many community members said heredity was an important factor in Diabetes and hypertension. Some community members also said that heart diseases are reported more in certain families. Physicians also agreed that diabetes and hypertension have its origin in the genes, but not all cases of hypertension and diabetes are due to genetic factors. In their opinion, following healthy life style can prevent most of the diabetes and hypertension cases.

6.5.2 *Diet and CVD*

All community participants during FGD said that there is a direct link between food and heart diseases. During the past 50 years, there was a drastic change in the eating habits of people of Kerala. Fast food restaurants were introduced in Trivandrum city few years back. All participants said that there is an increase in consumption of meat and egg during recent years. High fat content in the diet increases the incidence of heart disease and blood pressure. Low fat diet is generally good for health, all agreed. Bakery food is not good for children as it contain high amount of fat and sugar. They said that many addictives are also uses in bakery food.

Majority of community members (86%) believed that there is a relation between dietary practices and heart diseases. Ninety percent of community members were with the opinion that bad life style can lead to cardiovascular diseases.

6.5.3 *Smoking and CVD*

The prevalence of tobacco use in different groups is listed in the Table 13.

Table 13

The prevalence of tobacco use.

Sl no	Different groups	Smoking %	Chewing %	Tobacco use *(Total)%
1	Community (N 100)	35 (35)	11 (11)	42 (42)
2	Patients with Hypertension (N 40)	42.5 (17)	27.5 (11)	50 (20)
3	Patients with IHD (N 17)	41.2 (7)	29.4 (5)	58.8 (10)
4	Patients with stroke (N 13)	46.2 (6)	30.8 (4)	53.8 (7)

* Total will not tally because some people use both forms of tobacco.

The community sample also included 6% of ex-smokers. Among the smokers, the mean duration of smoking was 16.7 years. Majority of community members (78%), including 74.6% (N 47) males and 83.8% (N 31) females, were aware of the health effects of tobacco. All the females and 89% of the male community members were aware that smoking could adversely affect the heart. Only nine community members said that there is no relation between smoking and heart disease.

Community members during FGD said that smoking is one among the causes of heart diseases. During 1940s and `50s, cigarettes were not available in most of Kerala. Only country made beedies were available. Smoking was less common in the past and it has continuously increased through the decades. They also said that, now smoking has become common among the younger age group and among the middle age group.

Participants also suggested that field staff in the primary health center could be used for health education against smoking. This will not cause extra money for government, because the existing infrastructure can be used for this purpose. Smoking increases the chance of heart disease in all age groups. Now there is a change in smoking behavior already on its way. Now the smokers do not smoke in public places and at

offices, also, most of them do not smoke within the office room. Many go out of the house or office to smoke. There is a decrease in smoking in colleges also. However, there is an increase in the use of alcohol among college students, the participants said.

Community members also said that chewing tobacco is unpopular now. Most of the people in the city are not using tobacco for chewing. Some people use pan, which is available as packets. Old people still use traditional pan chewing.

Multipurpose workers also agree that the field staff can be used for campaign against smoking effectively. They are conducting anti smoking programmes in school, as it will prevent smoking by school children. It will also reduce the number of smokers in the future, because less number of children starts smoking. The health education should start from high school.

6.5.4 *Alcohol and CVD*

The prevalence of alcohol use in the community is 41% and it was significantly low among females (P<0.001). Seventy one percent of community members believed that consumption of alcohol could produce health problems and 26% did not consider alcohol as a risk factor for health. Only three percent of community members did not know the health effects of alcohol.

Alcohol consumption among different groups is listed in the table 14.

Table 14

Prevalence of alcohol use

Sl no	Different groups	Alcohol use %
1	Community (N 100)	41 (41)
2	Patients with Hypertension (N 40)	32.5 (13)
3	Patients with IHD (N 17)	35.3 (6)
4	Patients with stroke (N 13)	30.8 (4)

Among the community members only 4% were using alcohol regularly, on a daily basis; 13% were using alcohol more than once in a month and 24 % of community members were using alcohol once in a month or less.

6.5.5 *Stress and CVD*

Community representatives in FGD said that, stress can produce heart disease and can result in sudden death. Fifty-two percent of ischemic heart disease patients and 61.5% of stroke patients were affected by stress before the onset of disease. Stress affected 72.5% (N=29) of hypertensive patients, of which 10.3% were affected by stress usually, 75.9% were affected by stress occasionally and 13.8% were affected by stress rarely.

6.5.6 *Physical activity and CVD*

During FGD, community members said that another cause for diabetes and heart disease is lack of exercise. Now most of the people adopt a sedentary life style. This is one of the reasons for increase in the occurrence of the cardiovascular diseases and diabetes in the community. Many people start exercise only after an episode of heart attack.

Table 15

Regular exercise by different group

Sl no	Category	Exercise %	Percentage with opinion that exercise protect CVD or diabetes
1	Community (N 100)	54 (54)	87 (87)
2	Hypertensive patients (N 40)	42.6 (17)	87.5 (35)
3	Diabetic patients	59.6 (31)	73.1 (38)

6.6. Importance of Prevention of Cardiovascular and diabetes

All doctors had the opinion that preventive strategies of heart diseases are either important (opinion of 17.7% of doctors) or very important (opinion of 82.3% of doctors). Twenty-one percent of doctors said that targeting the whole population can prevent cardio-vascular diseases and 77.4% of doctors said that targeting high-risk groups could do it. The major barrier for prevention of cardiovascular diseases, according to the opinion of doctors is listed in the Table 16.

Table 16

Perception of physicians about major barriers in the prevention of Cardiovascular diseases

Sl No	Major barriers	Percentage of physician with the opinion (N62)
1	Difficult to implement in the community	29
2	Difficult to follow preventive strategies	29
3	Preventive strategies are costly	17.7
4	People will not accept it	9.7
5	The preventive strategies will not work	1.6
6	Other reasons	12.9

Physician perception on manpower and materials available for the care and management of cardiovascular diseases are listed in Table 17.

Table 17

Physician's perception on manpower and materials available for the care and management of cardiovascular diseases

Sl no	Physician's perception	Percentage of Physician with the opinion	Percentage of community members with the opinion
1	Sufficient	9.7	28
2	Average	46.8	26
4	Very poor	43.5	46

A national programme on cardiovascular diseases is important, according to the opinion of 90.3% of physicians. According to 40.3% of doctors, emphasis should be on primary prevention, 4.8% for secondary prevention and 54.8% of doctors opined that it should be on all levels of prevention; primary, secondary and tertiary level.

6.7. Role of the Government

The opinions of community members on the need for a national programme on the cardiovascular diseases are listed in the table 18.

Table 18

The need of a national programme

Sl no	Opinion of community members	Percentage with the opinion. (N 100)
1	Very important	31 (31)
2	Important	44 (44)
3	Less important	11 (11)
4	Not important	14 (14)

Majority of doctors (80.6%) had the opinion that Government is not paying sufficient attention to cardiovascular disease management, and 85.6% of doctors suggested that multipurpose workers of health sector could play a key role in the control and prevention of cardiovascular diseases. They can be used to educate the public, screening for hypertension and diabetes, promoting treatment and follow up. Many doctors (37.1%) said that their service could be utilized in all the above activities.

Fifty-eight percent of doctors had the opinion that training in medical colleges was inadequate to deal with cardiovascular and diabetic patients, and only 41.9% of doctors attended any training programme on the management of cardiovascular and

diabetic patients after graduation. Ninety one percent of doctors had the opinion that surveillance of CVD is important. Sixty seven percent of doctors had the opinion that local registers form a good surveillance system.

7. DISCUSSION

7.1 Hypertension

Hypertension prevalence in Trivandrum city was found to be higher both from this study and previous studies. Hypertension is associated with increased risk of adverse clinical events from coronary atherosclerosis as well as stroke. Most of the doctors are treating hypertensive patients with drugs. There is evidence that long-term, effective treatment of hypertension can decrease the occurrence of adverse coronary events.

During focus group discussions as well as interview with physicians, most of them stress the need for standard protocol and algorithms for the diagnosis and management of cardiovascular diseases especially for hypertension. Trained health workers can detect hypertension. Nobody in the patient sample, community sample or the FGD mentioned that there existed a policy to utilize the expertise of the health workers and nurses to measure and monitor hypertension in the community. Since Kerala has a good proportion of elderly and the proportion of hypertensives in the elderly is quite high a policy change is required at the state level in order to meet the challenge of high proportion of hypertensive in the future. Since the study focused only on urban hospitals it would be necessary to see whether blood pressure apparatus is available in rural hospitals and health centres and whether the health workers are measuring blood pressure in those health facilities.

7.2 IHD

Primary prevention of coronary atherosclerosis can reduce the occurrence of myocardial infarction and death both in subjects without clinical disease as well as those with a history of chronic angina or an acute coronary syndrome [61].

Aspirin is an irreversible inhibitor of platelet cyclooxygenase activity and thereby interferes with platelet activation. Regular administration of 100 to 325 mg orally per day has been shown to reduce coronary events in asymptomatic adult men, patients with asymptomatic ischemia after myocardial infarction, patients with chronic stable angina, and patients who have survived unstable angina and myocardial infarction[61]. Aspirin is a very useful drug in the emergency management of ischemic heart diseases. Many aspects of the treatment of acute myocardial infarction are initiated in the emergency department and then continued during inpatient management. Aspirin is now considered an essential drug in the management of patients with suspected acute myocardial infarction. Rapid inhibition of cyclooxygenase in platelets followed by a reduction of thromboxane A2 levels is achieved by buccal absorption of a chewed 160 to 325 mg tablet in the emergency department. This measure should be followed by daily oral administration of aspirin in a dose of 160 to 325 mg [61].

In our study, it was found that doctors are not routinely using aspirin in the emergency management of myocardial infarction or as an emergency measure before referring the patient to higher institution. Sorbitrate was the drug used by most of physician in emergency management of myocardial infarction. This directly pointed out the need of treatment algorithms in the management of ischemic heart diseases. The awareness of doctors regarding the impact of aspirin seems to be low. It is important to

make this drug available in all the hospitals since this is a common drug that can be used for routine management of patients with other illnesses also.

Basic management of patients with ischemic heart disease is medical, but many patients are improved by coronary revascularization procedures such as coronary angioplasty or coronary artery bypass grafting. These interventions should be employed in conjunction with but do not replace the drug treatment or continuing need to modify risk factors. Indications for coronary angioplasty or coronary artery bypass grafting are based on the severity of symptoms, coronary anatomy, and ventricular function.

In Trivandrum city, two hospitals in Government sector and two hospitals in private sector have the facility for coronary bypass surgery. Two hospitals in government sector and one in private sector have the facility for coronary angiogram and angioplasty. According to community members the treatment in the private hospitals are very costly and the health insurance services are very limited. This will keep away most of the people from private hospitals. Therefore, facilities for the management of ischemic heart disease are inadequate in the city especially in the Government sector.

