# THE IMPACT OF THE PRESENT POPULATION GROWTH RATES ON HEALTH EXPENDITURES IN KENYA

BY



ALEX JUMA



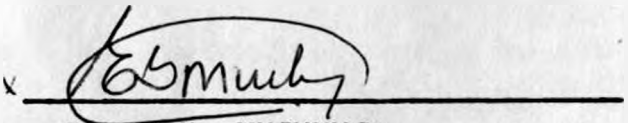
A THESIS SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE (POPULATION STUDIES) IN THE UNIVERSITY OF NAIROBI.

## DECLARATION

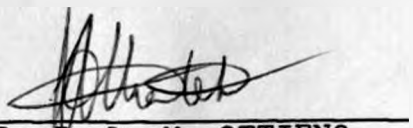
THIS THESIS IS MY ORIGINAL WORK AND HAS NOT BEEN PRESENTED FOR A DEGREE IN ANY OTHER UNIVERSITY.

JUMA ALEX

THIS THESIS HAS BEEN SUBMITTED FOR EXAMINATION WITH OUR APPROVAL AS UNIVERSITY SUPERVISORS.



DR. E.K. MUCHUNGA



DR. J. A. M. OTTIENO

DR. A.B.C. OCHOLLA-AYAYO

## ACKNOWLEDGEMENTS

Great many thanks are due to all the people and Institutions whose support, suggestions and criticisms led to the successful production of the present work.

My greatest debt of thanks goes to Professor S. H. Ominde, the Director of the Institute, Dr. A.B.C. Ocholla-Ayayo and Dr. J.A. M. Ottieno, whose supervision made this work stand as it is now; Dr. J. Oucho, Dr. T. Gatara, Dr. Wariara Mbugua, Dr. S. Khasiani, Dr. Galeb Oyuke and Mr. Oyieng, who provided the necessary background material. I am also indebted to Mrs. Mary A. Adamba for having diligently and tirelessly typed the manuscript of the thesis.

Similarly, my thanks go to the Population Studies and Research Institute for providing all the necessary learning material and the United Nations Fund for Population Activities (UNFPA) for offering the scholarship to pursue the course.

Finally my thanks go to my parents and family for their patience and encouragement.

## ABSTRACT

Kenya has had an increasing population growth rate. At independence, the population growth rate was estimated to be 3.2 percent per annum, which rose to 3.8 percent per annum as recorded in the Kenya Fertility Survey of 1977/78 and the population census of 1979. Presently, as per assessment of world population prospects in relation to estimates and projections by the United Nations in 1982, Page 248, the population growth rate stands at 4.1 percent per annum, thus making Kenya emerge as one of the countries in the world with the highest population growth rates.

The factors that directly influence or do affect positively the improvement of medical care and health services are those Government health policies which are geared to raising the general living standards of its people. Hence the first major objective of the study was to examine the effects of demographic parameters on the cost of total health expenditure in Kenya from 1969 to 1982. An associated objective was to project such health expenditures to the turn of the century. The Secondary problem dealt with determining which health variables are the best predictors or indicators to total health expenditures in relation to demographic variables, as well as trying to evaluate the possibilities for rapid health improvement.

The demographic variables included the various indices of both fertility and mortality, whereas health variables were preventive medicine and promotive health, curative health measures, rural health services, health training, medical supplies and medical research. The economic variables were the total government expenditures, the Gross National product and the Gross Domestic product. For the purpose of this study, sources of data included raw data from the Ministry of health Annual reports and publications, Economic Surveys and Reviews, Statistical Abstracts, Registrar - General's Annual reports, United Nations publications and reports, World Bank reports, the Kenya Government development plans of 1966 to 1970, 1970 - 1974, 1974 - 1978, 1978 - 1983, the Kenya fertility survey and the 1969 and 1979 population censuses.

## LIST OF CONTENTS

# LIST OF TABLES

LIST OF TABLES (CONT.)

LIST OF FIGURES/TABLES (CONT.)

## LIST OF FIGURES

LIST OF FIGURES (CONT.) PAGE

# CHAPTER ONE

## THE STUDY PROBLEM, SCOPE AND STRUCTURE

### 1.0 INTRODUCTION.

The terms that have been used in this study which need some basic definitions are the Gross Domestic Product (GDP). The Gross National Product (GNP), appropriate health technology, health centre, health sub-centre and dispensary. The defintion of the terms their ordinary meanings as outlined below.

Gross Domestic Product (GDP) is the estimated output for final use of goods and services of a Country within one year, including the output of goods and services used in the maintenance of the existing capital (Whethem E.H. 1969 - pp.268)[1]

Gross National Product is the total output of goods and services produced by the labour and property of the country's inhabitants in a given year valued at factor cost and with no part of output counted more than once (Brooman F., 1963 pp.28)[2].

Appropriate health technology, the term "appropriate" means that the technology being used for health apart from being sound, must also be acceptable to those who apply it and to those for whom it is applied. The technology should keep in line with the local culture, capable of being adapted and further developed if need be, preferably easily understood. "Technology means the association of methods,

techniques and equipment which the people using them can contribute significantly to solving a health problem.

A health centre consists of one preventive and one curative clinic block with supporting services and an in-patient block with twelve beds. It is staffed by one medical assistant, four community nurses, one health assistant, two family planning field workers, one statistical clerk and attendant staff.

A health sub-centre has similar clinics and supporting services as in the health centre, but no in-patient block. It is staffed by one medical assistant, two community nurses, one health assistant, one or two family planning field workers and attendant staff.

A Dispensary has one clinic block and service facilities staffed by a community nurse (in some cases ungraded community nurse plus one or two field workers), one health assistant and attendant staff.

It had been a popular view that planning for health facilities, financing and the implementation of health programmes and projects would result in failure and waste of resources.[3] However, the financing of health programmes and projects originates from government policies of which the implementation of such policies depend on the economic status of the country and critical planning of health priorities as influenced by population growth rates, the changing age structure and the available resources at disposal to be shared among the basic needs.

1.1.0 Health planning involves working out how best medical and health care services can be made easily available and accessible to the majority of the population. As noted in the Kenya Fertility Survey of 1977/78, most people who discontinued contraceptive use gave the difficulty of accessibility to the available services at the clinics as one of the reasons for stopping contraceptive use. That is, a lot of time was being spent on going to the clinics.[4] Planning thus has to concern mainly in identifying the basic problems for the provision of health care facilities required by the majority of the population to improve the general living standards and environmental conditions, which in turn is met by the availability of financial resources.

As from January, 1970, the Central Government took over the running of all basic health services in the rural areas from the County Councils. The fruits of such a move have been realised as the fertility rates have been increasing, mortality rates declining and rising life expectancies. The implications of the transfer of such basic health services in the rural areas from County Councils to the Central Government have well been documented and realised. These include the vast increase of responsibility for the Ministry of Health, need for the Ministry to provide additional means and set up the additional machinery, review priorities of different localities for the redistribution of health facilities and the reorganization of health services so as to standardise medical and administrative procedure.[5] All such dynamic changes in the system imply that a large sum of money be allocated if a good outcome has to be realised.

Unlike most developing Nations, Kenya has a good medical system which is the best in East and Central Africa. Spread throughout the country are Hospitals in all provinces and districts, Health Centres and Dispensaries. There are 218 Hospitals, 264 Health Centres, 1183 Dispensaries[6] and 5 Nyayo Wards have been constructed to improve the hospital bed capacity. The need for the Government to spend money on health is two-fold. First is the public demand to be satisfied and secondly the need of the economy for good

healthy conditions of skilled and qualified manpower. It should also be noted that once health projects have been started and established, they have to be maintained and improved. In Kenya, this has created a built-in momentum of health facilities and services which have enabled for the expansion and the establishment of more Hospitals, Health Centres and Dispensaries. This criteria, with the establishment of the District Focus for Rural Development will be more realised and given due attention.

1.1.1 STATEMENT OF THE PROBLEM

In Kenya, one of the most important factors in socio-economic development is the health care of the people. The health sector in Kenya has had several problems which emanate from the high population growth rate. The population growth rate increased the demand for health services and thus creating a challenge to the improvement of the scope and quality of health care. In so trying to improve the scope and quality of health care, the health expenditures (both recurrent and capital) have risen from K£7.9 million in the fiscal year 1969/70 to K£73.4 million in 1982/83 fiscal year.

The regional inequality of the distribution of health facilities and resources has continued to be one of the major problems in the health sector since independence. Closely associated with this are the demand

for health services within easy reach and the acute shortage of paramedical staff of all categories. In considering the Ministry of Health budgetary expenditures, by 1981, 70 percent was allocated and consumed by the facilities in urban centres which had 15 percent of Kenya's population.

The distribution of medical and paramedical personnel between urban centres and rural areas as well as among the different regions have been of a major concern. Among the cadres most hit were and are the Doctors and Registered Nurses of which more than 80 percent and 70 percent respectively live and work in the urban centres mostly Nairobi, Kisumu, Mombasa and Nakuru.

1.1.2 The patterns, levels and trends of morbidity, mortality and disability problems have been originating from the three main groups of diseases. The first of this group are the diseases of the respiratory system; the second is the parasitic and infectious diseases and the third group are the diseases that are transmitted by human faeces found in communities with poor environmental sanitation and water supply systems.

The organization and policy structure of the health sector has been a complex problem. In as far as the policies did emphasize on preventive medicine and promotive health not much was and has been done to

implement such plan policies and as a result homage has been paid to curative health. The organization of health has been in the hands of several individual agencies and thus created the administrative problems in terms of co-ordination, policy analysis and decision making. Hence an appropriate mechanism to formulate and implement a constructive consolidated National Health Policy to embrace all health providing agencies greatly lacks.

In all, the health problems in Kenya are exacerbated by poor environmental conditions associated with socio-economic status, the climatical conditions in the different regions, cultural practices among the different ethnic groups, general poverty, rapid population growth rate, insanitary conditions, nutritional and dietry habits as well as poor design and implementation of health policies.

1.1.3 In the last decade, health expenditures in most Nations have risen considerably. This meant that the realms of health allocations grew in line with national incomes and total budgetary expenditures. Accordingly, health's percentage share of the Gross National Product (GNP) and of the total budget in many countries grew at faster rates during that period. However, for the case of Kenya there has been financial stringency and as such, allocations to health could not

compete much with the demands by other basic needs and priorities. Internationally, the sharp rise in health expenditures could be attributed to the rising demand of health facilities owing to changes in the age-sex structure of the population, inflation and policies aimed at the development of crash programmes and diversification of manpower requirements which accrue from technological advances and health factor costs.

1.1.4 . In Kenya, operating within a background of financial stringency, the question of financing health programmes and implementation of projects has been a joint veture by the Government, Missionaries and other agencies providing for health facilities and services. During the colonial era, health facilities were developed and delivered on racial basis with Europeans and Asians having the best facilities within easy reach whereas most Africans who were rural dwellers depended entirely on traditional methods of treatment. In recent years, Government expenditures on health in Kenya has been increasing at the rate of 11.5 percent per annum whereas the Government revenue had been increasing at a rate of 17.6 percent per annum. Currently, 7.1 percent of the Government's recurrent budget is allocated to health.[7] Health expenditures thus continue to grow at a slow pace, whereas other basic needs such as education consume about a third of the Government's budget.

It can thus be realised that due to the current population rate of increase, there is a real pressure on health care in this country as will be analysed in Chapter 4.

This study was hence focussed on the problem of measuring the relationship between growth in total health expenditures and the growth in demographic, economic and health variables during the study period between 1969 and 1982. A detailed discussion on these three variables has been done in the theoretical structure (pp.24-36).

## 1.2 OBJECTIVES

When the Central Government took over the running of all rural health services from the County Councils, it had inherited a health system which was organized on racial lines. The take-over made it easy to co-ordinate all health facilities and services for the benefit of the populace and thus helped curb high mortality rates, raise the life expectancy and increase fertility rates. It is with this view that the study objectives are formulated as follows:

a) To examine the effects of reduced mortality rates in relation to costs of hospitalization and cost per life saved.

b) To analyse and measure how demographic variables affect the cost of health expenditures.

c) To evaluate the prospects Kenya has for rapid health improvements.

d) To identiry economic waste due to patients' death.

e) To examine the distribution of Health institutions and manpower in Kenya.

f) To attempt project the health expenditures, health institutions, cost of investment and manpower at the turn of the century using the figures for 1982 as the base.

## 1.3 SCOPE OF STUDY

The scope of the study covers the whole of Kenya and data to be used covers the period between 1969 and 1982. It will be on the basis of these data that projections into the future health expenditures, health facilities and manpower requirements will be made. This period has been particularly chosen because as from January, 1970, the Central Government took over from the County Councils the running of all basic health

services in the rural areas. Before 1970, the County Councils were responsible for the development and management of rural health services affecting 90 percent of the population. As the demand for health services outgrew the resources at the disposal of the County Councils, it was necessary for the Government to take over, and thus increased the Government's monopoly in running of such a basic need. The study will also deal with morbidity conditions in relation to the availability of medical personnel, health institutions and expenditures on such services in order to improve the health status.

### 1.3.1 THE SIGNIFICANCE OF THE STUDY

The purpose of this study is to bring into focus the critical factors that have contributed to the present trend in health expenditures. Thus it is proposed that this would help the health policy makers to give more control of these factors in their efforts to adjust the low expenditure on health facilities. The study will investigate the relationship between health expenditures and the variables listed above. It will also consider the relationship between the variables themselves. This will reveal how much change in one variable influences the change in others and how much change in each variable and all variables together do affect change in health expenditures. This will enable the health

policy makers predict the values of one variable from the knowledge of values of another variable or a combination of variables. One major point of significance of this study is that it will scientifically analyse the degree of association and direction between health expenditures and the economic, demographic and health variables mentioned earlier and discussed later.

### 1.3.2 LIMITATION OF STUDY

The study will be limited to public health expenditures as opposed to private health expenditures. Apart from the fact that a study of both the public and private health services expenditures would yield good comparability at the same time is too broad to cover adequately. In addition it is not possible to get or collect data from private sector of health services which are reliable enough to allow analysis free from error. The selection of economic, demographic and health variables in the study was done on the basis of the availability of data that lent themselves to the type of analysis that was envisaged. The relationship between National health expenditures and the individual provincial and district health expenditures would have been useful for comparison, but health expenditures in Kenya are not broken down according to the several provinces and districts. Hence the present policy of District Focus for Rural Development would inevitably

lead itself to such a breakdown of health expenditures and allocations within and among the districts and provinces.

## 1.4 REVIEW OF RELATED LITERATURE

1.4.1 The report of the Committee of Enquiry into the cost of the National Health Service, presented to the British Parliament by the Minister of Health and the Secretary of State for Scotland by command of Her Majesty in January, 1956 (pages 10-50),revealed that the major factor accounting for the increased cost of the Hospital Service was the rise in price (includes both the price of goods and the price at which services are purchased). Major increases were attributed to medical costs, whereas increases in non-medical costs were primarily due to increases of staff, average daily occupied beds and increases in out-patients' work.

Salaries and wages accounted for more than 60 percent of the cost of hospital services between 1949 and 1954. Summarily, the cost of hospital services increased between 1949 and 1954 due to increases in the number of staff and to a lesser extent to increases in supply of medical goods. The resources which could have been consumed in alternative uses, lack of employment for certain workers and other factors contributed to additional cost of £25 million in the use of productive

resources. In total the report found that population changes by themselves were not likely to exert a very appreciable effect on the future cost of the National Health Services.[8]

1.4.2 Some very comprehensive work on empirical hospital research was done by Martin Feldstein in 1967 (pages 260-275). He combined both his technical prowess and knowledge of the institutional structure of the British National Health Services to analyse the Hospital as a productive unit. He further employed Multiple Regression analysis in fitting quadratic relationship between operating expenses and hospital size. His final estimate expressed the cost per case as a quadratic function on both the number of beds and the flow of cases per bed per year. The result was that, if the rate of treating patients was identical for hospitals of all sizes, larger hospitals would achieve substantive economies of scale.[9]

1.4.3 Using Nation wide data on 3147 US Voluntary short-term general hospitals, Carr, W.J. and Feldstein P.J., 1967 (pages 45-65) determined the optimal hospital size for the purpose of area wide planning. By using Multiple Regression analysis, they isolated the partial relationship between the total operating expenses and hospital size in holding constant such variable parameters as the number of out-patient visits, range

and scope of service facilities available, and the presence or absence of training and research activities. They generally came to the conclusion that as size of general hospitals increased, the unit costs tend to decline and then rise.[10]

1.4.4 The investigation of Hospital costs in Massachusetts done by Ingbar, M.L. and Taylor, L.D. 1968 (pages 278-280) analysed an extensive array of variables. The eleven of these variables identified and used were private size-volume, maternity activity, surgical activity, ambulatory activity, pediatric activity, radiology activity, laboratory activity, utilization and length of stay and ward services. The most significant measures were selected for use in the multiple regression analysis. Three models were delineated which were, operating expense per available bed day, expense per patient day of utilization. In the first model it was found that medical and surgical physician expense per patient day were significant in association with the size and volume. In the second model radiology, surgical, size, volume and ambulatory activities, both beds and beds squared appeared to be significant variables in the regression. In the third model the coefficient of utilization was negative and highly significant indicating that higher utilization was associated with lower unit costs for hospitals of all sizes.[11]

1.4.5 The cost-benefit analysis is the organized consideration of the disadvantages and advantages of alternative policy options in terms of a common denominator, namely a common value unit (often a unit of money) and a common point of incidence both in terms of time and in terms of a target such as a nation, region or the economy. It thus tries to evaluate all social outcomes and states whether a policy is worth implementing. According to William Allen, (pp.30-60) the discussion on cost-benefit analysis constitutes a set of guidelines for health planners or decision makers. His discussion centred around four points, namely:

i) The essence of the cost benefit analysis approach technically lies on establishing whether it is possible to seperate one service from another in a sensible way. There is the possibility of choice between them; it is possible to estimate the outcomes associated with each alternative service; it is possible to value these outcomes and to estimate the cost of providing each service. These costs and benefits can be weighted against each other and planners should cease providing those services whose costs outweigh the benefits.

ii) Its applicability to health policy making. In practice, cost-benefit studies are concentrated where the rewards are likely to be greatest. The areas in which he sought to identify choice were sizeable amounts of scarce resources at stake, responsibility fragmentation, variant objectives of respective parties, existence of acceptable alternatives of a different kind radically, the understanding of the technology underlying each alternative and the results wanted in a very short period of time.

iii) The ways of measuring both benefits and cost. The criteria for measuring the success of health have been indicators such as Doctors per thousand population, available beds per thousand population, costs per day in hospital, cost per patient, perenial (annual) mortality and life expectancy at birth. However, costs are not immutable and hence generally, a community or nation prefers benefits sooner rather than later, and at the same time prefer to defer costs rather than incur them early.[12]

1.4.6 The World Health Organization study group in 1973 (pages 15-17) in analysing the inter-relationships between health programmes and socio-economic development identified that the fundamental criteria in determining the allocation of budget to health are the established need, community expectations and the budgetary priorities. The report further contends that although the budget in some countries was fairly stable, the allocation to health tended to increase as the economic level and Government revenues rose.

Within health expenditures on health services, large portion of the money was allocated to the maintenance of established services and provided for the necessary expansion to meet population increases and thus leaving a small portion for new programmes, improvements and extended coverage. The factors that mostly contribute to such resource distribution are based on the criteria of a pro rata distribution based on distributions in the previous years, allocation in accordance with the long term growth of estimate and the allocations for new projects and expanded activities. However, such criteria do vary from country to country. In some countries health expenditures were derived from the operational needs and those delineated expenditures to implement projects included in the National Development Plans; whereas others used the proportion of the Gross National Product and others used stated percentages of the National budget as a guideline.

Some other criteria that have been used in health expenditure allocation within the health sector are the use of cost-benefit analysis and cost-effectiveness analysis. The factors which influenced such priority of allocation within the health sector include the administrative feasibility and probable impact of the proposed action; the expectation that preventive programmes would increase the capacity of the labour force and lead to higher levels of production; the need to expand the education and training of medical and allied manpower because of severe restrictions imposed on service and the development by existing inadequacies; and the objective of integrating rural populations into the national life. In any case many of the socially desired programmes are often excluded on economic grounds.

The report further identified the high priority areas in health which were: Disease prevention and control especially communicable diseases; personal health care services for rural population, who are the deprived section of the community, and other special groups, maternal and child health services; education and training of medical and allied personnel; and the environmental health services.[13]

1.4.7 A scholar who made an effort to the study of health expenditures internationally was Abel-Smith Brain 1967 (pages 40-92). By splitting health expenditures into two, namely, recurrent and capital expenditures, he critically analysed the allocations within the selected countries of his study. He found that among the counties selected, the percentage of the Gross National Product allocated to health varied from 2.5 percent to 5.9 percent, while the percentage of National income allocated to health varied from 2.8 percent to 7.4 percent. Also the countries where physicians had a better pay had higher proportions of the health expenditures in the Gross National Product and National income. He also delineated the major sources of finances for recurrent expenditures on health. These included the Central Government, Compulsory Social Insurance, Donor Agencies and recipients.

The analysis of capital expenditures revealed that the amount spent had no clear relationship with the type of living conditions in any Nation. This was emphasized by the fact that those countries with the most rapid population growths were not necessarily those with the highest ratios of capital to recurrent expenditures, and that most of the medical care was paid for indirectly and used for the cost of hospital care than for the cost of care outside hospital.

On the whole the countries which had Social Security had a different health expenditure rise from those without such a social security. The countries with social security had the proportion of Gross National Product, Gross National expenditure or National income spent on health services rising in a secular trend. In this case most of the health expenditures was allocated to hospitals. However, in some countries, the rise of expenditure on health services was partly due to an increase in the part played by indirect financing through the Central Government, Compulsory Social Insurance and Voluntary Insurance.[14]

1.4.8 A report on a W.H.O. inter-regional seminar on health economics in 1975 (pages 14-30), at the macro level emphasized that expenditure on medical care were rising in both developing and developed countries. Out of all health service expenditure, the in-patient services were large and fast growing, whereas hospital costs tended to be nearly half the total recurrent expenditure while staff costs and drug costs took the largest share of all the health service expenditure. The reasons that were attributed to such factors were demographic, quality of health services, changing epidemiological picture in view of socio-economic development, organisational structure of the health delivery system of services, and extension of health services coverage.

The most salient were the demographic and the quality of health services. Demographically, there was the impetus to achieve the Alma-Atta declaration. In this case then there was need to keep pace with the demands of the increasing population growth rate in addition to more costly demands of the emerging aging population. The advances in medical technology to improve the quality of diagnosis and therapy often involve greater costs than increased effectiveness especially in terms of the prolification of proprietary of drugs and transfer of services to specialists. In order to curb such costs the technology should not be complex but appropriate for the community and personnel as well as scarce resources should be used only in cases where they cannot be replaced by less scarce ones.

At the micro level, health services were produced by means of various forms of labour, fixed capital structures and installations, consumable equipment and many others. Therefore, these components have at any point in time and space a corresponding set of prices or costs that would be incurred in terms of production, effectiveness and benefit.[15]

1.4.9 Abel-Smith Brain and Leiserson A. in 1980 (pages 142-152) in making the most of scarce resources identified two ways by which health services are financed in the Government sector and private sector.

They found that more money was spent in the private sector than in the Government sector, mainly on Doctors, Dentists, Traditional practitioners, drugs and herbal remedies. In the case of budget allocation within the health services, about 3/4 of the budget went to 10 percent urban population as opposed to 1/4 of budget spent on 90 percent rural population. In terms of unit costs for hospital use, consultation, vehicle-miles, number of students duration of courses and drop-out rate of health personnel were of paramount importance for financial feasibility of operations in health planning. The sources of the two methods of financing health services for indirect and direct expenditures were the Central Government, Local Government, Compulsory Insurance, Voluntary Insurance, Employment Insurance, Charity Funds and Foreign Aid.[16]

1.4.10 Perlman K. 1980 (pages 41-88) in his study of the economics of health and medical care of which the purpose was the identification of factors determining the level of National expenditure on health found that the relative size of the public sector's consumption and labour's share of income do exert some influence on the level of health expenditures. At the national level, as the Government increased its role in the provision of services in general, it also sets itself targets with respect to the health services it provided only when the households did not regard health services

provided publicly to be perfect substitutes for those acquired privately. At the individual level, the individual weighs the benefits gained from private treatment as opposed to that got from the public sector.[17]

1.4.11 According to Diesfeld, H.J. 1978 (page 30), the health budget expenditures of Kenya increased in 1968/69 fiscal year due to wages, employment and the expansion of Kenyatta National Hospital.[18]

1.4.12 Malone, I.M., 1976 (page 240) on her study of the quality of care assessment in the out-patient services of a district hospital in Kenya found that the quality of care assessment in the clinic was good and the overall assessment was that about 80 percent of the care was adequate.[19]

1.4.13 A similar study by Maina-Githinji, 1977 (pages 276-280) on out-patient and the staff satisfaction with the treatment provided in a District Hospital in Kiambu - Kenya studied the out-patient department. She emphasized that whereas in traditional medicine psychological satisfaction played a major role in prevention and treatment, Western Medicine was for physical recovery of the patient without providing the actual information on the cause and prevention of diseases. Further the social and demographic characteristics of out-patients did not influence satisfaction, but rather

the degree of satisfaction of out-patients making use of the out-patient department services was significantly related to their level of expectation. Thus the greater the length of waiting time spent in the out-patient department by the out-patients the less was the level of satisfaction with treatment. The level of satisfaction with the medical treatment received by the out-patient was positively correlated with the level of satisfaction with the staff patient relationship in the out-patient department.[20]

1.4.14 Opukah Shabanji, 1979 (pages 110-117) on the distribution of Rural Health facilities in Mumias and Butere Divisions contended that the country should opt for an appropriate spatial system that is capable of ensuring that health facilities are distributed with regard to demographic characteristics, existing health facilities and the local demand for such health services.[21]

1.4.15 Hartwig, E.M., 1975 (pages 177-182) in the analysis of health policies and National Development in Kenya, endeavour to examine the aspects of the relationship between health promoting policies and National Development in Kenya with special reference to the political factors affecting health policies in conjunction to health planning. Among his findings were that the history of health policies in Kenya

indicated a conscious effort to integrate health into the overall scheme of National Development. Thus the demand for health services rose due to "revolution of rising expectations". The Church-related health services were not in line with the theoretical objectives of the Government. The spatial planning had not helped in the development of Kenya's health services due to lack of sanctions or implementation authority; the Harambee concept of self-help programmes in health decision making illustrated that both the effectiveness of broadly ideological calls for sacrifice and self riliance in the mobilization of resources in rural areas of which the success depended on the revitalization of the political party at the local level. He therefore concluded that the de facto health policies in Kenya may not have been serving the best interest of National Development.[20] More will be dealt with in Chapter Three on past, present and future policies and strategies.

1.5.1 THEORETICAL STRUCTURE-CONCEPTUAL HYPOTHESES

Population growth not only creates pressure on the Nation's socio-economic resourses, but also makes increasing demand on its health services. The ever growing broad based pyramidal population structure means a large number of children, who, when sick will need to be cared for in health care centres by qualified medical personnel. This increasing number of babies

1.5.2 In the theoretical formulation, particularly the conceptual hypothesis, the key concepts that can be derived are the "economy", "demography" and "health". The conceptualization of the hypotheses are linked with the prepositions "likely to be affected". As another aspect of formal theory, it must show universality. Hence, the universe here is any given society.

1.5.2.1 The economy of any country in a wider sense is the administration of the resources of any community or establishments with a view to orderly conduct and productiveness.[23] The economics of a Nation is the study of human behaviour as it relates to scarse means, which have alternative, to given ends, such as maximization of incomes usually employing price data in the comparison.[24] These can only be realised through the Gross National Product, Gross Domestic Product, Government total revenues, taxes, inflation rates, income per capita and capital formation and employment.

The human behaviour in relation to scarce resource allocation are greatly influenced by demographic factors such as age, sex and the aggregate numbers. The age-sex structure of the population portrays different socio-economic needs. It also delineates the manpower requirement rates utilised to achieve the goals of basic and essential services.

An economy that is stable provides satisfaction to the needs of the nation through the stability of Government. As Professor Ominde points out that those nations whose economy is not able to meet the basic needs to its populace will be faced with instability as well as political upheavals.[25] With this note, it is clear that "economy" and "demography" are closely related and interwoven entities.

1.5.2.2 The term demography as was first introduced by Guillard, A. [26] in 1855 was defined as the natural and social history of human species, or in a narrower sense, the mathematical study of the population, their general movements, and their physical, civil, intellectual and moral conditions.[27] More recently, the term demography has been defined as the study of human population by statistical methods and deals with such aspects as the number living, dying or born in a country or region and the measurement of fertility, mortality and marriage rates. However, for some purpose, qualitative factors are included within the scope of the subject,[28] whereas the multilingual demographic dictionary defines demography as the scientific study of human populations, primarily with respect to the size, structure and development.[29] Henin, R.A,, defines demography as that being composed of structure and processes. The structural elements

of the population include size, its distribution and biological composition. Processes are those which operate within any population system and they include, fertility, mortality and migration. He farther stresses that for a complete definition, additional characteristics should be included. These additional characteristics, such as place of birth, place of death, literacy, place of residence, economic activities, occupation, industry and income are mainly socio-economic and therefore form a loose relationship which connects demography to environment.[30]

1.5.2.3 The term society can be defined as an aggregate of human beings of both sexes and all ages bound together into a self perpetuating group and possessing its own more-or-less distinctive institutions and culture. Where culture is that complex whole which includes knowledge, belief, art, morals law, custom and any other capabilities acquired by man as a member of society, for the maintanance of the population, division of function among population, solidarity of the group and the perpetuation of the social system within its three main categories of institutions, ideas and material products.[31]

1.5.2.4 On a positive note, the World Health Organization in 1958 defined health as a state of complete physical, mental and social well-being.[32] Roberts, F. 1952, in defining health simply stressed the absence of the ability to resist disease and death.[33] A few points

seem clear. Firstly, health has many dimensions - anatomical, physiological, mental, and so on. Secondly, the relative importance of different disabilities varies considerably depending upon the particular culture and the role of the particular individual in that culture. Thirdly, most attempts at measurement take the negative approach. That is, they make inferences about health by measuring the degree of ill health as indicated by mortality, morbidity, disability and so on. Finally, with respect to health, as in so many other cases, detecting changes in health is easier than defining or measuring absolute levels.

1.5.2.5 Often when we talk of health, we try to relate it to the health services provided by the Nation. Health services can be defined as services rendered by the personnel engaged in medical occupation such as doctors, dentists, and nurses, plus other paramedical personnel working directly under their supervision, such as practical (interns) nurses, orderlies, and receptionists; the plant and equipment used by these personnel such as hospitals, and X-rays; and the intermediate goods and services such as drugs, bandages, purchased laundry services and other related materials. Therefore, the impact of health services on health status of the people depends upon how effective the best known techniques of diagnosis (therapy) are, and how wide the gap between the best known techniques (treatment

of choice) and those actually used across the country are.[34] Hence, an important relationship exists between health services and the health status of the population.

An increase in the health status has two potential values for individual consumption and production. Good health is clearly something consumers desire for themselves. The extent that health services lead to better health, makes a contribution to the economy comparable to that of any industry producing a good or service wanted by consumers. Better health contributes to the production capacity of the economy by increasing the supply of potential man-hours through a reduction in mortality and decrease in time lost because of illness and disability. Better health may also increase production by improving productivity through increasing output per man-hour.

Besides, its potential direct contribution to production and consumption, better health may also have important indirect effects on the economy. These indirect effects occur through the changes in life attitudes that do accompany changes in health. It should also be noted that when the average life expectancy at birth in a country is thirty five years, attitudes towards work and saving, for instance may be different from those in countries where life expectancy at birth is fifty or more. If infant mortality rates are very

high, attitudes towards birth control are likely to be different from those in countries where infant mortality rates are low. Indeed the idea of progress itself may be intimately bound up with the health levels of the population and the rate of change of these levels.

1.6.1 Before going further to develop the model, it is right and fitting that the variable clusters be identified. These variables are divided into three clusters as follows:

i) ECONOMIC VARIABLES

a) Total Government expenditures

b) Gross National Product

c) Total Government Revenue

ii) DEMOGRAPHIC VARIABLES

a) Total Fertility rate

b) Total Population

c) Life Expectancy at Birth

d) Infant Mortality Rate

e) Population Growth Rate

iii) HEALTH VARIABLES

a) Available Hospital Beds and Cots

b) Reported Cases of Infectious Diseases

c) The Number of Doctors and Dentists

d) The Number of Nurses (Both registered and enrolled)

e) All Other Paramedical staff

However, these variables in the clusters are not exhaustive.

1.6.2 ECONOMIC VARIABLES

The amount of public expenditure on health is determined by the age-sex structure of the population and in particular the demand for health services and the prevalence of killer diseases. Thus the population's health status depends on the general standards of living, the geographical distribution of hospitals, health centres and dispensaries, attitudes towards modern medicine, availability as well as the accessibility of health services, availability of private resources, manpower needs and the unit cost of health expenditure.

As a general rule, countries with a high per capita income tend to spend relatively larger proportions of their Gross National Product on health. However, expenditures on health services or any other basic need, are apparently encouraged when real income rises in periods of relative price stability and when there are other alternative projects. Expenditures are thus related to the income of the Nation and especially their per capita income; the larger the surplus over what is needed to cover the essentials of life, the greater the

proportion of income likely to be spent on health. In any case price movements alone do not explain the trends in health expenditures, but such factors as the availability of the right health services within easy reach, manpower needs, structure of the health system, responsibilities for health among different levels of Government, total Government revenue, per capita income, Gross National Product and the contribution made by non-Governmental bodies as well as the resources at disposal all play part. In general, when the Gross National Product is small in a Nation, the expenditure on health services is as well small.[35]

1.6.3 HEALTH VARIABLES

The various health variables determine the way in which expenditures are allocated according to the different votes. The expenditure allocation takes into account the demand for health care and medical services in different areas to help increase or improve the health status of the Nation and within its other geographical units.

It is useful to distinguish between expenditure on public and private health services. Public health expenditures are those expenditures from public funds for public health, whereas private health expenditures are those expenditures from private means for private health services. The breakdown of total expenditure by

vote and type of health service primarily depends on public and private establishments. Health expenditures are divided into curative health, preventive and promotive health, rural health facilities, health training, National Hospital Insurance Fund, medical supplies and medical research. Another explanatory variable factor generally enters the analysis. In practice, the average unit costs are not identical in public and private health facilities and hence the quality of services rendered must be accordingly considered. These are as a result of the availability and accessibility to the facilities and services rendered.
The breakdown of health expenditures by votes allows analysis to be carried out in a number of directions. The most obvious is the variable population ratios which will enable regional, time and resource analysis. The comparison between recurrent expenditures and health variables will definitely show that the average recurrent unit cost vary widely between different variables.

### 1.6.4 DEMOGRAPHIC VARIABLES

Kenya has a population potential that is unprecedented in the world today. By way of comparison, the crude birth rate for the world is estimated to be 28 per thousand population, 46 per thousand population in Africa and 54 per thousand population for Kenya.[36] The average crude death rate for the world was 11 per thousand population, 17 per thousand population for Africa and 14 per thousand population for Kenya, thus

the crude death rate was among the lowest in Africa.

Kenya has fairly reliable indices of population growth, distribution and composition as a result of demographic enquiries and surveys in recent years. In 1977, the total fertility rate was 8.1 births per woman In comparison the total fertility rate for Africa was 6.2, 3.9 for Asia and 2 for Europe. Thus giving Kenya one of the highest total fertility rates in the world. The 1969 and 1979 population censuses together with the Kenya Fertility Survey showed that the total fertility rate was increasing or rising.

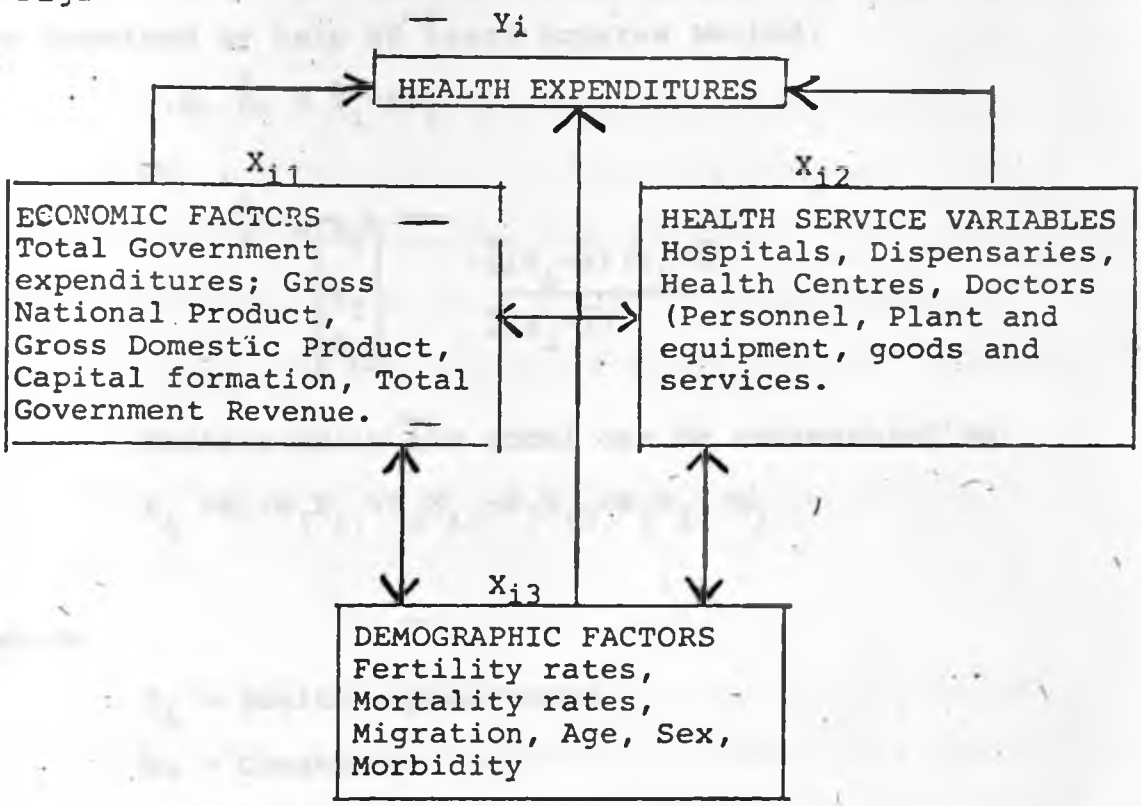
1.6.4.1 The life expectancy at birth was estimated at 51.2 years for males and 55.8 years for the females in 1979 census as compared to corresponding figures of 46.9 years for males and 51.2 years for females obtained from 1969 Population Census. The crude birth rate of 54.6 per thousand population and the crude death rate of 14.2 per thousand population simply implies a rate of natural increase of 40.4 per thousand population. At such a rate of population growth, the population would double by the turn of the century.

In perspective, our life expectancy at birth has been among the highest in Africa, whereas the infant mortality rate has been among the lowest in Africa

despite the low income per capita, the crude death rate has been among the lowest in Africa, and the highest total fertility rates in the world. However, some of these indices when compared to those in some of the less developed countries in Asia, would clearly indicate that health status in Kenya need a lot more of improvement to reach those standards. For example, Kenya's crude birth rate of 53.4 per thousand live births cannot be compared to 28 in Asia; whereas the life expectancy of 56 years is much lower than that of 58 in Asia. Therefore the most important and pressing issue that has affected Kenya's health status is the rapid population growth indicated by desire of the people for large families.

A conceptual model can be developed to explain the interaction of the various variables so far discussed above.

Figure 1.1




The various variables contribute to health expenditure either directly or indirectly through other variables. Mathematically, the model can be represented by a multiple regression equation as follows:

$$Y_i = B_o + B_1X_{i1} + B_2X_{i2} + B_3X_{i3} + \ldots + B_kX_{ik} + e_i$$

where

$i = 1,2,3,\ldots n$

$B_o$ = Constant

$B_1, 0, 2, 3\ldots, n$ = Gradient of best straight line

$e_i$ = The error

$X_i (1,2,3\ldots n$ = Independent variables

$Y_i$ = Dependent variable

$B_o$ and $B_i$ are regression coefficients that can be obtained by help of Least Squares Method.

i.e. $\hat{B}_o = \bar{Y}_i - B\bar{X}_i$

or

$$\hat{B} = \begin{bmatrix} B_1 \\ B_2 \\ B_k \end{bmatrix} = \frac{\sum(X_i - \bar{X})(Y_i - \bar{Y})}{\sum(X_i - \bar{X})^2}$$

Statistically the model can be represented as

$$Y_i = B_o + B_1X_{i1} + B_2X_{i2} + B_3X_{i3} + B_4X_{i4} + e_i$$

where

$Y_i$ = Health expenditures

$B_o$ = Constant

$B_i$ (1,2,3,4) = Gradients

$X_{i1}$ = Health services

$X_{i2}$ = Health variables

$X_{i3}$ = Economic factors

$X_{i4}$ = Demographic characteristics

$e_i$ = The error term

To determine the effect of one category of variables, the other categories of variables are equated to zero. For example, to find the effect of health variables on the Health Expenditure, then the equation becomes,

$$Y_i = B_o + B_2X_{i2} + e_i$$

## OPERATIONAL HYPOTHESES

1.7 In this study, economic demographic and health variables do affect health expenditure through increased demand of health care services. The demand of health services is as a result of rapid population growth rate, changes in the age-sex structure, increase in income per capita and improvement in the level of health which does create differences in tastes and preferences for health services.

The operational hypotheses that can be restructured from the conceptual hypotheses are as follows:

i) It can be hypothesized that there exists a linear relationship between health expenditures and the total population, Gross National Product, the death rate and medical personnel. Here we shall address ourselves to several questions as to whether there really exists a linear relationship and if it is so, in what direction. This will be done by means of regression analysis in Chapter Four. The study will also find out how strong the degree of association is between the health expenditures and related or selected variables; and which of the selected variables (as have already been outlined earlier)

is or are the best predictors of health expenditures.

ii) It is also hypothesized that health variables (available hospital beds and cots, the number of doctors and dentists, the reported morbidity and the number of nurses) do directly influence the quality of health services provided. Here the study will critically analyse the different proportions such as the population doctor ratio and hospital bed population ratios and other related ratios.

iii) It is hypothesized that the change in age-sex structure of the population do affect the cost of health. Here the index of life expectancy will be used. In addition the cost of health to different sections of the population will be analysed.

