ON HEALTH MANAGEMENT INFORMATION SYSTEM

(A Case Study of Christian Health Association of Nigeria)

By

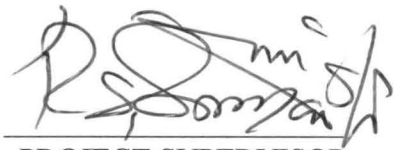
Bamidele Olukayode Samson
PGD/MCS/141/96

A PROJECT SUBMITTED TO THE DEPARTMENT OF MATHEMATICS/COMPUTER SCIENCE, FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA, IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF THE POST GRADUATE DIPLOMA IN COMPUTER SCIENCE

MARCH 1998

APPROVAL PAGE

This research project has been examined and found acceptable in partial fulfillment of the requirements for the award of the Post Graduate Diploma in Computer Science of the Federal University of Technology, Minna.



PROJECT SUPERVISOR
(DR. S.A. REJU)

23-03-98.

DATE

HEAD OF DEPARTMENT
(DR. K.R. ADEBOYE)

DATE

EXTERNAL EXAMINER

DATE

DEDICATION

This project is dedicated to the following:

* The glory of God, in whom we live, move and have our being.
* Lee, my wife, as a token of my love.
* 'Tosin, my daughter, who had to endure my absence for such a long period of time.
* 'Tobi, my son, the gift that came during the course of my undergoing this programme.

DECLARATION

I, Bamidele Olukayode Samson, hereby declare that the whole of this project work as submitted to the Department of Mathematics/Computer Science, Federal University of Technology, Minna, is the result of my research work, except where references were made to published literature and this has been duly acknowledged.

The material has never been presented elsewhere for the award of any certificate.

_____

BAMIDELE O.S.

CERTIFICATION

This is to certify that this project titled "***On Health Management Information System - A case study of the Christian Health Association of Nigeria (CHAN)***" by Mr. Bamidele O.S. of the Department of Mathematics/Computer Science, Reg. No. PGD/MCS/141/96, meets the regulation governing the award of a Post Graduate Diploma in Computer Science of the Federal University of Technology, Minna, Niger State, and is approved for its contribution to knowledge and literacy presentation.

ACKNOWLEDGEMENTS

I give God all the glory for the grace and privilege He has given me to attend this programme. He provided all the resources for the successful completion of the programme. Thank you Lord.

My deep and sincere appreciation goes to my supervisor, Dr. S.A. Reju, who did the thorough job of supervising this project enthusiastically. He could not have done it better. I also want to register my appreciation to the Head of Department of Mathematics/Computer Science, Dr. K.R. Adeboye for the mature way things were handled. I say a big thank you to all staff of the Department for making the programme worth its sort. I am particularly grateful to Mr. Kola Abdulraheem of the University Computer Centre for his very useful contributions.

I appreciate the support and encouragement that came from my wife, Lydia Ibiyemi. Thank you for playing the many roles you have had to when I was away, and to my children, Eunice Oluwatosin and Andrew Oluwatobi (Prof.) for being constant source of joy to me.

I must not fail to put on record the great contribution of the Oyegbiles - Bro. Tunji, Sis. Bola, Faith, David and Grace, for providing "*a home away from home*" for me. May the Lord reward your labour of love abundantly.

I should not stop without appreciating the cooperation of all my classmates especially Mr. T.S. Ajide (Class Rep.), Ibraheem Bioku, Victor, Winnie, Michael, Dr. Musa and Mr. S.A. Atteh. What a wonderful time together.

I am indeed very grateful to the members of Appointments, Promotions, & Disciplinary Committee and the Management of CHAN for granting my release and sponsor for this programme. I want to specially thank the Secretary General of CHAN, Rev. Moses Thliza, and the entire staff of CHAN for their support in so many ways. I am most grateful to Mrs. Esther Gado who offered to type part of this project work.

May the Lord richly reward you all.

TABLE OF CONTENTS

ABSTRACT

Information they say, is power. The dynamic nature of the health care system makes imperative the need to develop the information subsystem within it. Information system development, even though costly, has immense gains.

Even though orthodox medicine is about one century old in Nigeria, its information system is largely underdeveloped.