Physical activity, quitting cigarette smoking, maintaining normal blood pressure, and avoiding obesity were separately associated with lower rates of death from all causes and from coronary heart disease among middle-aged and older men [62]. Cigarette smoking accelerates coronary atherosclerosis at all ages and increases the risk of myocardial infarction and death. One of the important measures to reduce hypertension, stroke as well as the ischemic heart disease is reduction of smoking behavior of the community. As suggested in focus group discussions, this can be achieved by health education of the public, promotion of healthier lifestyles for entire populations, increase taxation of

tobacco products, implementing rules and regulations to prevent smoking in public places and discouraging children from adopting harmful life styles.

People of Indian subcontinent are highly susceptible to cardiovascular diseases [63]. In urban Kerala cardiovascular diseases are appears to be on the beginning of an epidemic. If it not controlled properly in time, this epidemic of cardiovascular disease will spread rapidly to semi urban and rural areas [63]. Our study demonstrates that most of the physicians, health workers and community members are aware of the high prevalence of cardiovascular diseases and diabetes in Kerala. Most of the physicians (90.3%) opined, that a national programme of cardiovascular disease is important. Majority of community members also share the same opinion. Kerala has banned smoking in public places in government offices. This is a good policy decision, if implemented effectively can make a lot of impact in the control of heart attacks and other cardiovascular diseases.

7.3 Stroke

The effect of aspirin in daily doses of 300 mg as secondary prophylaxis after cerebrovascular events is well-established [64]. Aspirin is a universally available and cost effective drug. Introducing treatment protocols for hypertension, and implementing programmes for the control of stroke is an important measure to correct this deficiency. Angiotensin converting enzyme inhibitors were also found to reduce fatality associated with stroke as well as functional impairment in non-fatal stroke. As stroke is the leading cause of disability in elderly, even moderate decrease in disability would be very important [65]. An average blood pressure reduction of 9/4 mm Hg was reported to reduce the risk of stroke by around 28% [66]. Therefore, treatment of all patients with hypertension is an important measure to reduce stroke in the community. As earlier stated,

incorporation of multipurpose workers in the diagnosis and follow up of hypertensive patients is an important public health measure to alleviate this problem.

Published randomized trials of statin drugs demonstrate large reductions in cholesterol and clear evidence of benefit on stroke and total mortality. There was a large and significant decrease in CVD mortality among patients taking statins [67].

7.4 Diabetes

Strict control of diabetes is helpful in lowering the elevated levels of plasma LDL cholesterol and triglyceride in this condition. Majority of physicians were treating diabetic patients with dietary advice, and or drugs. Proper treatment of diabetes will reduce the complications and should include prescribed exercise, dietary advice, weight reduction in obese individuals and may be combined with oral drugs and insulin in indicated patients. Majority of private hospitals and many government hospitals are managing diabetic emergencies. There are hospital facilities in the city to cater the needs of Diabetes patients. However we did not study the access to anti-diabetic drugs to the population since our sample was small. Since insulin is a costly drug the affordability for poor people will also be a problem. We found that insulin was not available in 23.5% of government hospitals.

7.5 Policy

In Kerala, medical and public health services had a share of around 10% of total budget allotment of the state between 1965 and 1980 [68]. There after it was continuously decreased during subsequent state budget. The money allotted to health was shared among modern medicine, ayurveda, homeopathy and other systems of medicine. During the last 20 years, there is tremendous growth in ayurveda and homeopathy in Government

sector [69]. During the period, the percentage of share of state budget allotted to the health was not increased. The percentage of budget allotted to health during 2001-2002 budget was only 6.2% of total budget allocation to the state [70].

The money allotted to the modern medicine has to be divided between curative and preventive services. In the curative side, there are many health care providers, which include private hospitals, missionary medical services, co-operative sector hospitals, insurance medical services, central Government institutions and medical college hospitals. However, in the preventive services sector Government is the sole provider of health services for the entire state. This clearly demonstrate that more resources are needed in preventive services sector. Both the diseases are chronic in nature, which drain more resources for diagnosis, treatment and management of complication. Primary prevention is cost effective in the prevention of cardiovascular diseases and diabetes. At present cardiovascular disease, prevention has not attained momentum in Kerala. Even the health education on avoidable risk factors is also limited to some voluntary organizations. In our study, it was found that community members had some knowledge on risk factors of cardiovascular diseases and diabetes mainly gathered from media, friends and relatives and to some extend from doctors. Field staff contribution on this regard in urban areas was negligible at present, which can be explained by the absence of organized primary health care setup in urban areas.

Government of India initiated a Pilot Project on Control of Cardiovascular Disease and Stroke in 1995-96. It is planned to start a programme in the organized sectors like railways, CGHS, industries by carrying out health check-ups [71]. A modified knowledge, attitude and practices study including measurement of blood pressure, weight

and lipid profile measurement had been initiated in the states Kerala, Aandhra Pradesh and West Bengal [71]. Cardiovascular Diseases, Stroke and Diabetes Mellitus are known to have multifactorial causation and share the risk factors. The level of these risk factors in Indians is not known and there may be large scale disparities in this regard among various states.

7.6 Health Insurance

In our study, it was found that most of the community members are unaware of health insurances available in India. Particularly, public delivery of health care is inadequate as per needs of the community, apparently for reasons of inadequate financing. The cost of medical care and treatment has increased to new heights, especially for the management of cardiovascular diseases in recent years and is expected to rise even further in the years to come. This leads to excessive financial burdens on households. One of the most important is the under funded public health care system, which suffers from quality and access problems, forcing consumers to pursue alternate expensive treatments from private providers [72]. This highlights the need for alternative finances, including provision for medical insurance at a much wider level. Some form of health insurance is attractive to the health sector in many developing countries [73].

7.7 Cardiovascular diseases in Kerala by 2020.

Kerala is now in the late expanding stage of population growth. The decadal population growth of Kerala reached highest figure of 26.9% in 1971, there after there is a continuous decline in growth rate and will enter in the fourth stage called low stationary, in the next few decades. Census 2001 showed 9.42% population growth rate

for Kerala in 1991-2001. There is a decline in trend of population growth rate after 1971. The population growth rate in Trivandrum is 9.78% in 1991-2001.

Our study pointed out that there is an increasing trend in the prevalence of cardiovascular diseases and diabetes during past so many years. If the trend continues for many more years, the current epidemic of cardiovascular diseases and diabetes is likely to worsen by 2020. The life expectancy at birth in Kerala is 71.67 years in males and 75 years in females, which also shows an increasing trend during the past many years [74]. Increase in age of population will change the structure of age pyramid. This will also enhance prevalence of cardiovascular disease and diabetes in future.

Our study found that there is enough number of private hospitals in the city, majority of them equipped with facilities necessary for the management of cardiovascular diseases. Diagnostic facilities, necessary for the diagnosis of cardiovascular diseases and diabetes, are available in a higher proportion of private hospitals. These private institutions can cater health need of affluent population in curative services. However, theses hospitals are out of reach of majority of population. Even now, the Government hospitals are not equitable with private hospitals in terms of equipment and specialist services. More government hospitals and work force is needed in the future to manage the expected increases in cardiovascular disease and diabetes morbidity and mortality. We need to provide facilities for primordial and primary prevention of cardiovascular diseases and diabetes to reduce the morbidity load of these diseases in the community.

The urban community has some disadvantage in terms of comprehensive primary health care, as there is no urban primary health center in the city. So practically, there is no preventive health services in Trivandrum city. Therefore, Government should consider

the implementation of urban health care services by providing urban primary health centers in the city, to provide preventive health care as well as curative health care. Investing money in preventive health care is a cost effective strategy, with the return of good health of the community. Primary prevention of cardiovascular diseases and diabetes will ameliorate the expected epidemic of 2020.

8. CONCLUSION

In this study, we found that treatment and prevention facilities for the management of cardiovascular disease and diabetes are inadequate in the city mainly from the focus group discussions and perceptions of people and health care providers. Many deficiencies are identified in the study, which includes inadequate diagnostic and treatment facilities in government hospitals, inadequate number of cardiologist and other paramedical staff members, inadequate preventive services for cardiovascular diseases and diabetes, inadequate training for doctors during MBBS course and there after, in the diagnosis and management of cardiovascular diseases, and also inadequate referral services. The deficiencies identified in this study highlight the need of additional investment in human resources and equipment in the Government sector. There is no primary health care system in Trivandrum city. Since there is no guidelines for measuring the capacity to the control of cardiovascular and diabetes it would be useful to set a standard for such capacity. For example, how many ECG machines are required for a population of 100000 population? How many cardiologists are required for a city like Trivandrum? These are based on many factors like economic development of a society, and political will of governments to provide health care to its populations.

8.1 Policy changes recommended

It is also important for the Government to provide proper guidelines and algorithm in the diagnosis and treatment of cardiovascular diseases and diabetes, and give proper training on this regard to general practitioners in the management of cardiovascular diseases and diabetes.

Government may take necessary steps to provide adequate facility for diagnosis and management of cardiovascular diseases and diabetes in Government sector. The government hospitals should be staffed with specialists to provide specialist care to those, who cannot afford treatment at private hospitals.

Government may take initiative to include urban areas also in the primary health care sector by providing Primary Urban Health Centers in the cities.

Field staff in the primary health centers can be empowered to provide extended health care services in the diagnosis and follow up of hypertensive patients and their service can also be utilized to provide health education to public on risk factors of cardiovascular diseases and diabetes.

Government may promote health insurance to cover the unexpected expenses in the event of cardiovascular diseases.

Government may give more emphasis on the prevention of cardiovascular diseases and diabetes, which is cost effective and prevent the worsening of the current epidemic of cardiovascular disease and diabetes.

References

1. Do KA, Green A, Guthrie JR, Dudley AC, Burger HG, Dennerstein L. Longitudinal study of risk factors for coronary heart disease across menopausal transition. American Journal of Epidemiology 2000; 151: 584-93.
2. Jeanine E, Lennep R, Westerveld HT, Erkelens DW, Van der Wall EE. Risk factors for coronary heart disease: implications of gender. Cardiovascular research 2002; 53: 538-49.
3. Bots ML, Elwood PC, Nikitin Y, Salonen JT, Concalves AF, Inzitari D, Sivenius S, Benetou V, Tuomilehto J, Koudstaal PJ, Grobbee DE. Total and HDL cholesterol and risk of stroke. Eurostroke: a collaborative study among research centers in Europe. Journal of Epidemiology and community health 2002; 56 (Suppl 1): i19-i25.
4. Timmis AD. Diabetic heart disease: clinical considerations. Heart 2001; 85: 463-469.
5. Iribarren C, Karter AJ, Alan S, Ferrara A, Liu JY, Sydney S, Selby JV. Glycemic control and heart failure among adult patients with diabetes. Circulation 2001; 103: 2668-2673.
6. Deborah Fulton Kehoe, Richard F Hamman, Judith Baxter, Julie Marshall. A case control study of Physical activity and non-insulin dependent diabetes mellitus (NIDDM): The San Luis valley diabetes study. Annals of Epidemiology 2001; 11: 320-327.

7. Twisk JWR, Kemper HCG, Mechelen WV, Post GB. Clustering of risk factors for coronary heart disease: the longitudinal relation with life style. Ann Epidemiology 2001; 11: 157-165.

8. Barnet E, Joel A, Halverson A, Elms GA, Braham VA. Metropolitan and non metropolitan treads in Coronary Heart Disease mortality within Appalachia, 1980-1997. Annals of Epidemiology 2000; 10: 370-379.