1.9 REFERENCES

1. Whethem, E.N. 1969 - pp. 268
2. Brooman, F., 1963 pp. 28
3. WHO, 1977 ppl - 15
4. Kenya Fertility Survey, 1977/78 - pp. 77-94
5. Vogel, L.C., 1970 - pp. 242 - 246
6. National Development Plan 1984-1988 - pp. 152-164
7. Kenya Statistical Abstract, 1980 - pp. 205-207
8. Great Britain, 1956 - pp. 10-50
9. Feldstein, M.S., 1967 - pp. 260-275
10. Carr, J.W. and Feldstein P.J., 1967 - pp. 277-278
11. Ingbar, M.L. and Taylor, L.D., 1967 - pp. 278-290
12. Williams, A., 1973 - pp. 30-60
13. W.H.O., 1973 - pp. 15-17
14. Abel-Smith Brain, 1967 - pp. 40-92
15. W.H.O., 1975 - pp. 14-30
16. Abel-Smith Brain and Leiseeson, A., 1980 pp. 142-152
17. Perlman, M., 1980 - 41-80
18. Diesfeld, H.J., 1978 - pp. 30
19. Malone, I.M., 1976 - pp. 240
20. Maina-Githinji, E., 1979 - pp. 276-280
21. Opukah, S., 1979 - pp. 110-117
22. Hartwig, E.M., 1975 - pp. 177-182
23. The Oxford English Dictionary Vol.111 pp. 35

24. Gould, J. and Kolb, L.W., 1975 - pp. 674-675

25. Ominde, S.H., 1980 - pp.44

26. Guillard A., 1855 - pp. 1

27. Holingsworth, T.H., 1969 pp. 1-60

28. Cox, P.R., 1959 - pp. 1-2

29. United Nations 1958

30. Henin, R.A., 1980 - pp. 20-40

31. Multi-Lingual Demographic Dictionary

32. W.H.O., 1959 - pp. 334-351

33. W.H.O., 1978, - pp. 2-6

34. World Bank, 1980 - pp. 11-19

35. World Bank World Population Data Sheet 1980

36. Central Bureau of Statistics, 1981 - pp. 9-13

# CHAPTER TWO

# METHODOLOGY

## 2.1 INTRODUCTION

In this section, I intend to deal with the methods that were used for data collection, sources, type, quality and methods (models) that data was analysed.

## 2.2 THE SOURCES OF DATA

The sources of data used in the study are secondary data that were obtained as raw data mainly from the Kenya Government Publications, World Bank and the United Nations agencies. These sources included the Kenya Fertility Survey of 1977/78, the National Demographic Survey of 1977, the Kenya Population Censuses of 1969 and 1979, the available Ministry of Health Annual Reports, the Health Information System Bulletins, the Kenya Economic Surveys from 1969 to 1983, the Kenya Statistical Abstracts from 1969 to 1983, the World Bank Reports, the International Labour Organization Reports, the Kenya Government National Development Plans from independence to 1984, the Registrar General Annual Reports, the United Nations Publications and the World Health Organization Reports.

In addition to these, other sources of data were from the Central Bureau of Statistics and the Directorate of Medical Services.

## 2.3 TYPE OF DATA AND METHODS OF COLLECTION

2.3.1 The patient's morbidity and mortality statistics that were used in the study were those collected by the Ministry of Health under the Health Information Systems (HIS) section. The HIS section compiles the information on morbidity and mortality data from Government Health institutions as well as from other agencies. These institutions keep records of attendances and prescriptions of patients in registers according to age, sex, day, data and the ailments the patients were suffering from.

This information is then sent to the HIS headquarters in Nairobi on quarterly basis. At the HIS headquarters, the information is compiled by statisticians in the form of tables and published in the Health Information Systems Bulletin. The information is further compiled and classified according to districts, month, the specific disease and the number of cases for each disease and the total number of referals. However, such information as on monthly immunization and the attendance of family planning clinics is also included in the Bulletin. At times, laboratory reports on specific diseases is included although not regularly.

2.3.2 In a census, there are two important schedules of samples. The first such a schedule covers the basic demographic items as age, sex, relationship and tribe or nationality. The second sample schedule include such items as marital status, educational level attainment, survival of parents, children ever born and the number of visitors in the household. These two sample schedules inevitably covers all the areas of fertility, mortality and migration irrespective of the type of census taking whether de jure or de facto. Often the boundaries of the enumeration areas were those which existed before the census. These enumeration areas were earlier delineated according to the administrative areas on maps that have remained as permanent records and can be used for other purposes such as surveys.

Both the 1969 and 1979 censuses, were conducted by Canvasser methods. In this method, the list of all persons present in the household or other living quarters at the night of the census or all who, on the night of census, stayed in the household. The schedules were completed by the enumerator on the basis of the answers supplied by the respondent who were in most cases the heads of the households. The enumeration was originally planned to be completed within 5 days for 1969 Census and 2 days for 1979 Census. However, in a few areas, it had to be extended beyond these periods. This was inevitable because of the environmental factors which separate one

household from the other especially in the semi-arid areas of the country.

2.3.3 The Kenya Fertility Survey (K.F.S.) was carried out as a component of the National Intergrated Sample Survey Programme (NISSP) with the latter covering the period 1974 to 1979 while the former covering the period 1977 to 1978.

The National Sample was designed to cover 1 percent of the rural population and 2 percent of the urban population. The population figures available to the Central Bureau of Statistics for 1974 were those which had been projected from the 1969 population census data. The major considerations in identifying the above sample size was made available as National, Provincial and ecological estimates from the data collected within the survey programme.

At the first step 64 rural locations and 80 urban areas were identified as primary sample units (PSU). Within each of the rural locations, 2 clusters of an average size of 200 households per cluster. The 80 areas selected in the urban stratum constituted about 100 households per area. Most of these urban areas (53) were located in Nairobi and Mombasa towns. The results were that a sample comprised of 120 rural and 80 urban clusters covering a total of 30000 households.

To reduce non-sampling errors, the selected areas were mapped out. The mapping exercise involved the identification of distinct features which formed convenient boundaries on the ground. After the identification and mapping of the clusters, the numbering of all structures found within the clusters was effected. The numbering made it easier to identify the households for the Kenya Fertility Survey and other sample surveys which were carried out within the National Sample.

In this connection, the Kenya Fertility Survey utilised a sub-sample of the households within the National Sample. The household listing carried out by the National Demographic Section in January, 1977 for the rural areas and a fresh relisting of the urban areas in June 1977 indicated that on the average each household had one eligible female in the 15-19 age group. Since the KFS was designed to cover a sample size of 10,000 eligible women, one-third of the National Sample household were selected for the Kenya Fertility Survey.

2.3.4 COMMENTARY

The Health Information Systems (HIS) have statistical clerks stationed in every Government Health Institution. They are charged with compiling all health statistical data available in the centres, that

are of demographic importance for analysis. The information is coded by age, sex, type of disease, treatment given as well as the referals. However, in most cases the information is taken in total such that some vital information is lost and left out. For example the number of cases and deaths due to a particular disease is given in totality without classifying it according to age and sex.

At the headquarters, the information collected from the health institutions is all compiled for analysis and publication. The Health Information System Bulletin comes out in quarterly basis in a year. At times, because of some technical problems, the publications are delayed.

The information contained in the Economic Surveys, Statistical Abstracts, Development Plans, Registrar General Annual Reports, World Bank Reports and International Labour Organization Reports are obtained either by research done by experts or from the various Government Ministries, departments and other agencies. They appear in the form of annual reports or returns and often represent the true picture. However, there are occassionally conflicting data due to definitions used are not very clear otherwise typographical and conterminated errors. For example

there is no clear-cut difference between a District Hospital and a District Sub-Hospital or between a Health Centre and a Health Sub-Centre.

## 2.4 QUALITY OF DATA

In Africa, however, a large part of the older population is still not as age conscious as in the more developed countries. As far as age is such an important demographic parameter, it is therefore essential that other methods are utilised to try and obtain reasonably accurate estimates of the ages of the respondent during a survey or census.

In Kenya, the methods that have been tried to improve the quality of data since independence include:

a) The comparison of respondents age by asking how much older or younger a respondent is compared to another respondent whose age is known. For example if Karanja's age is known and Mwangi's age is estimated to be about three years older, then Mwangi's age is Karanja's age plus three.

b) Age grades can be used to determine age. If the age of one person of the same age grade is known other ages can be equated to his age. However, there could be differences in ages of persons of the same age grades, the method (a) is employed in

corporation.

c) The other methods used include the enumerators' decision to estimate the ages and the use of calender of events.

The data on medical personnel has one deficiency. The registration and licencing of Medical Practitioners is done once for every officer. Since there is no renewal of such registration and licencing, a wrong figure often resuls. This is so because some of the personnel could have left the service by one way or other. The data on health expenditures are those gross figures that were actually utilised in any of the given year of study. These and other related data are accurate and free from error within the limits of the study. The data on demographic parameters do not have non-sampling errors for all necessary steps were taken to reduce such errors to occur. In all the defects in the data for analysis would not lead to wrong analysis and conclusions.

## 2.5 TECHNIQUES OF ANALYSIS

The study was organised in such a way that although its major thrust was analytic in the way variables were treated, there was some sense of historical sequence behind it. The first part of the study was to establish how health expenditures had been growing

in terms of the overall budget and as compared to other basic needs. That is the analysis of both inter and intra health expenditure growth. The study utilised the growth rates (yearly increases) procedure and the unit cost procedure coupled with regression.

2.5.2 The growth rate of health expenditures were compared with the growth rates of selected health, economic and demographic parameters to determine how much the health expenditures had kept pace with the growth rates of the selected health, economic and demographic parameters. The growth rates (yearly increases) were computed by dividing the differences between two consecutive years expenditures by the expenditure of the previous year and then expressed in percentages. For example, if the health expenditures in Kenya for 1979 was Kenya Shillings 1,073,059,960 and in 1980, it was Kenya Shillings 1,314,000,500, then the growth over the year was Kenya Shillings 240,940,540. This can alternatively be expressed as growth rate of health expenditure: $\frac{\text{Difference}}{\text{1979 expenditure (health)}} \times 100$

$$= \frac{240,940,540}{1,073,059,960} \times 100 = 22.5 \text{ percent.}$$

This was done for all variables and for the whole period.

2.5.3 An attempt was also made to compare unit costs for the whole health system and those of different votes (curative health, preventive health, rural health services, health training, medical supplies and National Hospital Insurance Fund). Unit cost per patient is an appropriate measurement for many purposes such as comparing costs between Health Votes, Institutions, Geographical areas and time periods.

2.5.3.1 The unit cost per patient is simply the total expenditure in a given period either for the whole system or more likely for some particular part of it, divided by the number of patients with the same disease or diseases. Thus, for example, by properly breaking down the overall expenditure, one can compute and compare unit costs (per patient) as between Health Centres, Dispensaries and Hospitals. The availability of such differentials provide insights that are often concealed by broader averages. Unit cost can also be expressed in terms of patients who die after treatment and patients whose lives are saved. The loss of working time by patients engaged in wage employment could also be of use. In general, costs can as well be related to a variety of other definable units such as the number of doctors available, nurses, health institutions, space and time.

2.5.3.2 The second method of analysis was designed to focus on the strength and direction of association between health expenditures, which was the dependent variable and economic health and demographic variables which were the independent variables. The independent variables were grouped into several clusters. Economic, Health expenditure by Votes, paramedical staff and demographic characteristics

These analyses was done by means of Bivariate Analysis, Pearson Correlation and Scattergrams. According to the authors of "Statistical Package for Social Sciences," Norman, H. Nie; Hardin Hull; Jean, G. Jenkins, Karim Steinbrenner and Dale, H. Bent, they have the following to say:

> "Bivariate Correlation provides a single number which summarises the relationship between two variables. These correlation coefficients indicate the degree to which variation (or change) in one variable is related to variation (change) in another. A correlation coefficient not only summarises the strength of association between a pair of variables, but also provides an easy means for comparing the strength of relationship between one pair of variables and a different pair. Of course, this is done at the sacrifice of the detail which one has in a crosstabulation, scattergrammes, or list of values of each case." (1975, pp.276-277)

Establishing a correlation between two variables can be useful in predicting values of one variable from the knowledge of values of another variable.

The technique known as Regression Analysis is employed in making the predictions. This is done by drawing a regression line through a scattergramme; and any point which does not fall exactly on the regression line is incompletely accounted for. The amount of "error" then is the vertical distance from the point to the line. The distances are squared and added together. This summation of the squared distances is a measure of the total error involved when the regression line is used as the prediction of the location of the data points. A line which minimises the sum of the squared distance will be the same as the best predictor than any other.

2.5.3.3 Stepwise multiple regression statistical technique will also be used to analyse the relationship between health expenditures and the selected variables in the study. Multiple Regression as a statistical technique may be viewed as a descriptive tool by which the linear dependence of one variable on the other is summarised and decomposed or as an inferential tool by which the relationships in the population are evaluated from the examination of sample data. As a descriptive tool, multiple regression technique is used to first find the best linear prediction equation and to evaluate its prediction accuracy. Secondly it can be used to control further confounding factors in order to evaluate the contribution of a

specific variable or set of variables and thirdly to find structural relationship as well as provide explanations for seemingly complex multivariate relationships.

Both the bivariate correlations analysis and the stepwise multiple regression analysis as well as related analyses were done by employing the 'SPSS' systems of computer programmes. The mathematical treatment of the models of regression will now be dealt with in greater detail.

## 2.6 REGRESSION MODEL

Regression analysis is a statistical method that is used for estimating the relationship between a dependent variable and one or more independent variables. In the Health Sector it can be used in finding the determinants of health status variables, estimating the demand for various types of health care services, the effect of the amount of personnel, the number of hospital beds and the hospital case-mix on the hospital costs. There are two regression models that can be used or dealth with; namely Simple and Multiple linear regression models.

### 2.6.1 THE SIMPLE LINEAR REGRESSION MODEL

In Simple linear regression model, there is only one explanatory (independent) variable. This

simple relation can be represented mathematically as:

$$Y = B_1+B_2X+e \quad \ldots\ldots 2.6.1$$

where

Y is the dependent variable

X is the independent variable

$B_1$ is the intercept of the relationship

$B_2$ is the slope of the relationship

e is the error term which indicates that there are other influences not covered by X at work in determining Y.

However, these influences are unpredictable and unobservable so that the observers interest is basically in the relationship between Y and X. As it can be observed from the above equation, the purpose of the regression model is to estimate the Population Sample Parameters $B_1$ and $B_2$ on the basis of the number of sample observations on Y and X.

In order that $B_1$ and $B_2$ are estimated, the Least Squares method is applied. This method consists of minimizing the sum of the squared deviations between the observed Y's and the explained Y's (denoted by $\hat{Y}$). Here the regression model aims at obtaining a fitted line which is as close as possible to the observations. Hence the relationship becomes:

$$\hat{Y} = \hat{B}_1+\hat{B}_2X \quad \ldots\ldots 2.6.2$$

The sum of the squared deviations between Y and $\hat{Y}$ becomes:

$$\sum_{i=1}^{n} e_i^2 = \sum_{i=1}^{n} (Y_i - \hat{Y}_i)^2 \quad \ldots\ldots\ldots \quad 2.6.3$$

Substituting equation 2.6.2 into equation 2.6.3 we get:

$$\sum_{i=1}^{n} C_i^2 = \sum_{i=1}^{n} (Y_i - B_1 - B_2 X_i)^2$$

where $e_i$ is the deviation between $Y_i$ and $\hat{Y}_i$.

$$\sum_{i=1}^{n} e_1^2 = \sum_{i=1}^{n} (Y_i - \hat{B}_1 - \hat{B}_2 X_i)^2 \quad \ldots\ldots\ldots 2.6.4$$

It is then the work of the Least Squares Method to minimise equation 2.6.4 by selection of $\hat{B}_1$ and $\hat{B}_2$. This can be done by differentiating equation 2.6.4 with respect to $\hat{B}_1$ and $\hat{B}_2$ and setting the result to zero.

$$\frac{d}{d\hat{B}_1}\left[\sum_{i=1}^{n} e_i^2\right] = -2\sum_{i=1}^{n} [Y_i - \hat{B}_1 - \hat{B}_2 X_i] = 0 \quad \ldots\ldots 2.6.5$$

and

$$\frac{d}{d\hat{B}_2}\left[\sum_{i=1}^{n} e_i^2\right] = -2\sum_{i=1}^{n} X_i [Y_i - \hat{B}_1 - \hat{B}_2 X_i] = 0 \quad \ldots\ldots 2.6.6$$

Equations 2.6.5 and 2.6.6 can be normalised to yield the following equations respcectively.

$$\sum_{i=1}^{n} Y_i = \hat{B}_1 n + \hat{B}_2 \sum_{i=1}^{n} X_i \qquad \ldots\ldots 2.6.7$$

and

$$\sum_{i=1}^{n} X_i Y_i = \hat{B}_1 \sum_{i=1}^{n} X_i + \hat{B}_2 \sum_{i=1}^{n} X_i^2 \qquad \ldots\ldots 2.6.8$$

From equations 2.6.7 and 2.6.8 the intercept $\hat{B}_1$, and the slope $\hat{B}_2$ can be derived as follows:

$$\hat{B}_1 = \bar{Y} - \hat{B}_2 \bar{X} \qquad \ldots\ldots 2.6.9$$

where $\bar{Y}$ and $\bar{X}$ represent the average observations on Y and X respectively. By substituting equation 2.6.9 into equation 2.6.8, the expression for the slope becomes,

$$\hat{B}_2 = \frac{\sum_{i=1}^{n} X_i Y_i - \bar{Y} \sum_{i-1}^{n} X_i}{\sum_{i=1}^{n} X_i^2 - \bar{X} \sum_{i=1}^{n} X_i} \qquad \ldots\ldots 2.6.10$$

## 2.7 THE MULTIPLE LINEAR REGRESSION MODEL

Here we study the dependence of one variable on a number of several explanatory variables. The methods employed are similar to those used in a simple linear regression model. The interest is to determine or the estimation of coefficients. The common ones being the Least Squares Estimation of Coefficients and

the Variance -Covariance Matrix of the Coefficients.

2.7.1 THE LEAST SQUARES ESTIMATION OF COEFFICIENTS

Statistically, the relationship in Multiple Linear Regression is of the form:

$$Y_i = B_o + B_1 X_{i1} + B_2 X_{i2} + B_3 X_{i3} + \ldots + B_k X_{ki} + e_i \quad \ldots.2.7.0$$

where $i = 1,2,3,4 \ldots.n$

In the above equation there are k-1 explanatory variables. Hence it can be represented in the Matrix form as,

$$Y = XB + e \quad \ldots\ldots \quad 2.7.1$$

where Y is a Nx1 Vector of values of the dependent variable; X is n x k Matrix of the independent variables; B is a k x 1 vector of coefficients and e the n x 1 vector of random term or error.

Therefore the regression line for the best fit is in the form:

$$\hat{Y} = X\hat{B} \quad \ldots\ldots 2.7.2$$

where $\hat{Y}$ and $\hat{B}$ represent the vector of explained $\hat{Y}_i$'s and the vector of estimated coefficients $B_i$ $(i=1,2,3,4, \ldots.k)$ respectively.

Therefore the sum of squared deviations between Y and $\hat{Y}$ can be represented as

$$E'E = (Y-X\hat{B})'(Y-X\hat{B})$$
$$= Y'Y-2\hat{B}'X'Y + \hat{B}'X'X\hat{B} \quad .....2.7.3$$

where E is the column vector of n x 1 residuals. In the above equation we need to determine the values of $\hat{B}$ for which E'E is minimum. This can be obtained by partial derivation of E'E with respect to $\hat{B}$ and equated to zero.

$$\frac{dE'E}{d\hat{B}} = -2X'Y +2X'X\hat{B} = 0 \quad ....2.7.4$$

Hence the Least Square Estimation can be defined as

$$\hat{B} = (X'X)^{-1}X'Y \quad .....2.7.5$$

2.7.2 THE VARIANCE-COVARIANCE MATRIX OF THE COEFFICIENTS

With respect to the error term, the following assumptions are made in the regression model.

i) The expected values of $e_i$ is 0

i.e. $E(e) = 0$ .....2.7.6

ii) The Variance-Covariance Matrix of the random terms $e_i$ and V(e) is diagonal

$V(e) = E(ee') = \sigma^2 1$ .....2.7.7

where $\sigma^2$ is a constant to be estimated and 1 is an n x n identity matrix.

The Variance-Covariance Matrix of the regression coefficients can be defined as:

$$V(\hat{B}) = E[\hat{B}-E(\hat{B})][\hat{B}-E(\hat{B})]^1 \quad \ldots\ldots.2.7.8$$

From equation 2.7.5 we get that

$$\Rightarrow E(\hat{B}) = E[(X'X)^{-1}X'Y]$$

$$= E[(X'X)^{-1}X'(XB+e)] \quad \ldots\ldots.2.7.9$$

$$= E[(X'X)^{-1}(X'X)B+(X'X)^{-1}X'e]$$

$$= E[B+(X'X)^{-1}X'e]$$

$$= B+(X'X)^{-1}X'E(e)$$

$$E(\hat{B}) = B \quad \ldots\ldots.2.7.10$$

This implies that with the assumptions made, B is an unbiased estimator.

Going back to equation 2.7.8, and substituting equation 2.7.9 and 2.7.10, we get:

$$V(\hat{B}) = E[\hat{B}-E(\hat{B})]\ [\hat{B}-E(\hat{B})]^1$$

$$= E[(X'X)^{-1}X'(XB+e)-B]\ [(X'X)^{-1}X'(XB+e)-B]^1$$

$$= E[(X'X)^{-1}X'ee'X(X'X)^{-1}]$$

$$V(\hat{B}) = \sigma^2(X'X)^{-1} \quad \ldots\ldots.2.7.11$$

This implies that the variance of any regression coefficient is equal to $\sigma^2$ times the appropriate diagonal element of the matrix $(X'X)^{-1}$. The standard error of the coefficients are obtained by taking the

square root of the diagonal elements.

$$\text{Therefore } \hat{\sigma}^2 = \frac{E'E}{n-k} \quad \ldots\ldots \text{ 2.7.12}$$

## 2.7.3 APPLICATIONS

The strength and power of the regression model lies in the measuring of the strength on the relationship and the amount of variation explained by the use of correlation coefficients. The correlation coefficients symbolised by 'r' in simple linear regression model and by 'R' in multiple linear regression models measure the degrees of association between the variables. If the values of correlation coefficients (r, and R) are squared ($r^2$, and $R^2$), they show the percentage variability in the dependent variable as explained by the independent variable(s). These can be defined as

$$R^2 = 1 - \frac{\text{Var } e_i}{\text{Var } Y_i} \quad \ldots\ldots 2.7.13$$

where R is the Pearson-moment correlation. The numerator and denominator, Var $e_i$ and Var $Y_i$ respectively are the variances of the error and dependent variables respectively.

$$\text{Hence Var } e_i = \frac{\sum_{i=1}^{n} e_i^2}{n} \quad \ldots\ldots 2.7.14$$

and $$\text{Var } Y_i = \frac{\sum_{i=1}^{n} (Y_i - \bar{Y})^2}{n} \quad \text{.....2.7.15}$$

Often the unbiased estimators of the variances of $e_i$ and $Y_i$ are used to calculate the correlation coefficients ($r^2$ and $R^2$).

$$\text{Hence } R^2 = 1 - \frac{\sum_{i=1}^{n} e_i^2 / n-k}{\sum_{i=1}^{n} (Y_i - \bar{Y})^2 / n-1} \quad \text{.....2.7.16}$$

where k is the number of coefficients to be estimated.

2.7.3.1 The Pearson-moment correlation coefficient symbolized by the 'r' serves as a means of association indicating the strength of the linear relationship between the two variables. If the value of 'r' is close to zero, then it can be assumed that there is little or no linear relationship between the two variables. If the value of 'r' approaches +1.0 or -1.0, then it can be assumed that there is a strong linear relationship between the variables under consideration.

If the Pearson's (r) is squared, another statistic, denoted as ($r^2$) is the result. This is a more easily interpreted measure of association when we are concerned with the strength of relationship

rather than the direction of the relationship. As it results from the squaring of (r), then it ranges from a minimum of zero to a maximum of 1.0. It's usefulness derives from the fact that ($r^2$) is a measure of the proportion of variance in one variable as explained by the other.

$R^2$ can be defined as the sum of squares due to regression over the total sum of squares. It is often stated as a percentage, $100R^2$; the larger it is, the better the fitted equation explains the variation in the data when there are two independent variables.

## REFERENCES

1. Central Bureau of Statistics, 1977 pp.1-17

2. Central Bureau of Statistics, 1976 pp.30-45

3. Nie, N.H.; Hull, H.C.; Jenkins, J.G.; Steinbrener, B.D.H., 1975 - pp.276-277

4. Carrin, G., 1984 - pp.120-147

5. Draper, N.R., 1966 - pp.1-33

6. Andrews, F., 1976 - pp.95-106

7. Cooper, H.M., 1976 - pp.95-106

# CHAPTER THREE

## PAST, PRESENT AND FUTURE HEALTH PROVISION, STATUS, POLICIES AND STRATEGIES

### 3.1 INTRODUCTION

Health planners do direct considerable effort towards the collection of health statistics for programme planning and evaluation. In so doing, substantially less effort is focussed on financial analysis and its use as a tool for the required planning and evaluation. However, financial analysis is of critical importance to the design evaluation and implementation of any health programme. In that respect it does enable the planners to isolate which facets of Health Care need more emphasis for the achievement of a better health status in the population. The 1979 Kenya Population Census showed that 86 percent of the population were rural dwellers, and if a health facility is needed, proper analysis would be required. Some studies have shown that five to six Health Centres or about eleven Dispensaries could be constructed and operated with funds that would be used for the construction and operation of one District Hospital with 300 beds.[1]

### 3.2 HEALTH PROVISION

The agencies delivering Health Care Services in Kenya are the Central Government under the Ministry of

Health, the Missionaries (Church missions), the Municipal Councils, the Companies and non-Governmental agencies.

3.2.1 The dominant sector of health care services in Kenya is organised and administered by the Ministry of Health financed primarily out of the National Budget. According to the Appropriation Accounts, other Public Accounts and the Accounts of the funds for the year ending June, 1970, 6.1 percent of the recurrent vote was on Health Centres and Dispensaries and 23.3 percent of the total budget too was devoted to development.

However, in 1975, 65.2 percent of the recurrent vote was spent on Curative Health whereas 6.1 percent was spent on Preventive Medicine and Promotive Health. This was a clear indication of the fact that there was more emphasis on the development of Curative Hospital Care, which even in 1980 still consumed 66.7 percent of the recurrent vote, as opposed to Preventive Medicine and Promotive Health. A further detailed analysis of budget for each category of Hospitals will be outlined in Chapter Four.

At the time the Central Government took over the running of all basic rural health services in January 1970, there were 70 Hospitals, over 800 Health Centres and Dispensaries all over the country. These had the capacity of 8402 Hospital beds and 1338 cots. During that year, there were 1524 Registered Medical Practitioners, 7634 Nurses of all cadres, 257 Dental Surgeons, Dental technologists, Pharmacists and Pharmacy technologists and a total of 3347 Midwives[2] deployed

in all the health facilities within the Ministry of Health, Municipalities, Missionary health facilities and other private enterpreneurs. The number of Hospital beds and cots in the Government sector rose from 8402 in 1970 to 9097 in 1971, 9404 in 1972, 9829 in 1973 and reached 10285 in 1974. These indicated a Hospital bed growth rate (yearly increase) of between 3.3 percent per annum and 4.6 percent per annum.

In absolute numbers of registration of Medical Practitioners, by 1972 there were 143 pharmacists, 4141 Registered Nurses, 5174 Enrolled Nurses, 1844 Registered Midwives and 2237 Enrolled Midwives. These figures do indicate the absolute numbers of those registered and since there is no renewal of licences annually, the figures shown here include those who do not practice, those who have left the country and those in the private sector.[3] However, in 1974 there were 1242 Doctors and Dentists, 202 Pharmacists, 4876 Registered Nurses, 2171 Registered Midwives and 2764 Enrolled Midwives.

Within the same period, the Hospitals handled 33005 patients of some infectious diseases in 1970 and 24870 in 1973 out of which 448 deaths occurred. Thus the patient mortality rate was 18.0 per thousand.

Assuming constant fertility rate and declining mortality rate, the ratio of the total number of Government General Hospital beds in 1974 per thousand population was 0.795. This was off by 0.205 beds per thousand population of the United Nation's target of 1.0 beds per thousand population. The provincial distribution of Hospital beds per thousand population ranged from 0.39 in Nyanza Province to as high as 4.76 in Nairobi. Analytically, Nairobi had a ratio of 4.76 beds per thousand population of Government hospital beds and Coast Province had 1.24 Government hospital beds per thousand population. All the other remaining Provinces had rates ranging from 0.39 beds to 0.90 beds per thousand population of Government Hospital beds. When hospital beds available in Mission hospitals are included, these rates are much improved such that only the North Eastern Province and Nyanza Province have rates of 0.86 and 0.68 hospital beds per thousand population respectively. With the exception of Nairobi which had a rate of 5.15 beds per thousand population, the rest of the provinces had rates of just above 1.0 beds per thousand population.

During the second half of the 1970's decade, there was a total of 589 Doctors, 20 Dentists, 202 Pharmacists, 190 Pharmacy technologists, 4876 Registered Nurses, 5902 Enrolled Nurses and 792 Clinical Officers serving in 72 Government Hospitals, 202 Health Centres and 568

Dispensaries distributed throughout the country. In these Hospitals, the number of hospital beds and cots varied from province to province as shown in the table below.

TABLE 3.1 : DISTRIBUTION OF HOSPITAL BEDS AND COTS BY PROVINCE

| Province | Beds and Cots |
|---|---|
| Nairobi | 2767 |
| Central | 1506 |
| Rift Valley | 1574 |
| Nyanza | 954 |
| Western | 1255 |
| Coast | 1334 |
| North Eastern | 241 |
| TOTAL | 10285 |

Source: Economic Survey 1977

It should be noted that there was wide variation in the distribution of the available hospital beds by province, urban and rural residences. Most of the hospital beds are located in urban centres where only 15 percent of the total population reside as opposed to rural areas where 85 percent of the population dwell.

The main training institutions are the Kenyatta National Hospital, Provincial Hospitals and some of the

selected District Hospitals. These institutions have an annual output of 100 Doctors per year, 20 Dental Surgeons per year, 20 Pharmacists per year, 120 Clinical Officers, 440 Registered Nurses, and 20 Public Health Officers. The cost of production of such medical personnel has been increasing within the study period from K£184,578 in 1970/71 fiscal year to as much as K£3,515,935 in 1982/83 fiscal year. The increase was steady over the period at an average of 13.8 percent per year. However between 1973/74 and 1982/83 decade, the rate of growth of cost of production of health personnel was 19.1 percent per year.

On the average, the cost of a hospital with a capacity of 200 beds was K£205,000 whereas improvements and beds costed K£703,000, while the improvements on existing hospitals costed on the average K£1,424,000 in the 1970's Decade. Towards the end of the study period, the cost of Nyayo Wards with a capacity of 144 beds on the average was K£ 300,000[4] In all, such costs were met by both the public sector and the private sector or individuals.

3.2:2 The other Health Services were and are provided by the Church Mission. The Church Missions were the first group to start practicing Modern Western Medicine in Kenya at the time of arrival. The first medical

service must have started at the Coast which then permeated through to the hinterlands as colonisation came and increased.

The Church Missionary Medical Services were originally staffed, controlled and financed from the parent bodies abroad. But increasingly, in recent years, these institutions have come under the influence of Africans who have risen to the leadership of Christian denominations. As of 1970, there were 72 Church Mission Hospitals with a bed capacity of 4118 spread all over the country as shown in the table below.

TABLE 3.2 : MISSION MEDICAL INSTITUTIONS AND BEDS BY PROVINCE

| Province | Institutions | Beds |
|---|---|---|
| Nairobi | 1 | 14 |
| Central | 19 | 1053 |
| Coast | 2 | 166 |
| Eastern | 15 | 982 |
| Nyanza | 12 | 539 |
| Rift Valley | 14 | 719 |
| Western | 9 | 645 |
| North Eastern | - | - |

Source: Economic Survey 1971

In total the Mission Institutions represented 39 percent of all available Medical (Health) Institutions and 28 percent of all the available hospital beds and cots in Kenya. After a period of ten years, in 1980, the number of Medical Institutions had greatly increased both in size and number. Hence, there were 94 Hospitals and Maternity Homes, 21 Health Centres, 2 Health Sub-Centres and 221 Dispensaries as shown in the table below.

TABLE 3.3 : DISTRIBUTION OF MISSION HOSPITALS/ MATERNITY HOMES, HEALTH CENTRES, HEALTH SUB-CENTRES AND DISPENSARIES

| Province | Hospital/ Maternity Home | Health Centres | Dispensarie |
|---|---|---|---|
| Nairobi | 3 | - | |
| Central | 22 | 1 | |
| Eastern | 19 | - | |
| North Eastern | - | - | |
| Coast | 2 | - | |
| Rift Valley | 18 | 11 | |
| Nyanza | 18 | 7 | |
| Western | 12 | 2 | |
| TOTAL | 94 | 21 | |

Source: The Kenya Gazette: 21st March, 1980 Gazette Notice No.842.

In comparison to the 1970 status, it showed an increase of 30.6 percent, i.e. an average increase of 3.06 percent per year. It can be noticed that the Church Hospitals and supporting Health Institutions are typically rural oriented as opposed to most Government Health Institutions most of which are located in urban surroundings. With the exception of North Eastern Province where there were no Church Hospitals, due to the harsh environment,and such historical factors as socio-economic and socio-political. The churches had organised homes for destitutes who require some medical attention and other welfare needs in Mandera, Wajir and Garissa.

The professional staff working in Mission Hospitals were mainly expatriates from the parent churches abroad and were assisted by locally trained paramedical staff. However, with the Kenya Government's policy of Africanization, most of these expartriates have left and created room for some Kenyans to take up such positions. In any case those expatriates with special talents and skills still render their services in the respective Mission Hospitals and some are also consultants in the Government and other Health Institutions In the beginning, the supporting paramedical staff were those locals who were affiliated to the particular church, but this policy no longer exists and the church medical institutions employ an officer irrespective of the religious affliation.

The Church Hospitals got and still get financial assistance mainly from the parent bodies, Grants in Aid from the Government and the fees charged to patients. In the late 1970's most Church Hospitals faced financial crisis that they had to increase the Grants in Aid to save some of the major Hospitals from collapsing. Another obstacle which has often disturbed the Church Hospitals was that most of them didn't meet the Government's requirements in terms of staffing though they rendered very essential services.

3.2.3 Although all basic rural health services were taken over in January 1970, from the County Councils by the Central Government, only six Local Authorities were allowed to provide the essential health services within their jurisdiction. These health services were to serve the residents in those municipalities, however, with the congestion of out-patients in the adjoining areas and boarder expansion of the municipalities, more patients have sought for health care services within these municipalities. Therefore the health services within the municipalities no longer serve the residents only, but rather other patients who come from far are also attended to.

There were only six municipalities that provided Health Care services to their residents. These were

Nairobi, Mombasa, Nakuru, Kisumu, Eldoret and Kitale. It should be noted that in 1969, these urban centres had populations of 509,286; 247,073; 47,151; 32,431; 18,196 and 11,573 respectively. However, the 1979 Population Census showed that these urban centres increased their populations to 827,775; 341,148; 92,851; 152,643; 50,503 and 28, 327 respectively. These indicate that the population in these urban centres had each been more than doubled for Nakuru, Kisumu, Eldoret and Kitale whereas Nairobi and Mombasa almost doubled theirs. Th reasons that mainly are attributed to such population increases are those associated with boundary changes, rural-urban migration and the natural rate of increase in these urban centres.

Nairobi City Council had a total of eight Hospitals and Maternity homes namely:- Bahati Maternity Unit, Pumwani Maternity Hospital, Eastleigh Maternity Unit, Langata Maternity Unit, Westlands Maternity Unit, Makadara Maternity Unit, Ngara Maternity Unit and Kahawa Maternity Unit. To assist these hospitals and maternity homes there were/are an array of thirteen Health Centres, six Health Sub-centres, two Dispensaries and four Clinics spread all over the City. In addition and in line with the Government's health policy of improving maternal and child care health services, the City Council of Nairobi operated forty Child Welfare Clinics.

Mombasa Municipal Council, though it didn't operate a Hospital, had a chain of six Health Centres, five Health Sub-centres, four Dispensaries and four Clinics. Nakuru Municipality operated one Maternity home, one Health Centre, one Dispensary and one Child Welfare Clinic Kisumu Municipality on the other hand operated one Health Centre and four Dispensaries; Eldoret Municipality operated only one Health Centre whereas Kitale Municipality operated one Clinic and one Dispensary.

These Local Authorities provided the Health Services as one of their social need to the residents. This helped alleviate the problems as mentioned in the statement of the problem in Chapter One in urban areas.

3.2.4 Economic production requires healthy manpower as a vital social resource. The general health care needs of workers are usually taken care of by the overall health system and the enterprise companies take care of on-the-job injuries or illnesses and work safety programme However, in cases where such companies have projects in isolated areas, for example Tea Estates, Sugar Farms, the employers have to provide general health care services for their workers. These helps save time that would have been used for going to the public health institutions far away.

Working under the same principles and guidelines, most companies operated their own health services in the form of Dispensaries and Clinics within their premises. In Nairobi alone, companies operated fifteen Dispensaries and one Clinic whereas in Mombasa, there were nine such Dispensaries. In all there were five Hospitals and Nursing Homes distributed and located both in the rural areas and urban centres. Most of these were owned by parastatals and situated in Sisal Farms, Tea Estates, Sugar Plantations, Cashewnut Farms and in Factories. Provincially, there are sixteen Dispensaries in Central Province, two Dispensaries in Eastern Province, Eighteen Dispensaries in Coast Province, fifty two Dispensaries in Rift Valley Province, three Dispensaries in Nyanza and only two Dispensaries in Western Province. In these institutions of health care, the primary concern is to attend to the workers and their family members who stay with them at that particular location.

The running of these health institutions is the sole responsibility of the owner companies. Often the wages for the personnel are attractive and therefore there is no shortage of paramedical staff. The development and the recurrent expenditures are met by the companies themselves.

3.2.5 It should be noted that for all the providers of Western Medical Care Services, only the Central Government undertakes the major training of doctors, dentists and pharmacists. The training of other paramedical staff is both a joint venture between the Central Government and the Church Mission Hospitals. When such manpower has qualified, all other health providers compete to absorb the limited supply of medical personnel to run their hospitals and other related health facilities. These type of situation and competition has led to the perpetual acute shortage and disperity distribution of such medical staff in Government Health institutions both in urban centres and rural areas.

As it happens in most cases that the medical staff that leave Government services are the most qualified and do have a wealth of experience which is of much value and need. Hence it has or is becoming a government policy to have such personnel attend to some patients in Government Hospitals on certain specified days of the week. However, the other health providers could assist the Government in training of such personnel in terms of sponsorship as they do in many other fields so that the shortage of manpower could be reduced otherwise completely eradicated. An elaborate analysis will be done in Chapter Four.

## 3.3 POLICIES AND STRATEGIES

3.3.1 The Government's approach to health problems in Kenya at independence was geared towards the achievement of free basic medical treatment for all[45], without any form of discrimination concerning the provision of health services on grounds of race, religion or politics and the application of the self-help concept as exemplified by the Harambee motto in raising the standard of medical services available to the population. In all, the Government's aim was to achieve a high and growing per capita income equitably distributed in such a way that all are free from want, disease and exploitation. At the same time ensuring and guaranting political equality in the full Kenyan traditional sense as a right independent of economic status and divorced from dscrimination; providing social justice and human dignity including freedom of conscience as well as equal opportunities.

3.3.2 In persuing the health policies, I shall look at them as found in the Development Plans and isolate the various constraints that the policies have met as well as the main programme achievements in the plan periods dealt with. In the first Development Plan, the Government's main objective, among all other things, was the provision of free medical treatment to all, in keeping in line with its ruling Party KANU Campaign pledge. Apart from this, it was the Government's commitment to

increase both capital(development) and recurrent budget on Health. In that plan period, there was a concerted effort directed to the improvement of the vitality and physical capacity of the country's labour force via curative health services as well as giving high priority to the intensification of promotive medicine and preventive health throughout the country.

Bearing this in mind, the Government's main emphasis in the field of Health was a determined attempt to bring health services increasingly accessible to all people so as to promote progressive improvement in the levels and standards of the country's health status. In particular more Health Centres and Dispensaries were to be built in the rural areas where the majority of the population lived to cater for their preventive, curative and promotive health needs. The Government had also an aim of generally expanding health services all over the country in such a way that the rate of increase of medical services was in line with the rate of population growth. These in effect would eventually reduce the past disparity in the accessibility, availability and the standard of health services that were existing in the various districts and provided by the various agencies.

Always as the Health institutions and services expand, there is need for qualified manpower equiped with the appropriate technology to run them. Hence the staff training has to be intensified and expanded in order to ease the shortage of Doctors, Dentists, Nurses, Midwives and other trained paramedical personnel. For Kenya these meant that new training facilities had to be developed and the old ones expanded to increase the training of the necessary personnel. This increased training was of absolute necessity as it was in line with the Government's policy of Africanization of all sectors, Health Services included.

In order that better epidemiological understanding was well utilised, Medical Research was to be intensified. It was with the help of Medical Research that diseases which needed greater attention were identified. Once identified, better methods were employed for the cure, prevention, control and even eradication. With the existence of the East African Community, it was hoped that closer co-operation would be maintained with the other two partner states of Tanzania and Uganda in order that resources and knowledge would be pooled together in the utilization of the limited trained medical personnel. The vital part of public policy on Health was to be directed towards preventive measures through Health Centres in which case the incidence of disease woul

reduce. These would have been a step towards the start of eliminating many of the prevalent preventable diseases.