This research work is a humble contribution to the development of computerised Health Management Information System in Nigeria using the Christian Health Association of Nigeria (CHAN - a non governmental organisation) as a case study. The work cashes on the potential advantages of reliability, efficiency, completeness and continuity of health data from about 4,000 health facilities responsible for about 40% of the total health services rendered in the country.

A study of the existing system was made and the design of a new one carried out. The eclectic approach to system conversion was suggested with a built-in maintenance culture.

CHAPTER ONE

INTRODUCTION TO HEALTH INFORMATION MANAGEMENT

1.1. Introduction to CHAN

Christian Health Association of Nigeria (CHAN) is the coordinating body for all church-sponsored health care work in Nigeria. It was founded by the following medical voluntary bodies:

i. The Christian Council of Nigeria Medical Board (CCN)

ii. The Northern Christian Medical Advisory Council (NCMAC)

iii. The Catholic Secretariat Medical Board (now the Catholic Bishops' Conference of Nigeria (CBCN)

CHAN was registered with the Federal Government of Nigeria under the Companies and Allied Matters Act, 1990 as a charitable organisation. It has about 400 registered member institutions. These member institutions in turn have about 4,000 health facilities altogether ranging from health posts and dispensaries through health centres to maternities and hospitals some of which are approved as centres of excellence. CHAN member facilities cut across most Christian denominations and are distributed throughout all the states of the Federal Republic of Nigeria.

The mission statement of CHAN is "***continuing the healing ministry of Jesus through networking (Matt. 9:35 and Luke. 10:9)***". Its motto is "***Reaching the Unreached***". In order to meet its goals, CHAN has the following objectives:

i. To encourage and develop the highest level of health care for the people of Nigeria, within the framework of national health policy.

ii. To provide a forum for discussion for Christian Agencies and Institutions providing health care; to share experience and knowledge of members in a common Ministry of Healing.

iii. To promote cooperation between the churches and the Federal/State/Local Governments in matters of common concern in relation to health; to speak on health matters for member institutions to the Federal Ministry of Health in accordance with the policies of the member institutions in health matters and relay information between Ministry and CHANs' member institutions.

iv. To encourage mutual cooperation among institutions; to assist church planning agencies and coordinating bodies in matters relating to Health; to advise on joint planning, the sharing of resources and the development of Health services in relation to the needs of the people of Nigeria.

v. To collect and collate information and statistics on voluntary agency Health Care work, to liaise with international and national organisations and to provide evaluation services of/for these bodies.

vi. To cooperate with Christian Fellowship and Associations in Nigeria engaged in Health Care Delivery in fulfillment of these objectives.

vii. To establish services for the purpose of achieving CHAN goals and objectives.

viii. To do all such other things in cooperation with the churches, members of the Association and other institutions as are conducive to the attainment of these objectives.

As a professional association, membership of CHAN is restricted to denominationally based Christian health care delivery institutions, organisations or associations. Its activities are mediated through the appointment of professional persons involved in health care or administrations and nominated by their governing bodies.

The organisational structure of CHAN is such that it enables members to cooperatively deal with matters at state, inter-state (Zonal) and Federal levels - hence the National, Zonal (4 of them) and State levels of CHAN. The structure is made up of the following:

i. The Board of Trustees with six members

ii. The National Executive Council with 17 members, headed by a President

iii. Four Zonal Councils with two members from each state CHAN headed by a chairman

iv. State CHANs, each with a Chairman, Secretary and Treasurer with representatives from member institutions

CHAN has its National Headquarters in Jos with a liaison office in Lagos.

CHAN operates two service components, viz:

i. ***Primary Health Care Services (PHCS)*** - This component promotes, support and carry out all Primary Health Care functions among member institutions. It is also responsible for the Wholistic Health Care Programmes, Training Programmes as well as AIDS/HIV Programmes of CHAN.

ii. ***CHAN Drugs Supply Services (CDSS)*** - This component manufactures, procures and distributes effectively and efficiently, high quality pharmaceuticals to CHAN member institutions through a network of strategically located depots.

In addition to these two components, CHAN has three support services units; The Management Information System (CHANMIS) which is responsible for research, monitoring and evaluation. It also supports in the development of information systems in member institutions; the Resource Centre with a Bookstore, stocking essential health books and good Christian Literature; and the Audit Unit which helps in the control of resources in CHAN.