9. McGovers PG, Pankow JS, Shahar E, Doliszny KM, Folsom AR, Blackburn H, Luepker RV. Recent rents in acute coronary heart disease. New England Journal of Medicine, 1996: 334: 90.

10. Reddy KS, Yusuf S. Emerging epidemic of Cardio vascular diseases in developing countries. Circulation, 1998; 97: 596-601.

11. Beaglehole R, Saracci R, Panico S. Cardiovascular diseases: causes, surveillance and prevention. International journal of Epidemiology 2001; 30: S1-S4.

12. Pearson TA, Smith SC, Poole-Wilson P. Cardiovascular specialty societies and the emerging global burden of cardio vascular diseases: A call to action. Circulation 1998; 97: 602-604.

13. Beaglehole R. Global cardiovascular disease prevention: time to get serious. The Lancet; Vol 358: 661-663.

14. Chobanian AV. Control of hypertension: An important National Priority. New England Journal of Medicine; Vol 345, No 7: 534-535.

15. Park K. Park's textbook of Preventive and social medicine, 15th edition 1997: 289-292.

16. Alberti G. Non communicable disease: tomorrow's pandemic. Bulletin of World Health Organization, 2001; 79: 907.

17. Sadd MF, Knowler WC, Pettitt DJ, Nelson RG, Mott DM, Bennett PH. The natural history of impaired Glucose tolerance in the Pima Indians. New England Journal of Medicine, 1988; 319: 1500-6.

18. Valdmanis V, Smith DW, Page MR. Productivity and economic burden associated with diabetes. American Journal of Public Health 2001; 91: 129-130.

19. King H, Rewers M. Diabetes in adult is now a third world problem. Bulletin of World Health Organization, 1991; 69 (6): 643-648.

20. Park. K. Park's textbook of Preventive and social medicine, 15th edition 1997: 269-74.

21. Raheja BS, Kapur A, Sathe SR, Jorgenson LN, Moorthi SR, Pendesey S, Sahay BK, the DiabCare Asia-India Study Group. DiabCare Asia-India Study: Diabetes Care in India-Current Status. Journal of Association of Physicians India, 2001; 49: 717-122.

22. Bai PVA, Murthy BN, Chellamariyappan M, Gupte MD, Krishnaswami CV. Prevalence of known diabetes in Chennai City. Journal of Associations of Physicians India 2001; 49: 974-981.

23. Iyer SR, Iyer RR, Upasani SV, Baituli MN. Diabetes Mellitus in Dumbali-An Urban Population Study. JAPI 2001; 49: 713-716.

24. Kannan KP, Thankappan KR, Ramankutty V, Aravindan KP. Health and Development in Rural Kerala. Sastra Sahitya Parishad 1991: 47.

25. Ramankutty V, Balakrishnan KG, Jayasree AK, Thomas J. Prevalence of heart disease in the rural population of Trivandrum district, Kerala, India. International Journal of Cardiology, 1993; 39: 59-70.

26. Hypertension study group. Prevalence, awareness, treatment and control of hypertension among the elderly in Bangladesh and India: a multicenter study. Bulletin of World Health Organization, 2001; 79:490-500.

27. Joseph A, Kutty VR, Soman CR. High Risk for Coronary Heart Disease in Trivandrum City: A Study of Serum Lipids and Other Risk Factors. Indian Heart Journal 2000; 52: 29-35.

28. Kutty VR, Aleyamma J, Soman CR. High prevalence of type 2 diabetes in an urban settlement in Kerala, India. Ethnicity and health, 1999; 4(4): 231-39.

29. Kutty VR, Soman CR, Aleyamma J, Ramdas P, Vijayakumar K. Cross sectional survey of Type 2 Diabetes in Neyyatinkara, Kerala, India. Research report, Health action by people, Pettah, Trivandrum, Kerala, India.

30. Ebrahim S, Smith GD. Exporting failure? Coronary heart disease and stroke in developing countries. International Journal of Epidemiology 2001; 30: 201-205.

31. Evans A, Tolonen H, Hense H, Ferrario M, Sans S, Kuulasmaa K. Trends in coronary risk factors in the WHO MONICA project. International journal of Epidemiology 2001; 30: S35-S40.

32. Fuster V, Gotto AM. Task force 1. Pathogenesis of coronary artery disease: The biologic role of risk factors. Journal of American College of Cardiology; Vol 27, No 5: 964-974.

33. McCarron P, Smith GD, Okasha M, McEven J. Blood pressure in young adulthood and mortality from cardiovascular disease. The Lancet, 2000: Vol 355: 1430-31.

34. Franklin SS, Larson MG, Khan SA, Wong ND, Leip EP, Kannal WB, Levy D. Does the relation of blood pressure to coronary heart disease risk change with aging? The Framingham heart study. Circulation, 2001; 103: 1245-49

35. Bots ML, Nikitin Y, Salonen JT, Elwood PC, Malyutina S, Concalves AF, Sivinius J, Carlo A, Lagiou P, Tuomilehto J, Koudstaal PJ, Grobbee DE. Left ventricular hypertrophy and risk of fatal and non-fatal stroke. Journal of Epidemiology and Community Health 2002; 56 (suppl 1): i8-i13.

36. Hess DC, Demehuk AM, Brass LM, Yatsu FM. HMG CoA reductase inhibitors (statins) A promising approach to stroke prevention. Neurology, 2000; 54: 790-796.

37. Mckee M, shkolnikov V, Leon DA.. Alcohol is implicated in the fluctuations in cardiovascular disease in Russia since the 1980s. Annals of Epidemiology Vol 11, No 1, January 2001:1-6.

38. Marmot MG. Alcohol and coronary heart disease. . International Journal of Epidemiology 2001; 30: 724-729.

39. Raitakari OT, Leino M, Raikkonen K, Porka KVK, Taimela S, Rasanen L, Viikari JSSA. Clustering of risk habits in young adults. American journal of Epidemiology 1995; 142: 36-44.

40. Bots ML, Salonen JT, Elwood PC, Nikitin Y, Concalves AF, Inzitari D, Sivenius S, Trichopoulou J, Koudstaal PJ, Grobbee DE. γ– Glutamyltransferase and risk of

stroke: the Eurostroke project. Journal of Epidemiology and community health 2002; 56 (Suppl 1) :i25-i29.

41. Niccoli G, Iacoviello L, Cianflone D, Crea F. Coronary risk factors: new perspective. International journal of Epidemiology 2001; 30: S41-S47.

42. Yajnik CS. Commentary: Fetal origins of cardiovascular risk-nutritional and non-nutritional. International Journal of Epidemiology 2001; 30: 57-59.

43. Moons KGM, Bots ML, Salonen JT, Elwood PC, Concalves AF, Nikitin Y, Sivenius S, Inzitari D, Benetou J, Koudstaal PJ, Grobbee DE. Prediction of stroke in general population of Europe (Eurostroke): Is there a role for fibrinogen and electrocardiography? Journal of Epidemiology and community health 2002; 56 (Suppl 1): i30-i36.

44. Perry IJ. Commentary: Smoking and diabetes accumulating evidence of causal link. International Journal of Epidemiology 2001; 30: 554-555.

45. Will JC, Galuska DA, Ford EF, Mokdad A, Calle EE. Cigarette smoking and diabetes mellitus: evidence of a positive association from a large prospective cohort study. International Journal of Epidemiology 2001; 30: 540-546.

46. Lenfant C. Can we prevent cardiovascular disease in low and middle income countries? Bulletin of World Health Organization, 2001; 79: 980-987.

47. Beaglehole R. Cardiovascular disease in developing countries. British Medical Journal; Vol 305: 1170-71.

48. Rajeev Gupta. Prevention of coronary heart disease among Indians: Focus on primary prevention. Journal of Indian Medical Association; Vol 98, No 11: 703-709.

49. Kim KS, Owen WL, Williams D, Adams LL. A comparison between BMI and Conicity index on predicting Coronary Heart Disease: The Framingham Heart study. Annals of Epidemiology 2000; 10: 424-431.

50. Mbewu A. prevention is more moral and cost effective. Bulletin of World Health Organization, 2001; 79: 983.

51. Kuller HL. Prevention of cardiovascular disease and the future of cardiovascular disease epidemiology. International journal of epidemiology, 2001; 30: S66-S72.

52. Giampaoli S, Palmieri L, Capocacia R, Pilotto L, Venuzzo D. Estimating population based incidence and prevalence of major coronary events. International Journal of Epidemiology 2001; 30: S5-S10.

53. Ades PA. Cardiac Rehabilitation and Secondary Prevention of Coronary Heart Disease. NEJM, 2001; Vol 345:892-902.

54. Krishnaswami S, Joseph G, Richard J. Demands on tertiary care for cardiovascular diseases in India: analysis of data for 1960-89. Bulletin of World Health Organization, 1991; 69, 3: 325-30.

55. Sande MAB, Walravan GEL, Milligan PJM, Banya WAS, Ceesay SM, Nyon A, McAdam KPWJ. Family history: an opportunity for early interventions and improved control of hypertension, obesity and diabetes. Bulletin of World Health Organization, 2001; 79: 321-328.

56. Kehoe DF, Hamman RF, Baxter J, Marshall J. A case control study of physical activity and non-insulin dependent diabetes mellitus (NIDDM): The San Luis valley diabetes study. Annals of Epidemiology 2001; 11: 320-327.

57. Reddy KS. The emerging epidemic of cardiovascular diseases. Country profile, India. Lancet, 1998; 351: 1265-75.

58. Stainwachs DM, Collins-Nakai RL, Cohn LH, Garson A, Wolk MJ. The future of cardiology: Utilization and cost of care. Journal of American College of Cardiology; Vol 35, No 4, 2000: 1092-99.

59. Lown B. Cardiology at cross roads: Challenges for India and lessons from he west. Indian Heart Journal 2001; 53: 38-43.

60. Census of India 2001, Kerala. Provisional population totals, paper 1 of 2001: 1-5.

61. Antman EM, Braunwald E. Acute myocardial infarction, Chapter 243. Harrison's Principles of Internal Medicine, 14th edition.

62. Paffenbarger RS Jr, Hyde RT, Wing AL, Lee IM, Jung DL, Kampert JB. The association of changes in physical-activity level and other lifestyle characteristics with mortality among men. New England Journal of Medicine, 1993; 328: 538-45

63. Bhopal R. Epidemic of cardiovascular disease in South Asians. British Medical Journal, 2002; 324: 625-626.

64. The SALT Collaborative Group. Swedish Aspirin Low-Dose Trial (SALT) of 75 mg aspirin as secondary prophylaxis after cerebrovascular ischaemic events. Lancet, 1991; 338: 1345-49.

65. Bosch J, Yusaf S, Pogue J, Sleight P, Lonn E, Rangoonwala B, Davis R, Osterfren J Probstfield J. Use of Ramipril in preventing stroke: double blind randomized trial. British Medical Journal, 2002; 324: 699-701.

66. Schrader J, Luders S. Preventing stroke. High-risk patients should require ramipril irrespective of their blood pressure. British Medical Journal, 2002; 324: 687-688.