In many cases, most diseases that attack man originate from the surrounding environmental conditions. Since independence, it has been the Government's major concern to improve environmental health status. This has included the protection of water catchment areas and supplies, bush clearing, the eradication of sleeping sickness and the continued malaria control programmes. Among other diseases that needed control measures intensified were Tuberculosis and Leprosy. In conjunction with such programmes, considerable efforts had to be made to educate the public on how to practise better nutritional and hygiene habits. These programmes enjoyed the advantage of the services and technical assistances offered by International donor agencies.

3.3.3 However, as a shared characteristic with all policies and strategies when it comes to their execution and implimentation, some constraints often come by. These constraints are either endogenous or exorgenous otherwise a mixture of both. By 1970 there was still a wide disparity in the distribution of health services among the different geographical regions and administrative districts. The disperity was greater in the semi-arid areas of North Eastern Province and Eastern Province as opposed

to other provinces like Central, Coast and Nyanza. There was also disparity between the urban centres and the rural areas. The distribution of both private and Government hospitals and the available hospital beds was uneven. There were more hospitals and hospital beds in Nairobi and Mombasa. In particular Nairobi had a high bed population ratio indicative of better health service provision as well as it provided for the National reference services in the country.

The leaving of expertriate medical personnel of all cadres and the policy of Africanization left a severe shortage of staff both in the Government Hospitals and Mission Hospitals. Another contributory aspect was the increasing number of private health facilities caused by those who resign from Government services to set up their own business helped aggrevate the shortage of personnel in Government Hospitals. Other aspects such as the lack of financial resources could not be under-scored and if available were limited indeed. The lack of the most effective use of skilled manpower, co-ordination of both Public and Private Health Services were other constraints that were encountered. Administratively, the varying degrees of efficiency in the machinery could not solve such issues of the emphasis to be placed on preventive and promotive health as opposed to curative services. Whereas this was the case, the impact of

health programmes could not be effectively assessed due to the inadequacy of statistical information on the evidence of diseases.

3.3.4 In the plan period 1970-1974, the basic policies and strategies were the construction of the urgently needed new facilities that could adequately be staffed. For the already existing structures and facilities, they were to be renovated and upgraded through consolidation to provide the required beds for clinical training. Hence there was to be a major training schedule at all levels of medical skills and paying more attention to preventive and promotive programmes. In order that the standard of hospital care be improved, domestic, diagnostic as well as treatment facilities were to be improved. It was thus through effective co-ordination and consolidation of the facilities that existed, increasing at the same time facilities in the rural areas and pastoral areas of the country. The improvements were to consist of four hospitals in Central Province, ten in the Coast Province, two in Nyanza Province, fourteen in the Rift Valley Province, five in Eastern Province and two in Western Province of Kenya.

3.3.5 In the plan period 1974-1978, there was still an acute shortage of manpower particularly the paramedical staff. In these cadre, the number of Enrolled Nurses was a major stumbling block in the Health Services.

There were many loses of this cadre in the Government service owing to such circumstances as marriages and transfers to non-Governmental institutions. These greatly contributes to the wide variation in the distribution and deployment of the personnel in this cadres between districts, urban centres and rural areas all over the country. The other constraint that still existed by 1974 was the inadequate resources and organization. Of importance to the large sector of the population was the unsatisfactory level of services in the rural areas as a result of insufficient service delivery points.

In order to curb the above constraints, it was the Government's main objective to control , prevent and ultimately eliminate of communicable diseases, deficiency conditions, environmental health hazards and those conditions associated with child birth . This was to be achieved throught the emphasis of preventive and promotive programmes rather than curative programmes. Noting that more than 30 percent of all available hospital beds were provided by the Mission Hospitals, it was the Government's policy to integrate such Health Services both in terms of service deployment and the training of paramedical staff. The main emphasis was to be laid in the development and improvement of the then existing Rural Health Services. It thus included the strengthening, co-ordinating,

supervising and giving full support for these units from the main centres. As well, the system of Medical Supplies, Procurement, Storage and distribution had sought ways of improvement.

The manpower requirements was to be averted by training specifically oriented towards the formation of a versatile and all-round nursing cadre and emphasizing Community Nurse training in particular. It was also outlined that the distribution of Doctors among the different districts be improved though there was a stiff competition from Provincial Hospitals which offered some training facilities.

In the light of these, the Government's strategies included the expansion of training of basic paramedical staff to the maximum the system could be able to carry and absorb. In so doing, the Government was expected to start implementing an integrated and comprehensive masterplan for the development of basic Rural Health Services to include the four basics of concern, namely: Rural Health Services, Health Training, Public Health Services and Hospital development. The Rural Health Services was charged with the responsibility of strengthening family health services, giving emphasis to Maternal and Child Health Services. The facilities had to be equiped to provide preventive and promotive services to include Health Education, Nutrition

Education, Family Planning and Protective Services such as Immunization. Therefore there was a need to increase Health institutions by the end of the plan period to 161 Health Centres, 57 Health Sub-centres and 492 Dispensaries.

3.3.6 From independence up to 1979, the Government's main objectives towards the development of Health Care Services had been:

" i) Strengthening and carrying out measures for the eradication, prevention and control of diseases; such measures included the protection of the environment against health hazards, vector diseases control, early detection of diseases and Health Education;

ii) Provision for adequate and effective diagnostic, therapeutic and rehabilitative services for the whole population offered at Hospitals, Health Centres, Dispensaries and Mobile Units;

iii) Promotion and development of biomedical and Health Services research as means of identifying improved and cost effective methods for the protection of the health of the people."

In trying to achieve these objectives new burdens were met in the then newly established health care services, as the number of people demanding for such services had greatly increased. These increased demands for health services made people travel for longer distances in order to receive treatment. This was more acute especially in the rural areas. The Integrated Rural Survey 2 of 1977, in terms of accessibility, as shown in the table below, which shows by province the percentage distribution of Households in the rural areas within given distances of a Rural Health Facility, indicated that there were for the whole country about 42.4 percent of the households within 4 kilometres of a Rural Health Facility and about 76.6 percent were within 8 kilometres.

Those households which were farther than 8 kilometres from the Rural Facility were about 23.5 percent and varied from 7.5 percent in Central Province to 43.5 percent in Eastern Province. From these it could be noted that the Rural Health Facilities were and are more accessible in the three most populated provinces of Central, Nyanza and Western than in the three sparsely populated provinces of Coast, Eastern and the Rift Valley. The accessibility in the North Eastern Province was at the other extreme due to its varied and harsh environmental conditions.

TABLE 3.4 : KENYA - PERCENTAGE DISTRIBUTION OF HOUSEHOLDS DISTANCE FROM A RURAL HEALTH FACILITY, BY PROVINCE 1975

| DISTANCE (KM) | CENTRAL | COAST | EASTERN | NYANZA | RIFT VALLEY | WESTERN | TOTAL |
|---|---|---|---|---|---|---|---|
| 0-1 | 0.7 | 1.6 | 4.6 | 9.0 | 3.7 | 7.1 | 4.8 |
| 1-2 | 13.4 | 3.2 | 7.3 | 9.1 | 12.7 | 14.0 | 10.7 |
| 2-4 | 35.1 | 33.1 | 18.1 | 30.0 | 25.3 | 21.7 | 26.9 |
| 4-8 | 43.3 | 29.7 | 26.5 | 33.7 | 31.2 | 28.8 | 34.2 |
| 8+ | 7.5 | 32.6 | 43.5 | 18.2 | 27.1 | 18.5 | 23.5 |

Source: Table 4.9 in Kenya Population and Development p.92

3.3.7 The insufficient medical manpower, shortage of funds, as well as insufficient management and organization still lingered on as major constraints in the development of Health Care Services as of 1979. The main deficiencies which came up as a result of these constraints were:

" i) . Inadequate and uneven coverage of the population due to the insufficient Health Care Service delivery points which were made worse by the rapid population growth and under-utilization of some existing facilities;

ii) Inadequate level of service because of shortage of medical manpower due to severe shortages of trainers and teachers in the Health field;

iii) Unsatisfactory patterns of utilization of manpower since the majority of staff had been deployed in urban areas and in major hospitals.

iv) Unsatisfactory utilization of equipment and transport because of financial and managerial problems relating to operation and maintenance;

v) Shortages of drugs and other essential supplies due to the financial constraints and an inefficient distribution system;

vi) Inadequate flow of health information and utilization of that information."

3.3.8 In view of these constraints that existed since independence, programmes were worked out with an intention of overcoming them. The strategies to be pursued were those related to Preventive Medicine and Promotive Health, Rural Health Services, Health Manpower, Hospital development, Medical Supplies and Equipment,

and Research. While strengthening and developing rural health services, concerted efforts had to be paid to the epidemiological surveillance and control of diseases and development of health information services to assist in the collection and analysis of data from all Health facilities in the country. The training programmes for Nurses, Public Health Officers and Paramedical staff to be strengthened and expanded.

The Provincial and District Hospitals had to basically provide curative services as well as providing both Preventive Medicine and Promotive Health Services. There had to be construction and improvement of those District Hospitals with training facilities for medical personnel while Provincial Hospitals needed only improvement and extension. In addition, Church (Mission) Hospitals in the rural areas had to continue receiving Government's Grants-in-aid for their development and off-setting financial constraints.

3.4 Having looked at the health policies, objectives, strategies and constraints from independence to the end of 1982, I now turn to deal with the implications of such policies to the present and future health policies and strategies. The major health policies persued in the present development plan period 1983/88 are those aimed at increasing coverage and accessibility to health

care services in the rural areas; to further consolidate urban, rural, curative and preventive medicine and promotive health services; to increase emphasis on Maternal and Child health services and Family Planning services in order to reduce morbidity, mortality and fertility; to strengthen the Ministry of Health management capabilities with emphasis at the District level; to increase interministerial co-ordination; to increase alternate financing mechanisms.

To keep in line with the above Government's broad health policies, the objectives that will guide the allocation of resources and programmes are those which will help to design development projects that favour the construction of smaller but more cost-effective facilities, aimed at increasing coverage and accessibility to health services. Other programmes are to selectively increase the number of District and District Sub-hospitals; to improve manpower deployment as well as increasing the number of highly skilled workers in hospitals; to increase the provision of preventive and promotive services and methods for early detection and treatment of communicable and vector-borne diseases paying attention on at-risk groups; to encourage wide spread community participation and mutual, social responsibility for all Kenyans in the health development process; to increase the number of workers receiving training in preventive medicine

and promotive health methods; to increase basic and post-basic training opportunities for all health workers; to improve the facilities and management of out-patients services; to standardise the treatment and operational procedures in hospitals, health centres and dispensaries; to strengthen the overall management including planning, implementation and evaluation capacity of the Ministry of Health; to continue strengthening the planning capabilities at all levels with emphasis on the District level and improve as well as consolidate various components of the National Health Information System including data gathering, processing, analysis, reporting and dissemination methods.

Further other objectives include the continued development and strengthening of the logistics of drugs supply and distribution systems, increased co-ordination between government and non-Government health institutions. In addition to persue an inter-sectorial, multi-disciplinary approach to health care system at all levels with particular emphasis on increasing interministerial sanitation projects that favour innovative approaches to cost-sharing and alternative financing.

3.4.1 At the international level, health policies have been debated by and within groupings representing countries of all types of social, economic development

and political opinions. These groups include the Non-aligned movement, Organization of African Unity, groups of Latin American countries, the CMEA countries, the EEC, the OECD and health organizations like WHO and UNICEF. The development of health policies achieved a great land mark in September, 1978 when an international conference on Primary Health Care took place in Alma-Ata, USSR. The Conference, and in particular the Declaration of Alma-Ata which it adopted, clearly stated that primary health care was the key to attaining the target of health for all by the year 2000 A.D. as part of overall development and in the spirit of social justice.

Summarily, the Declaration called on all Governments to formulate national policies, strategies and plans of action, to launch and sustain primary health care as part of a comprehensive national health system and incorporate an intersectorial co-ordination. The Declaration also called for urgent and effective international action to develop and implement primary health care throughout the world to augement national efforts to do so. It was thus the task of each country to develop its health policies in the light of its problems and possibilities, particularly circumstances, social and economic structures, political and administrative mechanisms.

3.4.2 The factors that have affected the realization of these goals in many countries both in the more developed nations and the less developed nations have been, the appropriate political commitment, the various social considerations including community participation, administrative reforms that were required, the financial implications, and the basic legislation. Most of these problems will continue to persist in some of the Third World countries where the health information systems have failed to provide much of the needed information to be used by decision makers in the art of establishing health priorities. However, it has been paradoxical that some countries with a high income per capita have not attained such health policies whereas some with low income per capita have done so.

As with other institutions we can also talk of international health law that is closely related to international environmental law, international population law and some aspects of international law on human rights, some aspects of international labour law that deals with occupational health and the international regime for the control of narcotics and psychotropic substances. In 1976, the International Covenant on economic, social and cultural rights in its article 12 based on the WHO's Constitution prescribed that the States and Parties to the Covenant

recognise the right for everyone to enjoy the highest attainable standards of physical and mental health. Hence, the steps to be taken to achieve the full realization of such a right include the provision for reduction of still-birth rate and infant mortality rate for the healthy development of the child. As well, the improvement of all aspects of environmental and industrial hygiene; the prevention, treatment and control of epidemics, endemics, occupational and other diseases; the creation of conditions which assure to all medical service and attention in the event of sickness were all of paramount importance.

However, there are many more United Nation's (UN) instruments that have come into force in persuit of health policies and strategies. By and large, some of the constraints on achieving nationwide coverage by health care services emanate from the poor understanding of the implementation of policies, not forgetting the ommision of essential health services and the principles of basic health care services are not translated into feasible programmes. Often the resources are scarce and those available are inadequately allocated and lack intersectorial co-operation as well as lack of understanding of appropriate health technology.

## 3.5 HEALTH STATUS

### INTRODUCTION

Health conditions within any country vary a great deal depending on the country's ecological and climatical conditions, socio-economic conditions, people's life styles, demographic parameters, environmental sanitation, nutritional status and other related factors. A fairly good measure of the variation of health status in Kenya was the big difference of child mortality that ranges from 49 deaths per thousand live births in Central Province (Nyeri) and over 200 deaths per thousand live births in Coast Province (Kilifi, Kwale) and in Siaya and South Nyanza in Nyanza Province.

### 3.5.1 MORTALITY PATTERNS

The shifting patterns on the causes of death can be examined by using the records in the office of the Registrar-General for the country as a whole since 1969 and supplemented by the Ministry of Health Annual Reports. However, the validity and reliability of such records is questionable since they are only 25 percent covered.

In any case, the recorded causes of death show a general persistence of some major categories of diseases and an upward change on other diseases as well as the

emergence of unclassified and ill-defined diseases among the various categories. However, this can be attributed to both the patient and the officer attending to him or her. The patients can be imprecise in their explanations which may lead to improper diagnosis of the disease category.

As the table below shows, the annual deaths from specific causes, it can be noted that infective and parasitic diseases, sysmptoms, ~~seri~~lity and ill-defined diseases, and the diseases of the respiratory system were on the increase by 1972. There was somewhat a lesser drop in the diseases of pregnancy and child birth and an increase in the diseases of the genito urinary systems.

TABLE 3.5 : CAUSES OF MORTALITY FOR THE YEARS 1969 AND 1972

| Type of Diseases | 1969 Cases | 1972 Cases | % Increase |
|---|---|---|---|
| Infective and Parasitic | 6837 | 20701 | 202.8 |
| Neoplasms | 838 | 762 | -9.1 |
| Blood Diseases | 1396 | 1493 | 6.9 |
| Diseases of Nervous System | 965 | 610 | -36.8 |
| Diseases of Circulatory System | 3017 | 2997 | -0.7 |
| Diseases of Respiratory System | 4794 | 4715 | -1.6 |
| Diseases of Digestive System | 2161 | 2514 | 16.3 |
| Diseases of Genito Urinary | 478 | 1131 | 136.6 |
| Diseases of Pregnancy and Child birth | 614 | 432 | -29.6 |
| Skin & Musculo-skeletal | 144 | 231 | -27.5 |
| Cogenital anomalities | 160 | 32 | -80.0 |

TABLE 3.5 (CONT.)

| Type of Diseases | 1969 Cases | 1972 Cases | % Increase |
|---|---|---|---|
| Diseases of New born | 1948 | 1305 | -33.0 |
| Symptoms, serility and ill-defined | 4904 | 6698 | 36.6 |
| 'E' | 856 | 904 | 5.6 |
| 'N' | 1228 | 1255 | 2.2 |

Source: Registrar-General's Annual Reports for the years 1969 and 1972.

Some of the diseases within the period had greatly increased as a cause of death. The infectious and parasitic diseases had the highest toll with an average annual death rate increase of 50.7 percent . On the other hand, such diseases as neoplasms, diseases of the nervous system, diseases of the circulatory system, diseases of the respiratory system, diseases of pregnancy and child birth, skin and musculo-skeletal, congenital anomalities and disease of the new born had been controlled and the incidence of death due to them was very low.

In 1975, the major killer categories of diseases were the infectious and parasitic which accounted for 31.4 percent of all deaths; diseases of the respiratory system accounted for 16.0 percent, diseases of the circulatory system accounted for 9.76 percent of all the deaths recorded in that year. Hence these three

categories of diseases accounted for more than 57 percent of all deaths. Comparing the 1969, 1972 and 1975 causes of death, a clear picture of which diseases had declined, increased or remained constant, as a cause of death is got.

TABLE 3.6: THE PERCENTAGE DISTRIBUTION OF THE CAUSES OF DEATH BY 1969, 1972 AND 1975

| Type of Diseases | 1969 % Cases | 1972 % Cases | 1975 % Cases |
|---|---|---|---|
| Whooping Cough | 1.7 | 12.0 | - |
| Symptoms, serility and ill-defined conditions | 7.5 | 13.0 | - |
| Entritis and Diarrhoeal | 6.1 | 10.6 | 9.0 |
| Measles | 2.6 | 7.8 | 6.1 |
| Paralytic fever and other salmonela infection | 0.1 | 6.3 | - |
| Pneumonia | 12.6 | 8.5 | 7.4 |
| Cerebro-vascular diseases | 4.5 | 5.2 | 3.0 |
| Malaria | 1.9 | 1.2 | 1.7 |
| Tetanus | 1.7 | 1.8 | 2.1 |
| Malignancies | 2.5 | 1.5 | 2.2 |
| Diabetes | 0.3 | 1.7 | - |
| Anemia | 1.4 | 1.2 | 1.1 |
| Small pox | 0.1 | 1.7 | - |
| Tuberculosis | 5.1 | 1.1 | 5.7 |
| Menengitis | 2.9 | 0.8 | 5.0 |
| Motor Accidents | 1.4 | 0.5 | 2.0 |
| Intra Cranial injury | 0.3 | 0.6 | - |
| Adverse Chemical Substances | 0.3 | 0.4 | - |
| Bronchitis | 0.7 | 1.1 | - |
| Cirrhoisis of liver | 0.8 | 1.0 | 1.1 |

Source: Registrar-General's Annual Reports for the Years 1969, 1972 and 1976

In 1975, the greatest number of deaths were due to entritis and diarrhoeal diseases which accounted for 9.0 percent of death as compared to 10 percent in 1972 and 6.1 percent in 1969, showing a fluctuating pattern. However, in 1972, most deaths were particularly due to symptoms, serility and ill-defined conditions that accounted for 13 percent. In any case this could not have been the case for two main reasons. First of all, the way patients explain the symptoms of the disease and secondly there is often lack of proper communication between the patient and the officer attending to him or her that lead to wrong diagnosis.

In 1969, the leading cause of death was pneumonia that accounted for about 12 percent of all deaths. Within 1969 and 1975 period, pneumonia, anaemia and small pox showed a progressive decline as a cause of death. Pneumonia declined from 12 percent in 1969 to 7.4 percent in 1975, showing a decline of about 38 percent over the 1969 value. The diseases that showed increases as causes of death included tetanus, diabetes, paralytic fever and salmonela infection, motor accidents, intracranial injury, adverse chemical substances, bronchitis and cirrhoisis of the liver. In all there tends to be a slow shifting trend of the diseases that cause death though these have been affected by the prevailing environmental conditions.

### 3.5.2 INFANT MORTALITY

In a heterogenus society, such as Kenya, the overall infant mortality rates tend to mask the considerable differences which exist between regions, type of family, mother's educational level, childbirth order, sex and place of residence.

TABLE 3.7 : INFANT MORTALITY RATES BY CURRENT PROVINCE OF RESIDENCE FOR TIME PERIOD

| Province | Pre-1969 | 1967-1976 | Change |
|---|---|---|---|
| Nairobi | 100 | 75 | 25 |
| Central | 88 | 56 | 32 |
| Eastern | 100 | 77 | 23 |
| Coast | 156 | 129 | 27 |
| Nyanza | 162 | 128 | 34 |
| Rift Valley | 103 | 64 | 39 |
| Western | 118 | 109 | 9 |

Source: Social Perspective, Vol.5 No.2 January 1981 p.3

The infant mortality rates for 1967 to 1976 period indicate that the chances of an infant dying before the age of one year are lower than the national average in Central, Rift Valley, Nairobi and Eastern Provinces while in the remaining - Coast, Nyanza and Western provinces, it was considerably higher. The magnitude of the variations between the provinces was significant, ranging from as low as 56 percent per thousand live births in Central Province to as high as 128 to 129 live births per thousand in Nyanza and Coast provinces

respectively.

It can also be noted that the dramatic changes and declines in infant mortality of the 1960's and 1970's occurred in all provinces except Western Province which had decreased by only nine deaths per thousand live births. A change of only 7.6 percent over the 10-year period (0.76 percent per year). However, the significant declines which occurred in most of the country have not narrowed the magnitude of the differentials in infant mortality between the provinces. For both the earlier and current (pre-1967 and 1967 to 1976) time periods, there were over 70 more infant deaths per thousand live births in the high risk areas of Nyanza and Coast provinces than in the low risk areas of Central and Rift Valley provinces. Such trends were mostly attributed to the high incidence of Malaria in those areas and the resistance to adopt modern medicines coupled by the unaccessibility of such services.

In all, the infant mortality has been on the decline before, during and after the study period. In 1977, the findings of the National Demographic Survey revealed that the infant mortality rate had reduced to 87 deaths per thousand live births. In the Kenya Fertility Survey it was found that the factors which often do affect child survival included, among

all other things, the age of mother, educational attainment of the mother, marital status as well as the place of residence.

### 3.5.3 CHILD MORTALITY

Kenya as most of the other developing Nations has variations in infant and child mortality rates by sex, and age. At any age the males have a higher mortality rate over their counterparts - the females.

TABLE 3.8 : THE PERCENTAGE OF CHILDREN DYING IN THE FIRST TWO YEARS BY PROVINCE AND SEX 1979

| Province | Males | Females |
|---|---|---|
| Nairobi | 9.5 | 8.3 |
| Central | 7.8 | 6.9 |
| Coast | 18.0 | 16.7 |
| Eastern | 11.3 | 10.4 |
| North Eastern | 13.4 | 13.7 |
| Nyanza | 19.2 | 17.7 |
| Rift Valley | 11.9 | 10.7 |
| Western | 16.8 | 14.8 |

Source: Table 10, in Compendium to Volume 1 1979 Population Census.

It can be noted that it was only in Nairobi and Central provinces where the percentage of children dying in the first two years of life was less than 10 percent for both the males and females whereas the others had their percentages ranging from above 10 percent to 18 percent. However, Central, Eastern and North Eastern provinces had less than one percent differences in the rates for both sexes; whereas the others had the differences between males and females ranging from 1.0 to 2.0 percent.

These indicate that the number of children who die in the first two years of their life is low in Nairobi and Central provinces, high in Nyanza and Coast provinces. The factors that have led to such differences include the access to health and medical services; adequate nutrition, the intensity of malaria infestation and the time or period of weaning children (lactation taboos).

The areas with very high malaria incidence are the districts of Kakamega, Siaya, Kisumu and South Nyanza in Nyanza Province; and the districts of Kilifi and Tana River in the Coast Province. In 1979, the out-patient department reported a total of 143999 cases of malaria in Nyanza Province and a total of 827497 cases in the Coast Province. The other provinces had their total number of cases below those recorded in Nyanza and Coast Provinces.

The results of the 1979 Population Census indicated that child mortality rates were high in Nyanza and Coast provinces with well above a rate of 200 per thousand whereas Nyeri in Central Province had a child mortality rate of less than 50 per thousand as in the table below.

TABLE 3.9 : CHILD MORTALITY BY DISTRICT 1979

| District | Child Mortality Rate |
|---|---|
| Nairobi | 93 |
| Kirinyaga | 82 |
| Murang'a | 68 |
| Kiambu | 70 |
| Nyeri | 49 |
| Nyandarua | 64 |
| Turkana | 133 |
| West Pokot | 188 |
| Trans Nzoia | 114 |
| Uasin Gishu | 92 |
| Nandi | 110 |
| Laikipia | 77 |
| Kericho | 91 |
| Narok | 95 |
| Nakuru | 97 |
| Kajiado | 75 |
| Samburu | 77 |
| Marsabit | 130 |
| Isiolo | 127 |
| Meru | 75 |
| Embu | 83 |
| Kitui | 148 |
| Tana River | 181 |
| Lamu | 200 |
| Kilifi | 212 |
| Mombasa | 120 |
| Kwale | 190 |
| Taita Taveta | 116 |
| Wajir | 129 |
| Mandera | 146 |
| Garissa | 131 |
| Kakamega | 143 |
| Busia | 198 |
| Bungoma | 140 |

Source: Kibet- Population Studies and Research Institute - Social Statistics Programme - Child Mortality.

### 3.5.4 ADULT MORTALITY

Like the infant and child mortality rates, the adult mortality rate has been on the decline since independence and throughout the study period. In 1969, the crude death rate in Kenya was 17 deaths per thousand of the population while the infant mortality rate was at 119 deaths per thousand live births. The life expectancy at birth was 49 years which was an improvement and above that average of the less developed countries.

The adult mortality in Kenya was lower than the infant and child mortality rates. About a third of the total number of deaths in 1969 were among the infants. The distribution of deaths by age group indicates that more than half the deaths occurred among children under 5 years of age. The reduction in infant mortality rate and child mortality rate has brought a significant change in the population profile.

TABLE 3.10 : THE DISTRIBUTION OF DEATHS BY AGE GROUPS

| Age | Distribution | % Distribution |
|---|---|---|
| Less than 1 | 138 | 34 |
| 1-4 | 24 | 20 |
| 5-9 | 8 | 7 |
| 10+ | 12 | 39 |
| All Ages | 17 | 100 |

Source: Table 1.17 Kenya, Population and Development page 22.

3.5.4.1 The age specific mortality rate has been reducing constantly and differing by province, sex and age after the first year of life. The mortality rates were lower among females at all ages and the difference being higher at infancy and old age.

TABLE 3.11 : AGE SPECIFIC MORTALITY RATE BY SEX AND AGE IN 1969 AND 1980.

| AGE | 1969 | | 1980 | |
|---|---|---|---|---|
| | Males | Females | Males | Females |
| <1 | 115 | 114 | 94.6 | 89.8 |
| 1-4 | 16 | 14 | 14.9 | 13.1 |
| 5-9 | 3 | 3 | 2.9 | 2.5 |
| 10-14 | 2 | 2 | 2.2 | 1.9 |
| 15-19 | 4 | 3 | 3.7 | 3.2 |
| 20-24 | 5 | 5 | 5.1 | 4.3 |
| 25-29 | 6 | 5 | 5.3 | 4.4 |
| 30-34 | 6 | 5 | 5.6 | 4.5 |
| 35-39 | 7 | 5 | 6.3 | 5.1 |
| 40-44 | 8 | 6 | 7.6 | 6.0 |
| 45-49 | 10 | 8 | 9.8 | 7.7 |
| 50-54 | 14 | 11 | 13.2 | 10.5 |
| 55-59 | 19 | 24 | 18.9 | 15.1 |
| 60-64 | 46 | 39 | 28.4 | 23.3 |
| 65-69 | 73 | 66 | 44.6 | 38.2 |
| 70-74 | 116 | 110 | 71.9 | 64.9 |
| 75-79 | 198 | 190 | 115.4 | 109.2 |

Source: 1) Population Census 1969 Volume IV : Analytical Report

2) UNICEF: Population Projections for Kenya 1980-2000. Table 5.

The reduction in age specific mortality rate among the females at old age reduced by 42.5 percent within the study period and by 41.7 percent among the males. At birth, the age specific mortality rate reduced by 17.7 percent for the males and by 21.2 percent among the females. In all the females enjoyed a high

reduction in age specific mortality rates both at the first year of life and at old age. However, the difference in mortality at adult-hood was not significant among the females and males.

In reference to the in-patient age specific mortality rates, for the year 1978, by sex and age, it reveals that most deaths occurred in the first five years of life and also at the ages of 50 years and above. The males had a higher number of deaths than the females, however, more females were hospitalised than males.

TABLE 3.12 : NATIONAL MORTALITY (IN-PATIENT) BY AGE AND SEX - 1978

| Age Group | Cases | % Cases |
|---|---|---|
| Less than 1 | 1399 | 21.0 |
| 1-4 | 1936 | 29.0 |
| 5-14 | 559 | 8.4 |
| 15-29 | 768 | 11.5 |
| 30-49 | 854 | 12.8 |
| 50+ | 1158 | 17.4 |
| MALES | 3592 | 53.8 |
| FEMALES | 3082 | 46.2 |

Source: Table 3, in Health Information Systems: In-patients Report, 1978.

It can be noted that about 50 percent of all the in-patients' deaths occurred to those aged 0 days to 4 years and out of all cases, 53 percent were to male deaths

## 3.6 LIFE EXPECTANCY

The life expectancy as one of the index of mortality is vital in determining the age structure of the population. Generally a population with a low life expectancy tends to be a young one whereas a high life expectancy is an indication of an aging population. In Kenya and the rest of the world, the life expectancy at birth and other subsequent ages has been rising. The life expectancy at any age indicates the mortality risk at various periods of life and gives the most comprehensive indicator of health conditions in a population. Within the three partner States of East Africa, namely, Kenya, Uganda, and Tanzania, the life expectancy at birth in 1962 were 40 years, 36 years and 33 years respectively. At the time of the 1969 Population Census, Kenya had a life expectancy at birth of 49.1 years, which, in ten years period had increased to 53.5 in the 1979 Population Census.

The rise in life expectancy can generally be attributed to the socio-economic development in the country. In particular it was the changing patterns of morbidity accompanied by the improvements in the control of the major problem diseases, the rise in the general living standards of the populace and the provision of better water supplies as well as nutritional and dietry habits. However, the rise in life expectancy had been

varying by age, sex and by region. Often these changes have favoured the young, females and those in the urban centres who have most social amenities within easy reach over the old, males and those in rural residences.

A closer look at the provincial life expectancies by age and sex, obtained from the 1969 Population Census reveal that Nyanza Province had the lowest life expectancy at birth for both males and females and at all other subsequent ages. On the average, it had the lowest life expectancy of 42.5 years, followed by the Coast Province with an average of 47.3 years and North Eastern Province with 47.6 years. This analysis does show that the mortality pattern was high in the mentioned provinces.

The highest life expectancies at birth were recorded in Central Province for both males and females, which on the average was 57.9 years. Nairobi recorded a life expectancy at birth of 56 years. This shows that the Central and Nairobi provinces had a low mortality rate at all ages. In all there was a difference of 15.4 years between the province with the highest life expectancy at birth and that with the lowest on the average. At any rate, during the old ages such differences had narrowed to 0.9 years, as can be noticed in the table below.

TABLE 3.13 : LIFE EXPECTANCY FOR SELECTED AGES BY SEX AND PROVINCE BY 1969

| AGES | NAIROBI | | CENTRAL | | RIFT VALLEY | | EASTERN | | NORTH EASTERN | | COAST | | NYANZA | | WESTERN | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | MALE | FE-MALE | MALE | FE-MALE | MALE | FE-MALE | MALE | FE-MALE | MALE | FE-MALE | MALE | FE-MALE | MALE | FE-MALE | MALE | FE-MALE |
| 0 | 54.0 | 58.0 | 54.7 | 61.0 | 53.4 | 57.2 | 48.7 | 55.3 | 45.1 | 50.1 | 45.1 | 49.4 | 39.4 | 45.6 | 48.7 | 50.1 |
| 5 | 57.4 | 60.0 | 58.2 | 63.1 | 57.9 | 60.4 | 54.6 | 60.3 | 51.9 | 55.6 | 53.5 | 56.9 | 49.2 | 55.3 | 57.2 | 57.0 |
| 20 | 45.6 | 47.6 | 46.3 | 50.5 | 46.2 | 48.2 | 43.6 | 48.4 | 40.9 | 44.3 | 43.0 | 45.8 | 39.5 | 44.6 | 46.2 | 45.7 |
| 40 | 29.8 | 31.2 | 30.5 | 33.7 | 30.6 | 32.0 | 28.4 | 32.3 | 26.7 | 29.2 | 28.5 | 30.6 | 26.2 | 30.0 | 31.0 | 30.4 |
| 60 | 15.1 | 15.8 | 15.4 | 17.7 | 15.8 | 16.6 | 14.8 | 17.1 | 13.5 | 14.9 | 14.8 | 16.1 | 13.5 | 15.9 | 16.6 | 15.8 |
| 80 | 5.1 | 5.3 | 5.3 | 6.0 | 5.5 | 5.7 | 5.3 | 6.0 | 4.9 | 5.3 | 5.4 | 5.9 | 5.1 | 5.9 | 6.1 | 5.9 |

Source : Population Census 1969 Vol.1V: Analytic Report

Always, the life expectancy at any age is higher for females than for the males. However, as shown in the above table, it should be noted that there was a departure from this general rule for the case of Western Province. In Western Province, the females below the age of 5 years had a higher life expectancy than their counterparts - the males. But, at the age of 5 years and other subsequent ages, the males had a higher life expectancy than the females.

The regional differences in life expectancy at birth and subsequent ages can be attributed partly to the differences in both physical and biological environments, the presence of malaria and the incidence of fatal infant diseases.

## 3.7 MORBIDITY PATTERNS

At the time the basic health services were taken over by the Central Government, the pattern of diseases and illness in the country as a whole was mainly dominated by those which could be prevented or treated very inexpensively if detected and treated at early stages. These diseases affected each age group of people with different intensities and often the children were the most affected especially those living in the rural areas. The morbidity of the out-patients in the rural areas in 1979 of all provinces excluding

Rift Valley showed high rates of easily preventable diseases. Assuming that there was no migration or temporary movement of patients, the twelve leading diseases in 1979 in order of intensity were as follows:-

TABLE 3.14 : THE MORBIDITY OF THE TWELVE LEADING DISEASES

| Diseases | Cases | % Cases |
|---|---|---|
| Malaria | 4590011 | 20.1 |
| Acute Respiratory Infection | 4321549 | 18.9 |
| Diseases of the Skin | 2186740 | 9.6 |
| Diarrhoeal Diseases | 1436455 | 6.3 |
| Intestinal Worms | 1118527 | 4.9 |
| Accidents | 645780 | 2.8 |
| Acute Eye Infection | 572020 | 2.5 |
| Rheumatism | 530481 | 2.3 |
| Gonorrhoea | 412072 | 1.8 |
| Ear Infection | 408807 | 1.8 |
| Measles | 323018 | 1.4 |
| Pyrexcia | 321603 | 1.4 |

Source : Health Information System

In totality, one out of every 5 sick persons in the rural areas has got malaria. Malaria is one of the diseases that can easily be prevented by the destruction of the mosquito breeding grounds. Throughout that decade (1970's) the fight against mosquito breeding grounds was carried out by the Ministry of Health Survilllance Group. Gonorrhoea, Ear Infection, Measles

and Pyrexcia were the least in incidence among the rural population.

The morbidity of the in-patients by age in 1979 showed that most diseases affected those in the age group 15-29 years which accounted for 42.5 percent of all the in-patient cases. In the same year there were 182234 referals from the rural areas. In comparison, then these referals formed a group of those seeking admission into the available hospital beds. This number of cases in terms of the in-patients handled that year were 86.6 percent. This showed how great is the demand for the available hospital beds both in the urban and rural areas.

TABLE 3.15 : MORBIDITY OF IN-PATIENTS 1979

| Age Group | Cases | % Cases |
|---|---|---|
| < 1 | 14051 | 6.7 |
| 1-4 | 30517 | 14.5 |
| 5-14 | 16509 | 7.8 |
| 15-29 | 89406 | 42.5 |
| 30-49 | 45144 | 21.5 |
| 50+ | 14834 | 7.0 |
| MALES | 62269 | 29.6 |
| FEMALES | 148192 | 70.4 |

Source: Health Information System.

The mortality and morbidity of some infectious diseases show that whereas some have been on the decrease, others have been on the increase and some continued to fluctuate without any pattern or trend. The disease that showed an increase was dysentry. In 1970 there were 15438 cases of dysentry reported, whereas in 1979 the number of dysentry cases had increased to 40321. Over the 10 years period, the incidence of dysentry was growing at the rate of 16.1 percent on the average per year. Infectious hepatitis increased from 924 cases in 1970 to 2423 cases in 1979 showing an increase of 16.2 percent per year. Leprosy increased from 609 cases in 1970 to 1850 cases in 1979 and represented an annual increase of 20.4 percent. However, leprosy showed a steady decline in the early 1970's, but started to increase steadily in the 2nd half of the decade.

Schistosomiasis had been fluctuating all along up to 1975 when the number of cases reported started to go up. Tetanus had been rather steady and showing no appreciable changes. The other disease that almost had the same trend as tetanus was cerebro-spinal meningitis. Although the cases of these two diseases were relatively low, the patient's mortality rate was extremely high. In 1974, out of the 815 tetanus patients, 215 of them died. This indicated about 26 percent of all the cases.

TABLE 3.16 : REPORTED CASES OF SOME INFECTIOUS DISEASES FROM 1969 TO 1979

| Disease | 1969 | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Acute Poliomyelitis | 424 | 71 | 144 | 245 | 190 | 583 | 197 | 210 | 290 | 1020 | 162 |
| Anthrax | 307 | 169 | 259 | 229 | 282 | 212 | 194 | 338 | 214 | 217 | 159 |
| Brucellois | 98 | 65 | 55 | 45 | 94 | 65 | 256 | 244 | 513 | 495 | 687 |
| Cerebro-Spinal Meningitis | 216 | 127 | 83 | 36 | 97 | 153 | 511 | 947 | 1557 | 1640 | 1613 |
| Cholera | - | - | 768 | 45 | - | 413 | 1120 | 1291 | - | 3 | - |
| Diphtheria | 3 | - | - | - | - | - | - | - | - | - | - |
| Dysentry | 18030 | 15438 | 18939 | 14368 | 19208 | 28866 | 17726 | 14532 | 24933 | 29743 | 40321 |
| Encephalitis Primary | 48 | 15 | 7 | 50 | 3 | 5 | 27 | 10 | 27 | 20 | 20 |
| Infectious Hepatitis | 788 | 924 | 768 | 746 | 819 | 1483 | 891 | 714 | 1366 | 1286 | 2423 |
| Kalazar | 272 | 23 | 121 | 155 | 196 | 174 | 226 | 184 | 184 | 238 | 544 |
| Leprosy | 691 | 609 | 607 | 349 | 262 | 326 | 340 | 449 | 466 | 1103 | 1850 |
| Schistosomiasis | 11526 | 14709 | 11633 | 9012 | 2849 | 1792 | 8800 | 9567 | 15198 | 14118 | 17169 |
| Tetanus | 677 | 627 | 538 | 495 | 663 | 815 | 640 | 691 | 718 | 645 | 723 |
| Trypanosomiasis | 37 | 14 | 34 | 40 | 13 | 9 | 19 | 7 | 20 | 13 | - |
| Typhoid Fever | 215 | 217 | 185 | 161 | 196 | 241 | 273 | 164 | 348 | 135 | 87 |
| Rabies | 95 | - | - | - | - | - | - | - | - | - | - |
| Relapsing Fever | 2 | 5 | - | - | - | - | - | - | - | - | - |
| Salmonellois | 84 | 7 | - | - | - | - | - | - | - | - | - |
| Small pox | 14 | - | - | - | - | - | - | - | - | - | - |
| TOTAL | 33530 | 33020 | 34141 | 25976 | 24608 | 35137 | 31040 | 29346 | 45834 | 50676 | 66758 |

Source: Statistical Abstracts of 1972, 1976, 1978, 1982

## 3.8 SUMMARY

The main provision of health services was under the Ministry of Health and financed by the Central Government. Apart from financing the Ministry of Health, the Government also gives assistance to Mission Hospitals in the form of Grants-in-Aid. These Grants-in-Aid are used by the Mission Hospitals to expand their physical facilities. It was the Ministry of Health that undertook the training of most of the paramedical staff. The different cadres of personnel were the Clinical Officers, Dental technologists, Registered and Enrolled Nurses, Community Nurses and Midwives and other supporting staff.

At the grass root level there were Rural Health Units that served the majority of the rural population. The rural health facilities included Health Centres, Health Sub-centres and Dispensaries. The District Hospitals acted as the focal points for both administrative and referal roles of those Rural Health Units under their jurisdiction. In turn the District Hospitals used the Provincial General Hospitals for referal. At the national level, Kenyatta National Hospital served as the only national referal hospital. This structure of health units is a top heavy one, which in turn streamlines the way medical practitioners are distributed. By 1982, the Government provided about 60 percent of the country's health infrastructure.

The Ministry of Health provided 13132 hospital beds and cots in 84 hospitals out of the total 22118 beds and cots. The Ministry had also 1066 health units out of the total 1723 institutions.

The other providers of health services included those services rendered by the Church organizations. These Church Hospitals were mainly concentrated in the rural areas. Although they are always hit by financial crisis, some do have training facilities for paramedical staff. It should be noted that out of all the available hospital beds and cots, about 30 percent are owned by the Church organizations, thus making it to be one of the vital structures of health services in the rural areas.