1.2. Roles of CHAN In Health Care Work in Nigeria

The contribution of Christian health work in Nigeria dates back to 1892 when the Roman Catholic Mission established a hospital in Abeokuta, Ogun State, called the Sacred Heart Hospital. By this, Sacred Heart Hospital became the first hospital in the whole of the geographical entity that is today known and called Nigeria. The only health institution that existed before this time was a clinic situated in Lagos and cared only for the Royal Army and colonial officers. The second hospital in Nigeria did not come until 1897 and was established in Calabar, this time by the government. The third hospital, Iyi-Enu Hospital, was established in 1907 by the CMS in Ogidi near Onitsha.

By 1944, the Protestant Missions alone had established 25 General Hospitals and over 120 maternity homes and dispensaries in Nigeria. Today, the 4,000 health facilities of CHAN, most of which are found in city slums and rural areas are delivering wide range of health care packages to the "*unreached*" teeming populace of their communities. CHAN's pioneering role as the oldest, largest and very reliable non-governmental health care infrastructure in Nigeria (through its member institutions) has endeared it to national and international organisations which in turn paved way for its collaboration with the Federal Ministry of Health, International agencies such as World Health Organisation (WHO), United Nations Children's Fund (UNICEF), British Council; Overseas Development Administration (ODA), ICCO, IDA, EZE, MISEREOR and CEBEMO.

The achievements of CHAN in health care delivery in Nigeria can be summarized as follows:

i. About four out of every ten medically served Nigerians receive such services in CHAN health facilities

ii. CHAN health facilities, numbering about 4,000 are found in all parts of Nigeria, even in remote areas where government health facilities has not reached. Infact, CHAN is the largest single provider of health care delivery in Nigeria after government.

iii. About 30,000 people of Nigeria are fully employed in CHAN health facilities

iv. Over two million children and women of reproductive age are immunized against major killer diseases every year in CHAN health facilities.

v. CHAN is the largest supplier of essential drugs in the country (after government) through its network of well-spread health facilities and depots.

vi. Establishment and operation of an MIS for research, monitoring and evaluation, training of Medical Record Officers and Health Statisticians and development of information systems for member institutions. The information systems in member institutions has made it possible for government to collect health data from them for planning purposes.

vii. CHAN has pioneered major areas of health care development such as Primary Health Care, Drug Revolving Fund, Wholistic Health Care, Training of Village Health Workers and Traditional Birth Attendants (VHWs/TBAs), Continuous Education for Health Workers, Distribution of Health Resource materials, etc.

viii. CHAN has successfully implemented a decentralized system (in order to reach the grassroot) through its structures and operation of a rotational leadership using its geographical and ecclesiastical spread.

ix. Collaboration with governments at all levels and related national and international agencies.

x. Offer of consultancy services in health related and human development areas.

1.3. Health Management Information System In Nigeria

Even though Western medicine is about one century old in Nigeria, the state of its information system has been largely underdeveloped. The quantity and quality of health data vary considerably. In certain areas, relevant data are collected and are seldomly (or never) used whereas in some cases data collected are not relevant, worse still, are some cases where data are never collected at all.

Some of the excuses for the poor quality of health data in Nigeria include lack of finance and other supports from government, low literacy level, low/lack of patronage, insufficient technical know-how and lack of qualified staff. Another important constraint is the cultural factor. Generally, in our culture, sad events are best forgotten; never to be remembered or recorded.

Above not withstanding, the role of health information in qualitative health care delivery cannot be over-emphasized. Health information is needed for a variety of uses, including policy formulation, effective health administration and management, efficient health service interaction and for health related research activities.

The national policy on health adopted by government in 1988 and formerly launched in 1989, identified the following six specific categories of indicators required for effective and comprehensive monitoring and evaluation of health care services and health delivery:

i. Health status indicator
ii. Social indicators
iii. Economic indicators
iv. Health care provision and utilization indicators
v. Health "policies" indicators
vi. Quality assurance indicators

Health as a subject in Nigeria is on the concurrent list of the constitution. This means that all three tiers of government have responsibilities for its provision. The Nigeria Health System has three subsystems with the Primary Health Care subsystem constituting the main entry point. Only those whose needs cannot be met at the Primary level should filter (through a well established referral process) to the secondary Health Care subsystem. Referral, yet again, from the Secondary to the Tertiary subsystem should be for patients who require highly specialized and invariably expensive medical interventions. These subsystems (Primary, Secondary and Tertiary) require health data to inform them on the health status of Nigeria.