67. Hebert PR, Gaziano JM, Chan KS, Hennekens CH. Cholesterol lowering with statin drugs, risk of stroke, and total mortality. An overview of randomized trials. JAMA, 278; 1997: 313-21.

68. Sadanandan R. Government health services in Kerala, Who benefits. Economic and political weekly, Aug 11, 2001: 3071-3077.

69. Economic review 2000. State planning board, Government of Kerala: S227-S230.

70. Demands for grants and detailed budget estimates 2001-2002. Finance department, Government of Kerala: i-xv.

71. Government of India. Ministry of health and family welfare, Department of health. Web site: www.mohfw.nic.in

72. Mills A. Economic aspects of health. Economics of health in Developing countries: 65-88.

73. Ellis R P, Alam M, Gupta I. Health Insurance in India: Prognosis and Prospectus. Economic and Political Weekly, January 22, 2000: 207-217.

74. Economic review 2001. State planning board, Government of Kerala.: 134-140.

Appendix-1

LIST OF TABLES

Appendix-2

FOCUS GROUP DISCUSSION WITH THE COMMUNITIES

Objective of FGD is to elicit

- ***People's perception on the magnitude of cardiovascular disease and its impact (economic and health) on the household and the community***
- ***Opinions of the community on the existing infrastructure for the treatment of cardiovascular diseases and locate the nature of deficiencies if any***

- *Knowledge of the community on the risk factors (biological and behavioral) of cardiovascular diseases and scope for the care and control of the same*

IMPORTANT POINTS COVERED IN FOCUS GROUP DISCUSSION ARE LISTED BELOW

A: Magnitude (Prevalence and Burden) of cardiovascular Diseases

1. Extend of cardiovascular diseases in the community.
2. Age and gender groups are most affected by different cardiovascular diseases.
3. Heart diseases related death in the community.
4. Nature and duration of cardiovascular diseases.
5. Impact death due to CVD on the household.
6. Disability resulted by cardiovascular disease, the nature and period of disability and impact of the disability on other members of the family.

B: Nature and Efficacy of Treatment of CVD

7. Symptoms of different cardiovascular disease i.e. heart attack, hypertension and stroke.
8. Immediate reaction of family members, if anybody in the family develops symptoms of heart diseases.
9. Medical facilities available for the treatment of heart diseases/stroke.
10. Referral services available in the local hospital. .
11. Deficiencies in the referral hospital.
12. Nature and risk factors associated with the diseases
13. Availability of medicines for the treatment of heart diseases.
14. The expense of treatment in an emergency care as well as for prolonged treatment.
15. Suggestions for improvement in the existing medical facilities for the treatment of cardiovascular diseases.

C: Knowledge and Scope for Prevention

16. Scope for prevention of heart diseases and strokes.
17. Causes of heart diseases and stroke.

C.A: Biological Risk Factors

18. Relation between diabetes and heart diseases.
19. Access to health care providers who can educate you about the symptoms as well as care of diabetes.
20. Relation between high blood pressure and heart diseases.

C.B: Behavioral Risk Factors :

Diet and CVD

21. Relation between food habits and heart diseases.

22. Changed in food habits over the past few years.

23. Relation between obesity and cardiovascular diseases.

Smoking and CVD

24. Ill effects of smoking (active and passive).

25. Method of controlling tobacco consumption.

Stress and CVD

26. Relation between stress and heart diseases.

27. Awareness of the methods of management of stress.

Physical Exercise and CVD

28. Physical exercise and health.

The Role of the Government

29. Government role in the treatment and prevention of heart diseases.

The availability of financial resources of Government in the control of cardiovascular diseases

Appendix-3

FOCUS GROUP DISCUSSION WITH THE SECONDARY HEALTH CARE PROVIDERS (PHYSICIANS)

Objective of FGD is to elicit

- ***Views on the magnitude of cardiovascular disease***
- ***Opinions on the existing infrastructure for the diagnosis and treatment of cardiovascular diseases and locate the nature of deficiencies if any***
- ***Views on the scope for the care and control of the biological and behavioral risk factor of cardiovascular diseases***
- ***Views on the role of the government, NGO and others in the care and prevention of cardiovascular diseases***

IMPORTANT POINTS COVERED IN FOCUS GROUP DISCUSSION ARE LISTED BELOW

A. Magnitude (Prevalence and Burden) of CVD Morbidity and Mortality: Perception of the Health Care Providers

1. Do you think cardio-vascular diseases are becoming common?
2. Age and age and gender groups are most affected by cardio-vascular diseases.
3. Do you consider CVD to be serious killers? Do you think there has been an increase in deaths due to CVD in the recent years
4. Nature of illness in most cases of chronic cardio-vascular diseases. Nature and period of disability produced by cardiovascular diseases.
5. Impact of morbidity and mortality due to heart diseases on the country.

B. Diagnosis and Treatment of cardiovascular diseases

6. Do you think heart attack and stroke can be detected early? At what stage can these be detected?
7. Do you think the medical facilities available for the treatment of CVD at the secondary health care settings are adequate?
8. Do you treat the patients at the particular medical center where you are employed or you have had to refer cases to other hospitals? Have you had any problems in referring cases? Have you had the time to follow up such referral cases? What has been your experience?
9. Do you think the hospital (referred to) is well equipped to deal with heart diseases? If not what are the deficiencies?
10. Availability of drugs for treating heart diseases.
11. Name some of these drugs used for treatment. Are these reasonably priced? Any suggestions?

C. Knowledge and Scope for Prevention:

12. How important do you think it is to prevent the occurrence of CVD?
13. The risk factors of CVD.
14. Biological Risk Factors: hypertension, Diabetes.
15. Relation between diabetes and CVD. Who are the people at risk?
16. Symptoms associated with diabetes.
17. Nature of treatment of diabetic patients.
18. Relation between hypertension and major cardiovascular diseases.
19. Possible symptoms associated with hypertension.
20. What are your suggestions for control and treatment of hypertension?
21. Relation between high blood cholesterol and cardiovascular diseases.
22. Why do you think some people have high cholesterol?

Behavioral Risk Factors:
Diet and CVD

23. Relation between food habits and heart diseases.
24. How do you advise people about good eating behavior in order to prevent heart diseases? Do you think people actually follow these in their daily routine? If no, what are the barriers?
25. Do you think the way people eat and what they eat have changed dramatically over the past few years? Do you believe that the change in dietary habits has any impact on the disease profile of the country? If so how?
26. Do you think people are getting fatter? Do you consider this a very common phenomenon? Is obesity a risk factor for heart diseases? Do you think there is a need to educate people on how to check obesity?

Smoking and CVD

27. What your view are the ill effects of smoking (active and passive)? Do you see any relation between smoking and heart diseases?

28. Why do you think smoking and other forms of tobacco are so widely prevalent? How do you think these can be controlled? Do you consider the laws on tobacco consumption to be effective? If no, what are your suggestions for improvement? Do you see any other method of controlling tobacco consumption?

Stress and CVD

29. Do you consider stress an important factor leading to heart diseases? What are the situations that frequently contribute to stress?
30. What do people do to control stress? Do you th,ink people are aware of the methods of management of stress? What are these? Do you advise people on the same?

Physical Exercise and CVD

31. Do you think people are aware of the importance of physical exercise? Do you advise them on the same? What kind of exercise would you recommend for a patient with heart disease?

Role of the Government

32. Do you think health awareness programs (Prompt: Control and Prevention of Malaria, Polio etc.) are effective? If yes, is there a need for having similar programs for heart diseases? What should be the nature of these programs? What should be the main focus?
33. Do you think the Government pays sufficient attention to the prevention of heart diseases on the same scale as the communicable diseases? If No, should the government consider this a health priority? Do you think the Government has enough resources (financial) to do that?
34. Do you think the allocation to cardiovascular diseases is adequate? If no, do you think it has any impact on the prevalence of CVD mortality and morbidity?
35. Do you think the medical syllabus is updated enough to incorporate measures of treating and preventing Cardio-Vascular Diseases? If No, should the syllabus be updated and revised? What sort of revisions would you suggest? Are there deficiencies in practical training?

Appendix-4

FOCUS GROUP DISCUSSIONS WITH THE PRIMARY HEALTH CARE PROVIDERS (MULTI PURPOSE WORKERS/NURSES)

Objective of FGD is to elicit

- ***Views of the primary health care providers on the magnitude of cardiovascular disease, its impact on the community and the nation***
- ***Opinions on the existing infrastructure for the treatment of cardiovascular diseases and locate the deficiencies if any***
- ***Opinion on the need and scope for prevention of cardiovascular diseases***

IMPORTANT POINTS COVERED IN FOCUS GROUP DISCUSSION ARE LISTED BELOW

A. Magnitude (Prevalence and burden) of CVD (Cardiovascular Diseases) Morbidity and Mortality

1. Do you think cardiovascular diseases (heart diseases and strokes) are becoming common? If yes, which ones?
2. The age and gender groups are most affected by different cardiovascular diseases.
3. Do you consider cardiovascular diseases to be serious killers?
4. How do you think do CVD deaths affect a household? Can you recall any particular case?
5. In cases where the heart disease does not result in death, do you think the disease results in disability? If so, what is the nature and period of disability? Can you give any example from your service area?
6. Impact of Cardiovascular Diseases morbidity and mortality on the country.

B. Perception of their role in diagnosis, care and prevention of Cardiovascular Diseases

7. Symptoms of heart attack and stroke.
8. Symptoms of conditions, which precede heart attack and stroke.
9. What would you do if you come across any person developing symptoms of heart attack/Stroke?
10. Do you think the medical facilities available for the treatment of heart diseases at the level of Primary Health Centers are adequate? If no, what is missing?
11. What are your suggestions for improvement in the existing medical facilities at the level of primary health care for the treatment of heart diseases?
12. Does your training involve information on diagnosis, care and prevention of cardiovascular diseases? If yes, what is the content of the training? If no, do you think there is a need to include this in the training program?

C. Knowledge and Scope for Prevention

13. Do you think cardiovascular diseases can be prevented?
14. Do you think health workers can play an important role in the prevention of cardiovascular diseases? If so, how?
15. What in your view are the causes of cardiovascular diseases.

A. Biological Risk Factors

16. Do you see any relation between diabetes and heart diseases?
17. What are the symptoms associated with diabetes? Do you think you can counsel people on how to control diabetes? If yes, what is the nature of counseling?
18. Do you see any relation between high blood pressure and heart diseases?
19. What are the possible symptoms associated with High B.P? Do you think you can counsel people on how to control High B.P7 If yes, what is the nature of counseling?

C.B. Behavioral Risk Factors Diet and CVD

20. Do you see any relation between food habits and heart diseases? Are you aware of foods that protect cardiovascular diseases?
21. Do you think people are sufficiently aware about good eating behavior? Do you think people actually follow these in their daily routine? If No, what are the barriers?
22. Do you think people are getting fatter? Do you consider this a very common phenomenon? Do you think obesity could be a risk factor for heart diseases'? Do you think there is a need to educate people on how to check obesity?

Smoking and CVD

23. What in you view are the ill effects of smoking? Do you see any relation between smoking and heart diseases?
24. Why do you think smoking and other forms of tobacco are so widely prevalent? How do you think these can be controlled? Do you consider the laws on smoking behavior to be effective? IF No, what are your suggestions for improvement? Do you see any other method of controlling tobacco consumption?