Only five Municipalities provided health services to residents in their municipalities. These were Mombasa, Nairobi, Nakuru, Kisumu, Eldoret and Kitale. The health services provided by these municipalities did supplement the services and facilities provided by other agencies. However, there was a great demand for the health services since the urban populations had increased due to migration, natural increase and extension of boundaries.

The private agencies which provide health services were mainly concentrated in the urban centres and in the place of the agency's interest. In these category was the large agricultural farms, commercial companies and individuals.

Fertility in Kenya has been increasing whereas mortality has been declining. Some of the causes of death had been eliminated as for the case of smallpox. Most causes of death were diseases that could easily be prevented and cured and affected mostly the young and old people.

Kenya's health conditions compare favourably with that of other African countries. The life expectancy at birth as of 1982 was among the highest (56 years) in Africa, and the infant mortality rate was among the lowest despite the low per capita income. The crude birth rate was among the lowest in Africa while the Total Fertility Rate was among the highest in the world. The extreme high population growth rate resulted from the comparatively low death rates and high birth rates.

## REFERENCES


1. Economic Survey 1971 pp. 212-213
2. Economic Survey 1972 pp. 188-190
3. Economic Survey 1975 pp. 190-193
4. Daily Nation 1985 pp. 1 , January 22nd.
5. Koinange K.W. 1982 pp. 1-20
6. Kanu Manifesto 1963
7. Vogel, L.C. 1970 pp. 242-246
8. National Development Plan 1966-1970; 1966 pp.314-333
   1970-1974 pp.488-504
   1974-1978 pp.449-468
   1979-1983 pp.105-126
   1979-1983 pp.33-54
   1984-1988 pp.143-154
9. The Kenya Gazzete, 1980 pp.373-385
10. Ministry of Health, 1982
11. The World Bank 1980 pp.22
12. The Manpower Survey 1971
13. Central Bureau of Statistics 1976 pp. 1-3
14. Ministry of Economic Planning 1979 pp. 1-2
15. Anker J.K. 1982 pp. 1-7
16. Central Bureau of Statistics 1981 pp. 1-4

| | | | |
|---|---|---|---|
| 17. | Economic Survey | 1970 | pp.180-181 |
| | | 1971 | pp.212-213 |
| | | 1972 | pp.188-190 |
| | | 1975 | pp.190-192 |
| | | 1976 | pp.159-160 |
| | | 1979 | pp.181-182 |
| | | 1980 | pp.187-188 |
| | | 1982 | pp.213-216 |
| | | 1983 | pp.224-225 |
| | | 1984 | pp.201 |
| 18. | Statistical Abstract | 1970 | pp.142-143 |
| | | 1972 | pp.176-177 |
| | | 1975 | pp.198-199 |
| | | 1978 | pp.225-226 |
| | | 1980 | pp.205-206 |
| | | 1981 | pp.207 |
| | | 1983 | pp.196-197 |

19. Central Bureau of Statistics, 1970 pp. 4-10

20. Kibet 1981 Wallchart

21. Central Bureau of Statistics, 1981 pp. 9-10

22. United Nations, 1983 pp.1-12

23. Health Information Systems 197

24. Vogel, L.C., 1974 pp. 1-140

25. Central Bureau of Statistics, 1971 pp. 1-7

# CHAPTER FOUR

## THE ANALYSIS OF DATA

### 4.1 INTRODUCTION

It is the purpose of this section to deal in details with the various variables for the purpose of clear analysis, the section will be divided into three major sections. First will be the analysis of the Ministry of Health budget and the loss due to the death of a person. Secondly, I will look at the computerised analysis of Multiple regression, Pearson Correlation and Scattergrams. Thirdly, an attempt will be made to projecting of health facilities and expenditures, medical personnel and other related variables in view of the then existing population (demographic) parameters to the turn of the century. I shall also try to determine the investment cost of such facilities by the turn of the century in accordance with the UN status required by that time.

### 4.2 MINISTRY OF HEALTH BUDGET

In order to critically analyse the role of financial limitations in providing for Health Care in Kenya, a review of the principal categories (votes and sub-votes) of the Central Government health expenditures is of necessity. These, in one way or other, would

indicate whether providing more money would buy more health services, and if so, at what cost and benefit? Health budgetary expenditures are divided into two main categories, namely: recurrent expenditure and development expenditure. The recurrent expenditures for any current year are distributed by the object class of expenditure (vote) whereas in development expenditures a detailed outline is provided of actual development expenditures for new facilities or for major improvements to old facilities in every vote and Grants-in-Aid to Mission and Non-Governmental health institution

### 4.2.1 RECURRENT EXPENDITURE

The recurrent budget expenditure is the money that is allocated and utilised for the day to day running of the health services and facilities. On closer examination of the annual growth of the recurrent expenditure shows that it has been growing at a rate of 8.9 percent to 39.2 percent per annum. On the average in between the study period, the recurrent expenditure grew at 21.2 percent per annum.

TABLE 4.1 : TOTAL RECURRENT EXPENDITURE BY YEAR AND PERCENT INCREASE YEARLY

| Year | Recurrent Expenditure £ | % Increase |
|---|---|---|
| 1969/70 | 6,083,078 | - |
| 1970/71 | 7,525,289 | 23.7 |
| 1971/72 | 9,642,387 | 28.7 |
| 1972/73 | 10,616,504 | 10.1 |
| 1973/74 | 12,144,586 | 14.4 |
| 1974/75 | 16,902,965 | 39.2 |
| 1975/76 | 19,522,364 | 15.5 |
| 1976/77 | 21,259,704 | 8.9 |
| 1977/78 | 29,201,795 | 37.4 |
| 1978/79 | 35,379,279 | 21.2 |
| 1979/80 | 42,943,414 | 21.4 |
| 1980/81 | 52,868,619 | 23.1 |
| 1981/82 | 59,075,899 | 11.7 |
| 1982/83 | 65,774,289 | 11.3 |

**Source: Summary from the Appropriation Accounts.**

There hasn't been any particular trend of these expenditures, but had been fluctuating between 11.3 percent to 39.2 percent. However, the percent increase per year seemed to be stabilising at the end of the study period to 11 percent. Part ot these recurrent expenditure was being used for personnel emoluments in the Ministry. Below is the table of such expenditure compared with the total recurrent expenditure.

TABLE 4.2 : TOTAL RECURRENT EXPENDITURE, PERSONAL EMOLUMENTS BY YEAR

| Year | (1) Recurrent Expenditure (K£) | (11) Personal Emoluments (K£) | (11) as % of (1) |
|---|---|---|---|
| 1969/70 | 6,083,078 | 3,217,090 | 52.9 |
| 1970/71 | 7,525,283 | 3,936,494 | 52.3 |
| 1971/72 | 9,642,387 | 5,418,488 | 56.2 |
| 1972/73 | 10,616,504 | 5,476,650 | 51.6 |
| 1973/74 | 12,144,586 | 6,222,815 | 51.2 |
| 1974/75 | 16,902,965 | 7,050,530 | 41.7 |
| 1975/76 | 19,522,364 | 9,031,281 | 46.3 |
| 1976/77 | 21,259,704 | 8,685,852 | 40.9 |
| 1977/78 | 29,201,795 | 12,534,748 | 42.9 |
| 1978/79 | 35,379,279 | 17,758,374 | 50.2 |
| 1979/80 | 42,943,414 | 16,244,288 | 37.8 |
| 1980/81 | 52,868,619 | 21,297,212 | 40.3 |
| 1981/82 | 59,075,899 | 24,421,496 | 41.3 |
| 1982/83 | 65,774,289 | 27,342,973 | 41.6 |

**Source: Summary from the Appropriation Accounts.**

In the first half of the 1970's decade, more than half of the recurrent expenditure was allocated to personal emoluments. But in the second half of the decade, this percentage had reduced by almost 10 percent to just about 40 percent; thus ensuring that most of the budget (recurrent) doesn't just go to personal emoluments. The only possible reason that can be

attributed to the reducing percentage of personal emoluments in relation to the recurrent expenditure is the governments commitment in trying to emphasize preventive medicine and promotive health as opposed to curative health services as had been the case earlier on.

However, although these had been reducing it continued to take the lions share of the recurrent budget. The hired personal services for both medical, paramedical and non-medical staff was spread over about 15000 job positions. Of these job positions about half of them are made up of the paramedical staff in the health division of the Ministry of Health and spread in the health institutions in the country.

Most of the job classifications in the non-health division and the majority of the persons employed in the health division would appear to fall into extensible categories, especially with a moderate increase in training. These implied to orderlies, office help auxiliaries of various kinds, drivers, chemical assistants and labourers. The most common problem that was prevalent during the study period was the acute shortage of professional personnel of all cadres ranging from doctors, dentists and pharmacists to the low cadres of clinical officers and nurses in the Government health institutions. Such a problem could have been curtailed if appropriate

policy changes were made, review modes of supply and possible expansion of training through inter-ministerial co-operation.

Further analysis of recurrent expenditure would require that the study period be divided into two phases. The first phase is the period between 1969 to 1974 and the second phase covering the period 1975 to 1982 so that the data is easily analysed.

TABLE 4.3 : VOTES AS PERCENT OF RECURRENT EXPENDITURE BY YEAR

| Year | Administration and planning | Kenyatta National Hospital | National Hospital Insurance Fund | Health Centres and Dispensaries |
|---|---|---|---|---|
| 1969/70 | 82.6 | 6.8 | 0.7 | 9.9 |
| 1970/71 | 77.2 | 7.2 | 0.6 | 14.8 |
| 1971/72 | 80.8 | 6.1 | 0.6 | 12.5 |
| 1972/73 | 86.2 | 7.0 | 0.6 | 6.3 |
| 1973/74 | 87.5 | 6.9 | 0.5 | 5.1 |

**Source: Summary from the appropriation Accounts.**

It can be seen from the table above that general administration and planning consumed more than 77 percent of the recurrent expenditure whereas Kenyatta National Hospital consumed on the average 7.0 percent of the recurrent expenditure as opposed to only 9.7 percent

to the Health Centres and Dispensaries in the rural areas. This indicated the bias in spending more for the urban health facilities as opposed to the rural health units like health centres and dispensaries. The expenditure on these rural health units was infact declining to about 5 percent of the recurrent expenditure.

During the second half of the decade, the recurrent expenditure was divided into eight votes, namely; General administration and planning, Curative health, preventive medicine , and promotive health, Rural health services, Health training, National Hospital Insurance Fund, Medical supplies and medical research.

TABLE 4.4 : VOTES AS PERCENT OF RECURRENT EXPENDITURE BY YEAR

| Year | 110 | 111 | 112 | 113 | 114 | 115 | 116 | 117 |
|---|---|---|---|---|---|---|---|---|
| 1974/75 | 4.2 | 65.2 | 6.1 | 8.1 | 6.4 | 0.4 | 9.7 | - |
| 1975/76 | 5.2 | 70.1 | 6.3 | 7.6 | 6.8 | 0.4 | 3.6 | - |
| 1976/77 | 5.0 | 72.2 | 7.4 | 7.9 | 7.1 | 0.4 | - | - |
| 1977/78 | 5.0 | 69.2 | 6.9 | 7.4 | 6.4 | 0.5 | 3.3 | 1.3 |
| 1978/79 | 5.2 | 68.7 | 4.8 | 7.8 | 8.4 | 0.3 | 3.5 | 1.2 |
| 1979/80 | 5.6 | 66.7 | 6.0 | 9.2 | 6.1 | 0.5 | 4.5 | 1.4 |
| 1980/81 | 5.4 | 68.4 | 6.6 | 9.2 | 6.0 | 0.3 | 2.4 | 1.8 |
| 1981/82 | 6.0 | 72.3 | 4.6 | 8.2 | 6.0 | 0.2 | 2.7 | - |
| 1982/83 | | | | | | | | |

Source: Summary from the Appropriation Accounts, other Public Accounts and Accounts of the funds.

NOTE

110 - General Administration and Planning

111 - Curative Health

112 - Preventive medicine and Promotive Health

113 - Rural Health Services

114 - Health Training

115 - National Health Insurance Fund

116 - Medical Supplies

117 - Medical Research

Expressing these votes as percent of the total recurrent health expenditure by year, it showed that more than 65 percent of the recurrent budget was spent on curative health in any one year whereas preventive medicine and promotive health consumed only a mere 6.0 percent per annum on the average. The amount spent on medical research was never constant and at times it had no allocation for it.

Although the Government health policies over the study period did emphasize the shifting to preventive medicine and promotive health rather than the then existing emphasis on curative health, this policy was not well implemented and fully backed by the financial resource allocation available. Between 1974/75 and 1981/82, the recurrent expenditure allocated for curative health irregularly increased from 65.2 percent in 1974/75 to as high as 72.3 in 1981/82

whereas on the other hand between the same period, the allocation of recurrent expenditure to preventive medicine and promotive health continued to irregularly decline from as high as 7.4 percent in 1976/77 to as low as 4.6 percent in 1981/82. Under such circumstances, the policy of emphasizing preventive medicine and promotive health can then only be achieved by integrating with curative health as well as health education and training as long as there are financial constraints.

## 4.3 DEVELOPMENT EXPENDITURE

The outlays for development expenditure are for the purpose of the development of new health facilities or for the major improvement of and extensions of old health facilities during the period and some is given to Mission and Local Governments as subventions and Grants-in-Aid. These outlays of development are utilised for the purchase of the complex of inputs that go into institutional buildings, planning and architectural services, building materials and labour, contracting organizations and imported equipment and supplies including plumbing and electrical goods and services.

TABLE 4.5: DEVELOPMENT EXPENDITURES AND GROWTH BY YEAR

| Year | Development Expenditure K£ | % Increase by Year |
|---|---|---|
| 1969/70 | 1,850,284 | |
| 1970/71 | 2,626,244 | 41.9 |
| 1971/72 | 2,600,942 | -0.96 |
| 1972/73 | 2,183,231 | -16.1 |
| 1973/74 | 2,320,877 | 6.3 |
| 1974/75 | 3,499,105 | 50.8 |
| 1975/76 | 4,455,232 | 27.3 |
| 1976/77 | 8,092,862 | 81.7 |
| 1977/78 | 7,684,786 | -5.0 |
| 1978/79 | 7,734,366 | 0.7 |
| 1979/80 | 10,885,160 | 40.7 |
| 1980/81 | 12,831,405 | 17.9 |
| 1981/82 | 11,010,414 | -14.2 |
| 1982/83 | 7,484,588 | -32.0 |

**Source: Summary from the Appropriation Accounts**

The above table gives the account of the actual Gross development expenditures. This is so because often actual Gross expenditures differ widely from estimates and hence it is preferable to deal with the actual expenditures. It can be seen that the development expenditures had been increasing during the study period up to towards the end when it reduced by more than 30 percent. However, the increases show no particular pattern as indicated by the fluctuating

yearly increases. Such an inconsistent pattern shows that within the study period high increases were due to major extensions and improvements of old facilities whereas negative increases show that the extensions were minimal and most of the fund was utilised for the purchase of complex institutional inputs.

4.4.1 OBSERVATION

The analysis of both recurrent and development health expenditures was not primarily for their own sake, but rather on the effect of financial limitations on service delivery flows. Likewise, whether this service flows were extensible and hence would seek to inquire otherwise analyse if the provision of additional funds over the broad range of services, commodities and facilities purchased could result in an augmented real flow of health services.

By and large it can be pre-supposed that an augmented flow of health services would require a step up of expenditures for all classes of goods and services then utilised by the Ministry of Health. It could also be appreciated that the Ministry of Health was imperfect in the utilization of expenditures in all types, votes and sub-votes.

For most of these votes, in both recurrent and development expenditures, involved in the provision of goods and services within the Ministry of Health budget, it could be presumed that an increase in the Ministry's budget was met by an increase in the quantity of goods and services thus utilized within budgetary limitations. In terms of the development expenditure this applied to the sub-votes within their claim on building activity and building resources. In the case of recurrent expenditure most of it was consumed by personal emoluments which on the average utilised about 50 percent. Thus the remainder of the 50 percent was utilised by the drugs, hospital supplies, purchased foodstaffs maintenance and replacement, leave passage allowances, travel allowances, training and office expenses.

Hence it was clear that the question of extensibility was a bit more complicated when it came to hired medical personnel services which in the form of "personal emoluments" utilised a lion's share of the Ministry's Health budget (50%). Out of the available job positions, nurses and clinical officers were the majority.

4.4.2 TABLE 4.6 : GOVERNMENT BUDGET EXPENDITURES AS PERCENT OF GIVEN VARIABLES BY YEAR

| Year | Total Health Expenditure % | Total Recurrent Expenditure % | Total Development Expenditure % |
|---|---|---|---|
| 1969/70 | 7.7 | 5.9 | 1.8 |
| 1970/71 | 7.7 | 5.7 | 2.0 |
| 1971/72 | 7.6 | 6.0 | 1.6 |
| 1972/73 | 7.1 | 5.9 | 1.2 |
| 1973/74 | 6.9 | 5.8 | 1.1 |
| 1974/75 | 7.5 | 6.2 | 1.3 |
| 1975/76 | 7.1 | 5.8 | 1.3 |
| 1976/77 | 8.0 | 5.8 | 2.2 |
| 1977/78 | 7.1 | 5.6 | 1.5 |
| 1978/79 | 6.9 | 5.7 | 1.2 |
| 1979/80 | 7.8 | 6.2 | 1.6 |
| 1980/81 | 7.8 | 6.3 | 1.5 |
| 1981/82 | 7.6 | 6.4 | 1.2 |
| 1982/83 | 8.3 | 7.5 | 0.8 |

Source: Summary from the Appropriation Accounts, other Public Accounts and Accounts of the funds.

In the above table the percentage of Health expenditure, recurrent expenditure and development expenditure with respect to total Government budget available for its purposes in the study period have been on no increase that is plausible. Comparing the growth in current and real terms with the percentages shown above do indicate that these two did not keep

pace with each other. The share of the recurrent health expenditure shows an irregular and fluctuating within a mean over the study period, falling between a minimum of 5.6 percent of the total government budget and a maximum 7.5 percent of the total Government budget.

On the other hand the Development health expenditure fluctuated between 0.8 percent of the total Government expenditure in the fiscal year 1982/83 to a maximum of 2.2 percent in the fiscal year 1976/77. In comparison with other basic needs over the study period, both the recurrent and development health expenditures had been fluctuating at low levels varying between 6.9 percent in the fiscal year 1973/74 to as high as 8.3 percent in the fiscal year 1982/83. The reason that can be attributed to such low percentage of health expenditures out of the total Government expenditure was that the Government took over the running of the basic health services from the County Councils in 1970 and as such it could not over-ride other basic needs which had even more insistent requirements since independence.

In all the 1970's decade could be regarded as a period of consolidation in the health sector. During this period a substantial part of public expenditures on health was spent on the development of facilities

such as the construction and equiping hospitals. Towards the end of that period the demand for resources in the sector was being shifted from development and capital to recurrent expenditures. This infact reflected the danger inherent in any massive transfer of resources from capital and development to recurrent expenditures which had well overlooked the need to expand preventive medicine and promotive health services that are known to be more cost-effective. Without disregard to the necessity of maintenance of the existing facilities which in a way reflect demand rather than a need-oriented pattern of resource allocation, there was at the same time a need to ensure that limited resources were spent on economic, in terms of costs to benefits, and in socially acceptable manner.

4.4.3 Public spending on recurrent expenditures to maintain costly health equipment and facilities may not have been the best form of investment in the health sector. In that period, Kenyatta National Hospital alone consumed more than 7 percent per annum of the recurrent expenditure. Thus far from improving health status in total, such a pattern of expenditure triggered off a vicious cycle in the health sector, where in the negligence of preventive services caused an increasing demand for curative services, and in turn an increasingly higher demand for such services that would lead to the further expansion of curative facilities.

This constituted a threat to the adequate provision of health services in the public sector especially under conditions of budgetary constraints that do exist.

From the point of view of equity, inequalities in the distribution of both recurrent and development expenditures between urban and rural areas in all types of health services were compounded with the wide disparity in accessibility and quality of services thus provided. Within the rural areas it should be noted that Harambee activities had the effect of distorting planned development in an inequitable way. The resources allocated to the needs of remote and poorly served areas were diverted to fairly well served areas, and close to urban facilities.

Within the framework of the Rural Health Development Programme (RHDP) the headquarters of the rural health units range from a hospital at the top to a dispensary at the bottom. Towards the close of the end of the study period, 23 percent of all rural health units had a district hospital as a headquarters, 57 percent had a rural health centre and 20 percent had a dispensary. It seems reasonable to assume that rural health units which had a district hospital as their headquarters were better provided for than those operating from village dispensaries. This indicated that there were likely inequalities with regard to

quality of facilities accessible to various rural health units. All these efforts were aimed at increasing access to the available health care services as had earlier been sighted in the statement of the problem.

## BUDGET ALLOCATION TO HOSPITALS

4.4.3.1 Between 1969/70 and 1973/74 fiscal years, the available data showed that Kenyatta National had the highest allocation of the health budget in comparison to the Provincial, District, Private and Rural Health Centres and Dispensaries. This could be attributed to the fact that Kenyatta National Hospital was the only National referal hospital and that the Government was still restructuring its health expenditures after having taken over the running of all basic rural health services from the County Councils in 1970.

TABLE 4.7 : HEALTH EXPENDITURES OF HOSPITALS BY TYPE AND YEAR

| Year | Kenyatta National | Provincial | District | Private | Rural Health Centres & Dispensaries |
|---|---|---|---|---|---|
| | KE | KE | KE | KE | KE |
| 1974/75 | 3580234 | 2798051 | 5381063 | 590057 | 1546559 |
| 1975/76 | 3567843 | 3355316 | 6796999 | 656195 | 1583672 |
| 1976/77 | 5228293 | 3930905 | 6752208 | 783470 | 1740200 |
| 1977/78 | 6302082 | 5792298 | 10547588 | 976936 | 2365334 |
| 1978/79 | 5839941 | 7563654 | 13412037 | 1297322 | 3614460 |
| 1979/80 | 8444325 | 9317734 | 15419798 | 1317059 | 5022632 |
| 1980/81 | 9104071 | 11888312 | 20573754 | 1773275 | 6457927 |
| 1981/8 | 9416953 | 14021736 | 23488150 | 2062236 | 5915927 |
| 1982/8 | 8632646 | 12914060 | 24153398 | 2210630 | 5931345 |

Source: Summary from appropriation Accounts, other Accounts and Accounts of funds for the given years.

In all, within the nine years, the allocation of health expenditures incurred by Kenyatta National Hospital did more than double whereas those incurred by the Provincial Hospitals increased six-folds, that of the District Hospitals increased more than five times, the Private Hospitals (Mission) increased four times, the Rural Health Centres and Dispensaries increased by four times of the 1974/75 expenditures by 1982/83 fiscal years. Although the expenditure to the Provincial, District and Private Hospitals, Rural Health Centres and Dispensaries are higher, the net expenditure of Kenyatta National Hospital was greatest. The main reason is that such expenditures are shared among the many hospitals.

The manner in which these expenditures were allocated was influenced by two main factors, namely the type of organization structure of the health system and the high orientation to western type of medical services that do emphasise on curative health. The organization structure of the Kenya health care services is top heavy with Kenyatta National Hospital as the National Referal Hospital and Rural Health Centres and Dispensaries at the bottom. With the new policy of District Focus for Rural Development, these disadvantaged health units would get more health budgetary allocations to raise their expenditures to provide for a better scope and quality of health.

4.4.4 TABLE 4.8 : HEALTH EXPENDITURE BY VOTE AS PERCENTAGE OF THE TOTAL HEALTH EXPENDITURE BY YE

| Vote | 1974/75 % | 1975/76 % | 1975/77 % | 1977/78 % | 1978/79 % | 1979/80 % | 1980/81 % | 1981/82 % |
|---|---|---|---|---|---|---|---|---|
| 110 | 3.47 | 4.23 | 3.61 | 3.98 | 4.40 | 4.52 | 4.39 | 5.06 |
| 111 | 64.72 | 65.70 | 66.77 | 67.96 | 68.52 | 67.96 | 69.44 | 73.26 |
| 112 | 6.29 | 8.28 | 10.76 | 9.24 | 4.22 | 5.41 | 5.57 | 4.06 |
| 113 | 7.96 | 6.76 | 5.99 | 6.44 | 8.49 | 10.65 | 11.43 | 9.87 |
| 114 | 9.18 | 11.71 | 12.58 | 7.90 | 9.95 | 6.04 | 5.25 | 5.24 |
| 115 | 0.30 | 0.31 | 0.27 | 0.42 | 0.28 | 0.41 | 0.22 | 0.20 |
| 116 | 8.09 | 3.0 | 0.11 | 2.75 | 2.94 | 3.74 | 1.96 | 2.30 |
| 117 | - | - | - | 1.32 | 1.20 | 1.27 | 1.72 | 0.01 |

Source: Summary from Appropriation Accounts.

The percentage distribution of health expenditure by vote shows that most of the health budget was allocated to curative health followed by health training. These two votes were directly influenced by the rapid population growth rates which did increase the demand for treatment and therapeutic services at the institutions. The population growth rates produces an age structure with different demands on health services.

The Kenya health system having been planned according to the western medical services delivery system had then to allocate the biggest portion of the

budget on curative health to meet such demands of the different age-sex structure. These did necessitate the training of the required manpower and thus tending to direct substantial expenditures for programmes of health training.

With such a trend, most of the health expenditure would continue to be allocated to curative health at the expense of preventive medicine and promotive health. Hence there was and is an urgent need to try to re-allocat health expenditures in such a way that an almost even and equitable distribution is achieved. The policy of shifting to preventive medicine and promotive health has been difficult to implement. The efforts to divert the attention or emphasis from curative health to preventive and promotive health could only have been achieved via health training, involvement of local communities, education and intersectorial efforts coupled with integration.

4.4.5 The health expenditures on the average had been consuming a mere 7.4 percent per annum of the total Government budgetary expenditures. Health does both influence and is influenced by the social environment. The relationship between social variables and the health status are complex and uncertain, hence as one of the basic needs, more emphasis had to be given to other needs too. Education for one example,

on the average, consumed 30 percent per annum of the total Government budget.

Therefore the constance of health budget expenditures as a percentage of total Government expenditure was due to the powerful and more insistence of requirements that had been experienced in the areas of need for schools, improved roads and expanded urban and rural water supplies. However, these improvement had not been done at the expense of health needs, but rather they helped both directly and indirectly to increase accessibility to health facilities and helped reduce the incidence of water borne diseases in the populace.

TABLE 4.9 : HEALTH EXPENDITURE AS PERCENTAGE OF GIVEN INDICATORS BY YEAR

| Fiscal Year | Total Government Expenditure % | Gross National Product % | Total Government Revenue % |
|---|---|---|---|
| 1969/70 | 7.7 | 1.6 | 10.1 |
| 1970/71 | 7.7 | 1.8 | 11.1 |
| 1971/72 | 7.6 | 1.9 | 10.5 |
| 1972/73 | 7.1 | 1.8 | 9.1 |
| 1973/74 | 6.9 | 1.9 | 9.0 |
| 1974/75 | 7.5 | 2.0 | 10.9 |
| 1975/76 | 7.1 | 2.1 | 9.4 |
| 1976/77 | 8.0 | 2.1 | 9.4 |
| 1977/78 | 7.1 | 2.1 | 10.7 |
| 1978/79 | 6.9 | 2.2 | 8.9 |
| 1979/80 | 7.8 | 2.4 | 9.7 |
| 1980/81 | 7.8 | 2.6 | 10.2 |
| 1981/82 | 7.6 | 2.4 | 9.1 |
| 1982/83 | | | |

In reference to the Gross National Product there was a general trend that perpetuated within the study period. The proportion of the Gross National Product used up for health purposes was irregularly increasing since 1969/70 fiscal year. Since that time the percentage of the GNP used for health services increased from 1.6 percent per annum in 1969/70 fiscal year to a maximum of 2.6 percent per annum in 1980/81 fiscal year.

The important point here that seemed to come out clearly was the relationship between the percentage of the Gross National Product used for the purpose of health service and the rise in the life expectancy at all ages, rise in population growth rate, increase in fertility, decline in mortality rates and the improved health status in general. These demographic factors since 1969 had greatly changed. The life expectancy at birth rose from 45 years in 1969 to 55 years in 1979. The intercensal population growth rates rose from 3.2 percent per annum to 4.0 percent per annum in 1979 and even more at the end of the study period. The total fertility rate rose from 7.6 in 1969 to 8.1 as was indicated by the Kenya Fertility Survey whereas the mortality rates reduced. The crude death rate per thousand population in 1969 was 18 and 14 as recorded in the Population Census of 1979.

The infant mortality rates reduced from 120 per thousand live births in 1969 to 80 per thousand live births in 1979.

The percentage of the total Government Revenue allocated for health services showed no particular pattern but kept on fluctuating. It fluctuated from a low of 8.9 percent in the fiscal year 1978/79 and reached a maximum of 11.1 percent in the fiscal year 1970/71. By and large, on the average, health expenditures utilised about 9.9 percent of the total Government revenue. These behaviour on the total Government revenue could have been attributed to inflation and the participation of the economy to generate such revenues.

## 4.5 EVALUATION OF AVAILABLE BUDGETARY EXPENDITURE FOR HEALTH

In broad terms, Kenya has since independence persued with vigour its post-colonial reconstruction policies. The measure of these policies were not only modernisation, but also the centrality of basic social policies in the formulation of Government priorities and the allocation of resources. But whereas in the 1960's decade the past planning had been more or less, carried out under conditions of reasonably adequate resource base which made it somewhat easier to persue growth with equity strategies. The later part of the 1970's

decade and early 1980's, a situation of financial stringency posed a real challenge to the Government to continue its development pattern of post-colonial reconstruction. The Government thus adopted the poverty alleviation objective within the framework of formal planning.

4.5.1 From independence until about mid-1970's, the Government's budgetary operations were relatively free of resource constraints as depicted by the expansion of revenues and expenditures relative to the Gross National Product. The immediate post-independence reconstruction programme which characterised the first National Development Plan was thus persued with vigour, particularly in terms of Africanization in agriculture through a number of different land settlement schemes whereby fertile land formerly cultivated by European settlers was transferred to land-poor or landless Kenyan small-holders and peasants. This led to the rapid expansion of small-holder cash crop production in the late sixties and early seventies. The economy grew steadily and rapidly to attain an average annual growth rate of 6.6 percent between 1964 and 1973. Hence during the plan period, 1970-1974, the Government was able to focus attention as well on rural development as part of its modernization programme, on the basis of an assumed flow of adequate revenues derived from agriculture and manufacturing.

4.5.2 The third National Development Plan, 1974-78 was formulated on the basis of a projected rate of growth of Gross Domestic Product at 7.4 percent per annum. This was significantly higher than the targets for the previous plans. Influenced by the report of the 1972 International Labour Organization (ILO) comprehensive employment mission, the plan sought to redistribute productive resources and income earning opportunities more equitably throughout the economy. To this end there was a marked expansion in public expenditures on economic and social infrastructure and services. However, soon after the launching of the Third National Development Plan, the economy began to experience serious difficulties stemming mainly from rapid inflation and then recession in the international economy and widespread drought throughout the country. Higher oil and other import prices and the slower rate of growth of export earnings combined to produce budgetary pressures which compelled the Government to revise downwards the growth target for the plan period to between 5 and 6 percent per annum. In any case a boost came in 1976 and 1977 from unprecedented boom in the world coffee and tea prices, but this marked only temporarily the deterioration in the underlying trend.

4.5.3 The Fourth National Development Plan, 1979-1983, which had poverty alleviation as its main theme, was infact launched against a background of increasing pressures to contain the balance-of-payments deficit. The adoption of a basic needs oriented strategy in a sense posed a real challenge to the Government in a situation of mounting budgetary constraints. The attainment of planned targets in the core basic needs areas was thus highly dependent on the achievement of the plan in terms of sustaining positive growth of per capita income, on the one hand, and generating a pattern of growth which results in a more equitable distribution of income and improved access to essential public services for the vast majority of the population on the other hand.

So far, that challenge proved insurmountable, after all, Government revenues had been at a much slower pace than in the 1970's due mainly to deteriorating international terms of trade, which were adversely affecting both growth of the Gross Domestic Product in a downward direction and cost of imports in an upward direction. As a consequence, the expansion in Government expenditures consistent with a poverty alleviation objective had not been marched by actual increases in revenues, thereby leading to increased pressure on the budget. It should also be noted that budgetary operations in recent years have

also witnessed a significant increase in expenditures on defence which in a way has increased the squeeze on Government finances with respect to the provision of social services as called for in the Development Plan.

4.5.4 A more detailed examination of the problem of budgetary constraints pointed to certain structural weaknesses in the economy as a whole which proved somewhat detrimental to the implementation of a poverty alleviation plan. Since independence, the Kenyan economy had been structured to grow on the basis of rapidly expanding output in the agricultural sector contingent on favourable commodity export prices, and the accumulation of a surplus to support an import-substitution or import-reduction industrialization strategy based on a relatively high import content. These constitutes a liability on foreign exchange reserves. Such a foreign oriented structure has now then proved grossly inadequate to withstand the external shocks of a global recession, high energy costs, imported cost inflation and low commodity export prices even after the Fourth National Development Plan.

At the same time, control over the growth of public expenditures (budgetary) has been impaired by certain internal development. Besides increases in

defence expenditures in recent years, the following developments were significant; namely, the expansion of free education at both basic and higher levels in a manner not closely related with current and future manpower requirements. The creation of new parastatals to replace the corporations of the defunct East African Community, many of which operated at a deficit. The apparent subsidy on growing food imports in the form of the difference between consumer prices and actual costs of imports mainly for the benefit of the urban population. The continued expansion in the public sector of non-productive employment coupled with the recent general salary increases in the sector. The rising costs of completing delayed development projects and initiating new ones and higher related operating and maintenance costs. The unforeseen pre-emptive demands on public resources for operating and maintaining Harambee self-help projects mainly in the education, health and water sectors which nevertheless, have to be fulfilled on the basis of prior politically induced spending commitments.

4.5.5. What exists in effect is a situation where planning for the alleviation of poverty was being persued within a financial setting of reduction in the rate of growth of revenues and increased demand for public expenditures overall. Budgetary constraints on the possibilities for meeting basic needs in

support of poverty alleviation therefore call for a reappraisal of current policies as they relate to the planning, implementation and operation of development programmes and projects in core basic needs areas, as well as of the pattern of resource allocation between different items of expenditure in the Government budget. The broad aim should have been to achieve more cost-effective patterns of public spending in relation to the impact on poverty alleviation. This implies, in particular, increased capacity utilisation and a more efficient organization and management of existing and new basic needs facilities and services.

Budgetary constraints ought not lead to only a reduction in existing commitments by Government to a basic needs strategy. Since whatever conflicts that apparently may exist between growth and poverty alleviation objectives can be resolved through judicious planning and plan implementation. In the specific context of Kenya, policies designed to increase the rate of growth of output in both agriculture and industry could at the same time have a positive impact on the alleviation of poverty if the pattern of growth is altered to result in more equitable distribution of income and socio-economic opportunities.

As far as the delivery of basic needs services was concerned, the adverse effects of budgetary constraints could be minimised by adopting a comprehensive approach to the provision of different services, given the potential complementarities and linkages between core basic needs. In a situation of financial stringency, it should be possible to increase the overall impact of public investments on basic needs services by co-ordinating and phasing in the implementation of several basic needs programmes in a rational manner. If for one example, available resources are directed initially on the improvement of nutritional status of the population, this should over time reduce the financial requirements for providing costly curative health care services (facilities).

4.5.6 Similarly, improved health status consequent upon improved access to safe water and adequate shelter could increase productivity and incomes of the poor. At the same time improved living standards among the poor could reduce fertility. This is a critical factor in Kenya. The reduced fertility could be achieved as the need for more children to augment family labour in agricultural production diminishes and concormitantly the desire to have large families could also be less as prospects for survival of the children increases.

Given that basic needs programmes for education, health, nutrition, water and shelter, do reinforce each other to increase the overall positive effects on the well-being. It could also cost less to implement such programmes in a comprehensive manner than if they were implemented individually as separate and unrelated activities in an unco-ordinated fashion. In this regard, it will be necessary to improve co-ordination between the Central Government operating ministries and agencies and local level implementing authorities. This would also require improvement in the capacity of local authorities to operate and maintain such basic needs services through better staffing. The effects of budgetary constraints can also be minimised by more effective monitoring and evaluation of a comprehensively implemented set of basic needs programmes with the aim of reducing overhead costs and improving performances.

Furthermore, the continuation of a basic need oriented strategy in a period of financial stringency would require increased mobilization of human and financial resources for meeting basic needs at the local level, but with the necessary caution regarding the spread of Harambee projects as already indicated otherwise re-orientation. Within the public sectors, user charges as appropriate for certain services could be one way of meeting part of the costs of providing basic needs services. Greater participation by the

private sector especially non-Governmental organizations in the delivery of basic needs services, where this is feasible, could reduce costs and increase efficiency in providing basic needs services at the local level.

Yet, it is important that whatever savings are realised in the consumption component of core basic needs areas through measures indicated above are re-invested in basic needs productive activities which will enhance the growth propensity of the economy to support the effectiveness of implementation of poverty alleviation policies and programmes on a continuing basis. In this way, it should be possible to achieve both growth and equity objectives within the framework of existing budgetary constraints. The important point to stress in this regard is that the implementation of basic needs activities as spelled out in the fourth development plan is not essentially consumption oriented, nor does it imply a redirection of resources from growth to welfare activities.

4.5.7 Most of the basic needs projects and programmes identified in the plan were infact productivity-enhancing with positive impact on employment and income. If caried out properly, basic needs activities also have the potential save the scarce foreign exchange reserves through reduction in import contents in Gross Domestic Product, contain balance of payments pressures, increase

effective demand for mass consumption goods; and help to control population growth consequent on improved living standards among the poor. Through higher levels of productivity and output, the actual cost of meeting basic needs may infact be less than normally envisaged.

It should also be noted that a common weakness of developmental planning exists in many third world countries. This weakness from which Kenya on the record of achievements of the targets of the last four development plans was not immune. There was usually a large and big gap between stated intent and actual implementation. Partly, this was because plans do not place sufficient stress on implementation and delivery mechanisms, and partly because there was an inherent centralist tendency in policies predominantly concerned with fiscal measures and instruments of financial and monetary control. In respect, a basic needs oriented strategy should in principle provide something of a counterweight, because it emphasises operations at local administrative levels and the need for popular participation in the development process and sets out measures by which achievements can be tested.

## 4.6 THE GROWTH OF HEALTH FACILITIES

Health has a major role to play in economic development of a country. In the more developed countries, it has been demonstrated that there is a direct relationship between the health of a population and its productivity. Here in Kenya, the earlier and present development plans have recognised the major role of better health in two ways. It has been a major objective of social and economic development, as well as a significant contributor to the development through its impact on productivity.

In order that the standard of National health was promoted and developed, the Government made determined efforts to bring health services within easy reach for the majority of the population. As of 1982, the Government provided for 62 percent of the country's health services infrastructure. The Ministry of Health provided 13132 hospital beds and cots in 84 hospitals. The Ministry had 1109 health facilities out of the total 1733 institutions. The Church organizations provided about 30 percent of the country's hospital beds in 84 hospitals whereas the private organizations and individuals provided for about 11.6 percent of the total hospital beds in 48 private and company hospitals.

In contrast to 1970, the Central Government had 65 hospitals which represented 36 percent of the hospitals available and 58 percent of the available hospital beds. The Church organizations owned 72 hospitals that represented an ownership of 39 percent and similarly owned 28 percent of the available hospital beds. The rest was owned by private and other agencies. However, if all health institutions had to be included the ownership trend changes such that the Central Government facilities show a downward trend as will be discussed later.

The rate of increase of health facilities for the last decade (study period) was based on the rate of the country's population growth rate. For this reason the-demand for health services had been growing at an increasingly high rate, which thus created a challenge for the health sector to improve the scope and quality the health care. This then necessitated the tremendous increase in the recurrent expenditure from K£ 6,083,078 in the fiscal year 1969/70 to K£65,774,289 in the fiscal year 1982/83.

The growth of hospital beds has been rising at a rate similar to that of the health institutions. The Government had the lion's share followed by the Church organizations and then others. By 1982, the Government owned 67.1 percent of the available

hospital beds as compared to 57.5 percent in 1969. Hence in 1969 the country had 1.33 beds per 1000 population and 1.7 beds per 1000 population in 1979. In terms of the beds in Government hospitals, the bed population ratios were much lower as follows:. In 1969, the country had 0.76 Government beds per thousand population and in 1981 it was 1.14 Government beds per thousand population.

TABLE 4.10 : THE GROWTH OF AVAILABLE HOSPITAL BEDS IN ALL HEALTH INSTITUTIONS AND GOVERNMENT HOSPITALS:

| Year | Beds All | Yearly Increase % | Government Hospital Beds | Yearly Increase % |
|---|---|---|---|---|
| 1970 | 14537 | | 8359 | |
| 1971 | 14525 | -0.08 | 9097 | 8.83 |
| 1972 | 18055 | 24.30 | 9404 | 3.38 |
| 1973 | 18186 | 0.73 | 9829 | 4.52 |
| 1974 | 19523 | 7.35 | 10285 | 4.64 |
| 1975 | 21787 | 11.60 | 12610 | 22.61 |
| 1976 | 22345 | 2.56 | 13845 | 9.80 |
| 1977 | 22848 | 2.25 | 14438 | 4.28 |
| 1978 | 24708 | 8.14 | 15470 | 7.15 |
| 1979 | 26922 | 8.96 | 17684 | 14.31 |
| 1980 | 27691 | 2.86 | 18453 | 4.35 |
| 1981 | 28108 | 1.51 | 18870 | 2.26 |

Source: Summary from Economic Surveys for the given years.

4.6.1 The negative increase or growth rate in hospital beds in 1970/71 could be due to the poor records and to some extent to the closure of some of the Mission hospitals that were faced with critical financial crisis and lack of highly qualified personnel to run them. The number of hospital beds in the Government hospitals continued to grow at a higher rate of 10.48 percent per annum on the average than the total available hospital beds which grew at the average rate of 7.78 percent per annum. Such a growth rate in Government hospital beds was due to the Government's concerted efforts in the building of District hospitals and extensions of the existing facilities to curb the high demand for hospital beds in the institutions.