In 1988, in an attempt to remedy the grievous inefficiencies of the civil service, government decree has among many other things, established in every ministry (Federal and State) and in every extra-ministerial department, Departments of Planning, Research and Statistics. This gave birth to a new National Health Information System (NHIS).

The new NHIS is expected to provide accurate, timely and good quality data for policy makers, service managers, operators, the consumers of health services and for the data generators themselves through expediting, forwarding and feedback processes.

The National Health Policy also prescribes the stages of development of health information system. During the first stage, data collection and usage will be institutionalized at the community level such that data shall be available and used for planning and monitoring health services at the local level. During the second stage, state Ministries of Health shall provide technical support to Local Government Health Authorities to improve the quality and quantity of information collected and to achieve standardization as far as possible to facilitate data collation and comparability. During the third stage, state Health Ministries shall acquire simple electronic data processing equipment for data storage retrieval and analysis. At the Federal level, the Planning, Research and statistics (PRS) Unit of the Federal Ministry of Health and Social Services shall be responsible for obtaining, collating, analyzing and interpreting health and related data on a national basis. The unit shall support the state Health Authorities in the development of their information system.

The flow of data and information within the Nigeria Health Information System is illustrated below diagrammatically:

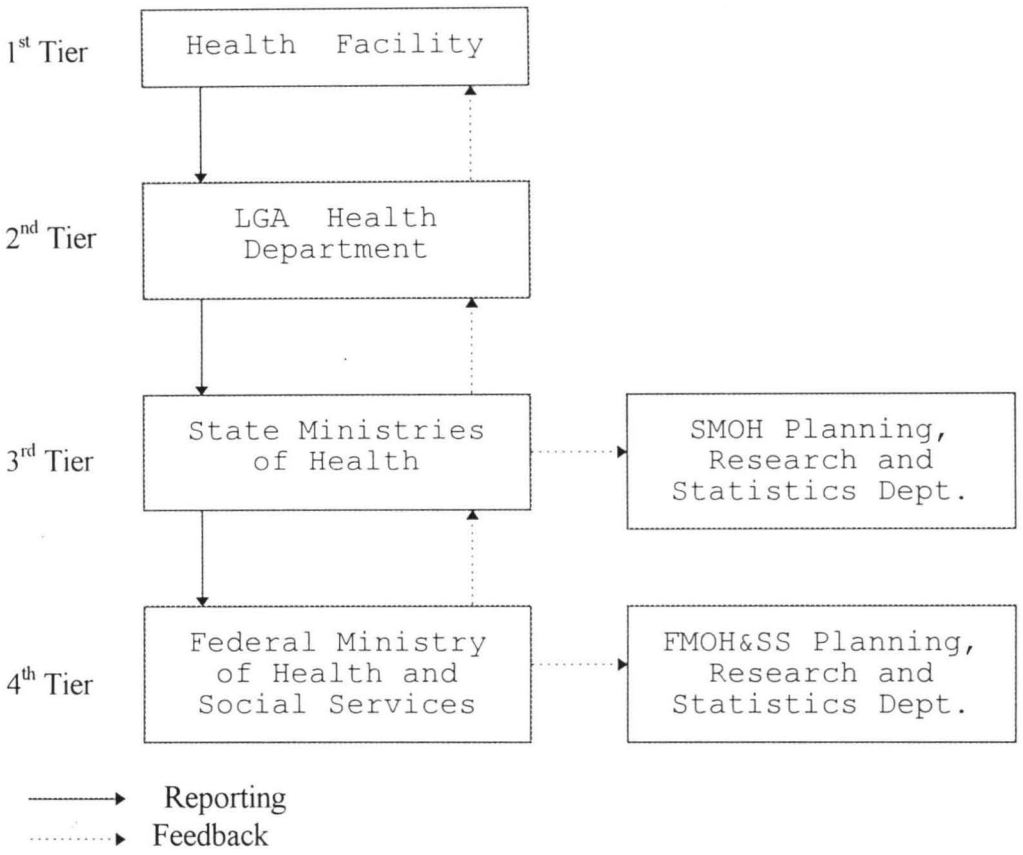


Figure 1.3.1. - Health Information Flow in Nigeria

Finally, the National Policy on health clearly points out that a more effective delivery of health care can be achieved in the country by a more efficient management of the health resources and that it is essential to establish permanent systematic managerial processes for health development at all levels of health care. This is illustrated in the diagram below:-