Stress and CVD

25. What do you think is the relation between stress and CVD? What are the situations that frequently contribute to stress?
26. What do people do to control stress? Are you aware of the methods of management of stress? Do you think you can counsel people on the same?

Physical Exercise and CVD

27. Do you think physical exercise can contribute to a healthy living? Do you think people are aware of the importance of physical exercise? Do you advise them on the same?

The role of the Government

28. Do you think health awareness programs are effective? If yes, is there a need for having similar programs for heart diseases? What should be the nature of these programs?
29. If the health awareness programs are not effective, what are the deficiencies? Do you have any suggestions on how can it be made more effective? Can you recall any such program that was conducted and elaborate on the details of the program and the views of the health worker on its pros and cons?
30. Do you think the Government pays sufficient attention to the prevention of heart diseases on the same scale as the communicable diseases? If no, should the government consider this a health priority? Do you think the Government has enough resources (financial) to do that?

Appendix-5

INTERVIEW SCHEDULE/PHYSICIANS

Please tick all the correct choices.

Serial Number :

Name :

Age :

Qualifications :

Hospital :

Experience in clinical practice (in years):

Q1. What are the common diseases these days?

(A) Respiratory infections (B) HIV/STD

(C) Cardiovascular diseases (hypertension, stroke, heart attack) (D) Diabetes

Q2. Is Cardio Vascular Diseases (CVD) is becoming a major problem?

Yes / No

Q3. If yes, why is it so?

(A)Increase in deaths in recent years (B) Affects more number of people

(C) Treatment is costly (D) Other reasons

Q4. Among all CVDs, how will you rank the following in terms of number of diseases in a given population? *Give no 1-4*

Rheumatic heart disease ( ) Angina ( ) Heart attack ( ) Stroke ( )

Q5. Out of every 100 patients you are treating, how many are CVD (angina, heart attack, hypertension, stroke) patients?

Q6. Commonest age group: (A) <20 (B) 20-30 (C) 30-40

(D) 40-50 (E) 50-60 (F) >60

Q7. Has there been an increase in deaths due to CVD in recent years: Yes / No

Q8. If yes, why there has been an increase in deaths due to CVD in recent years?

(A) Lack of facilities for treatment (B) Poor quality of care

(C) Poor transportation facilities (D) Death-not preventable

(E)More diagnostic facilities (F) Others

Q9. What are the risk factors for CVD? Rank it according to importance in prevention. (*Most important give 1*)

( ) High BP ( ) Diabetes ( ) Smoking ( ) food habits ( ) Obesity

( ) stress ( ) physical inactivity ( ) family history ( ) alcohol

Q10. Do you check blood pressure of all adult patients?

Yes / No

Q11. How important it is to measure the Blood pressure of every patient?

(A)Very important (B) Important (C) Not important

Q12. What are the reasons for uncontrolled hypertension?

(A) Poor diagnostic facilities (B) Diagnosed but untreated

(C) Inadequately treated (D) Non compliance to treatment

(E) Impossible to control hypertension in all patients.

Q13. What are the preventive services are available for diabetes and CVD in the community?

(A) Smoking prevention clinic (B) Alcohol de-addiction clinic

(C) Exercise facilities (D) Lifestyle counseling (E) Others

Q14. What is body mass index?

Q15. Do you measure weight and height of all adult patients? Yes / No

Q16. Do you treat hypertensive patients? Yes / No

Q17. If yes, what drugs?

Q18. Who are the patients that you check for diabetes?

(A) Symptomatic patients (B) All adult patients

(C) Before surgery (D) Elderly (E) Others.....

Q19. Do you ever treat diabetic patients? Yes / No

Q20. If yes, what drugs?

Q21. Is it possible to detect strokes and heart attacks early? Yes / No

Q22. If yes, what are the facilities needed?

Q23. How important are the preventive strategies for control of diabetes and CVD?

(A) Very important (B) Important (C) Less important (D) not important

Q24. How do you think this can be best done by?

(A) Target whole population (B) target high-risk groups

(C) Not possible to control (D) Others.....

Q25. What are the barriers in prevention of CVD?

(A)Difficult to implement in a community (B) Costly

(C) Difficult to follow preventive strategies (D) People won't accept it

(E) The preventive strategies don't work (F) others.....

Q26. Manpower and materials for the care and management of heart disease are?

(A)Sufficient (B) average

(C) Satisfactory (D) very poor

Q27. Do you think that a national program on CVD (like polio, Tuberculosis etc) is important?

(A) Very important (B) Important

(C) Less important (D) Not important

Q28. If important, what should be the emphasis in the national program for control of CVD?

(A) Primary prevention (B) secondary prevention

(C) Tertiary prevention (D) All

Q29. Do you think that Government is paying sufficient attention to CVD management?

Yes / No

Q30. Do you think that the multipurpose health workers of health sector can play a key role in the control and prevention of CVD?

Yes / No

Q31. If yes, how they can be a part of control and prevention program of CVD and diabetes?

(A) Educating the public (B) Screening for hypertension and diabetes

(C) Promoting treatment and follow up (D) Others specify

Q32. Is the training in the medical colleges are adequate to deal with CVD and Diabetic patients?

Yes / No

Q33. Did you attend any training programs on management of CVD and diabetes after MBBS?

Yes / No

Q34. Are you following any treatment guidelines (WHO, AHA, JNC, BMC etc) or treatment algorithms for management of CVDs? Yes / No

Q35. If yes, specify?

Q36. Do you think that standard treatment guidelines and algorithms are important in the prevention and management of CVD and diabetes?

(A) Very important (B) Important

(C) less important (D) Not important

Q37. What are your suggestions for improving the prevention and control strategies in our state/ country?

Q38. Do you think that surveillance for CVD is important?

(A) Most important (B) Very important

(C) Less important (D) Not important

Q39. If important, how it is possible to have a good surveillance system?

(A) Local registries (B) National Registries

(C) Periodic Epidemiological surveys (E) Others.....

Appendix-6

INTERVIEW WITH COMMUNITY MEMBERS

1. Serial Number :
2. Name :
3. Occupation :
4. Sex :
5. SES : Low Middle High
6. Religion : Hindu Muslim Christian Other
7. Marital Status : Married Divorced Unmarried
8. Education :
9. Past H/O of majour illness : DM / HT / IHD / Angina
   Other Heart diseases
10. Did you visit a doctor How often:
    (A) Weekly (B) monthly
    (C) twice in an year (D) yearly (E) rarely
11. Did your physician check your blood pressure during your visits?:
    (A) every time checked (B) on request
    (C) once in a while (D) Never
12. Was your BP measured (1Yr) :
13. Ever examined urine sugar :
14. Blood FBS ever examined :
15. S. Cholesterol ever examined :
16. Any drugs used :
17. Dietary habits :Veg Egg Fish Meat
18. How often (per week) : : : :
19. Type of Tobacco use :Cigarettes : Beedi :Chewing :Pan :Sniffing
20. How long(Yrs) : : : : :
21. Do you know Health effects of Tobacco :
22. Did you ever drink :
23. How often (week) :
24. Type of alcohol :

25. Do you know Health effects of Alcohol :
26. Physical activity :Yes / No
27. Type of physical activity :
28. Do you have any type of health insurance? :Yes/ NO
29. What was your perception regarding heart disease?
    A) It has relation with smoking
    B) It has relation with physical exercise
    D) It has relation with dietary pattern
    E) It has relation with modern life style
    F) All the above
    G) No relation with any factores.
30. How important the prevention strategies for heart disease?
    (A) Most important (B) Very important
    (C) Less important (D) Not important
31. Do you think that we have sufficient facilities for treatment and prevention of heart disease in terms of available facilities and manpower?
    (A) Sufficient (B) Average
    (C) Satisfactory (D) Very Poor
32. Do you think that a national program on Heart disease is important?
    (A) Very important. (B) Important
    (C) Less important (D) Not important.

Appendix-7

CROSS SECTIONAL SURVEY FOR AVAILABLE TREATMENT FACILITIES

1. Serial Number :
2. Name of Hospital :
3. Government :Private Missionary Others (Specify)
4. Type :Multi specialty Others
5. Number of beds :
6. Number of Doctors :
7. ECG Machine : Yes / No Present-Number: Type:
8. Trained ECG technicians : Present / Absent

9. Diabetic clinics :

10. Preventive cardiology clinic :

11. Thrombolytic therapy :

12. Echocardiography :

13. Treadmill :

14. Cardiac catheter lab :

15. Cardiologist :

16. Physicians :

17. Surgeons :

18. Nurses :

19. Laboratory technicians :

20. Emergency management : cardiac emergencies :

21. : Diabetic emergencies:

22. Number of OP patients per day :

23. Number of OP patient's attending cardiology OP:

24. IP patients in the past one month :

25. IP with heart diseases past one month :

26. Death in Cardiac patients past one month :

27. Cardiac intensive care units: Yes / No

28. No of Beds in ICU :

29. Cardiac Defibrillator : Yes / No

30. If yes where :

31. Ambu bag in Causality : Yes / No

32. Oxygen in the Casualty : Yes / No

33. Oxygen mask in Casualty : Yes / No

34. BP Apparatus in Casualty : Yes / No

35. X ray unit : Yes / No

36. Operation theatre. : Yes / No

37. Cardiac surgery facility : Yes / No

38. Type of surgery :

39. Cardiac surgeries in the previous year :

40. Facilities for primary prevention of Diabetes :

41. Facilities for primary prevention of CVD :

42. **Lab facilities**
Urine examination :
43. Blood sugar estimation :
44. GTT / GCT
44. Lipid profile facilities :
45. Glycosilated hemoglobin:
46. Enzymes, CPK-MB, Etc :
46. Blood TC, DC, ESR, Hb :
46. C reactive protein :
57. Microbiology, culture :
58. ASO :
59. Others Specify :
60. **Drugs** : Aspirin Sorbitrate Nitrates
Beta-blocker Ca+ channel blockers
Statins Streptokinase
Insulin Hypoglycemic drugs

61. Surgery for diabetes :

Appendix-8

HYPERTENSION –QUESTIONNAIRE

Name : Age :

SES : Sex :

1. How long have you been suffering from High Blood Pressure? ☐

2. How was the problem of High B.P detected?
[By Chance = 1, Through regular screening check ups = 2, Check up as a response to the symptoms = 3] ☐

3. Which of these symptoms did you experience at the time of detection? **[Yes = 1, No = 2]**

(i) Headache ☐ (iv) Irritation ☐

(ii) Giddiness ☐ (v) Anxiety ☐

(iii)Swelling of legs and feet ☐ (vi) Any other ☐

4. During the last six months have you been regularly experiencing any symptom which your doctor says is due to Hypertension ? **[Yes = 1, No = 2]** ☐

5. a)If 'yes', please specify :

6. How often do you get your Blood Pressure checked? **[Once a month = 1, Once in three months = 2, Once in six months = 3, Once a year = 4, When symptoms occur = 5]** ☐

7. When did you last get your Blood Pressure checked? ☐☐

8. What was the recording when it was checked last? **[≥ 140/90 mm Hg = 1, ≥ 130/85 mm Hg - < 140/90 = 2, <130/85 mm hg = 3 Don't know = 4]** ☐