It should be noted that a high growth in all the available hospital beds does not necessarily correspond to high growth in Government hospital beds except in 1975. This could be attributed to the completion of New District Hospitals. The high growth in Government hospital beds in 1979 was due to the completion of the extension work at the Kenyatta National Hospital. The pattern of growth of the hospital beds had been irregular but reducing towards the end of the study period which could be due to the financial constraints and stringency.

categories. Taking the doctor population ratio for those in Government, then a staggering ratio (small and diminishing ratio) is obtained especially after 1979. This was due to the Government efforts in banning private practice among Government doctors which led to the exodus of specialists and highly qualified medical personnel from public service to lucrative private practice.

4.6.4 The pharmacist and pharmacist technologist population ratio remained constant throughout the study period. The nurse population ratio irregularly increased and was highest ratio among all the other cadres. Though these averages are good, most of the personnel work in urban centres. In 1981, about 80 percent of the doctors lived and worked in four major towns of Mombasa, Nairobi, Nakuru and Kisumu, whereas 70 percent of the registered nurses lived and worked in the same towns. Hence an inequitable distribution of health facilities, both in physical structures and personnel was a major regional problem.

4.6.5 The bed population ratio increased throughout the 1970's decade but started to drop in 1980. This does reflect that the growth of hospital beds was far much slower or has not been in step with population growth rate. Therefore it was important that the growth in provision of health services should

have been continued at a faster rate if the average number of beds per 100,000 population was to be increased to a level which was thus adequate to serve the population more effectively. In future this would require concerted efforts from the agencies that provide health facilities and donors.

4.7.0 EXPENDITURE LOST DUE TO DEATH OF PATIENT

When a person dies, depending on sex and age, it is difficult to assess what the net effects on the population and the national income will be. Generally, however, in many cases there will be a considerable readjustment in the family, population and the labour market as a whole.

4.7.1 In terms of the family, some constant income is lost due to the death of a person who was a bread winner, and as well, some anticipated benefits are lost. In the long run, widows might be forced to go to work, who otherwise, would have remained at home. In all, the net effects to the family are rather subjective to analyse.

4.7.2 To the population, the occurance of a death causes some structural changes in the age and sex composition. This however depends on the prevailing demographic parameters of infant mortality, child mortality, adult mortality, the crude death and total

4.6.2 In all, it can be said that the growth rate of hospital beds was in pace with population growth rate, but however, the rate at which the demand for the available hospital beds grew was out of pace with the number of available hospital beds and growth rate. For example, in 1979, the number of referals that demanded hospital beds were 182234 against the available 26922 hospital beds. Hence at any time only one bed was available for seven referals whereas at the same time the occupancy was high.

TABLE 4.11: THE RATIO PER HUNDRED THOUSAND POPULATION OF GIVEN VARIABLE BY YEAR

| Year | Doctors & Dentists | Pharmacists & Pharm. Technologists | Nurses | Clinical Officers | Hospital Beds |
|---|---|---|---|---|---|
| 1969 | 03 | 1 | 64 | | 133 |
| 1970 | 05 | 1 | 68 | | 129 |
| 1971 | 07 | 1 | 72 | | 154 |
| 1972 | 07 | 1 | 77 | | 150 |
| 1973 | 08 | 1 | 82 | | 156 |
| 1974 | 10 | 1 | 84 | | 169 |
| 1975 | 12 | 1 | 89 | | 171 |
| 1976 | 12 | 1 | 97 | | 177 |
| 1977 | 11 | 1 | 94 | 7 | 171 |
| 1978 | 11 | 1 | 96 | 10 | 181 |
| 1979 | 11 | 1 | 97 | 10 | 181 |
| 1980 | 11 | 2 | 92 | 10 | 168 |
| 1981 | 13 | 2 | 93 | 10 | 159 |
| 1982 | 13 | 2 | 96 | 10 | 156 |

**Source: Summary from economic surveys**

4.6.3 It can be noticed that the doctor and dentist population ratio has been increasing over the study period. This is due to the increased output of these

4.6.2 In all, it can be said that the growth rate of hospital beds was in pace with population growth rate, but however, the rate at which the demand for the available hospital beds grew was out of pace with the number of available hospital beds and growth rate. For example, in 1979, the number of referals that demanded hospital beds were 182234 against the available 26922 hospital beds. Hence at any time only one bed was available for seven referals whereas at the same time the occupancy was high.

TABLE 4.11: THE RATIO PER HUNDRED THOUSAND POPULATION OF GIVEN VARIABLE BY YEAR

| Year | Doctors & Dentists | Pharmacists & Pharm. Technologists | Nurses | Clinical Officers | Hospital Beds |
|---|---|---|---|---|---|
| 1969 | 03 | 1 | 64 | | 133 |
| 1970 | 05 | 1 | 68 | | 129 |
| 1971 | 07 | 1 | 72 | | 154 |
| 1972 | 07 | 1 | 77 | | 150 |
| 1973 | 08 | 1 | 82 | | 156 |
| 1974 | 10 | 1 | 84 | | 169 |
| 1975 | 12 | 1 | 89 | | 171 |
| 1976 | 12 | 1 | 97 | | 177 |
| 1977 | 11 | 1 | 94 | 7 | 171 |
| 1978 | 11 | 1 | 96 | 10 | 181 |
| 1979 | 11 | 1 | 97 | 10 | 181 |
| 1980 | 11 | 2 | 92 | 10 | 168 |
| 1981 | 13 | 2 | 93 | 10 | 159 |
| 1982 | 13 | 2 | 96 | 10 | 156 |

**Source: Summary from economic surveys**

4.6.3 It can be noticed that the doctor and dentist population ratio has been increasing over the study period. This is due to the increased output of these

4.8.0 In this analysis I shall use three samples namely, the total population, the total population aged between 15-60 years and total work force for selected years. In the first sample it is assumed that every individual does contribute to the economy both directly and indirectly. In the second sample it is assumed that they are all economically active and the third sample uses those people that are actually engaged in the production of goods and services in the economy.

TABLE 4.12 : UNIT COST OF HEALTH EXPENDITURE PER PERSON IN POPULATION BY YEAR

| Year | Population | Health Expenditure KShs. | Unit cost KShs. | Yearly Increase % |
|---|---|---|---|---|
| 1969 | 10942705 | 158667240 | 14.50 | |
| 1970 | 11247000 | 203030660 | 18.05 | 24.5 |
| 1971 | 11694000 | 244866580 | 20.94 | 16.0 |
| 1972 | 12091000 | 255994720 | 21.17 | 1.1 |
| 1973 | 12504000 | 289309260 | 23.14 | 9.3 |
| 1974 | 12935000 | 408041400 | 31.55 | 36.3 |
| 1975 | 13413000 | 479551920 | 35.75 | 13.3 |
| 1976 | 13853000 | 587051320 | 42.38 | 18.6 |
| 1977 | 14348000 | 737731620 | 51.42 | 21.3 |
| 1978 | 14875000 | 862272900 | 57.97 | 12.7 |
| 1979 | 15327061 | 107651480 | 82.37 | 21.2 |
| 1980 | 15952570 | 1314000480 | 82.37 | 17.3 |
| 1981 | 16603606 | 1401726260 | 84.42 | 2.5 |
| 1982 | 17281213 | 1465177540 | 84.78 | 0.4 |

**Source: Summary from the Appropriation Accounts and population projections.**

The population projections used here are those based on "Series A" from 1970 to 1980 and those from "Series A" of 1980 to 2000 A.D. The assumptions of the projections were that there was no change in fertility from 1969 to 1975; there was a steady decline in mortality leading to rise in life expectancy at birth for both sexes from 49 years in 1969 to 53 in 1980; there was no change in age specific fertility rates leading to a fall in total fertility rate from 7.6 in 1969 to 6.9 in 1980.

4.8.1 The unit cost of health expenditure per person had been increasing steadily since 1969 from KShs.14.50 to KShs.84.78 in 1982. The increase in the unit cost per person was however not uniform over the period. They were yearly growing at an irregular fluctuating manner; reducing from as high as 36.5 percent per year in growth to 0.4 percent in 1982. This small growth recorded in 1982 shows that the growth of unit cost per person was levelling off at that time. With the highest annual growth in 1974, on the average, the annual growth rate of unit cost per person had been 15.0 percent. Such growth rates and increases have emphasized that health expenditures have not been growing at a fast enough rate to keep pace with the rapid population growth rate even under financial constraints. In any case the unit cost per person seemed to have reached a levelling point at the

end of the study period.

4.8.2 However, when an economically active population is employed, a totally different picture is obtained. These groups are the ones who produce the goods to be utilized.

TABLE 4.13 : UNIT COST OF HEALTH EXPENDITURE TO THE POPULATION AGED 15-60 YEARS FOR SELECTED YEARS:

| Year | Population aged 15-60 years | Health Expenditures KShs. | Unit Cost KShs. | Annual Growth % |
|---|---|---|---|---|
| 1970 | 4774700 | 203030660 | 46.41 | |
| 1975 | 6439000 | 479551920 | 74.48 | 12.10 |
| 1980 | 7495404 | 1314000480 | 175.31 | 27.08 |
| 1982 | 8126883 | 1465177540 | 180.29 | 1.42 |

Source: Summary from Population Projections and the Appropriation Accounts.

The unit cost per person for selected years did indicate that the people between age 15-60 had to pay more for the health services. The dependency ratio in Kenya is thus high because most of the people fall between ages 0-15 age group and 60+ years. At all these selected years, the unit cost per person was more than double than when the whole population was used. This actually corresponds to the dependency ratio which, for Kenya, is quite high. These implies that those aged 15-60 years pay more for health needs which thus leads to lower domestic savings rate.

In all the unit cost had been increasing within the study period. It was growing at an annual rate of 12.10 percent between 1970 and 1975. This growth however increased between 1975 and 1980 to 27.08 percent per year. This could be attributed to inflation rates and the recession of that time. Hence the unit cost grew at a pace out of step with the growth of the population aged 15-60 years. The trend after 1980 seemed to have changed since the annual growth rate had greatly reduced to 1.42. It can be said that under the financial constraints not much could be utilised and allocated for health needs whereas the number of people in that age group increased substantially. Another factor that can be considered is that the economy was picking up by 1982.

4.8.3 Engaging those actively involved in the economy, higher units rates are obtained. This is a more refined measure of unit cost because it involves persons who directly participate in the production of goods and services. It should be noted that not all people aged 15-60 are in the labour force. Past activity rates show that only between 39.94 and 57.60 percent of these are economically active. The activity rates have been reducing.

TABLE 4.14 : UNIT COST OF HEALTH EXPENDITURE OF LABOUR FORCE FOR SELECTED YEARS

| Year | Labour Force (1) | Health Expenditure KShs | Unit Cost KShs | Annual Growth % |
|---|---|---|---|---|
| 1970 | 3988000 | 203030660 | 50.91 | .. |
| 1975 | 5010000 | 479551920 | 95.71 | 17.60 |
| 1980 | 5783000 | 1314000480 | 226.77 | 27.43 |

The unit cost between 1970 and 1975 had almost doubled and was growing at an annual rate of 17.60 percent. Through up to 1980, the unit cost per worker continued to grow at a higher rate of 27.43 percent. This could be attributed to the unemployment rates in Kenya which had been experienced in the near past; and which had been persisting throughout the study period. The activity rates had been reducing since 1970 from 39.94 percent per annum to an expected value of 37.60 percent in 1985. Thus the activity rates have been reducing whereas the population growth rates have been on the increase and creating unemployment in the economy.

---

1 International Labour Organization; Labour Force Projections Part 11, Geneva 1971, pp.128

As the population increases, more people enter the labour market than those who leave it. This situation creates a higher supply of the labour force than the economy is able to absorb. Since employment represents how much of the labour force is demanded by the economy, as supply exceeds demand the results are growing unemployment rates and declining activity rates. The unit cost has been growing for reasons of high population growth rates and the declining proportions of the labour force over the total population. These two have been out of proportion with labour force growth rates lower than the population growth rates.

4.8.4 Having looked at the unit cost for the three different samples, namely total population, population aged 15-60 years and the total labour force, expenditures lost can be found by relating these to the registered cases of death both medically and non-medically certified. Several studies carried out on the civil registration have shown that the reported cases of death are not any near 100 percent. Nyokangi in 1983 found that the registration of deaths was only about 22 percent complete; the study in the Ministry of Health showed that the registered cases of death was only about 30 percent complete.

Therefore in trying to calculate the total cases of deaths I shall pool these two figures to arrive at an average figure of 26 percent throughout the study period.

TABLE 4.15 : THE RELATIONSHIP OF REGISTERED DEATHS, TOTAL POPULATION AND HEALTH EXPENDITURES BY YEAR:

| Year | Registered Deaths | % Registration | Expected Deaths | Cost per person KShs | Expenditure lost KShs | Expenditure Lost as percent of Health Expenditure |
|---|---|---|---|---|---|---|
| 1969 | 28702 | 26 | 110392 | 14.50 | 16000688 | 1.01 |
| 1970 | 42912 | 26 | 165046 | 18.05 | 2979083 | 1.47 |
| 1971 | 47325 | 26 | 182019 | 20.94 | 3811483 | 1.56 |
| 1972 | 46884 | 26 | 180323 | 21.17 | 3817440 | 1.49 |
| 1973 | 46992 | 26 | 180738 | 23.14 | 4182288 | 1.45 |
| 1974 | 53050 | 26 | 204038 | 31.55 | 6437413 | 1.58 |
| 1975 | 45643 | 26 | 175550 | 35.75 | 6275913 | 1.31 |
| 1976 | 49924 | 26 | 192015 | 42.38 | 8137612 | 1.39 |
| 1977 | 47319 | 26 | 181996 | 51.42 | 9358242 | 1.27 |
| 1978 | 44699 | 26 | 171919 | 57.97 | 9966158 | 1.16 |
| 1979 | 50020 | 26 | 192385 | 70.24 | 13513095 | 1.26 |
| 1980 | 50848 | 26 | 195569 | 82.37 | 16109038 | 1.23 |
| 1981 | 57764 | 26 | 222169 | 84.42 | 18755526 | 1.38 |
| 1982 | 65392 | 26 | 251508 | 84.78 | 21322822 | 1.46 |

Source: Summary from Registrar-General's Annual Reports and the Appropriation Accounts.

The assumptions used here are that among all the deaths that were registered, the people must have had some sort of treatment either as an out-patient, or an in-patient. The other assumption was that the civil registration was only 26 percent complete in the country and hence this percentage used together with the deaths registered to determine the expected number of deaths that had occured. The number of registered deaths per year had not been following a particular trend although they had been increasing while at the same time fluctuating.

The most important of all is the expenditure lost as percentage of total health expenditure. In the first half of the 1970's decade, and excluding 1969, on the average, the percentage of health expenditure lost on the average remained above 1.50 percent per annum. However, during the second half, the percentage of expenditure lost had reduced to an average of above 1.20 percent per annum. These have a bearing that the Government health policies and health programmes started to gain momentum after 1974. Hence the improvement of all demographic parameters had a positive effect on the health status.

TABLE 4.16 : RELATIONSHIP OF REGISTERED DEATHS, WORKING AGE POPULATION AND HEALTH EXPENDITURE BY YEAR:

| Year | Registered Deaths | % Registration | Expected Deaths | Cost per person aged 15-60 years KShs. | Expenditure lost KShs. | Expenditure Lost as percentage of Health Expenditure |
|---|---|---|---|---|---|---|
| 1970 | 42912 | 26 | 165046 | 46.41 | 7659785 | 3.77 |
| 1975 | 45643 | 26 | 175550 | 74.48 | 13074964 | 2.73 |
| 1980 | 50848 | 26 | 195569 | 175.31 | 34285201 | 2.61 |
| 1982 | 65392 | 26 | 251508 | 180.29 | 45344377 | 3.09 |

Source: Summary from Registrar-General's Annual Reports and the Appropriation Accounts.

The persons aged 15-60 years have to pay more for the basic needs and this costs have been rising within the study period which thus increased the expenditure lost due to death. On the average, these losses have been over 2 percent of the total health expenditure.

TABLE 4.17 RELATIONSHIP OF REGISTERED DEATHS, LABOUR FORCE AND HEALTH EXPENDITURE BY SELECTED YEAR:

| Year | Registered Deaths | % Registration | Expected Deaths | Cost per person in labour force | Expenditure lost in KShs. | Expenditure lost as percentage of total Heal Expenditur |
|---|---|---|---|---|---|---|
| 1970 | 42912 | 26 | 165046 | 50.91 | 8402491 | 4.14 |
| 1975 | 45643 | 26 | 175550 | 95.71 | 16801890 | 3.50 |
| 1980 | 50848 | 26 | 195569 | 226.77 | 44349182 | 3.38 |

Source: Summary from Registrar-General's Annual Reports, International Labour Organization and the Appropriation Accounts.

Within the study period, the activity rates in the labour market had been reducing and hence the labour force. The activity rates reduced from 39.94 percent in 1970 to 38.00 in 1982. These reductions did increase the cost of health expenditure per person in the labour force. However, the expenditure lost as a proportion of total health expenditure has been reducing.

4.9.1 COMPUTER ANALYSIS

INTRODUCTION

As had been mentioned earlier, this section addresses itself to the type of relationships that exist in the variables analysed. Hence, the problem(s) set for analysis are:

i) Is there any linear relationship between total health expenditures and the selected economic, demographic and health variables?

ii) If there is any relationship, what is its direction?

iii) How strong is the degree of Association between health expenditures and the selected economic, demographic and health variables?

iv) Which of the selected economic , demographic health variables are the best predictor(s) of total health expenditure?

4.9.2 OVERVIEW

Therefore, in order to test for the existence of a linear relationship between health expenditures and other selected economic, demographic and health expenditure, and at the same time determine the direction as well as the strength of such association, the data was analysed through the Pearson Product Moment Correlation, r, and Scattergrams. In order that the Pearson Correlation, r, was used for the analysis, the following assumptions were made:-

i) That the data were at least of the interval level of measurement.

ii) That the association between two variables was linear. Linearity exists when the intersectional points lie roughly in a straight line.

4.9.2.1 In this analysis, the Multiple Regression Statistical Technique was also used to:

a) Find the best prediction equations and as well as to evaluate their accuracy.

b) Control for other confounding factors in order to evaluate the contribution of a specific variable or set of variables.

c) Find structural relations and provide explanations for seemingly complex multivariate relations.

It should be noted that one of the confounding factors that is of importance was the significance level. (Tolerance). Simply the tolerance of an independent variable being considered for inclusion in the regression is the proportion of the variance of that variable not explained by the independent variables already in the regression equation. Hence if the significance level is too low, the contribution of a specific variable or set of variables would not be determined.

4.9.2.2 The Multiple Regression generally enables the researcher to select a subset consisting of a reasonable number of the available predictor variables to fit the regression equation. In addition to entering one variable on the basis of its having the highest partial correlation with the criterion variable (significance levels), the Multiple Regression procedure examines each of the pre-existing predictors for possible elimination. If the elimination of any one of the pre-existing predictors does not lead to a significant drop in multiple, r, then it is eliminated (significance level of less than 0.00001).

Therefore, correlation measures co-relation, which is a joint property of two variables. On the other hand, regression deals primarily with the means of one variable and how its location is influenced by another variable. Hence correlation is association with descriptive technique whereas regression comes close to implying causal relationship between variables. Thus whereas a correlation coefficient indicates a joint relationship between variables, a regression coefficient means that if the value of the independent variable is altered then the dependent variable can be expected to change by a certain amount on the average, sampling variation and making it unlikely that presicely the stated amount of change to be observed.

4.9.3 PEARSON CORRELATION

As mentioned earlier, the Pearson's Correlation coefficient, r, which is often calculated by both via Scattergram and Pearson Correlation has two uses. Besides its role as an indicator of the fairness of fit of the linear regression, it also serves as a measure of association that shows the strength of the linear relationship between any two given variables. In other words, r, gives both the strength and direction of the linear relationship. When the purpose and concern of the Pearson Correlation is about the strength of relationship rather than the direction of the relationship, then the Pearson's, r, is squared to

yield a statistic $r^2$ that is more easily interpreted measure of association.

TABLE 4.18 : CORRELATION BETWEEN TOTAL HEALTH EXPENDITURES AND THIRTEEN ECONOMIC, DEMOGRAPHIC HEALTH VARIABLES

| VARIABLES | r | $r^2$ |
|---|---|---|
| Total Population | 0.98820 | 0.97654 |
| Life Expectancy at Birth | 0.95530 | 0.91260 |
| Total Government Expenditure | 0.99510 | 0.99022 |
| Total Government Revenue | 0.99397 | 0.98798 |
| Gross National Product | 0.99398 | 0.98800 |
| Population Growth Rate | 0.93757 | 0.87904 |
| Total Fertility Rate | 0.84965 | 0.72191 |
| Cases of Some Infectious Diseases | 0.94523 | 0.89346 |
| Hospital Beds | 0.90948 | 0.82715 |
| Nurses (Registered & Enrolled) | 0.94681 | 0.89645 |
| Doctors & Dentists | 0.90876 | 0.82584 |
| All Other Paramedical Staff | 0.98930 | 0.97871 |
| Infant Mortality Rate | -0.96717 | 0.93542 |

Among the thirteen variables, it was only the Infant mortality rate that was negatively correlated with the total health expenditure. However, this correlation was high. From the above table, it is clear that there was a high positive bivariate

correlation between economic, demographic and health variables. Apart from the infant mortality rate which was negatively correlated, it was only the Total fertility rate which had a Pearson Correlation coefficient, r, of 0.84965 that was less than 0.90000 whereas the other had a Pearson Correlation coefficient r of above 0.90000.

The highest Pearson Correlation coefficients were between the Total health expenditure and Total Government expenditure with a correlation coefficient of 0.99510, Total Government revenue with correlation coefficient of 0.99397 and the Gross National Product with the correlation coefficient of 0.99398. This high correlation is always to be expected because of auto correlation which occurs when a variable is correlated with part of itself. All these three are the economic variables from which the health expenditure is derived from. Hence only 10 variables out of the thirteen variables show more valuable correlations because they are not derivable from health expenditures and therefore not auto-correlated with total health expenditures.

The coefficient of association, the $r^2$, column above does indicate that only seven out of the variables had coefficients of association of over 0.90000.

This implies that over 90 percent of the variation in the total health expenditure is accounted for by using any one of these seven variables. The other six remaining variables had coefficients of association between 0.70000 and 0.90000 or less than 0.90000.

The above table can also be divided into three categories. The first category having three variables (economic), the second category having five variables (demographic parameters), the third category having five variables (health parameters). As already cited earlier, the first category variables are highly correlated with health expenditures as they are auto-correlated; their coefficients of association are also high and are above 0.98000. In the second category variables, three out of the five variables have coefficient of association above 0.90000 whereas the other two have their coefficient of association between 0.70000 and 0.90000. In the third category variables, only one variable out of the five had the coefficient of association above 0.90000 whereas the other four had the coefficient of association between 0.82000 and 0.90000.

### 4.9.4 INTERCORRELATION BETWEEN VARIABLES

As it has been already determined above that there exists a high positive correlation between total health expenditures and most of the thirteen variables

with the exception of the Infant Mortality Rate which was highly negatively correlated, it will be of an advantage to critically examine the intercorrelation among the thirteen variables.

Hence out of the thirteen variables only nine variables had the intercorrelation coefficient, quite high and above 0.99000. Out of these nine pairs, two were highly negatively intercorrelated. Those which had very strong negative intercorrelation were between demographic variables and health variables. Namely the intercorrelation between life expectancy at birth with the infant mortality rate and between the number of Registered nurses and Enrolled nurses with the infant mortality rate.

TABLE 4.19 : THE INTERCORRELATION BETWEEN THE THIRTEEN ECONOMIC, DEMOGRAPHIC AND HEALTH VARIABLES

| Variables | r | $r^2$ |
|---|---|---|
| Total Health Expenditure with Total Government Expenditure | 0.9951 | 0.9902 |
| Total Health Expenditure with Total Government Revenue | 0.9940 | 0.9880 |
| Total Health Expenditure with G.N.P | 0.9940 | 0.9880 |
| Total Population with G.N.P. | 0.9915 | 0.9831 |
| Life Expectancy at birth with Nurses | 0.9969 | 0.9938 |

TABLE 4.19 (Cont.)

| Variables | r | $r^2$ |
|---|---|---|
| Life Expectancy at birth with I.M.R. | -0.9979 | 0.9958 |
| Total Government Expenditure with other Paramedical Staff | 0.9908 | 0.9817 |
| Total Government Revenue with G.N.P. | 0.9948 | 0.9896 |
| Nurses (Registerd & Enrolled) with I.M.R. | -0.9957 | 0.9914 |

In all the intercorrelation of the variables is almost perfect. In examining the coefficient of association of the intercorrelation, the three variables that were highly associated were the total health expenditure with the total Government expenditure, life expectancy at birth with the number of nurses and the number of nurses with the infant mortality rate all of which had the intercorrelation coefficient of association above 0.9900. However, the others too had very high intercorrelation coefficients of association that was above 0.9800. Hence these pairs accounted for more than 98 percent of the association of the variables that were selected for the analysis.

4.9.5 SCATTERGRAMS

A Scattergram is a graph of data points based on two variables, where one variable defines the

horizontal axis (abscica) and the other defines the vertical axis (ordinate). The values of the variables of any given case serve as co-ordinates of the points representing the case. A regression line is then drawn through the scatter of data points approximating the pattern of these points. The most common type of regression is linear regression, in which the objective is to locate the best fitting line.

Therefore, in order to gain a better vission of the relationship between total health expenditures and the economic, demographic and health parameters, scatttergrams were drawn showing the relationship between total health expenditures and the thirteen variables.

To be able to draw the scattergrams the data for the total population, total health expenditures, Grosss National Product, total Government revenue and total Government expenditures were all reduced by dividing through by 1,000,000.

TABLE 4.20 : THE REGRESSION COEFFICIENTS FOR THE SCATTERGRAMS OF THE THIRTEEN VARIABLES

| Variables | r | $r^2$ |
|---|---|---|
| Total Population | 0.98820 | 0.97654 |
| Life Expectancy at birth | 0.95530 | 0.91260 |
| Total Government Expenditure | 0.99510 | 0.99023 |
| Total Government Revenue | 0.99397 | 0.98798 |
| Gross National Product | 0.99398 | 0.98800 |
| Population Growth Rate | 0.93757 | 0.87904 |
| Total Fertility Rate | 0.84965 | 0.72191 |
| Reported Cases of Some Infectious Diseases | 0.94523 | 0.89346 |
| Hospital Beds | 0.90948 | 0.82716 |
| Nurses (Registered & Enrolled) | 0.94681 | 0.89644 |
| Doctors and Dentists | 0.90876 | 0.82584 |
| Other Paramedical Staff | 0.98930 | 0.97872 |
| Infant Mortality Rate | -0.96717 | 0.93542 |

Using the statistics provided by the computer runs with scattergrams, the relationship between total health expenditure and the thirteen variables can be shown by means of simple regression equations. The figures 1 to 13 below show the scattergrams drawn to explain further the high correlations between health expenditures and the economic, demographic and health parameters with the probability level of 0.05.

The general simple regression equation is given by:

$$Y = a + bX \pm e$$

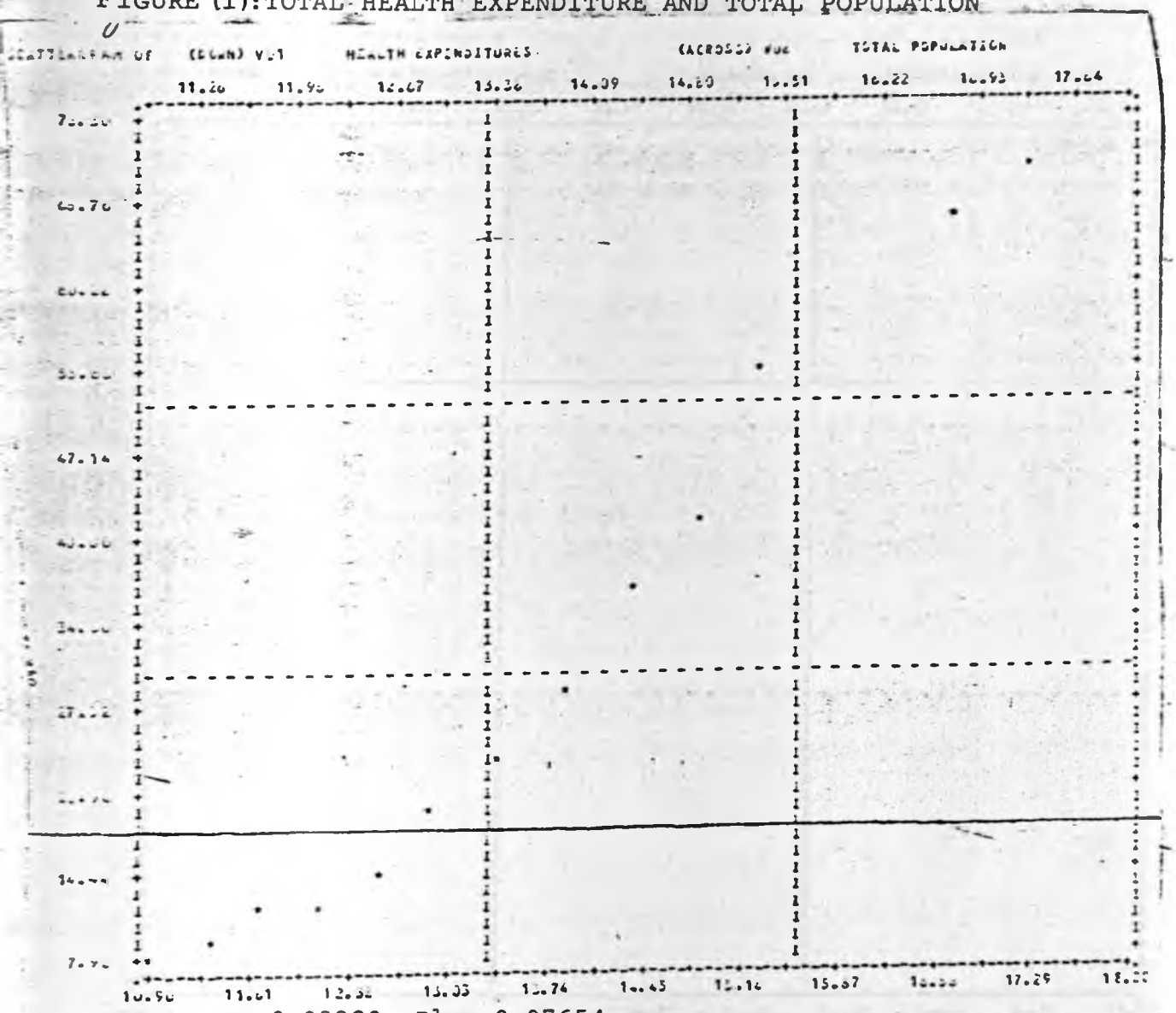
where

a is the Y intercept

b is the slope

e the standard error of estimate

FIGURE (i):TOTAL HEALTH EXPENDITURE AND TOTAL POPULATION




r= 0.98820, $R^2$ = 0.97654

Intercept (A) = 109.57640

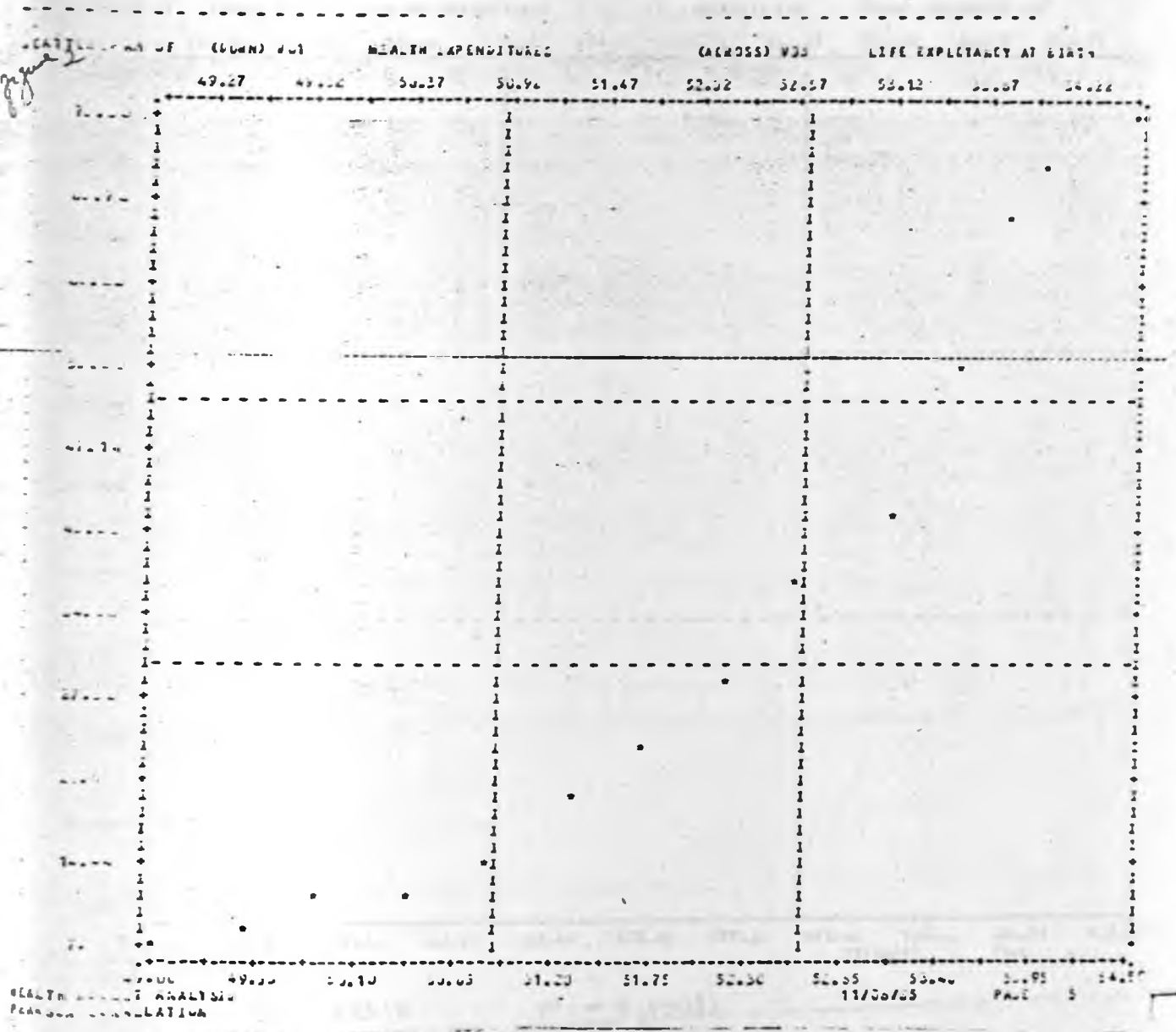
Slope (B) = 10.28351

Std. error of estimate = 3.75060

The regression equation

$Y=-109.57640+10.28351X_1 \pm 3.75060$ (1.96) .....4.9.1

FIGURE (ii) : TOTAL HEALTH EXPENDITURE AND THE LIFE EXPECTANCY AT BIRTH

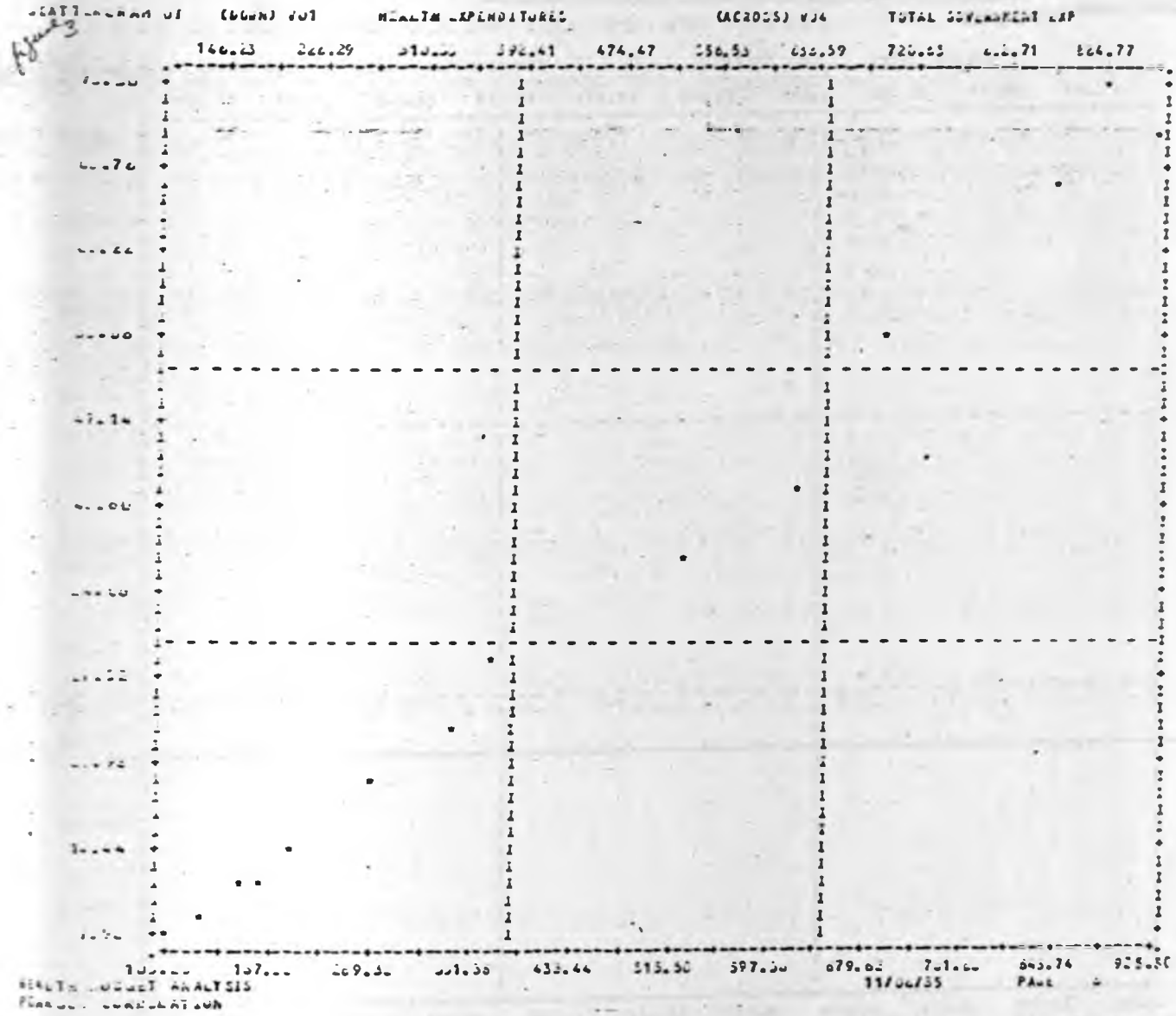



r = 0.95530 $r^2$ = 0.91260

Intercept (A) =-619.56649
Slope (B) = 12.59566
Standard error of estimate = 7.23883

The regression equation
$Y = -619.56649+12.59566X_2 \pm 7.23883\ (1.96)$ .....4.9.2

FIGURE (iii) : TOTAL HEALTH EXPENDITURE AND TOTAL GOVERNMENT EXPENDITURE

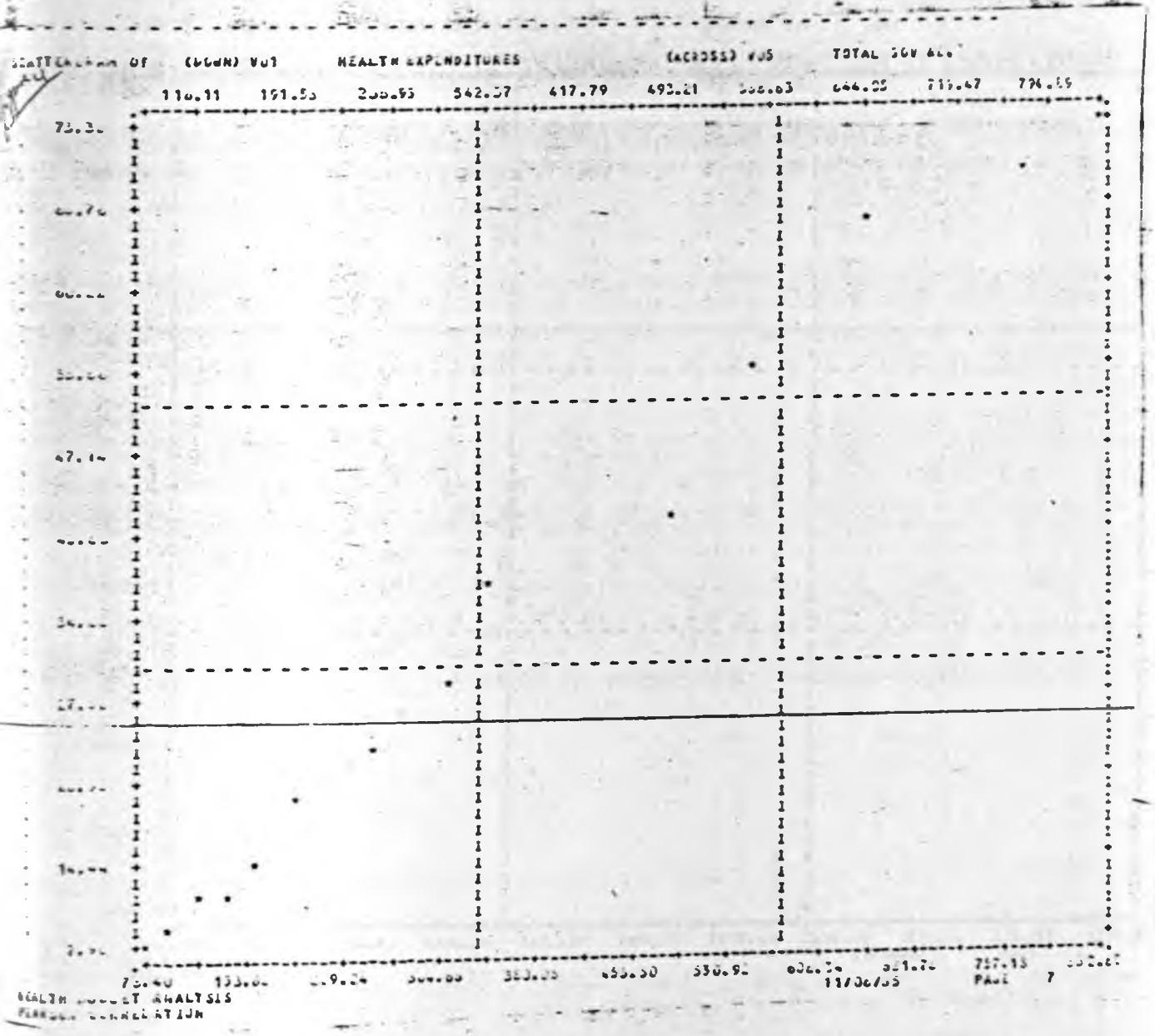



$r = 0.99510$ $r^2 = 0.99023$

Intercept (A) = -1.30640
Slope (B) = 0.07874
Standard error of estimate = 2.42023