9. Do you think your blood pressure is under control? **[Yes = 1, No = 2]** ☐

10. Are you being treated for High Blood Pressure? **[Yes = 1, No = 2]** ☐

11. Are you satisfied with the doctor who treats you for High B.P? **[Highly Satisfied = 1, Satisfied = 2, Dissatisfied = 3, Am not sure = 4]** ☐

12. Where do you go for follow up treatment? **[P.H.C/Dispensary = 1, GP'S Clinic = 2, Nursing Home = 3, Private Hospital = 4 Government Hospital = 5]** ☐

13. What treatment are you taking? **[Yes = 1, No = 2]**

(i) Allopathic Medicines ☐ (iii) Prescribed Diet ☐

(ii) Healing methods* ☐ (iv) Traditional Medicines** ☐

If any other (Please Specify)_____

**** Yoga, Meditation, Reiki etc. **Ayurvedic, Homeopathic, Unani, Tibetan etc.***

14. a) If 'yes' to (i) and/or (iv) in Q 12, how regular are you in taking medicines? **[Never skip medicines = 1, Forget to take it occasionally = 2, Take medicines only when I feel the blood pressure is high = 3, Discontinued for more than a month = 4]** ☐

15. b) If 'yes' to (iii) in Q 12 Who suggested the treatment? **[Healer = 1, Doctor = 2, Media = 3, Friends/Relatives = 4]** ☐

A. Diet

16. Do you add extra salt to your food after it is served ? **[Most of the times = 1, Sometimes = 2 Rarely/Never= 3]** ☐

17.a) What do you think high salt diet does to Blood Pressure? ☐

[Increases Blood Pressure = 1, Decreases Blood Pressure =2, Has No affect =3, Don't Know = 4]

18. Do you think eating of fruits and vegetables have any affect on Blood Pressure ? ☐
[Increases Blood Pressure = 1, Decreases Blood Pressure =2, Has No affect =3, Don't Know = 4]

19. Have you been given any dietary advice? **[Yes = 1, No = 2]** ☐

20. a) If 'yes', what does the advice say? **[Yes = 1, No = 2]**

(i) Low Salt Diet ☐ (iii) Plenty of Green Vegetables and Fruits ☐

(ii) Low fat diet ☐ (iv) Any other (Pl. specify) ----------

21. Do you follow the prescribed diet? ☐
[Yes = 1, No = 2]

22. a) If 'No', What is the reason for not following the same? ☐
[Lack of family support = 1,Feel weaker = 2, Used to Good Taste = 3,Not convinced about dietary modifications = 4, Cannot afford healthy diet = 5]

23. How would you describe your food habits from the items listed below?
[Regularly (4 -7 days a week) = 1, Sometimes (1- 3 days a week = 2, Rarely (less than one day a week) = 3, Never = 4]

Fast Food	Dairy Products	Fruits	Green Vegetables	Egg	Meat	Chicken	Fish

B. Overweight

24. Do you consider overweight to be a risk factor for Hypertension? **[Yes = 1, No = 2]** ☐

25. a) If 'yes', what is the source of knowledge? ☐
[Doctor = 1, Paramedical = 2, Staff Media = 3, Friends/Relatives = 4, Self = 5]

26. How do you rate the risk of hypertension occurring in people who are overweight? ☐
[Negligible = 1, Mild =2, Moderate = 3, High = 4]

27. How often do you get your weight checked? ☐
[Once in a month = 1, Once in Two-Three Months = 2, Once in Six Months = 3, Any Other = 4]

28. Do you know your weight (measured within the last one year)? ☐
[Yes = 1, No = 2]

29. a) If `yes', please specify. **Weight in Kg** :

30. Do you consider your weight to be? ☐
[Average = 1, Underweight = 2, Overweight = 3]

31. Do you know your height? ☐

[Yes = 1 No = 2]

32. a) If `yes' pl. specify. **Height in cm :**

C. Stress

33 .Have you felt troubled by stress (Mental Tension) either at the onset or during the course of the disease? ☐
[Yes = 1, No = 2]

34. a)If 'Yes', How frequent has it been ? ☐
[Almost Always = 1, Sometimes = 2, Rarely = 3]

35. What has been the most frequent source of stress? ☐
[Job Related problems = 1, Economic Hardship = 2, Familial Problems= 3 , Life Events (Death, Birth etc.) = 4, Self or Family Illness = 5 Any other (Pl. specify)].

36. How do you release stress? ☐
[Share it with others = 1, Watch television/listen music/read books = 2, Sit Quietly = 3, All the above = 4 Find it difficult to release = 5, Any other = 6]

- If the person opts for more than one option (1-3) for releasing stress, then the selected option should be 4

37. Do you think stress increases the risk of hypertension? ☐
[Yes = 1, No = 2 Don't Know = 3]

38. a) If yes, how do you rate the risk? ☐
[Slightly Increases =1, Moderately Increases =2, Highly Increases = 3, Don't Know =4]

39. Have you been given any advice by your doctor to control your stress? ☐
[Yes = 1, No = 2]

40. a)If 'yes', what does the advice say?

D. Physical Activity

41. How would you describe your daily physical activity? ☐
[Very Light = 1, Light = 2, Moderate = 3, Heavy = 4]

42. Do you feel that being physically active protects against hypertension? ☐
[Yes = 1, No = 2 Don't know =3]

43. a) If 'yes', what is the source of this knowledge? ☐
[Doctor = 1, Paramedical Staff = 2 Media = 3, Friends/Relatives = 4 self =5]

44. Do you do physical exercise regularly? ☐
[Yes = 1, No = 2]

45. If 'yes' to Q.3, what is the nature of physical exercise? ☐

[Walk = 1, Brisk Walk = 2, Go to the Health Club/Gym = 3, Swimming = 4, Cycling = 5 Any other (Please specify) = 6]

46. a) If 'No' to Q.3, what is the most important reason for not being able to do the same? ☐
[Lack of Time = 1, Lack of social Support = 2, Lack of facilities = 3, Do not think it is important = 4, Other illness = 5, Laziness =6 Not applicable (Nature of job includes heavy physical labour) = 7]

E. Consumption of Alcohol

47. Do you drink alcohol? ☐
[Yes = 1, No = 2, Have given up =3]

48. a) If 'yes', how regularly do you drink? ☐
[4 -7days a week = 1, 1-3 days a week = 2, Less than one day a week = 3]

49. What do you think drinking alcohol does to blood pressure ? ☐
[Increases = 1, Decreases = 2, Does not effect = 3 Don't know =4]

50. Has the Doctor advised you on cessation of alcohol consumption after the diagnosis of hypertension? **[Yes = 1, No = 2]** ☐

51. a)If 'yes', do you follow the advice? ☐
[Yes = 1, No = 2]

52. b)If 'no', what is the reason for not complying with the doctor's advice? ☐
[Difficult to give up = 1, Fear of social isolation = 2, Not convinced about its ill effects for Blood Pressure = 3, Any other = 4]

F. Consumption of Tobacco

53. Have you ever experimented with tobacco in any form (smoking, chewing, snuff etc)? ☐
[Yes = 1, No = 2]

54. Do you currently* consume tobacco? **[No = 1, Regularly** =2 Occasionally =3]**

(i) Smoking ☐ (ii) Chewing ☐

(iii) Any other ☐

* in the past six months
** Regularly means at least once a day
*** Occasionally means less than once a week

G.Complications of Hypertension

55.. Do you feel hypertension affects the risk of heart attack and/or stroke?
[Increases = 1, Decreases = 2 Does not affect =3 Don't know =4]

(i) Heart Attack ☐ (ii) Stroke ☐

56. a) If '1', what is the source of this knowledge?
[Doctor = 1, Paramedical Staff = 2 Media = 3, Friends/Relatives = 4, Self = 5] ☐

57. b). If `1' (increases) How do you rate the risk ?
[It slightly increases the risk = 1, Moderately increases = 2, Highly increases = 3, Don't know= 4]

(i) Heart Attack ☐ (ii) Stroke ☐

Appendix-9

DIABETES-QUESTIONNAIRE

Name : Age :
Sex : SES :

1. How long have you been suffering from Diabetes? ☐☐

2. How was the problem of Diabetes detected? ☐
[By chance = 1, Through regular screening check-ups = 2, Check up as a response to the symptoms = 3]

3. Which of these symptoms did you experience at the time of detection? **[Yes = 1, No = 2]**

(i) Frequent Urination ☐ (iii) Increased Appetite ☐

(ii) Increased Thirst ☐ (iv) Delay in healing of wounds ☐

(v) Weakening and loss of eye sight ☐ (vi) Any other (Please specify)

_____

4. During the last six months have you been regularly experiencing any symptom which your doctor says is due to Diabetes ? **[Yes = 1, No = 2]** ☐

5. a) If 'yes', please specify.

6. How often do you get your sugar checked? ☐
[More than once in a month =1 Once in a month = 2 Once in three months = 3, Once in six months = 4, More than a year =5, When symptoms occur = 6]

7. Where do you get your sugar checked ? ☐
[Do it myself = 1, Laboratory = 2 Both =3]

8. When did you last get your blood sugar checked? :

9. What was the blood sugar when you got checked last?

Fasting ☐ Post Prandial ☐

[≥126mg/d1 = 1, <126 mg/d1 =2 don't know = 3] **[≥200mg/d1 = 1, <200 mg/d1 =2 don't know = 3]**

10. Are you being treated for Diabetes? **[Yes = 1, No = 2]** ☐

11. Are you satisfied with the doctor who treats you for diabetes? ☐
[Highly Satisfied = 1, Satisfied = 2, Dissatisfied]

12. Where do you go for your follow-ups? ☐
[P.H.C/Dispensary = 1, GP'S Clinic = 2, Nursing Home = 3, Private Hospital = 4 Government Hospital = 5]

13. What treatment are you taking for diabetes? **[Yes = 1 No =2]**

(i) Oral anti-diabetic drugs ☐ (ii) Insulin ☐

(iii) Traditional Medicines* ☐ (iv) Prescribed Diet ☐

(v) Prescribed Physical Exercise ☐

Ayurvedic, Homeopathic, Unani, Tibetan etc.

14. a)If 'yes' to I and/or iii , how regular are you in taking medicines? ☐
[Never skip medicines = 1, Forget to take it occasionally = 2, Take medicines only when I feel the sugar is high = 3, Discontinued for more than a month = 4

A. Diet

15. Do you consider diet (high sugar, high fat diet) to be a risk factor for developing diabetes? **[Yes = 1 No =2]** ☐

16. a) If 'yes', how do you rate the risk? ☐
[Negligible = 1, Mild =2, Moderate = 3, High = 4]

17. Have you been given any dietary advice? **[Yes = 1 No =2]** ☐

18. a)If 'yes', what does the advice say? **[Yes = 1 No =2]**

(i) Less sugar ☐ (ii) Low Carbohydrate/starch ☐

(ii) Low fat diet ☐ (iii) Plenty of green Vegetables ☐

(iv) Any other (Please specify) _____

19. Do you follow the prescribed diet? **[Yes = 1 No =2]** ☐

20. a) If 'No', What is the reason for not following the same? ☐
[Status Symbol = 1, Feel weaker = 2, Used to Good Taste = 3, Not convinced about dietary modifications = 4]

21. How would you describe your food habits from the items listed below?
[Regularly (4-7days a week) = 1, Sometimes (1- 3 days week) = 2, Rarely (less then one day a week) = 3, Never = 4]

Dairy Products	Fruits	Green Vegetables	Egg	Meat	Chicken	Fish

b. Overweight

22. Do you consider overweight to be a risk factor for Diabetes? ☐
[Yes = 1, No = 2, Don't know = 3]

23. a)If 'yes', what is the source of this knowledge? ☐
[Doctor = 1, Paramedical Staff = 2, Media = 3, Friends/Relatives = 4, Self = 5]

24. How do you rate the risk of diabetes occurring in people who are overweight? ☐
[Negligible = 1, Mild = 2, Moderate = 3, High = 4]

25. How often do you get your weight checked? ☐
[Once in a month = 1, Once in Two-Three Months = 2, Once in Six Months = 3, Any other (Please specify) = 4]

26. Do you know your weight (measured within the last one year)? ☐
[Yes = 1, No = 2]

27. a) If `yes', please specify. **(Weight in Kg):**

28. Do you consider your weight to be? ☐
[Average = 1, Underweight = 2, Overweight = 3]

29. Do you know your height? ☐
[Yes = 1 No = 2]

30. a) If `yes' pl. specify. (Height in cm) :

B. Physical Activity

31. How would you describe your daily physical activity? ☐
[Very Light = 1, Light = 2, Moderate = 3, Heavy = 4]

32. Do you feel that being physically active protects against hypertension? ☐
[Yes = 1, No = 2 Don't know =3]

☐

33. a) If 'yes', what is the source of this knowledge?
[Doctor = 1, Paramedical Staff = 2 Media = 3, Friends/Relatives = 4 self =5]

34. Do you do physical exercise regularly? ☐
[Yes = 1, No = 2]

35. If 'yes' to Q.3, what is the nature of physical exercise? ☐
[Walk = 1, Brisk Walk = 2, Go to the Health Club/Gym = 3,
Swimming = 4, Cycling = 5 Any other (Please specify) = 6]

36. a) If 'No' to Q.3, what is the most important reason for not being able to do the same? ☐
[Lack of Time = 1, Lack of social Support = 2, Lack of facilities = 3,
Do not think it is important = 4, Other illness = 5, Laziness =6
Not applicable (Nature of job includes heavy physical labour) = 7]

C. Heredity

37. Does anybody else in the family have diabetes? **[Yes = 1 No =2]** ☐

38. How important is heredity for deciding vulnerability to diabetes? ☐
[Negligible = 1, Important = 2, Very Important = 3, Don't know = 4]

39. Do you feel diabetes affects the risk of heart attack/stroke? ☐
[Increases the risk = 1 Decreases = 2Does not affect =3 Don't know =4]

40. a) If '1', what is the source of this knowledge? ☐
[Doctor =1, Paramedical Staff = 2, Media = 3, Friends/Relatives = 4]

41. b) How do you rate the risk? ☐
[It slightly increases the risk = 1, Moderately increases = 2, Highly increases = 3
Don't know= 4]

Appendix-10

IHD AND STROKE

GENERAL AND DEMOGRAPHIC INFORMATION

Sl. No: ☐ 2. Date of the Interview ☐☐☐

2. Name ☐

3. Age ☐ (Years)

4. Sex **[Male =1, Female=2]** ☐

5. Marital Status ☐

[Married = 1, Unmarried = 2, Divorced = 3, Widow/widower =

6. Education
[Unschooled = 1, Primary = 2, Secondary = 3, Graduation = 4, Professional/Post-Graduation etc.=5]

7. Occupation
[Self- Employed = 1, Government Service = 2, Private Firms = 3, Student = 4, Unemployed = 5, Retired = 6, Housewife = 7] ☐

8. Annual Income (Rs.) _____

9. **Household Information**

Sl. No.	NAME	RELATION TO RESPONDENT	SEX [male=1, female = 2]	AGE (Years)	EDUCATION*	OCCUPATION*	ANNUAL INCOME	USUAL RESIDENCE	ANY SPECIFIC ILLNESS

* Information should be coded. The coding should follow the patterns given in Q 6 and 7 respectively.

ACUTE MYOCARDIAL INFARCTION AND STROKE

A. Recognition of Symptoms (Heart attack)

1. How many episodes of Heart Attack have you had? ☐
[One = 1, Two = 2, Three = 3, More than Three = 4]

2. At what age did you get the first attack? ☐ (Years)

3. Which of these following symptoms did you experience?
[Yes = 1 No =2]

(i) Chest pain/discomfort) ☐ (iii) Sweating ☐

(ii) Breathlessness ☐ *(iv)* Anxiety ☐

(v) Any other (Please specify) _____

4. Have you ever experienced these symptoms **prior to this episode? [Yes = 1, No = 2]** ☐

4. a) If 'yes', what was your reaction to the symptoms?
[Ignored it = 1, Tried some treatment at home = 2, Took a Tablet of Aspirin = 3 Took a Tablet of Nitrate (for example Sorbitrate) = 4, Consulted a doctor = 5] ☐

5. Did these symptoms manifest suddenly in the present episode? **[Yes=1, No=2]** ☐

6. When you had these symptoms, what did you suspect the cause to be?
[Indigestion/stomach upset = 1, Asthma = 2, Heart Disease=3, Don't know = 4] ☐

If any other (Please specify) _____

B. Pre-Hospital Care (of the first Heart attack)

1. What immediate action was taken when you developed acute chest pain/discomfort?
[Yes = 1, No = 2]

(i) Tried primary treatment at home ☐ (iii) Rushed to the nearby hospital ☐

(ii) Consulted a Family Physician/Private Practitioner ☐

If any other (Please specify) _____

2. If option to Q.1. (i) is 'Yes', what was the nature of treatment?
[Massaged chest = 1, Took a Tablet of Aspirin= 2,
Took a Tablet of Nitrate (for example Sorbitrate) = 3, Any other = 4] ☐

3. If option to Q.2. is 2 or 3, who advised you to take the same?
[Took on my own = 1, Family member/relative = 2, Paramedical staff = 3, Doctor = 4] ☐

4. If option to Q.1. (ii) is 'yes', what was the nature of advice offered?
[Give a Tablet of aspirin = 1, Advise an ECG = 2, Consult a Cardiologist = 3, Any other = 4] ☐

5. If option to Q.1. (iii) is 'yes', How far is the nearest Hospital? Km ☐

6. How did you reach the hospital?

[Own Vehicle = 1, Hired Vehicle = 2, Ambulance = 3, Any other (Neighbor's vehicle etc) = 4] ☐

7. Did you call for the ambulance service to reach the hospital? **[Yes = 1, No = 2]** ☐

7. a) If 'yes': was it available to you? **[Yes = 1, No = 2]** ☐

7. b) If 'no', what was the reason for not calling an ambulance ?
[Not aware of the service = 1, Aware that service will not be available = 2, Prefer own vechile = 3, Any other (pl. specify) ☐

C. Stroke

1. At what age did you develop stroke? ☐ years

2. Which of the following symptoms did you experience? **[Yes = 1, No=2]**

(i) Numbness in any part of the body ☐

(ii) Paralysis ☐

If any other (please specify) _____

3. Was the attack accompanied by the following? **[Yes = 1, No = 2, Do not know = 3]**

(i) Seizures (convulsions or fits) ☐ (iv) Loss of consciousness ☐

(ii) Headache ☐ (v) Visual impairment ☐

(iii) Difficulty in swallowing ☐ (vi) Lack of coordination in moving limbs ☐

4. Which part of the body did the paralytic attack affect? **[Yes = 1, No=2]**

(i) One half of the body ☐ (iv) One limb ☐

(ii) Both Legs ☐ (v) Face ☐

(iii) Speech ☐ (vi) The whole body ☐

Any other (Please specify) _____

5. Did the attack result in ☐
[Complete inability to move /use the affected part = 1, Difficulty in moving or using the affected part =2, Mild weakness only = 3, Do not know = 4]

6. Did the attack result in any residual disability? **[Yes=1, No=2]** ☐

6. a) If 'yes', does it involve the following? **[Yes=1, No=2]**

(i) Weakness of leg/foot ☐ (ii) Weakness of arm/hand ☐

(iii) Defect of speech ☐ (iv) Defect of vision ☐

(v) Urinary incontinence ☐

If any other (please specify) _____

7. Compared to your state of function before the stroke, how would you rate the loss of function? ☐

[No loss = 1, <25 % = 2, 25- 50 % = 3, 50- 75% = 4, >75 % = 5]

8. What steps did you take when you developed stroke? **[Yes=1No=2]**

(i) Tried treatment at home ☐ (iii) Rushed to the nearby health center ☐

(ii) Contacted Traditional Healer ☐

If any other (please specify) _____

8.a) If option to Q.8. (i) is 'yes', did it give any relief? ☐

[To some extent = 1, To a great extent = 2, No = 3]

8. b) What was the duration of the treatment (at home)? ☐

[Days = 1, Weeks = 2, Months = 3]

8.c) Who suggested the treatment to you? ☐

[Spouse = 1, Any other Family Member = 2, Friends/Relatives = 3, Neighbour = 4]

If any other (Please Specify) _____

9. a) If option to Q.8. (ii) is 'yes', what made you contact a healer? ☐

[Prolonged nature of allopathic treatment = 1, Over medication = 2, Slow Recovery = 3, Greater faith on traditional healing methods = 4]

9. b) Do you find the healing method useful? ☐

[To some extent = 1, To a great extent = 2, No = 3]

10. If option to Q.8.(iii) is 'yes', where did you go? ☐

[P.H.C/Dispensary = 1, Nursing Home = 2, Government Hospital = 3, Private Hospital = 4]

D. Hospital Care

1. How long did you take to reach the hospital? ☐ (hrs) ☐☐ (mts)

2. Were you admitted in that particular hospital? **[Yes=1, No=2]** ☐

2. a) If **yes**, how long did it take to get admitted there? ☐ (hrs) ☐☐ (mts)

3. What was the response of the hospital staff? ☐
   [Prompt = 1, Casual =2, Delayed = 3]

4. Where did you get admitted? ☐
   [General Ward = 1, ICU = 2, Coronary Care Unit = 3, Don't know = 4]

5. Were you administered the following by the doctor on your admission to the hospital?
   [Yes = 1, No = 2, Don't know = 3]

   (i) Aspirin ☐ (iii) Clot Dissolving Injection ☐

   (ii) Nitrate (for example sorbitrate) ☐

6. Did you have to go to any other hospital? **[Yes = 1, No = 2]** ☐

6. a) If yes, how did you go to other hospital? **[Formal referral = 1, Without referral = 2]** ☐

7. If option to Q. 6.a) is 1, what was the reason for referral? ☐
   [Problem of bed strength = 1, Problem of diagnostic equipment = 2
   Complicated case requiring higher level of expertise/equipment = 3]

   If any other (please specify) _____

7. a) Did you face any problem in such referral? ☐
   [Problem of reaching the referred center=1, Honoring the referral on the part of the hospital staff = 2, Problem of admission in the referred center=3