The regression equation
$Y = -1.30640 + 0.07874X_3 \pm 2.42023$ (1.96) .....4.9.3

FIGURE (iv) : TOTAL HEALTH EXPENDITURE AND TOTAL GOVERNMENT REVENUE




$r = 0.99397$ $r^2 = 0.98797$

Intercept (A) = 1.78183

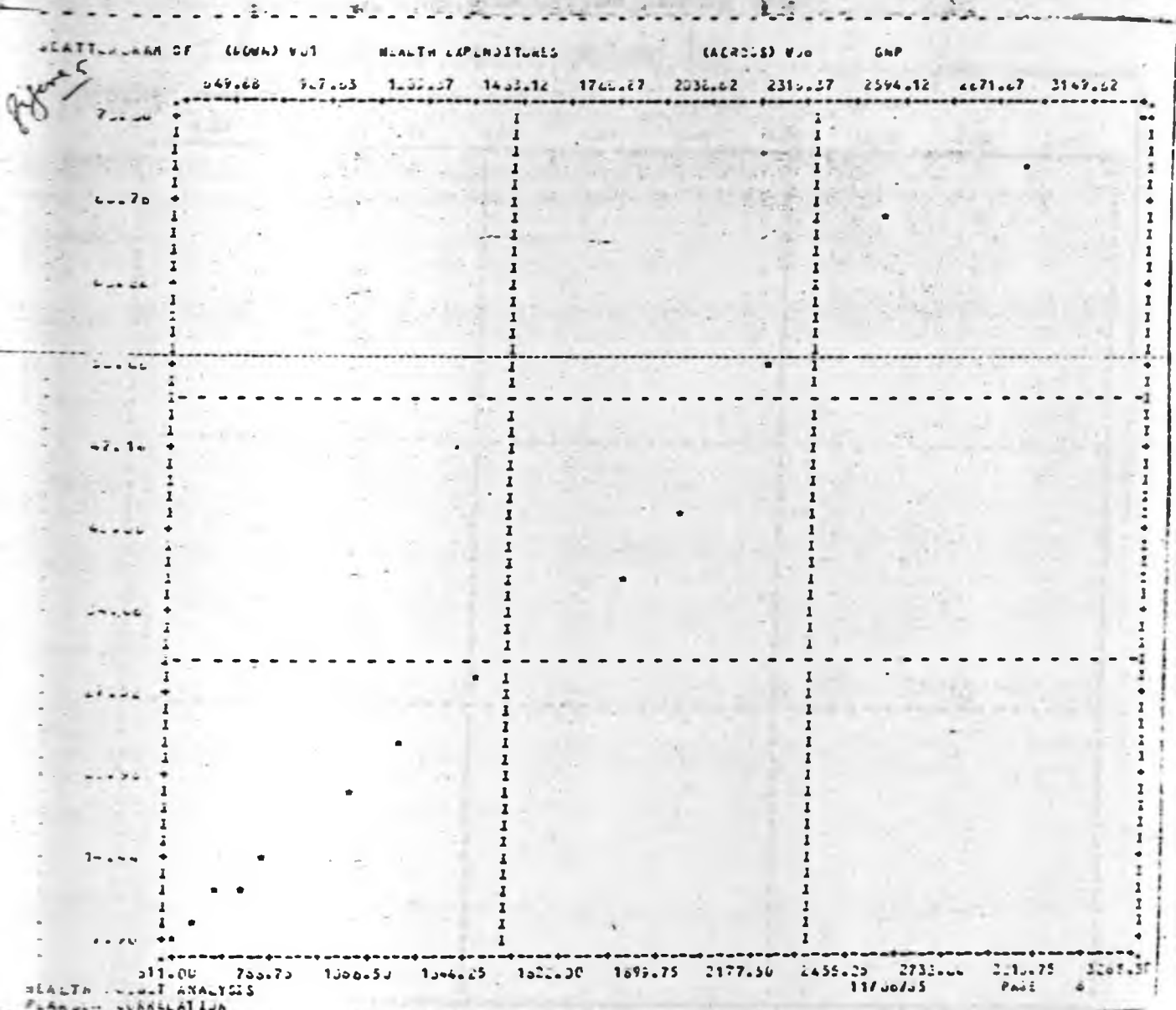
Slope (B) = 0.09030

Standard error of estimate = 2.08572

The regression equation

$$Y = 1.78183 + 0.09030X_4 \pm 2.08572 \ (1.96) \ \ldots\ldots 4.9.4$$

FIGURE (v) : TOTAL HEALTH EXPENDITURE AND GROSS NATIONAL PRODUCT



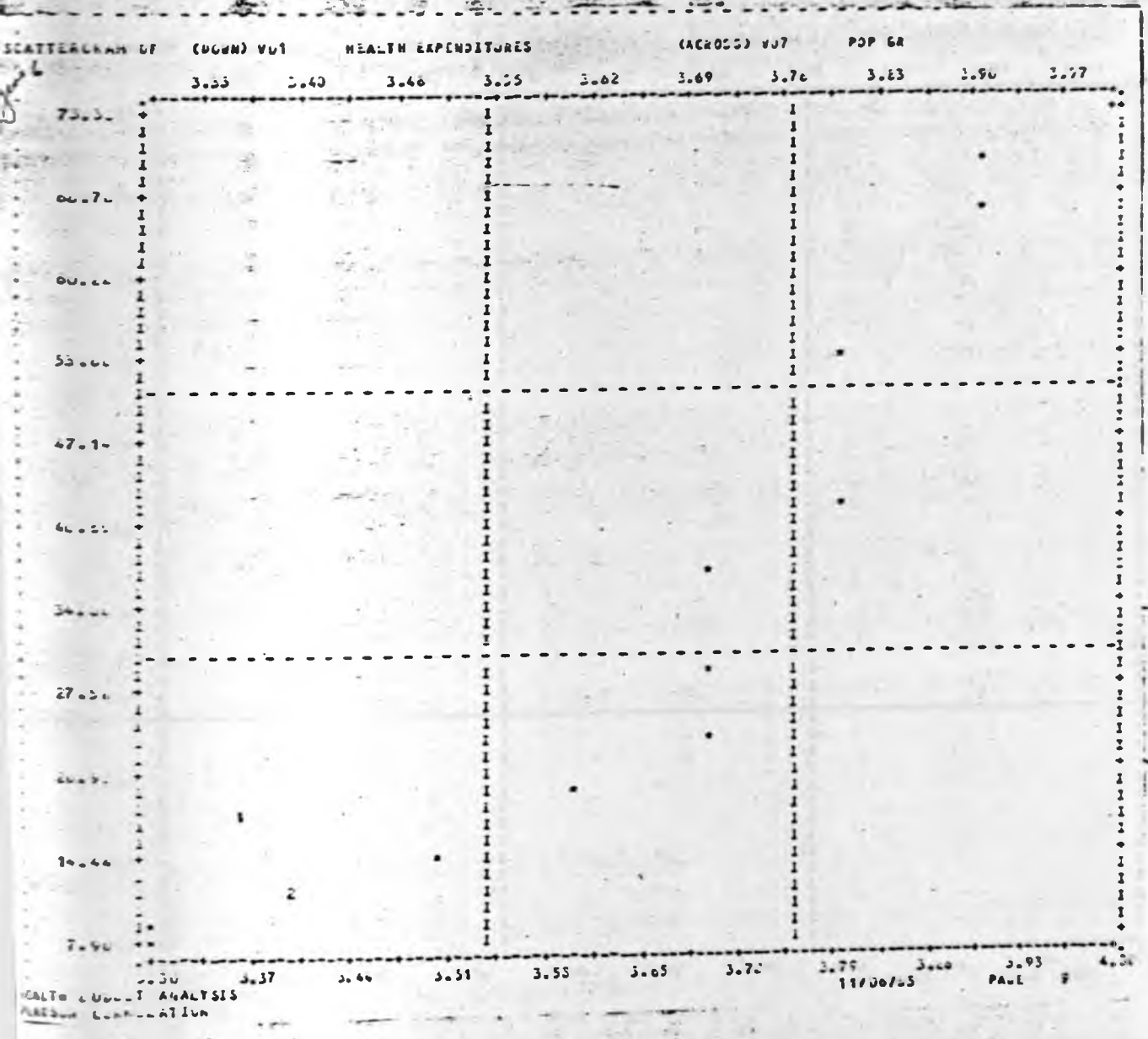
$r = 0.99398$ $r^2 = 0.98800$

Intercept (A) = -4.59969
Slope (B) = 0.02508
Standard error of estimate = 2.68245

The regression equation is

$$Y = -4.59969 + 0.02508X_5 \pm 2.68245 \ (1.96) \quad .....4.9.5$$

FIGURE (vii) : TOTAL HEALTH EXPENDITURE AND POPULATION GROWTH RATE

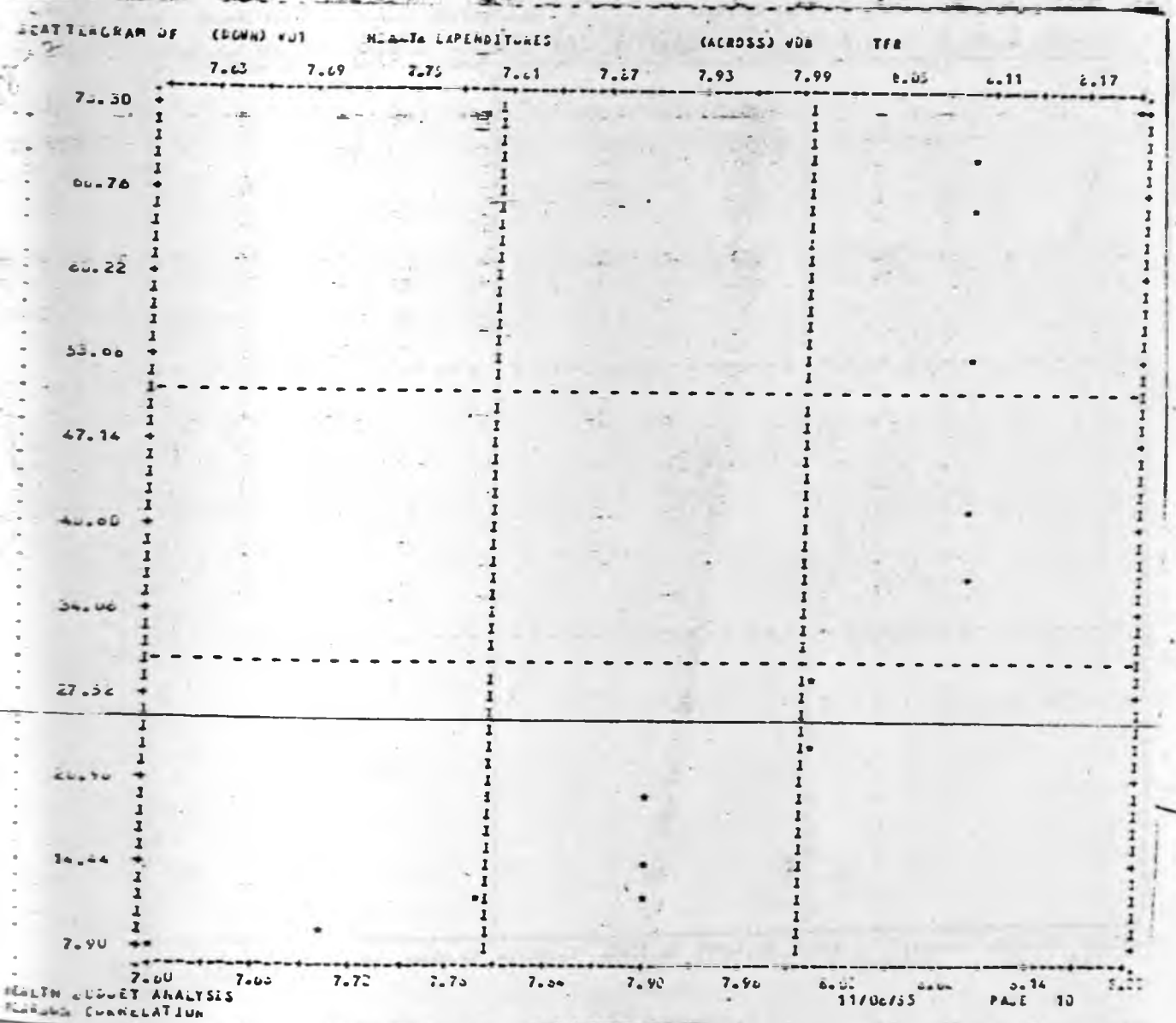



$r = 0.93757$ $r^2 = 0.87904$

Intercept (A) = -313.79691
Slope (B) = 95.44033
Standard error of estimate =8.51565

The regression equation is
$Y = -313.79691+95.44033X_6 \pm 8.51565\ (1.96)$ .....4.9.6

FIGURE (vii): TOTAL HEALTH EXPENDITURES AND TOTAL FERTILITY RATE

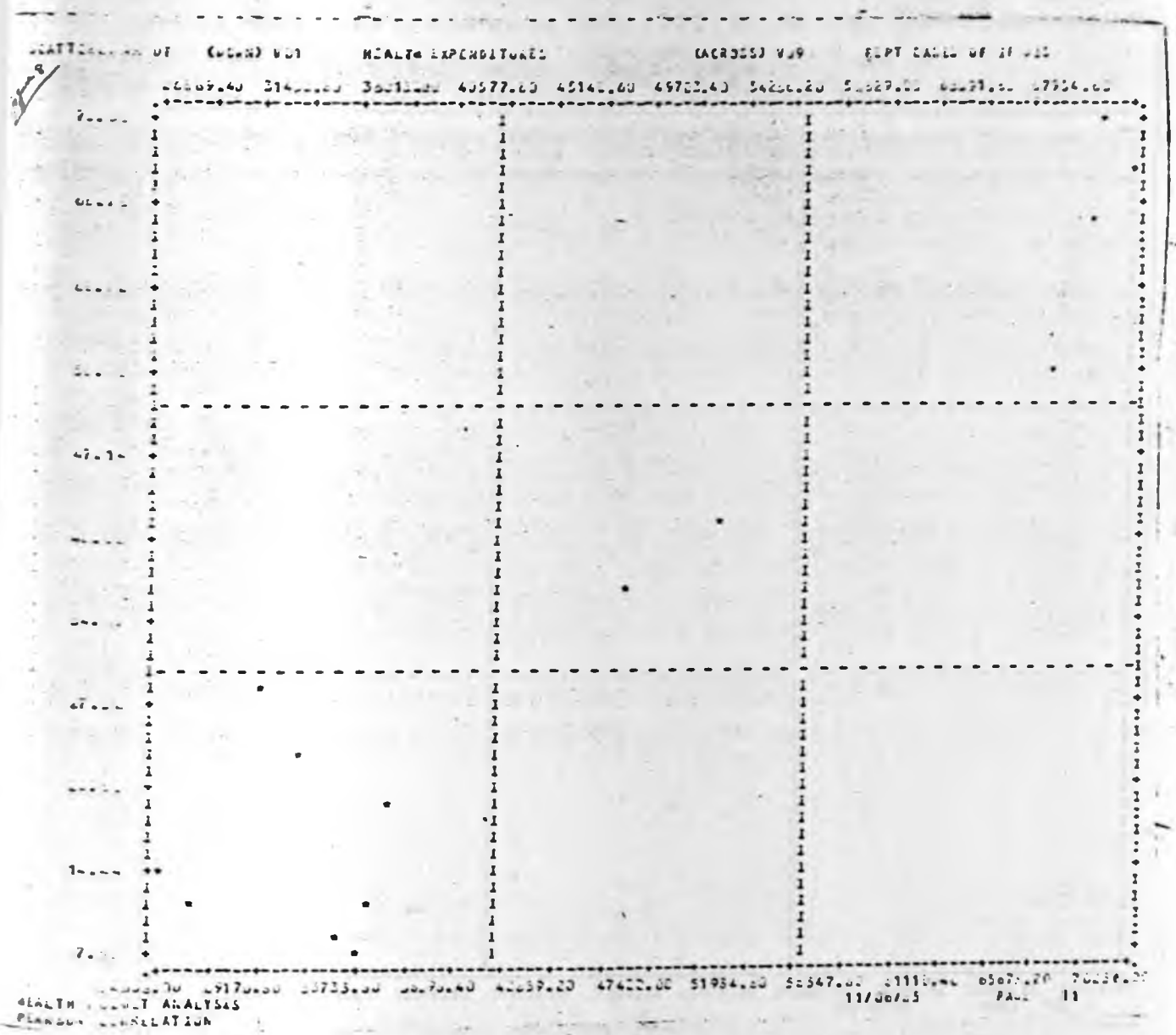



$r = 0.84965$ $r^2 = 0.72191$
Intercept (A) = -882.68164
Slope (B) = 115.08379
Standard error of estimate = 12.91218

The regression equation is
$Y = -882.68164 + 115.08379X_7 \pm 12.91218\ (1.96)$ .....4.9.7

* There exists some irregularity in the scattergram although the data had been checked and found to be correct thus giving the values of r and $r^2$ that are relatively high.

FIGURE (viii): TOTAL HEALTH EXPENDITURE AND REPORTED CASES OF SOME INFECTIOUS DISEASES



$r = 0.94523$ $r^2 = 0.89346$

Intercept (A) = -22.32589

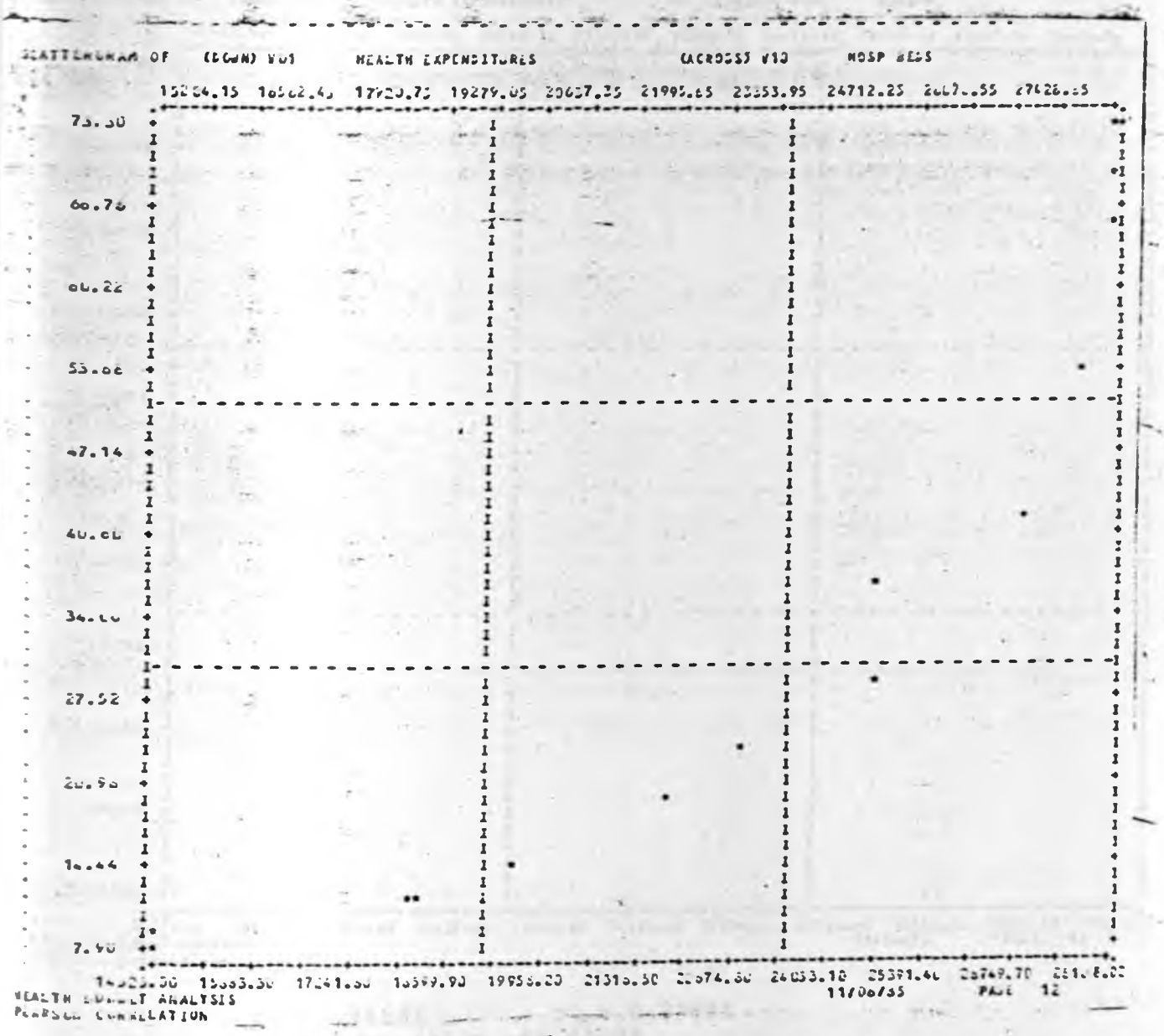
Slope (B) = 0.00127

Standard error of estimate = 7.99229

The regression equation is

$$Y=-22.32589+0.00127X_8 \pm 7.99229\ (1.96) \quad \ldots\ldots 4.9.8$$

FIGURE (ix): TOTAL HEALTH EXPENDITURE AND HOSPITAL BEDS




HEALTH EXPENDITURE ANALYSIS
PEARSON CORRELATION

$r = 0.90948$ $r^2 = 0.82716$

Intercept (A) = -63.27462

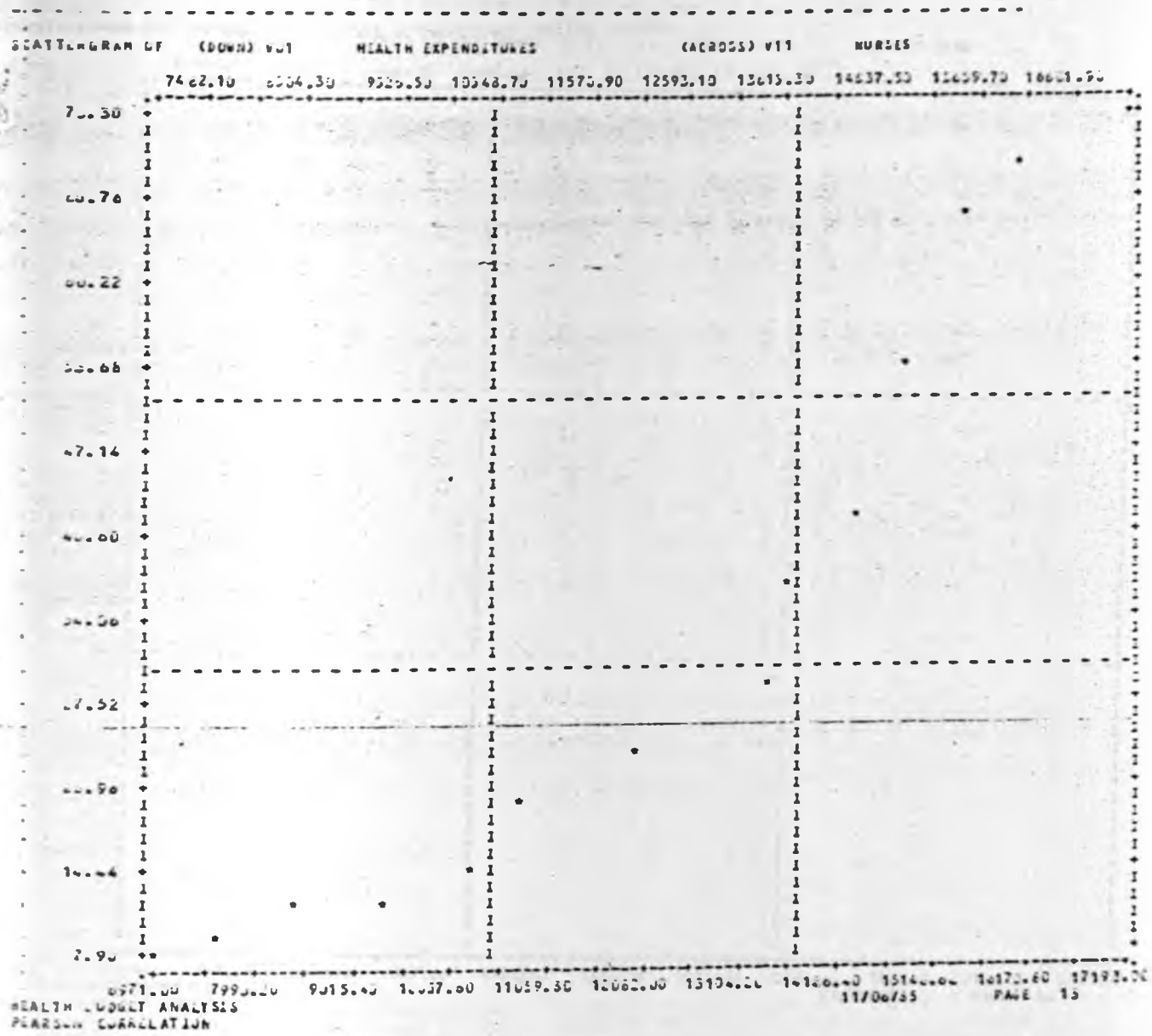
Slope (B) = 0.00428

Standard error of estimate = 10.17952

The regression equation is

$Y=-63.27462+0.00428X_9 \pm 10.17952\ (1.96)$ .....4.9.9

FIGURE (x): TOTAL HEALTH EXPENDITURE AND NURSES (REGISTERED AND ENROLLED)




$r = 0.94681$ $r^2 = 0.89644$

Intercept (A) = -48.04209

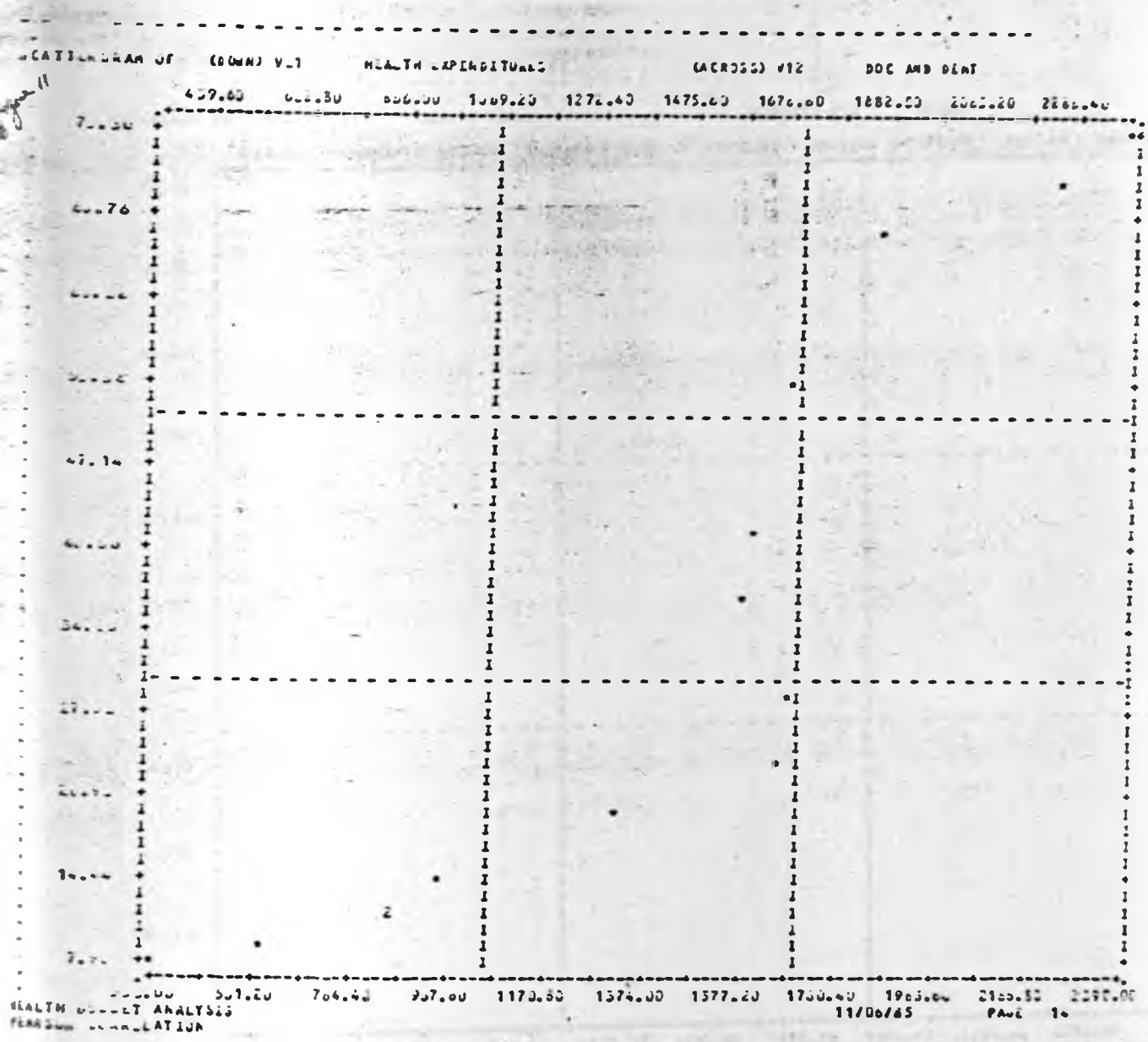
Slope (B) = 0.00674

Standard error of estimate = 7.87949

The regression equation is

$Y=-48.04209+0.00674X_{10}\pm 7.87949\ (1.96)$ .....4.9.10

FIGURE (xi) : TOTAL HEALTH EXPENDITURE WITH DOCTORS AND DENTISTS




$r = 0.90876$ $r^2 = 0.82584$

Intercept (A) = -15.45113

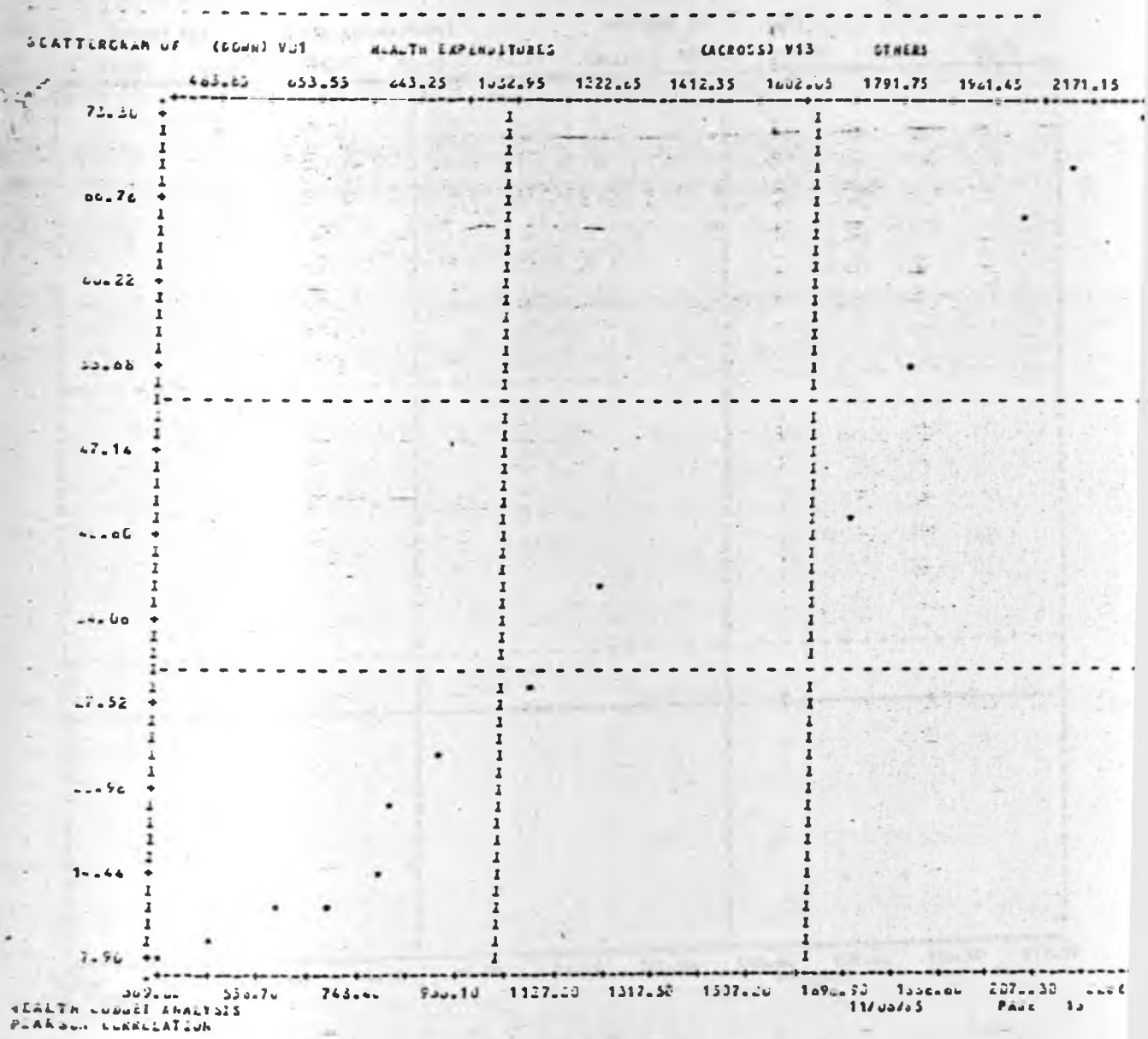
Slope (B) = 0.03526

Standard error of estimate = 10.21836

The regression equation is

$Y=-15.45113+0.03526X_{11} \pm 10.21836$ (1.96) .....4.9.11

FIGURE (xii): TOTAL HEALTH EXPENDITURE WITH ALL OTHER PARAMEDICAL STAFF




$r = 0.98930$ $r^2 = 0.97872$

Intercept (A) = -8.66090

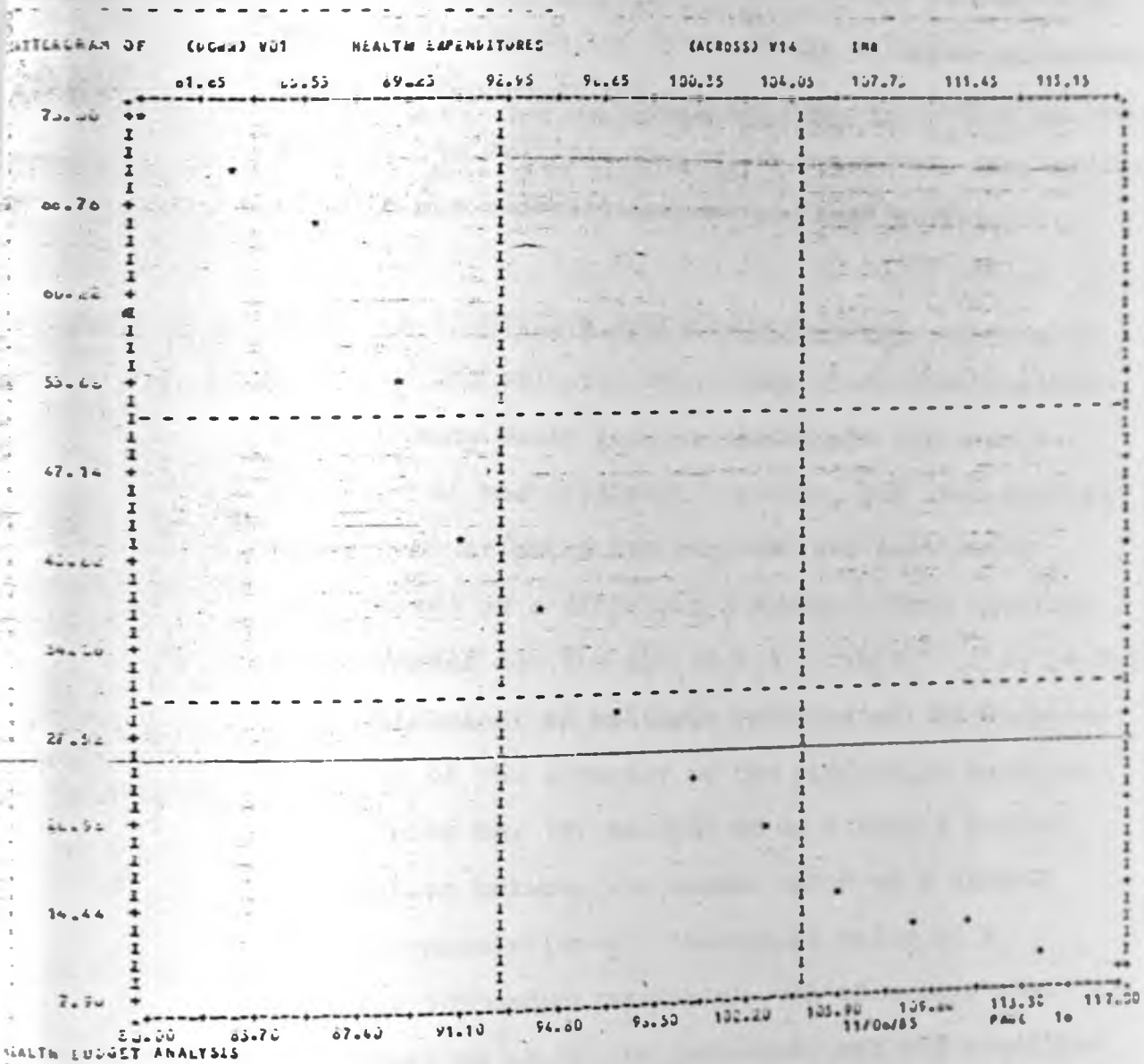
Slope (B) = 0.03539

Standard error of estimate = 3.57182

The regression equation is

$Y = -8.66090+0.03539X_{12} \pm 3.57182$ (1.96) .....4.9.12

FIGURE (xiii): TOTAL HEALTH EXPENDITURE WITH THE INFANT MORTALITY RATE




$r = -0.96717$ $r^2 = 0.93542$

Intercept (A) = 222.62583

Slope (B) = -1.91483

Standard error of estimate = 6.22246

The regression equation is

$Y = 222.62583 - 1.91483X_{13} \pm 6.22246(1.96)$ .....4.9.13

## MULTIPLE STEPWISE REGRESSION

4.10 In order that the total health expenditures were predicted on the basis of the selected variables, the most important information was interpreted in the form of the multiple regression equations, the coefficient of multiple correlations and the Beta Weights.

## MULTIPLE REGRESSION PREDICTION EQUATION

4.11 The multiple regression prediction equation has the same basic form as the simple regression equation of one predictor variable, but then several predictor variables are included and each being represented by a different X symbol. This equation is expressed as: $Y = B_1X_1+B_2X_2+ \ldots+B_kX_k$ .....4.7.14 The coefficient of multiple correlation (R) provides an index of the accuracy of the prediction equation. It can also be, (R) thought of as a simple Pearson correlation between the actual value of a simple Pearson correlation and the actual value of Y variable (dependent variable). In this case then, if R is equal to ±1.00, it indicates that the predicted value correlates perfectly with the actual value of the criterion variable.

## REGRESSION COEFFICIENT AND BETA WEIGHTS

4.12 In a multiple regression prediction equation, the number that precedes each of the predictor variables

are called the regression coefficients. These regression coefficients cannot be compared against one another in an attempt to determine which of the various predictor variables is the best predictor. This is so because each of the predictor variables in the actual equation are not the same scale of measurement. However, it is possible to convert the regression coefficients into comparable units called BETA WEIGHTS. Always there will be one beta weight for each predictor variable which can be thought of as the regression coefficients that would have been obtained if the various predictor variables were equal to one another in terms of means and standard deviations. Hence, the predictor variable that has the largest beta weight disregarding whether the beta weight is possitive or negative, is the best predictor.

Conversely, a small beta weight indicates that the corresponding predictor variable does not contribute to the successful prediction as much as other prediction variables do. Therefore, working with the beta weights enables one to simplify the regression equation since it assumes that the Y intercept (A) is always equal to zero. At this stage, we can now be able to determine the best prediction of the total health expenditures from the several thirteen variables.