   If any other (please specify) _____

8. If option to Q.6.a) is 2, what was the reason? ☐
   [Problem of bed strength = 1, Problem of diagnostic equipment = 2,
   Costly Treatment = 3, Uncaring attitude of the hospital staff = 4]

   If any other (please specify) ----------

9. Who mainly treated you in the hospital? ☐

[Cardiologist = 1, Physician = 2, Resident Doctor = 3]

10. How would you rate the treatment offered in the hospital? ☐
[Highly satisfactory = 1, Satisfactory = 2, Unsatisfactory = 3]

11. Did you have problems in obtaining drugs recommended? ☐
[Yes = 1, No = 2]

12. How would you rate the price of these drugs? ☐
[Reasonable = 1, Costly = 2, Very Costly =3]

E. Discharge and Follow Up

1. Did the doctor prescribe the following for continued care?
[Yes=1, No=2, Don't know = 3]

(i) Aspirin ☐ (iii) Statin (Any other Cholesterol lowering drug) ☐

(ii) Beta-blocker ☐ (v) Any other blood pressure lowering drug ☐

(iv) ACE inhibitor ☐

1. a) If 'yes', are you taking the drugs regularly? **[Yes=1, No=2]** ☐

2. If option to Q.1.a) is 'No', what is the most common reason for not taking the same? ☐
[Cannot buy regular medicines = 1, Fear of side effects = 2
Fear of overmedication = 3, Take traditional medicines = 4]

Life style prior to and after the Attack (Heart Attack & Paralytic Attack)

A. Tobacco & Alcohol use

1. 1. Have you ever experimented with tobacco in any form (smoking, chewing, snuff etc)? ☐
[Yes = 1, No = 2]

2. Do you currently* consume tobacco? **[No = 1, Occasionally =2** Regularly*** =3]**

(i) Smoking ☐ (ii) Chewing ☐

(iii) Any other ☐

* in the past six months
** Occasionally means less than once a week

*** Regularly means at least once a day

2.Do you think that consuming tobacco affects the risk of heart disease? ☐
[Yes =1, No = 2, Don't know= 3]

2.a) If 'yes', How ? ☐
[Increases the risk = 1, Decreases the risk = 2, Don't know =3]

3. Did the doctor advise you to give up consuming tobacco after the treatment? ☐
[Yes =1, No = 2]

3. a) If yes, do you follow the advice? **[Yes =1, No = 2]** ☐

4. If option to Q.3.a) is 'No', what is the most important reason for not following the same? ☐
[Difficult to give up = 1, Fear of social isolation = 2,
Not convinced about its ill effects for the heart = 3]

If any other, please specify _____

5. Do you drink alcohol?
[Never used =1,Currently using= 2, Used alcohol in the past*= 3, Recently stopped = 4** ☐

* Stopped more than 6 months ago. ** Less than 6 months ago

5. a) If `2 or 4' to Q 5, how regularly do (or did) you drink? ☐
[4-7 days a week = 1, 1=3 days a week = 2,
Less than one day a week =3]

6. Do you feel that drinking alcohol affects the risk of heart disease? ☐
[Yes =1, No = 2, Don't know =3]

6. a)If `yes', how ? ☐
[Increases the risk = 1, Decreases the risk =2, Don't know =3]

7. Did the doctor advise you to give up consuming alcohol after the diagnosis ? ☐
[Yes =1, No = 2]

7. a) If yes, do you follow the advice? **[Yes =1, No = 2]** ☐

7. b) If 'no', what is the most important reason for not following the same? ☐
[Difficult to give up = 1, Fear of social isolation = 2,
Not convinced about its ill effects for the heart = 3]

If any please specify _____

B. *Physical Activity*

1. How would you describe your daily physical activity prior to the attack? ☐
   [Very Light = 1, Light = 2, Moderate =3, Heavy = 4]

2. Do you think that physical exercise or regular physical activity protects against heart disease? ☐
   [Yes =1, No = 2, Don't know = 3]

3. a) If 'yes', what is the source of this knowledge? ☐
   [Doctor = 1, Paramedical Staff = 2, Media = 3, Relative/Friends = 4, Self = 5]

4.. Do you do physical exercise regularly? **[Yes =1, No = 2]** ☐

4. a) If 'No', what is the most important reason for not doing physical exercise? ☐
   [Lack of Time = 1, Lack of Social Support = 2, Lack of facilities = 3,
   Do not think it is important = 4, Other illness = 5,
   Not applicable (nature of job includes heavy physical labour) = 6]

C. Stress (Mental Tension)

1. Have you felt troubled by stress either at the onset or during the course of the disease*? ☐
   [Yes =1, No = 2]

1. a) If 'Yes', how frequent has it been? ☐
   [Almost Always = 1, Sometimes =2, Rarely = 3]

2. What has been the most frequent source of stress? ☐
   [Job Related problems = 1, Economic Hardship = 2, Familial Problems = 3,
   Life Events (Death, Birth etc.) = 4, Self or Family Illness = 5]
   If any other, Please specify.

3. Do you think stress affects the risk of heart disease? ☐
   [Yes =1, No = 2]

3. a) If yes, how ? ☐
   [Increases the risk =1, Decreases the risk =2, Don't know =3]

4. How do you release stress? ☐
   [Share it with others = 1, Watch television/listen to music/read books = 2,
   Sit Quietly = 3, All the above = 4, Find it difficult to release = 5, Any other = 6]**

* Onset of the attack or after the attack.
** If the person opts for more than one or all the three options (1-3) for releasing stress, then the selected option should be 4

5. Did the doctor advise you to control stress as a follow up care? **[Yes =1, No = 2]** ☐

6. If `yes', what did the doctor suggest you to control stress? _____

D. Diet

1. How would you describe your food habits prior to the attack from among the items listed below? ☐
[Regularly (4 -7 days a week) = 1, Sometimes (1-3 days a week) = 2
Rarely (less then one day a week) = 3, Never = 4]

Fast Food	Dairy Products	Fruits	Green Vegetables	Egg	Meat	Chicken	Fish

2. Do you think that diet is an important way of preventing heart disease? ☐
[Yes =1, No = 2, Don't know = 3]

Do you feel that centain food habits (high fat diet) affect the risk of heart disease? ☐
[Yes =1, No = 2, Don't know = 3]

3. a) If yes, how ? ☐
[Increases the risk =1, Decreases the risk =2, Don't know =3]

4. Were you given dietary advice after the treatment of the attack? **[Yes =1, No = 2]** ☐

4. a) If yes, was it properly explained to you? **[Yes =1, No = 2]** ☐

5. If option to Q.4.a) is 'yes', do you seriously follow the prescribe diet? ☐
[Yes =1, No = 2]

5. a) If 'No',. What is the reason for not following the same? ☐
[Status Symbol = 1, Feel weaker = 2, Used to Good Taste = 3,
Not convinced about dietary modifications = 4]

E. Diabetes, Hypertension and High Cholesterol

1. Do you have any of these following illnesses? **[Yes = 1, No=2]**

(i) Diabetes ☐ (ii) Hypertension ☐

☐

2. If yes to `i' , how long have you been suffering from the same? Years

3. How did you come to know about this illness? ☐
[Chance = 1, Through regular screening check ups = 2, Check up as a response to the symptoms = 3, Told by doctor after the attack = 4]

4. Do you think diabetes affects the risk of heart attack and stroke? **[Yes = 1, No =2]**

Heart Attack ☐ Stroke ☐

4. a) If yes, what is the source of this knowledge? ☐
[Doctor =1, Paramedical Staff = 2, Media = 3, Friends/Relatives = 4, Self = 5]

4. b) If `yes' to Q 4 , Ho w do you rate the association of diabetes to heart attack and stroke
[It slightly increases the risk of the disease = 1, Moderately increases = 2, Highly increases = 3, Don't know =4]

Heart Attack ☐ Stroke ☐

5. How frequently did you get your sugar checked prior to the attack? ☐
[Once in three months =1, Once in six months = 2, More than a year = 3, When symptoms occur = 4]

6. How frequently do you get the same checked after the attack? ☐
[< I month =1, 1- < 3 months =2, 3 - <6 months = 3, 6- 12 months =4 > 12 months = 5]

7. Did the Doctor prescribe the following for the treatment of diabetes? **[Yes = 1 No =]**

(i) Dietary Advice ☐ (ii) Advice on physical exercise ☐

(iii) Medicines prescribed ☐

8. What treatment are you taking? **[Yes=1 No =2]**

(i) Allopathic medicines ☐ (ii) Prescribed Dietary Modifications ☐

(iii) Prescribed physical exercise ☐ (iv)Traditional medicines* ☐

(*Ayurveda, naturopathy, unani, Tibetan medicine, any other etc.)

9. Do you think your sugar is under control? **[Yes=1 No =2, Don't know =3]** ☐

10. When did you last get your sugar checked? ☐
(months)

Hypertension

1. If `yes' to Q 1 ii, how long have you been suffering from the same? ☐ Years

2.How did you come to know about this illness? ☐
[Chance = 1, Through regular screening check ups = 2,
Check up as a response to the symptoms = 3, Told by doctor after the attack = 4]

Do you think High B.P affects the risk of heart attack and stroke?
[Yes = 1, No =2, Don't know =3]

Heart Attack ☐ Stroke ☐

3. a) If yes, what is the source of this knowledge? ☐
[Doctor =1, Paramedical Staff = 2, Media = 3, Friends/Relatives = 4, Self = 5]

3. b) If `yes' to Q 3 , Ho w do you rate the association of High B.P to heart attack and stroke ☐
[It slightly increases the risk of the disease = 1, Moderately increases = 2,
Highly increases = 3, Don't know =4]

Heart Attack ☐ Stroke ☐

5. How frequently did you get your B.P checked prior to the attack? ☐
[Once in three months =1, Once in six months = 2, More than a year = 3,
When symptoms develop = 4]

6.How frequently do you get the same checked after the attack? ☐
[Once in three months =1, Once in six months = 2, More than a year = 3,
When symptoms develop = 4]

7.Did the Doctor prescribe the following for the treatment of High B.P? **[Yes = 1 No = 2]**

(i) Dietary Advice ☐ (ii) Physical Exercise ☐

(iii) Relaxation Techniques ☐ (iv) Prescription of medicines ☐

8. What treatment are you presently taking? **[Yes = 1 No =2]**

(i) Allopathic Medicines ☐ (ii) Prescribed Dietary Modifications ☐

(iii) Prescribed physical exercise ☐ (iv) Relaxation Techniques ☐

(v) Traditional medicines* ☐

*(*Ayurveda, naturopathy, unani, Tibetan medicine, anyother etc.)*

9. Do you think your B.P is under control? [**Yes = 1 No =2, Don't know = 3**] ☐

Blood Cholestreol

1. Were you told about your blood cholesterol during the treatment of the attack? [**Yes = 1 No =2**] ☐

1.a) If yes, what did the doctor say? **[High = 1, Normal = 2]** ☐

1. b) If `1' did the doctor prescribe the following for lowering cholesterol ? [**Yes= 1, No =2**]

(i) Diet ☐ (ii) Drugs ☐ ii) Physical Exercise ☐