Stepwise 1 : In stepwise 1 only three independent variables were entered.

| Variable | Multiple R | R Square | BETA |
|---|---|---|---|
| Total Government Expenditure | 0.99510 | 0.99023 | 0.49611 |
| Total Government Revenue | 0.99773 | 0.99547 | 0.31515 |
| Gross National Product | 0.99789 | 0.99578 | 0.19000 |

Out of these three independent variables the total Government expenditure was the best predictor to the total health expenditure and followed by the total Government revenue. Hence multiple regression equation is $Y= 0.49611X_1+0.31515X_2+0.19000X_3$ ....4.7.15

Stepwise 2 : Here three independent variables were entered into the equation.

| Variable | Multiple R | R Square | BETA |
|---|---|---|---|
| Other Paramedical staff | 0.98930 | 0.97872 | 1.06946 |
| Doctors and Dentists | 0.98980 | 0.97970 | 0.26154 |
| Total Nurses (Registered & Enrolled) | 0.99117 | 0.98241 | -0.33089 |

The best predictor of the total expenditure is the total of all other paramedical staff which excludes Registered and Enrolled nurses. It was then followed by the total number of Registered and Enrolled nurses. The Multiple Regression equation is

$$Y=1.06946X_1+0.26154X_2-0.33089X_3 \quad \ldots\ldots 4.7.16$$

Stepwise 3 : In step three, five variables were selected, but one of them was left out due to its very low tolerance level, thus leaving only four for analysis.

| Variable | Multiple R | R Square | BETA |
|---|---|---|---|
| Total Population | 0.98820 | 0.97654 | 0.88835 |
| Total Fertility Rate | 0.99246 | 0.98497 | -0.43643 |
| Life Expectancy at Birth | 0.99423 | 0.98849 | 0.91214 |
| Population Growth Rate | 0.99633 | 0.99267 | -0.41144 |

Out of the four independent variables, the best predictor to total health expenditures were the life expectancy at birth and the total population. The multiple regression equation is

$$Y= 0.88835X_1+0.91214X_2-0.43643X_3-0.41144X_4 \quad \ldots\ldots 4.7.17$$

Stepwise 4 : Here only three variables were selected.

| Variable | Multiple R | R Square | Beta |
|---|---|---|---|
| Reported Cases of Some Infectious Diseases | 0.94523 | 0.89346 | 0.59633 |
| Hospital Beds and Cots | 0.98210 | 0.96452 | 0.34866 |
| Registered Deaths | 0.98653 | 0.97324 | 0.13004 |

The reported cases of some infectious diseases was the best predictor of total health expenditure. This could be in the sense that more money is used for

survailance and eradication efforts. The equation is :

$$Y=0.59633X_1+0.34886X_2+0.13004X_3 \quad .....4.7.18$$

Stepwise 5 : In this step 8 variables were entered but only 7 of them were selected for the analysis. The other one had a low tolerance level.

| Variable | Multiple R | R Square | Beta |
|---|---|---|---|
| Total Government Expenditure | 0.99510 | 0.99023 | 0.44923 |
| Total Government Revenue | 0.99773 | 0.99547 | 0.09986 |
| G.N.P. | 0.99789 | 0.99578 | 0.12983 |
| Total Fertility Rate | 0.99813 | 0.99627 | -0.17999 |
| Total Population | 0.99846 | 0.99693 | 0.35089 |
| Life Expectancy at Birth | 0.99850 | 0.99701 | 0.25502 |
| Population Growth Rate | 0.99863 | 0.99726 | -0.12320 |

The best predictors were the total Government expenditure and total population. Hence the multiple regression equation is

$$Y=0.44923X_1+0.35089X_2+0.25502X_3+0.12983X_4+0.09985X_5$$
$$-0.17999X_6-0.12320X_7.....4.7.19$$

Stepwise 6 : In this step 6 variables were entered but only 4 were selected for the analysis.

| Variable | Multiple R | R Square | Beta |
|---|---|---|---|
| Total Government Expenditure | 0.99510 | 0.99023 | 0.52424 |
| Total Government Revenue | 0.99773 | 0.99547 | 0.26850 |
| Nurses (Registered & Enrolled) | 0.99801 | 0.99603 | -0.05644 |

The total Government expenditure was the best predictor of total health expenditure. The equation is:

$$Y=0.52424X_1+0.26850X_2+0.26249X_3-0.05644X_4 \quad .....4.7.20$$

Stepwise 7 : In this step 8 independent variables were entered but only six were selected for analysis.

| Variable | Multiple R | R Square | Beta |
|---|---|---|---|
| All other Paramedical Staff | 0.98930 | 0.97872 | 0.22478 |
| Total Population | 0.99271 | 0.98548 | 0.75918 |
| Total Fertility Rate | 0.99642 | 0.99286 | -0.34526 |
| Life Expectancy at Birth | 0.99670 | 0.99342 | 0.95276 |
| Population Growth Rate | 0.99732 | 0.99465 | -0.24621 |
| Total Nurses | 0.99765 | 0.99530 | -0.38369 |

Out of all these the life expectancy at birth and total population were the best predictors of total health expenditure. The equation is:

$$Y=0.95276X_1+0.75918X_2+0.22478X_3-0.38369X_4-0.34526X_5$$
$$-0.24621X_6 \quad .....4.7.21$$

Stepwise 8 : In this step the eleven variables were entered.

| Variables | Multiple R | R Square | Beta |
|---|---|---|---|
| Total Government Expenditure | 0.99510 | 0.99023 | 0.10836 |
| Total Government Revenue | 0.99773 | 0.99547 | 0.10059 |
| Reported Cases of Infectious Diseases | 0.99807 | 0.99615 | 0.40799 |
| Total Population | 0.99917 | 0.99835 | 0.84798 |
| Total Fertility Rate | 0.99932 | 0.99863 | -0.04985 |
| Nurses (Reg. & Enr.) | 0.99943 | 0.99886 | 0.70874 |
| Population Growth Rate | 0.99952 | 0.99904 | -0.04857 |
| G.N.P. | 0.99967 | 0.99934 | -0.47928 |
| Life Expectancy at Birth | 0.99977 | 0.99954 | -0.46559 |
| Hospital Beds | 0.99980 | 0.99960 | -0.08167 |
| Doctors & Dentists | 0.99980 | 0.99961 | -0.02148 |

Here the best predictor to total health expenditure are the total population, number of nurses (both registered and enrolled) and the GNP. The equation is:

$$Y=0.84798X_1+0.70874X_2+0.40799X_3+0.10836X_4+0.10059X_5 -0.04985X_6-0.04857X_7-0.47928X_8-0.46559X_9-0.08167X_{10} -0.02148X_{11} \quad .....4.7.22$$

In all, the best predictor to total health expenditure were the total population with a beta weight

of 0.84798, Nurses (Registered and Enrolled), with a beta weight of 0.70874, life expectancy at birth with a beta weight of 0.95276, total Government expenditure with a beta weight of 0.52424, reported cases of some infectious diseases with a beta weight of 0.59633, and all other paramedical staff.

CREATION OF NEW VARIABLES

Out of the original variables, some other six new variables were created or rather derived from. These derived variables were as follows:

i) Economic variables
ii) Demographic variables
iii) Health Manpower variables
iv) Bed population ratio
v) Doctor and Dentist population ratio and
vi) Nurse population ratio - the nurses included in this category were only the registered and enrolled ones.

4.13 The creation of such variables would help policy makers in decision making of which cluster of variables do affect our health system in terms of the expenditure under the background of budgetary constraints. These would be salient when considered together with the facility projections as to what the possibilities of the achievement of health for all by the turn of the century.

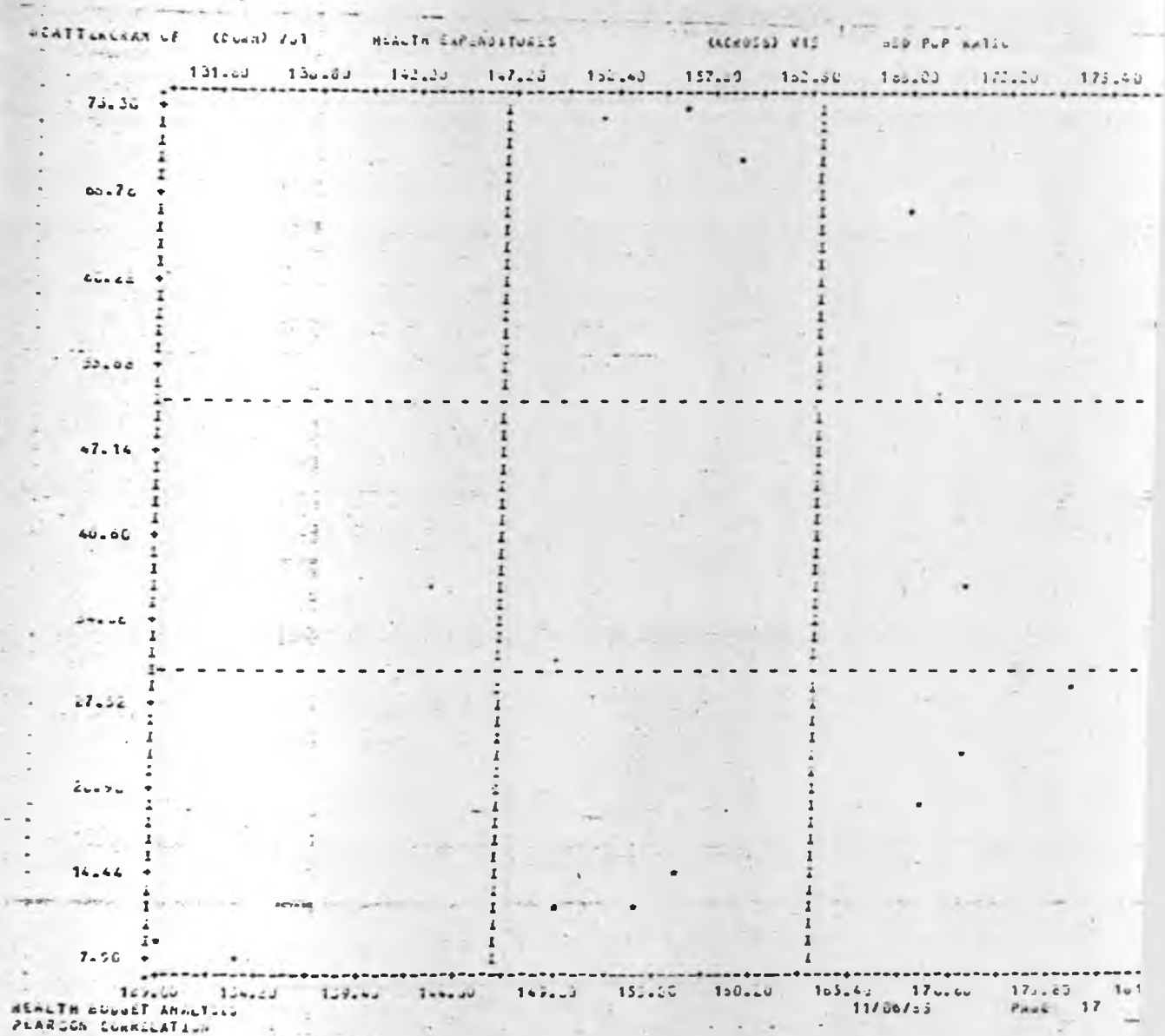
Correlation Between Health Expenditure and the Created Variables

4.13.2 Out of the created variables, only one variable showed a better correlation coefficient of 0.9452. This variable was the health manpower variable. The other variable that had a high correlation coefficient is the economic variable which had a Pearson correlation coefficient of 0.9978 as was expected since the total health expenditures are auto-correlated with it. However, the demographic variable had a very low Pearson correlation coefficient of -0.2666 showing that it had negligible association with total health expenditures. In any case the doctor and dentist population ratio and the nurses population ratio had Pearson correlation coefficient of 0.7741 and 0.7684 respectively. This type of coefficient shows relatively a good association. It is therefore not the demographic characteristics of the population per se that are the major contributary factors to high health expenditures, but rather the manpower (medical personnel) development within the health sector that is of great importance.

TABLE 4.21 : CORRELATION BETWEEN HEALTH EXPENDITURE AND THE CREATED VARIABLES

| | Health Expenditure | Bed Population Ratio | Doctor & Dentist Population Ratio | Nurse Popula-tion Ratio | Economy | Demog-raphy | Manpower |
|---|---|---|---|---|---|---|---|
| Health Expenditure | 1.0000 | 0.4556 | 0.7741 | 0.7684 | 0.9978 | -0.2666 | 0.9452 |
| Bed Population Ratio | 0.4556 | 1.0000 | 0.7847 | 0.8628 | 0.4664 | 0.5482 | 0.6668 |
| Doctor & Dentist Population Ratio | 0.7741 | 0.7847 | 1.0000 | 0.9456 | 0.7833 | 0.2912 | 0.9241 |
| Nurse Population Ratio | 0.7684 | 0.8628 | 0.9456 | 1.0000 | 0.7786 | 0.2865 | 0.9283 |
| Economic Variable | 0.9978 | 0.4664 | 0.7833 | 0.7786 | 1.0000 | -0.2546 | 0.9500 |
| Demographic Variable | -0.2666 | 0.5482 | 0.2912 | 0.2865 | -0.2546 | 1.0000 | 0.0108 |
| Manpower | 0.9452 | 0.6668 | 0.9241 | 0.9283 | 0.9500 | 0.0108 | 1.0000 |

FIGURE (xiv) : TOTAL HEALTH EXPENDITURE WITH BED POPULATION RATIO




$r = 0.45560 \quad r^2 = 0.20757$

Intercept (A) = -72.85523

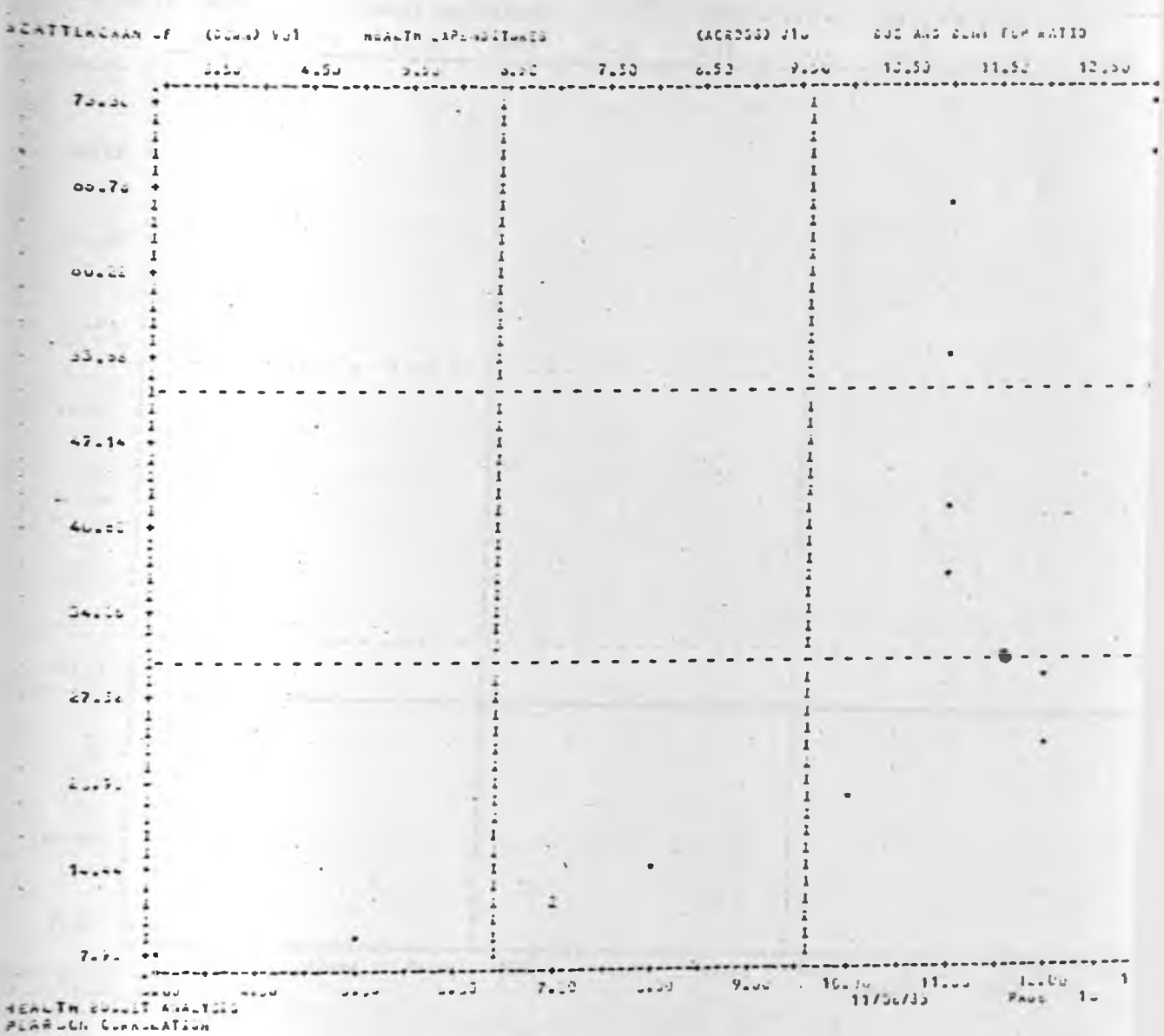
Slope (B) = 0.66265

Standard error of estimate = 21.79638

The Simple Regression equation is

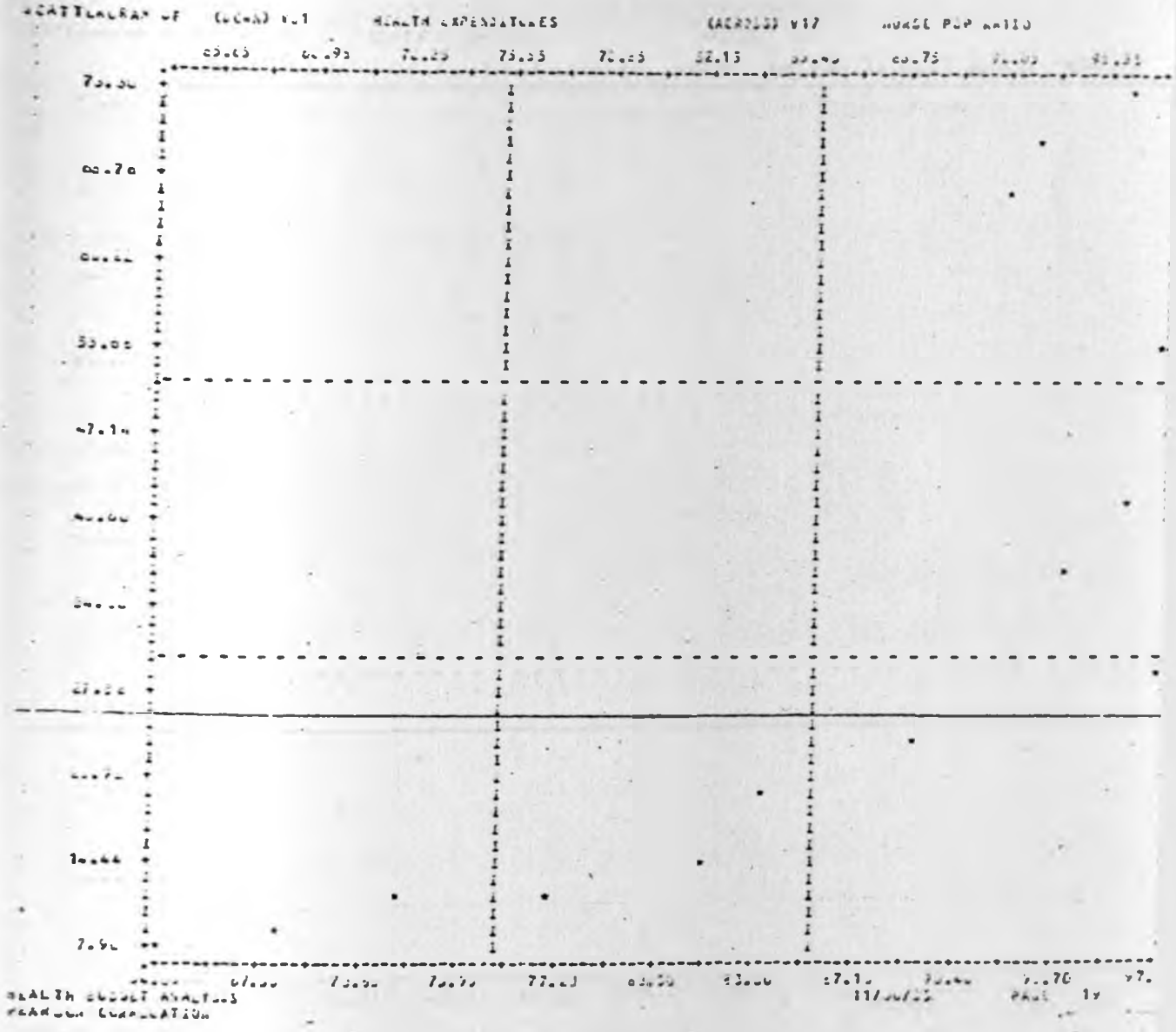
$Y = -72.85523 + 0.66265X_1 \pm 21.79638\ (1.96)$ .....4.9.23

FIGURE (xv) : TOTAL HEALTH EXPENDITURE WITH DOCTOR AND DENTIST POPULATION RATIO



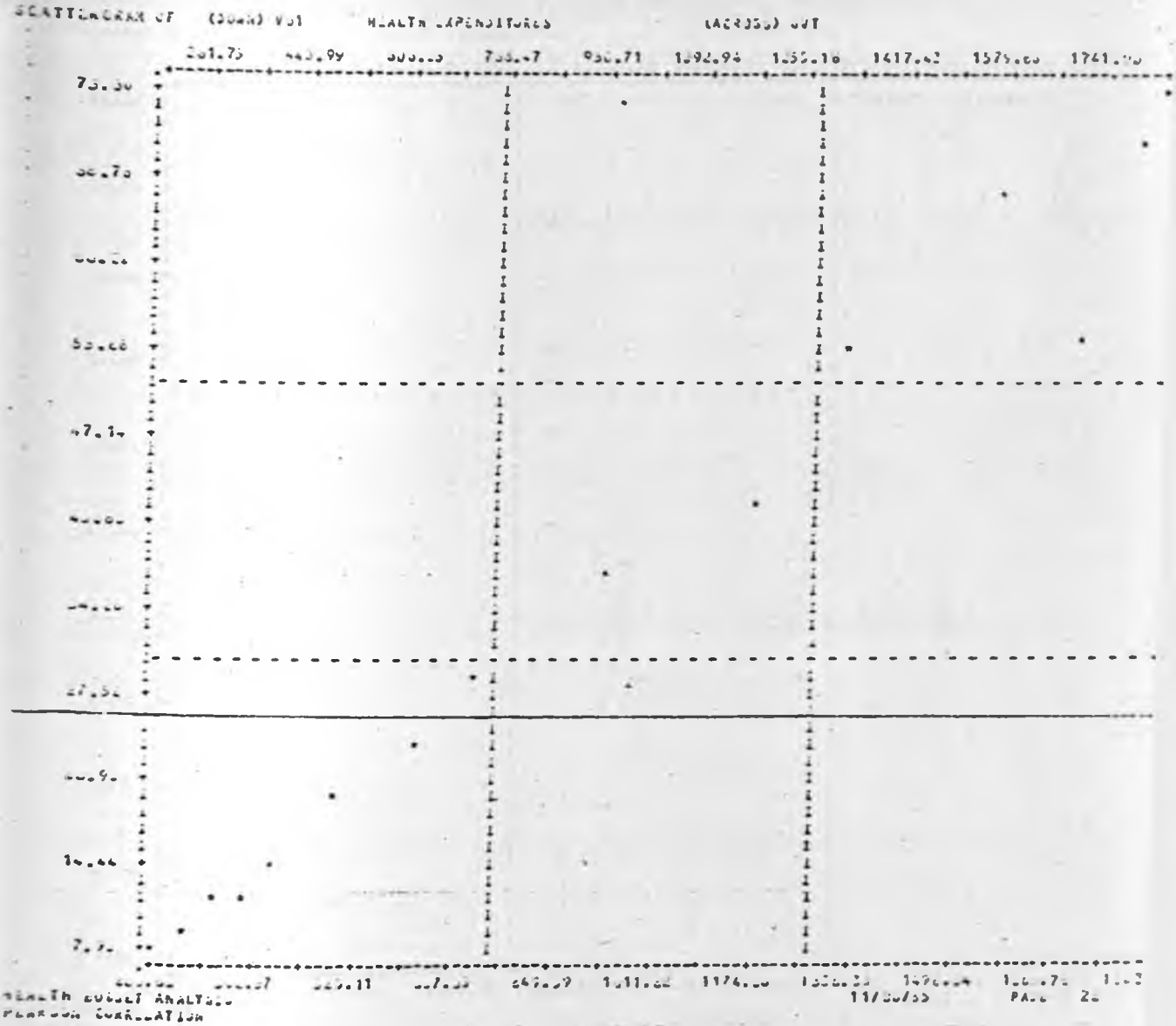
r= 0.77411 $r^2$ = 0.59925
Intercept (A) =-22.68924
Slope (B) =5.91007
Standard error of estimate =15.50031
The Simple Regression equation is
Y=-22.68924+5.91007X±15.50031 (1.96) .....4.9.24

FIGURE (xvi): TOTAL HEALTH EXPENDITURE WITH NURSE POPULATION RATIO



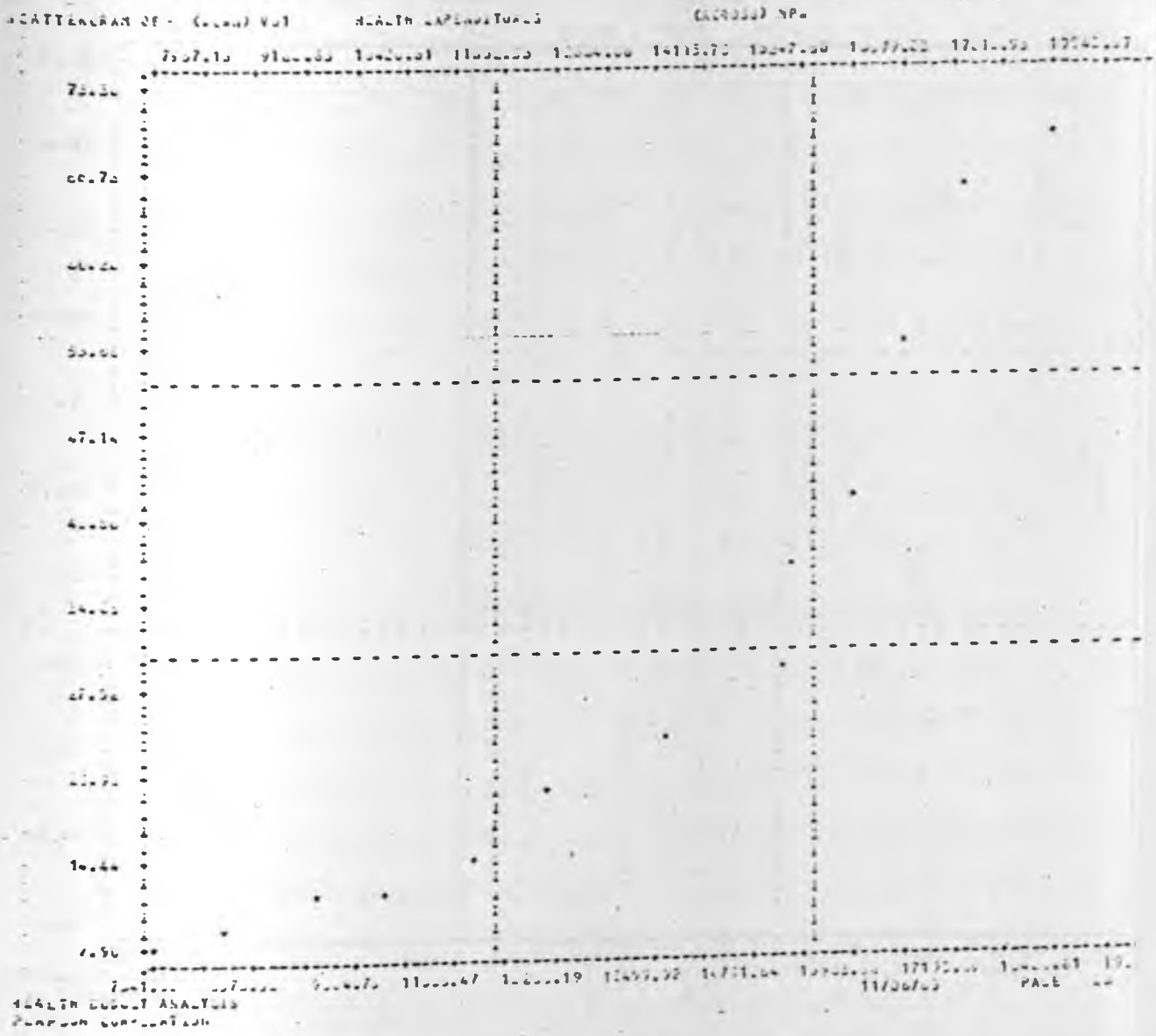
r = 0.76841 $r^2$ = 0.59046
Intercept (A) =-101.55471
Slope (B) =1.57874
Standard error of estimate =15.66943
Simple Regression equation is
Y=-101.55471+1.57874X±15.66943 (1.96) .....4.9.25

FIGURE (xvii) : TOTAL HEALTH EXPENDITURE WITH ECONOMIC VARIABLE



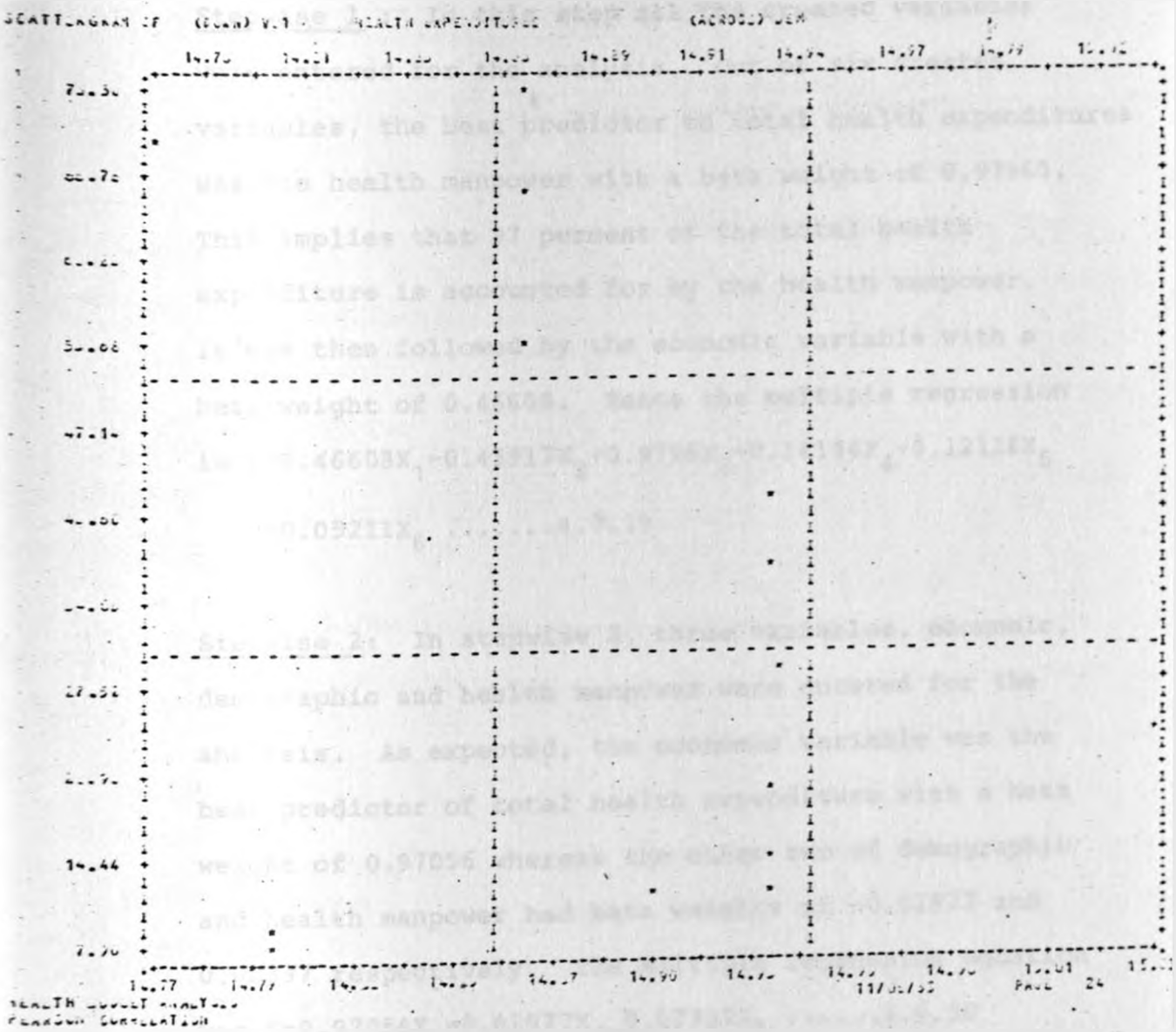
r= 0.99780 $r^2$ = 0.99560
Intercept (A) =-0.34141
Slope (B) = 0.04010
Standard error of estimate =1.62351
The Simple Regression equation is
Y=-0.34141+0.04010X±1.62351 (1.96) .....4.9.26

FIGURE (xviii) : TOTAL HEALTH EXPENDITURE WITH HEALTH MANPOWER



r =0.94520 $r^2$ 0.89341
Intercept (A) =-43.30589
Slope (B) =0.00568
Standard error of estimate = 7.99400
The Simple Regression equation is
Y=-43.30589+0.00568X±7.99400 (1.96) .....4.9.27

FIGURE (xix) : TOTAL HEALTH EXPENDITURE WITH DEMOGRAPHIC VARIABLE



$r = -0.26663$ $r^2 = 0.07109$

Intercept (A) = 1356.57346

Slope (B) = -88.81404

Standard error of estimate = 23.59886

Simple Regression equation is

$Y = 1356.57346 - 88.81404X \pm 23.59886\ (1.96)$ .....4.9.28

## 4.14 MULTIPLE REGRESSION

This enabled the selected or created variables to be entered for the analysis as was deemed appropriate.

Stepwise 1 : In this step all the created variables were entered for the analysis. Out of six created variables, the best predictor to total health expenditures was the health manpower with a beta weight of 0.97960. This implies that 97 percent of the total health expenditure is accounted for by the health manpower. It was then followed by the economic variable with a beta weight of 0.46608. Hence the multiple regression is $Y=0.46608X_1-0.45917X_2+0.9796X_3-0.14194X_4+0.12116X_5$

$-0.05211X_6$ .....4.9.29

Stepwise 2: In stepwise 2, three variables, economic, demographic and health manpower were entered for the analysis. As expected, the economic variable was the best predictor of total health expenditure with a beta weight of 0.97056 whereas the other two of demographic and health manpower had beta weights of -0.01977 and 0.02337 respectively. The Multiple regression equation was $Y=0.97056X_1-0.01977X_2\_0.02337X_3$ .....4.9.30

Stepwise 3 : The other remaining three variables were also entered in this step and the Nurse Population ratio was the best predictor of total health expenditure

with a beta weight of 1.23941 followed by the Bed Population ratio with a beta weight of -0.78476. The beta weight for the other variable was quite low at 0.21794.

The multiple regression equation is

$$Y=1.23941X_1-0.78476X_2+0.21794X_3 \quad \ldots\ldots 4.9.31$$

Stepwise 1

| Variable | Multiple R | R Square | Beta |
|---|---|---|---|
| Economic | 0.99780 | 0.99560 | 0.46608 |
| Nurse Population Ratio | 0.99789 | 0.99579 | -0.45917 |
| Health Manpower | 0.99802 | 0.99603 | 0.97960 |
| Doctor & Dentist Population Ratio | 0.99816 | 0.99633 | 0.14194 |
| Bed Population Ratio | 0.99841 | 0.99682 | |
| Demographic | 0.99868 | 0.99736 | -0.05211 |

The health manpower is the best predictor of total health expenditures.

Stepwise 2

| Variable | Multiple R | R Square | Beta |
|---|---|---|---|
| Health Manpower | 0.94520 | 0.89341 | 0.02337 |
| Economic | 0.99784 | 0.99568 | 0.97056 |
| Demographic | 0.99789 | 0.99579 | -0.01977 |

The economic variables are the best predictors of total health expenditures.

Stepwise 3

| Variable | Multiple R | R Square | Beta |
|---|---|---|---|
| Bed Population Ratio | 0.45560 | 0.20757 | -0.78476 |
| Doctor & Dentist Population Ratio | 0.81197 | 0.65929 | 0.21794 |
| Nurse Population Ratio | 0.87381 | 0.76355 | 1.23941 |

In all, out of the created variables, the best predictors of the total health expenditures were the health manpower (paramedical), economic, nurse population ratio and to some extent the bed population ratio.

## 4.15 PROJECTIONS

### 4.15.1 HEALTH EXPENDITURES

First of all I shall look at the recurrent health expenditures. Here a few assumptions were made, first the annual growth rate of recurrent expenditure of 21.2 percent per year was kept throughout the projection. This value was the average rate at which the recurrent expenditure grew within the study period. Secondly that the yearly increases of health expenditure remains constant at 11.3 percent as the 1982/83 value up to the turn of the century. Thirdly, I shall look at the recurrent expenditure as compared to the population, that is recurrent expenditure and population ratio that existed in the fiscal year 1982/83 remains constant throughout up to the turn of the century. For this third case it will be

more convenient to look at a few selected years only namely, 1985, 1990, 1995 and the year 2000 A.D. This will serve for comparative purpose to determine the trend of health expenditure.

TABLE 4.22 : PROJECTED RECURRENT EXPENDITURE UNDER SEVERAL POPULATION ASSUMPTIONS USING 1982/83 EXPENDITURE POPULATION RATIO FOR SELECTED YEARS

| Year | (i) Declining Fertility and Mortality K£ | (ii) Constant Fertility Declining Mortality K£ | (iii) Constant Fertility Constant Mortality K£ |
|---|---|---|---|
| 1985 | 73770565 | 74222497 | 74105869 |
| 1990 | 88917567 | 91239184 | 90648757 |
| 1995 | 106557483 | 112822568 | 11240807 |
| 2000 | 126803295 | 139985852 | 136691124 |

It is now clearly shown that, since these three projections are far from one another, under financial constraints recurrent health expenditures are not expected to rise beyond the available resources. Thus the yearly increases in recurrent health expenditures and its ratio to the population will be expected to decline greatly. In particular the yearly growth of recurrent expenditure will have to decline to less than by 50 percent i.e. to less than 5 percent per year.

Having looked at the recurrent expenditure, I now intend to deal with the total health expenditure by year up to the turn of the century. Here I shall use the 1982/83 year increase of 4.5 percent per annum as the trend shows that there is a downward shift of health expenditures and the expenditure population ratio as of the 1982/83 figure.

TABLE 4.23: PROJECTED HEALTH EXPENDITURE BY YEAR UNDER THE 1982 GROWTH RATE

| YEAR | K£ |
|---|---|
| 1983/84 | 76555526 |
| 1984/85 | 80000525 |
| 1985/86 | 83600549 |
| 1986/87 | 87362573 |
| 1987/88 | 91293889 |
| 1988/89 | 95402114 |
| 1989/90 | 99695209 |
| 1990/91 | 104181494 |
| 1991/92 | 108869661 |
| 1992/93 | 113768796 |
| 1993/94 | 118888392 |
| 1994/95 | 124238369 |
| 1995/96 | 129829096 |
| 1996/97 | 135671405 |
| 1997/98 | 141776619 |
| 1998/99 | 148156566 |
| 1999/2000 | 154823612 |
| 2000/01 | 161790674 |

In all, the health expenditures would have more than doubled by the year 2000 whereas the population would just have doubled and the labour force would not have doubled. This implies that there will be greater constraints on the economy in trying to achieve and satisfy this basic need - health.

TABLE 4.24 : PROJECTED TOTAL HEALTH EXPENDITURE UNDER GIVEN POPULATION ASSUMPTIONS FOR SELECTED YEARS

| Year | (i) Declining Fertility and Mortality K£ | (ii) Constant Fertility, Declining Mortality K£ | (iii) Constant Fertility, Constant Mortality K£ |
|---|---|---|---|
| 1985 | 82166065 | 82668423 | 82538524 |
| 1990 | 99035675 | 101621473 | 100963860 |
| 1995 | 118682872 | 125660874 | 123899121 |
| 2000 | 141232496 | 155915122 | 152245480 |

Under all the assumptions, there seems to be no much differences as to the total health expenditure by the year 2000. However, the difference between the projected total health expenditure assuming declining fertility and mortality and that projected using the 1982 growth rate is only K£20558178. This is due to the fact that mortality may not decline at all by the turn of the century. But the difference between the other projection assumptions are quite plausible and

expected.

TABLE 4.25 : PROJECTED NUMBER OF DOCTORS FOR SELECTED YEARS UNDER DIFFERENT ASSUMPTIONS

| Year | Using Doctor Population Ratio of 1:8390 | | | Using Annual output of 100 |
|---|---|---|---|---|
| | (i) Declining Fertility Declining Mortality | (ii) Constant Fertility Declining Mortality | (iii) Constant Fertility Constant Mortality | |
| 1985 | 2413 | 2427 | 2423 | 2451 |
| 1990 | 2907 | 2983 | 2964 | 2951 |
| 1995 | 3485 | 3690 | 3638 | 3451 |
| 2000 | 4147 | 4578 | 4470 | 3951 |
| Extra | 1996 | 2427 | 2319 | 1800 |
| DENTISTS | 1:75510 | | | output % |
| 1985 | 268 | 270 | 269 | |
| 1990 | 323 | 332 | 329 | |
| 1995 | 387 | 410 | 404 | |
| 2000 | 461 | 509 | 497 | |
| extra | 222 | 270 | 258 | |
| CLINICAL OFFICERS | | 1:9910 | | output of 120 |
| 1985 | 2042 | 2055 | 2052 | 2181 |
| 1990 | 2462 | 2526 | 2510 | 2781 |
| 1995 | 2950 | 3124 | 3080 | 3381 |
| 2000 | 3511 | 3876 | 3785 | 3981 |
| ENROLLED NURSE 1:1896 | | | | output of 475 |
| 1985 | 10676 | 10741 | 10724 | 10943 |
| 1990 | 12868 | 13204 | 13118 | 13318 |
| 1995 | 15420 | 16327 | 16098 | 15693 |
| 2000 | 18350 | 20258 | 19781 | 18068 |
| REGISTERED NURSE 1:2351 | | | | output of 150 |
| 1985 | 8610 | 8662 | 8649 | 8125 |
| 1990 | 10377 | 10648 | 10579 | 8875 |
| 1995 | 12436 | 13167 | 12983 | 9625 |
| 2000 | 14799 | 16337 | 15953 | 10375 |

In the above table (4.25) a few basic items of service units have been projected. Trying to project the number of hospitals, health centres and dispensaries that would be available by the turn of the century might be misleading but I shall later deal with the proportion of ownership of such facilities by the providing agencies to the turn of the century.

The results show that at the current 1982 levels, Kenya would require at least an additional 1800 doctors and a maximum of at least 2427 doctors. It can be seen that if the mortality remains constant, then Kenya will require an additional 2319 doctors such that the levels of 1982 are maintained.

The additional number of dentists that would be required is at least 222, but considering the demand for dental care would require that this number be even trebled so as to achieve satisfactory coverage and levels.

Being consistent with the work that the clinical officer does due to the mere fact that most doctors are situated in urban centres, and majority in private practise, the additional number of this cadre that will be required by the year 2000 under the 1982 levels would at least be 1590. In order that the demand and access to better health services is

achieved, this additional number would better be more than trebled to render services in the rural areas.

The other cadre that is urban oriented in distribution is the nursing. In this category, the registered and enrolled nurses are of crucial importance. The additional numbers that would be required by the turn of the century would be unequally distributed following the doctor distribution.

In all, the additional levels of all these cadres by the turn of the century demand much from the economy. Their growths out-space both the growth in the economy and population. To require that only the Government participates in the training of such cadres, would very much strain the economy and in most cases reduce access and increase the demand for better health services. The only possible remedy as such is to involve the agencies providing health services in the country in a co-ordinative nature to meet the training and supply of these cadres.

TABLE 4.26: PROJECTED HOSPITAL BEDS FOR SELECTED YEARS

| Year | Hospital Beds | Hospital Beds | Hospital Beds |
|---|---|---|---|
| 1985 | 31525 | 31718 | 31668 |
| 1990 | 37998 | 38990 | 38738 |
| 1995 | 45536 | 48214 | 47538 |
| 2000 | 54188 | 59321 | 58414 |
| Extra | 26080 | 31713 | 30306 |

Under all the conditions the country will need an additional number of more than 26080 hospital beds by the turn of the century. This implies that on the average at least 1450 beds per year which will need much of the investment cost to meet. Without including the improvement in the structural changes in Health centres and Hospitals, to get such number of hospital beds needs a lot of money which the budget cannot meet bearing in mind that the hospital beds during the study period increased by 970 beds per year on the average.

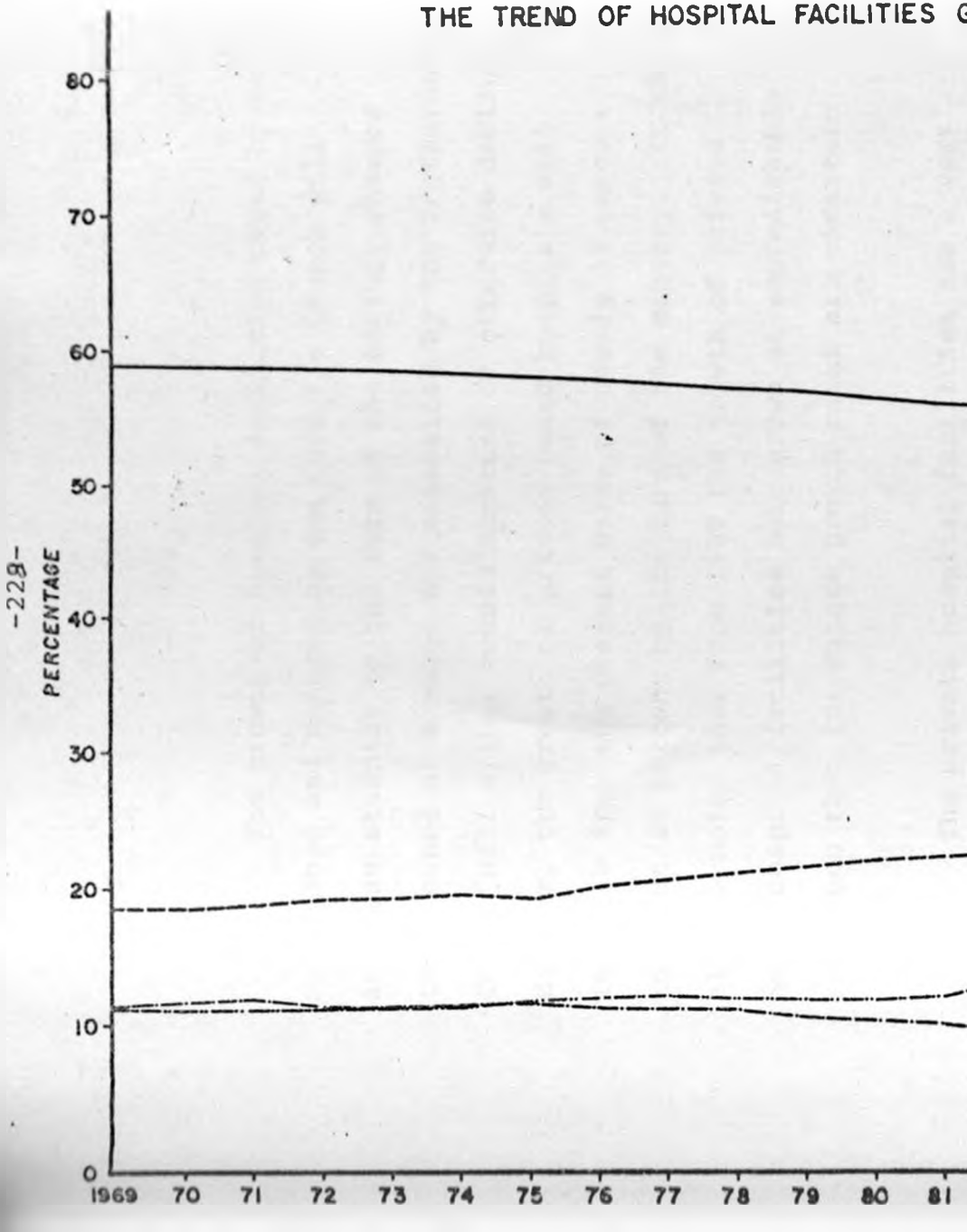
## 4.16 THE TREND OF HOSPITAL FACILITIES GROWTH BY AGENCY (1969-1997)

During the study period, the percentage of Government health facilities had been reducing from about 59 percent to about 55.5 percent at the end of 1982. Such a decrease could be attributed to the Government's financial constraints. Although there was such a decrease in the percentage of Government health facilities substantial constructions and extensions had been undertaken to help reduce congestion and the demand for such facilities. One such notable example was the completion of the extension of Kenyatta National Hospital.

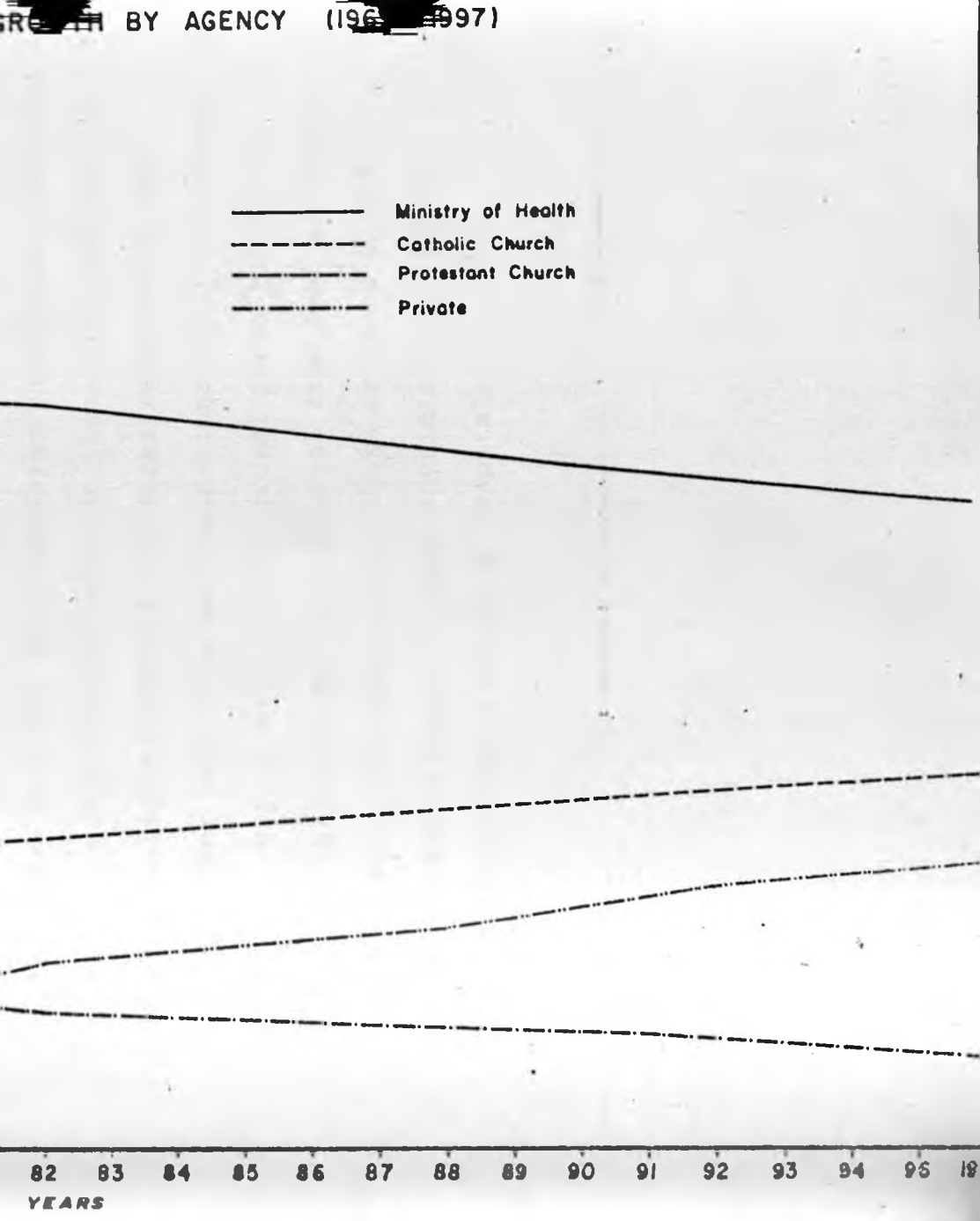
The Church organizations operated health services mostly in remote and outlying areas where the Government and Private health agencies had not been able to open up the necessary infrastructures for such purposes. Over the study period, the Catholic Mission steadily increased its health services. By way of example, in 1969, the Catholic Mission provided for 18.3 percent of all total hospital beds in the country which increased to 21 percent by 1982. On the other hand, the Protestant Church's health facilities reduced to 9.5 percent in 1982 from its original share of 11.4 percent in 1969. Whereas there was a reduction in hospital facility, there was an increase in the total number of available hospital beds from 1564 in 1969 to 2123 beds in 1982.

In view of these existing conditions, the graph next page tries to project these to the future, the growth of health facilities provided by the various agencies, namely, the Government, Catholic Church, Protestant Church and the private enterpreneurs. The graph was drawn with the assumption that the trends of curative health policy during the study period continue to the turn of the century. With such assertions in the framework, the growth of curative health care facilities will remain constant or decline in the future from the value of 55.4 percent in 1982 to about 48 percent by the turn of the century would be owned by the Ministry of Health.

THE TREND OF HOSPITAL FACILITIES G



GR[redacted]H BY AGENCY (19[redacted]997)



The growth of hospital facilities owned by or maintained and managed by the Catholic Church will increase steadily to the turn of the century whereas those owned or managed and maintained by the Protestant Church will either remain constant or otherwise decline. However, the growth of private owned hospitals will increase from the present value of nearly 12 percent to about 20 percent by the turn of the century. It should also be noted that from 1980 the growth of private owned hospital facilities have grown at unpredictable rate such that its future growth rates are uncertain.

The private hospital facilities are a very lucrative area for the practising physicians. The most salient reasons that have contributed to that are the poor quality of hospital services rendered in the Government hospitals and the National Health Insurance Policy coupled with the commercial firms policy of paying reimbursement for hospital treatment of their employees. To some extent, there are some credit facilities offered to those physicians who aspire to open private clinics or hospitals.

PROJECTED POPULATION TOTALS FOR

4.27 KENYA 1980 - 2000 (ROUNDED IN THOUSANDS)

| | ASSUMPTIONS | | |
|---|---|---|---|
| CALENDER YEAR | DECLINING FERTILITY DECLINING MORTALITY | CONSTANT FERTILITY DECLINING MORTALITY | CONSTANT FERTILITY CONSTANT MORTALITY |
| 1980 | 16,667 | 16,667 | 16,667 |
| 1981 | 17,342 | 17,342 | 17,342 |
| 1982 | 18,035 | 18,047 | 18,044 |
| 1983 | 18,748 | 18,784 | 18,775 |
| 1984 | 19,482 | 19,555 | 19,536 |
| 1985 | 20,241 | 20,365 | 20,333 |
| 1986 | 21,021 | 21,212 | 21,163 |
| 1987 | 21,826 | 22,100 | 22,030 |
| 1988 | 22,657 | 23,032 | 22,936 |
| 1989 | 23,513 | 24,009 | 23,883 |
| 1990 | 24,397 | 25,034 | 24,872 |
| 1991 | 25,308 | 26,109 | 25,905 |
| 1992 | 26,247 | 27,236 | 26,985 |
| 1993 | 27,214 | 28,418 | 28,113 |
| 1994 | 28,211 | 29,657 | 29,292 |
| 1995 | 29,237 | 30,956 | 30,522 |
| 1996 | 30,292 | 32,315 | 31,806 |
| 1997 | 31,375 | 33,738 | 33,144 |
| 1998 | 32,487 | 35,226 | 34,538 |
| 1999 | 33,626 | 36,782 | 35,991 |
| 2000 | 34,792 | 38,409 | 37,505 |

Source: Table 1 of Population Projections for Kenya 1980 - 2000 page 7.

The projections were made under the assumptions outlined next page. When these figures were used the results were plausible and expected.

Population Projections for Kenya 1980 - 2000 from Central Bureau of Statistics. Ministry of Economic Planning and development March 1983 were made under three basic assumptions. The assumptions of the projections were on the basis that

i) Birth fertility and mortality decline from the rates estimated for 1980.

ii) Fertility remains constant, but mortality continues to decline.

iii) Both fertility and mortality remain constrant.

It was under these projections that the projected health expenditures, the number of Doctors, dentists and paramedical staff were obtained.

# CHAPTER FIVE

## SUMMARY, FINDINGS, RECOMMENDATIONS AND CONCLUSIONS

### 5.1 SUMMARY

5.1.1 The importance of health as a basic need has been recognised in Kenya since independence and progress in curative health services has been good. However, there is need to correct the imbalances in public spending between curative services and preventive and promotive services, and between urban and rural facilities. In any case due to the financial stringency many activities had been proposed to focus on preventive and promotive services in rural areas in plan but lacked any implementation.

The study had the major promise that there exists a linear relationship between health expenditures and demographic and economic factors as they contribute to the health status of the population. Health interacts with other basic needs such as education to affect the levels of productivity and incomes. In that case then if the health status of the population is satisfactory, it has a positive impact on productivity and output with income gains. It is also true that if the health status of the population is poor, it can hamper the attainment of broad development objectives of growth and social progress.

5.1.2 The study covered a period of 14 years ranging from 1969 to 1982 of which the determinants of health were analysed both in its historical perspective as well as analytically by computer work. The methods used in the analysis were the interrelation between the various demographic, economic and health variables in the form of yearly growth rates (increases), percentages, and cost per population. The other method was the computer analysis which had its main components of the Pearson Correlation Coefficients, Scattergrams and Multiple Regression Analysis.

Before and just after independence, the health sector was run and developed on racial lines with the Europeans having the best form of western medicine whereas the Africans had the worst form of western medicine and thus relied on local medicine men some of whom have now been institutionalised. To-date there has been an effort to incorporate some of the good traditional medicines into the health services. In all, the western medicine has dominantly continued to be curative in nature.

5.1.3 The Government policies are those aimed at the achievement by all of the availability and accessibility of health care services to all by the year 2000. In the first development plan the policy was the provision

of free medical treatment to all the citizens without discrimination. The health status of the population was to be improved through curative health services as well as through preventive medicine and promotive health. In order to reduce the past disparities and increase accessibility the rural health services had to be expanded. By the end of that plan period, there was still a wide disparity in the distribution of health care facilities, paramedical staff and an acute shortage of medical personnel, hence not much emphasis was placed on preventive medicine and promotive health in real practical terms and implementation.

In the Development Plan Period 1970-1974, the emphasis was the construction of Rural Health Units that were urgently needed, while the old facilities were to be renovated and extended; as well as the consolidation of clinical training. In the plan period 1974 to 1978 and throughout the whole of the 1970's decade, the main objective was to prevent and ultimately eliminate the most common diseases in an effort to alleviate poverty among the populace. Hence the strategies included were the expansion of the training of basic paramedical staff, and develop the basic Rural Health Units which could serve 50000 to 60000 people each. At the end of the study period, the policies and strategies were those aimed at increasing coverage and accessibility to health care services as well as reduce urban-rural disperity.

The achievements that were met were those mainly supported by the UN agencies and other international bodies. There was also the realisation of international laws related to the promotion of health which were adopted. As much as the policies and strategies were set out categorically, there was poor implementation of such policies and strategies within the health sector. The various factors which led to such were the appropriate political commitment, social considerations to include community participation, adminstrative reforms, financial stringency and basic legislation.

5.1.4 The main provision of health services is under the Ministry of Health and financed by the Central Government. Apart from financing the Ministry of Health budget, the Central Government also gives assistance to Mission Hospitals in the form of Grants-in-Aid. These Grants-in-Aid are used by such institutions to expand their physical facilities. It is also the Ministry of Health which undertakes the training of most paramedical staff. The different cadres of paramedical personnel include, Clinical Officers, Dental Technologists, Laboratory Technologists, Pharmacy Technologists, both Registered and Enrolled Nurses, Community Nurses, Midwives and other supporting staff.

At the grass roots level, there were Rural Health Units that served the majority of the rural population. The rural health facilities included Health Centres, Health Sub-centres and Dispensaries. The District Hospitals acted as the focal point for both administrative and referal roles of those rural health units under their jurisdiction. In turn the District Hospitals used the Provincial General Hospitals for referal. At the National level, Kenyatta National Hospital served (serves) as the only national referal hospital. This structure of health units is a top heavy one, which in turn streamlines the manner in which both the medical practitioners and paramedical staff are distributed. By 1982, the Government provided for about 60 percent of the country's health infrastructure. The Ministry of Health provided 13132 hospital beds and cots in 84 hospitals out of the total 22118 beds and cots. The Ministry had also 1066 health units out of the total 1723 institutions.

The other providers of health included those services rendered by the Church organizations. These church health institutions were (are) mainly concentrated in the rural areas. Although they are always hit by financial crises, some do have training facilities for paramedical staff. It should be noted that out of all the available hospital beds and cots, about 30 percent are owned by the Church organizations

thus making it to be one of the vital structures of health services in the rural areas.

Only five municipalities provided health services to residents in their municipalities. These were (are) Mombasa, Nairobi, Nakuru, Kisumu, Eldoret and Kitale. The health services provided by these municipalities did supplement the services and facilities provided by other agencies. However, there was great demand for the health services since the urban population had increased due to migration, natural increase and extension of boundaries.

The private agencies which provide health services were mainly concentrated in the urban centres and in the place of the agency's interest. In this category were the large agricultural farms, commercial companies and individuals.

Fertility in Kenya has been increasing whereas mortality was declining. Some of the causes of death had been eliminated as for the case of small-pox. Most causes of death were diseases that could easily be prevented and cured.

5.1.5 Kenya's health status and conditions do favourably compare with those of other African countries.

The life expectancy at birth as of 1982 was among the highest in Africa (56 years); and the infant mortality rate was among the lowest despite the low per capita income. The crude birth rate was among the lowest in Africa while the total fertility rate was among the highest in the world. The extreme high population growth rate resulted from the comparatively low death rates and high birth rates.

## 5.2 FINDINGS

In the first part of the study which concentrated much on health expenditure growth in relation to the total Government expenditure, total Government revenue and the Gross National Product, its relation to the population, labour force and people aged 15-60 years was also looked at in terms of unit cost and expenditure lost due to each category of persons.

5.2.1 The most salient outcomes of all were that:-

i) The total recurrent health expenditure was fluctuating without any particular pattern.

ii) Out of the whole recurrent health expenditure in any one given year, personal emoluments consumed about 50 percent in the early 1970's decade, but reduced to 40 percent

in the early 1980's.

iii) The Administration and planning utilised about 80 percent of all the total recurrent health expenditure.

iv) Among the eight votes into which the recurrent health expenditures was allocated, the curative health services received in any one of the years more than 70 percent of the recurrent expenditure on the average whereas the preventive medicine and promotive health which had been emphasized only had a mere 7 percent of the recurrent expenditure on the average.

v) The development expenditure on the other hand was fluctuating but increasing.

vi) In comparison to the total Government budget expenditures, on the average total health expenditures was only 7 percent per year of which at least 5 percent was recurrent and at least 1 percent was development expenditure.

vii) In total, on average, curative health services consumed about 67 percent of total Government expenditure whereas only 6 percent was allocated for preventive medicine and promotive health.

viii) The total health expenditures as percentage of the Gross National Product had been increasing and attained 2 percent by the second half of the study period, while in the 1st half it was above 1.3 percent.

ix) The total health expenditure was on the average about 10 percent of the total Government revenue.

x) In terms of percent ownership of the health facilities, the Government facilities were reducing and will continue to do so, whereas the ownership by the Catholic Church and private enterpreneours were increasing and that of the Protestant Church was declining

xi) The production of physicians and other paramedical staff was very low to meet the high demand and help reduce population personnel ratios.

xii) The unit cost of the total health expenditure per population was increasing from KShs.14.50 per person in 1969 to KShs.84.78 per person in 1982.

xiii) The unit cost of the total health expenditure in terms of the population aged 15-60 years was increasing by rising from KShs.46.41 per person to KShs.180.29 per person in 1970 and 1982 respectively.

xiv) The unit cost of total health expenditure for the active population in the labour force was increasing throughout the study period rising from KShs.50.91 per person in 1970 to KShs.226.77 in 1982.

xv) Considering the total population, about 1.3 percent of the total health expenditure was lost per year due to the patient's death.

xvi) For the persons aged 15-60 years about 3 percent of the total health expenditure was lost per year due to the patients death.

xvii) In the case of the active population engaged in the labour force about 3.6 percent of the total expenditure was lost per year due to the death of patients.

Thus there exists a real pressure on health care expenditures as had been dealth with in the statement of the problem and analysed in Chapter Four.

5.2.2 In the second part of the analysis which was mainly computer work, the following computer programmes were used, namely, the Pearson Correlation, Scattergrams and Multiple Regression. From these the results were as follows:

i) The Infant Mortality Rate was highly negatively correlated with the total health expenditure.

ii) There was a strong positive correlation between total health expenditure and the other remaining variables.

iii) The changes in any one of the independent variables accounted for a high change in the total health expenditure.

iv) There was also strong intercorrelation between the independent variables themselves, in which the life expectancy at birth with the Infant Mortality and the number of

nurses (registered and enrolled) with the Infant Mortality Rate were negatively intercorrelated.

Further to these, it does then confirm or achieve the objective that there exists a linear relationship between total health expenditure and the various parameters in the analysis. Some of the parameters were positive whereas others were negative. Those that had a positive linear relationship with the health expenditures included the total population, the life expectancy at birth, the total Government expenditure, the total Government revenue, the Gross National Product, population growth rate, morbidity rates and the paramedical staff. The reasons behind such positive linear relationship have well been documented earlier in Chapter Four Section 4.9.4.

The only variable that had a negative linear relationship with the health expenditures was the Infant Mortality Rate. This was however expected on the basis that the health expenditures have been increasing and the Infant Mortality Rate reducing. As mentioned earlier, the greater achievement of this started to take shape from mid 1970's.

v) Any one of the selected variables can predict with a relatively high degree of accuracy the rise of health expenditures.

vi) The best predictors from the various clusters were :

a) Total Government expenditure for the economy variables.

b) In the Manpower of health variables, all other paramedical staff was the best predictor.

c) The life expectancy at birth was the best predictor for the Demographic variables.

d) The reported cases of some infectious diseases was the best predictor for epidemiological variable.

e) The Infant Mortality Rate was the best predictor when both demographic and economic variables were considered, as it had a beta weight of 1.16816.

## 5.3 RECOMMENDATIONS AND CONCLUSIONS

### For the Planners and Policy Makers

From the study it can be concluded that:

1 (a) There is no foreseable increase in the total health expenditure so as to increase the facility ownership of health facilities by the

Government. In view of such a fact, it can be recommended that other possible ways of increasing the financing of health expenditure be sort. Such ways may include a basic fee based on the unit cost per population.

(b) Most of the health budget expenditure had been allocated for curative health services against the background in which the policies emphasise preventive medicine and promotive health, thus making such policies not to be implemented. In view of such facts there is need to expand primary health care. This is so because the modality of operation of primary health care system aims at preventing disease and sickness while at the same time it maintains the health status of the populace through community participation on basic health education.

(c) There has been a high shortage of medical personnel of all cadres which emanates from the fact that it's only the Government which is involved with the training of such personnel. In view of this and the fact that other providers of health employ such personnel, there should be a concerted effort by all the providers of health to participate in the training of the most needed personnel via sponsorship or building more training schools.

(d) The health status in Kenya compares favourably with other African countries' status, but when compared to some Asian countries, it becomes poor. In order that an even better health status be achieved by the turn of the century, there is need for inter-ministerial co-ordination and co-operation in mattters that are directly or indirectly related to health. These factors include education of the people, nutrition status, dietry habits, shelter, good drinking water and a good living environment.

2. As much as the Health Information System does exist and being charged with the responsibility of collecting all data that is of demographic importance, and being coupled by the fact that statistical assistants are posted to all health institutions, the availability of the demographic data in any form was a problem. In view of this fact, the Statistical Assistants should be closely supervised so that they submit the data to the Health Information System monthly or otherwise as it may be so suitable to enable the Health Information System compile it.

3(a) There was strong correlation between the selected variables in the study and in particular the Infant Mortality rate, total Government expenditure and life expectancy at birth. In view of these, the policy makers should in-corporate such factors (variables) in their planning in order to generate easy implementation of programmes that would lead to better health status. In such planning however the regression analysis would be of much help.

(b) There was also strong intercorrelation between most of the independent variables. Therefore the efforts to be taken to control the rise in the total expenditures must take into account all the health-economic-demographic variables used in the regression analysis.

4. Under any one of the assumptions of the projected total health expenditure, the total health expenditures by the turn of the century would have just more than doubled and therefore the availability of such budget would very much depend on the responsiveness of the economy.

## 5.4 RESEARCH AREAS

1. Within the background of financial constraints and high demand for the health services within easy reach more research is needed to determine methods or sources of financing health services and which type of health care system would suit to reduce the existing disparity.

2. As the majority of the population (85%) reside in the rural areas, there is need to research on the effects of socio-cultural factors on the health status in the country in connection with the following:

a) The availability of traditional medicine.
b) The amount of resources the households use for their health.
c) The effects of the number of living units.
d) The nutrition and dietry conditions.
e) The literacy in the population.
f) The factors that have led the people to prefer the different health services provided by the different agencies (providers).

## BIBLIOGRAPHY


1. Abel-Smith, B. : An International Study of Health Expenditures and its Relevance for Health Planning. in Public Health Papers No.32 pp.40-92.

2. Abel-Smith, B. and Leiserson. : Making the most of Scarce Resources; in World Health Forum 1980, Vol.1 & 2 pp.142-152.

3. Andrew, F.; Morgan, J. Sonquist, J. : Multiple Classification Analysis. May, 1976 pp.95-106.

4. Brooman, F. : Macroeconomics: George Allen and Unwin Ltd., 1963 pp.28.

5. Carr, J.W. and Feldstein, P.J. : Case Study of Hospital Size - The Emperical Evidence, in Health Economics --.277-279.

6. Carrin, G. : Economic Evaluation of Health Care in Developing Countries: Groom Helm, St. Martins, 1984. pp.120-147.

7. Central Bureau of Statistics : National Development Plan 1966-1970, Government Printer 1966 pp.314-333.

_____ : National Development Plan 1970-1974, 1969 pp.488-504

_____ : National Development Plan 1974-1978, Part 1: Government Printers, Nairobi 1974. pp.449-468.

_____ : National Development Plan 1974-1978 Part 11: Government Printers, Nairobi 1974. pp.105-126.

_____ : National Development Plan 1979-1983 Part 1: Government Printers, Nairobi 1979. pp.125-151.

_____ : National Development Plan 1979-1983 Part 11: Government Printers, Nairobi, 1979. pp.33-54.

_____ : National Development Plan 1984-1988: Government Printers, Nairobi 1984, pp.5,35,143-154.

_____ : Appendix to a Proposal for the Improvement of Rural Health Services and the Development of Health Training Centres in Kenya. Ministry of Health, 197

_____ : Information System for Vital and Health Statistics: In Social Perspective, Vol.1 No.2, August, 1976, pp.1-3.

_____ : The Manpower Survey, 1971

_____ : Major Highlights of the Kenya Fertility Survey: In Social Perspective Vol.4, No.2 December, 1979, pp.1-2.

_____ : The Future Growth of Kenya's Population and its Consequences. In the Statistical Digest Vol.1 No.2 June, 1971.

_____ : The Kenya Fertility Survey 1977/78 pp.77-94.

_____ : Integrated Rural Survey 1974-75. Basic Report, 1976.

_____ : The Prospects for Fertility Decline in Rural Kenya: In Social Perspectives Vol.7 No.4, December, 1982. pp.1-7.

_____ : Infant Mortality in Kenya: Trends and Levels: In Social Perspectives Vol.5 No.2, January 1981, pp.1-4.

_____ : Economic Survey 1970: Ministry of Economic Planning and Development, pp.180-181.

_____ : Economic Survey 1971, pp.212-213

_____ : Economic Survey, 1972, pp.188-190

_____ : Economic Survey 1975, pp.190-193

_____ : Economic Survey 1976, pp.159-160

_____ : Economic Survey 1979, pp.181-182

_____ : Economic Survey 1980, pp.197-188

_____ : Economic Survey 1982, pp.213-216

_____ : Economic Survey 1983, pp.224-225

_____ : Economic Survey 1984, pp.201

_____ : Statistical Abstract 1970, pp.142-143.

_____ : Statistical Abstract 1972, pp.176-177

_____ : Statistical Abstract 1975, pp.198-199.

_____ : Statistical Abstract 1978, pp.225-226.

_____ : Statistical Abstract 1980, pp.205-206.

_____ : Statistical Abstract 1981, pp.207.

_____ : Statistical Abstract 1983, pp.196-197.

_____ : The 1969 Population Census, Analytic Report Volume 1V.

_____ : Compendum to Volume 1, 1979 Population Census: July, 1981 pp.9-10.

8. Cooper, H.M. Cuyler, J.A. : Health Economics. Penguin Books 1973, pp.135-230.

9. Cox, P.R. : Demography 1959. Fifth Edition. pp.1-2.

10. Daily Nation. : No.7504 Tuesday, January, 22, 1985.

11. Diesfeld, H.J. : Kenya, A Geographical Monograph 1978, pp.30.

12. Draper, N.R.; Smith, H. : Applied Regression Analysis, John Willey & Sons. Inc; 1966, pp.1-33.

13. Feldstein, M.S. : The Effects of Case-Mix on Hospital Cost, In Health Economics pp.260-275.

14. Gould, J. & Kolb, L.W.: A Dictionary of the Social Sciences, pp.674-675.

15. Great Britain : Great Britain Committee of Inquiry into Cost of the National Health Report. pp.10-50.

16. Guillard, A. : Demography, 1855

17. Hartwig, E.M. : Health Policies and National Development in Kenya 1975. Ph.D. Thesis, University of Nairobi, pp.177-182.

18. Henin, R. A. : Population and Socio-economic Change in Kenya. Population Studies and Research Institute, pp.20-40.

19. Hollingsworth, T.H. : Historical Demography, Camelot Press, 1969. pp.1-60.

20. Ingbar, M.L and Taylor, L.D. : Hospital Costs in Massachusetts in Health Economics, pp.78-290.

21. Kibet : UNICEF Wallchart on Infant Mortality, based on 1979 Census figures: Population Studies and Research Institute.

22. Koinange, K. W. : The Status of Health 1980. Ministry of Health, 1982.

23. Maina-Githinji-Elizabeth : The Out-patient and the Staff Satisfaction with the Treatment provided in a District Hospital in Kiambu, Kenya 1977. M.A. Thesis, University of Dare es Salaam, pp.276-280.

24. Malone, I.M. : Quality of Care Assessment in the Out-patient Services of a District Hospital in Kenya, 1976. M.A. Thesis, University of Dublin, London, pp.240.

25. Ministry of Health : Health Information System Bulletins.

26. Nie, H.H.; Hull, H.C.; Jenkins, J.G.; Steinbrenner, B.D.H. : Statistical Package for Social Sciences. McGraw-Hill 1975, pp.276-277.

27. Ominde, S. H. : Population Change and Socio-economic Development in East Africa. Population Studies and Research Institute 1980, pp.44.

28. Opukah, S. : The Distribution of Rural Health Facilities - A Case Study of Mumias and Butere Divisions. M.A. Planning 1979 Dissertation. pp.110-117.

29. Perlman, M. : The Economics of Health and Medical Care, in World Health Forum 1980, Vol.1, No.1 and 2. pp.41-80.

30. The Oxford English Dictionary : Vol.111 pp.35.

31. United Nations : Multilingual Demographic Dictionary. Prepared by the Demographic Dictionary Committee of the International Union for the Scientific Study of Population, Department of Economics and Social Affairs, New York, 1958.

32. United Nations : Number 29, 1958.

33. United Nations : Population Projections for Kenya 1980-2000, March, 1983, Central Bureau of Statistics, pp.1-12.

34. Vogel, L.C. : The Implications of the transfer of basic Health Services in Rural Areas from County Councils to the Central Government; in the East African Medical Journal Vol.47, No.2 of May, 1970, pp.242-246.

35. Vogel, L.C.; Muller, A.S.; Odingo, R.S. Onyango, Z; De Geus, A. : Health and Diseases in Kenya. East African Literature Bureau 1974, pp.1-180.

36. Williams, A. (1973) In Wolfe, J.W. etc. : Cost Benefit and Cost Effectiveness Studies and Analysis: Allen and Unwin London, pp.30-60.

37. World Bank : Health Sector Policy Paper 1980, pp.11-19.

38. World Bank : Kenya, Population and Developments, July 1980, pp.22.

39. World Bank : World Population Data Sheet, 1980.

40. W.H.O. 1958 (a) : The First Ten Years of World Health Organization, UN 1959, pp.334-357.

41. W.H.O. Geneva, 1973 : The Interrelationship Between Health Programmes and Socio-Economic Development in Public Health Papers No.49 pp.15-17.

42. W.H.O., Geneva, 1975 : Health Economics

43. W.H.O., UNICEF : Alma-Ata 1978 Primary Health Care, pp.2-6.

44. W.H.O., 1977, : Approaches to Planning and Design of Health Care Facilities in Developing Areas. pp. 1-15

# AN SPSS COMPUTER PROGRAMME FOR REGRESSION ANALYSIS AND PEARSON'S CORRELATION

```
JOB XEL1,T00,BOKORA
ICSNRUN SPSS ,, OV
VOLUME 99999
MAXTIME 99999
****
DOC DATA
DEFAULTS
RUN NAME        HEALTH BUDGET ANALYSIS
FILE NAME       PSR71
VARIABLE LIST   V01 TO V18
INPUT MEDIUM    CARD
N OF CASES      14
INPUT FORMAT    FIXED(3F4.1,2F5.1,F6.1,2F3.1,3F5.0,2F4.0,2F3.0,2F2.0,F5.0)
VAR LABELS      V01,HEALTH EXPENDITURES/V02,TOTAL POPULATION/
                V03,LIFE EXPECTANCY AT BIRTH/V04,TOTAL GOVERNMENT EXP/
                V05,TOTAL GOV REV/V06,GNP/V07,POP GR/V08,TFR/
                V09,REPT CASES OF IF DIS/V10,HOSP BEDS/V11,NURSES/
                V12,DOC AND DENT/V13,OTHERS/V14,IMR/V15,BED POP RATIO/
                V16,DOC AND DENT POP RATIO/V17,NURSE POP RATIO/
                V18,REG DETHS/
TASK NAME       COMPUTATION
COMPUTE         HLT=V01/10



COMPUTE         GVT=V04+V05+V06/30
COMPUTE         MPW=V11+V12+V13/30
COMPUTE         DEM=V07+V08+V14/30
READ INPUT DATA
07.910.949.0105.2078.40511.03.37.6335301453706971035803691171330364287O2
10.211.349.5132.0091.40563.43.37.7330301452567634058404701141290568429l2
12.211.749.9159.8116.30633.03.47.8341411805508401084605881111540772473Z5
12.812.150.4180.8140.30703.33.47.9259761818066931508460669107156077746884
14.512.550.8207.7166.10770.93.57.9246081953310273094907901061560882469Y2
20.412.951.3272.3188.01022.93.67.9351372170710778132208021031691084530S0
24.013.451.7336.0254.01150.43.78.0310402284811°321654090e100171128945643
29.413.952.2368.6312.91385.53.78.029346247081343616721068097177129749924
36.914.452.6522.9343.11781.23.78.1458342470813599157811990941711194473l9
43.114.953.1625.7485.21967.63.88.150e7426922142906159617040911811196446Y9
53.815.353.5695.7556.22212.63.88.166758276911485916821806089181119750020
65.716.753.8842.4643.62548.53.98.168251281081541418532640086168119250848
70.117.354.0925.8774.42941.53.98.170236281081668222542133063159139357764
73.318.054.5880.8832.63288.54.08.269070281081719323902266080156139e65392
TASK NAME       REGRESSION
REGRESSION      VARIABLES=V01,V02,V03,V04,V05,V06,V07,V08,V09,V10,V11,V12,
                V13,V14,V15,V16,V17,V18,HLT,GVT,DEM,MPW/
                REGRESSION=V01 WITH V02,V03,V07,V08,V14(2)/



                REGRESSION=V01 WITH V09,V10,V11,V18,V12,V13,V14(2)/
                REGRESSION=V01 WITH V02,V03,V04,V05,V06,V07,V08,V14(2)/
STATISTICS      ALL
TASK NAME       PEARSON CORRELATION
PEARSON CORR.   V01,V15,V16,V17,GVT,DEM,MPW WITH V01,V15,V16,V17,GVT,DEM,
                MPW
STATISTICS      ALL
FINISH
****
15.59.55_
```

## AN SPSS COMPUTER PROGRAMME FOR SCATTERGRAMS

```
JOB XEL1,T40,BOKORA
ICSNRUN SPSS ,, OV
VOLUME 99999
MAXTIME 99999
****
DOC DATA
DEFAULTS
RUN NAME          HEALTH BUDGET ANALYSIS
FILE NAME         FSR71
VARIABLE LIST     V01 TO V18
INPUT MEDIUM      CARD
N OF CASES        14
INPUT FORMAT      FIXED(3F4.1,2F5.1,F6.1,2F3.1,3F5.0,2F4.0,2F3.0,2F2.0,F5.0)
VAR LABELS        V01,HEALTH EXPENDITURES/V02,TOTAL POPULATION/
                  V03,LIFE EXPECTANCY AT BIRTH/V04,TOTAL GOVERNMENT EXP/
                  V05,TOTAL GOV REV/V06,GNP/V07,POP GR/V08,TFR/
                  V09,REPT CASES OF IF DIS/V10,HOSP BEDS/V11,NURSES/
                  V12,DOC AND DENT/V13,OTHERS/V14,IMR/V15,BED POP RATIO/
                  V16,DOC AND DENT POP RATIO/V17,NURSE POP RATIO/
                  V18,REG DETHS/
TASK NAME         COMPUTATION
COMPUTE           HLT=V01/10


COMPUTE           GVT=V04+V05+V06/30
COMPUTE           MPW=V11+V12+V13/30
COMPUTE           DEM=V07+V08+V14/30
READ INPUT DATA
07.910.949.0105.2078.40511.03.37.6335301453706971035803691171330364287O2
10.211.349.5132.0091.40563.43.37.7330201452567634058404701141290568429l2
12.211.749.9159.8116.30633.03.47.8341411805508401084605881111540772473l5
12.812.150.4180.8140.30703.23.47.9259761818609315084606891091500777468B4
14.512.550.8207.7160.10770.93.57.9246081952310273094907901061560882469B2
20.412.951.3272.3188.01022.93.67.9351372178710778132208021031691084530S0
24.013.451.7336.0254.01150.43.78.0310402284811932165409061001711289456A3
29.413.952.2368.6312.91385.53.78.0293462470813436167210680971771297499Z4
36.914.452.8525.9343.11701.23.78.1458342470813599157811990941711174473l9
43.114.953.1625.7485.21967.63.88.1506762692214296159617046911811196446B9
53.815.353.5695.7556.22212.63.88.1667582769114859168218066891811197500Z0
65.716.753.8842.4643.62548.53.98.1682512810815414185320400861681192508A8
70.117.354.0925.8774.42941.53.98.1702362810811608225421330831591393577G4
73.318.054.5880.8832.63288.54.08.2690702810817193239022660801561396653B2
TASK NAME         SCATTERGRAM
SCATTERGRAM       VARIABLES=V01,V02,V03,V04,V05,V06,V07,V08,V09,V10,V11,V12,
                  V13,V14,V15,V16,V17,V18,HLT,GVT,DEM,MPW/
                  SCATTERGRAM=V01 WITH V15,V16,V17,GVT,DEM,MPW(2)/


                  SCATTERGRAM=V01 WITH V09,V10,V11,V18,V12,V13,V14(2)/
                  SCATTERGRAM=V01 WITH V02,V03,V04,V05,V06,V07,V08,V14(2)/
STATISTICS        ALL
FINISH
****
15.59.55_
```