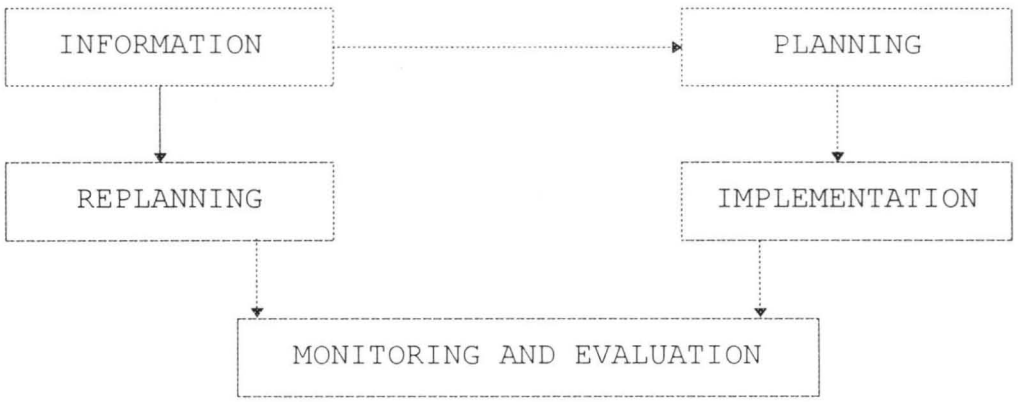


Figure 1.3.2. - Management Process for Health Development

The managerial process implies the use of information to plan. It means the implementation of projects and programmes only after these have been carefully planned, it expects concurrent monitoring and evaluation, during implementation, it demands replanning at intervals, applying experiences and information obtained from monitoring activities. It means readiness to change the content and approaches adopted during implementation in line with replanned programmes.

1.4. Health Management Information System In CHAN

Even though data collection activities had been going on in CHAN before the advent of the new National Health Information System (NHIS), the challenges of the new system brought about an imposed change in the Information System of CHAN. For example, an aspect of the NHIS (Sentinel Surveillance) required that some CHAN member institutions together with certain government health facilities (150 of them in all) were to be supplying data on a monthly basis to FMOH in addition to their routine reports to their local authorities. The idea was to use them as sentinel surveillance sites to help validate the monthly routine data.

This led to the establishment of a Management Information System for CHAN in 1991 by ICCO, through its collaborating programmes with CHAN. An Information Scientist was engaged to operate and develop the system in 1992. The MIS Unit could however not go beyond the traditional activities of simple data collection and information dissemination (not regular) to the management. The unit's activity was further paralyzed as the whole organisation had to go through a painful but inevitable restructuring. The restructuring brought about almost an entire change in CHAN structure. This affected the MIS Unit which was now transferred from its former supervising department to the National Secretariat of CHAN in order for it to play its central role of operating Information System for CHAN effectively.

The wake of the restructuring exercise ushered CHAN into a strategic Planning Exercise in which the MIS Unit was actively involved. The strategic planning exercise is being completed and the inevitable review of the information system of CHAN to reflect the changes that have taken place during the restructuring and the strategic planning processes.

This study is therefore embarked upon with the objectives stated below:

1.5. Objectives of the Study

The objectives of the study are:

i. To study in details the Health Management Information System in CHAN, its problems and prospects and to offer some useful suggestions for possible improvement.

ii. To develop an information system which is capable of capturing all data representing the church's giant contribution to health care delivery in Nigeria.

iii. To attempt the development of an information system that can aid in national and international lobby and advocacy strategies. It is envisaged that this system will further enhance meaningful discussions between CHAN and her collaborating partners.

iv. To design and implement a software required to computerize the activities of any health coordinating body in a developing world.

v. To design means and strategies required to effect computerization of Health Management Information System theoretical basis so that in the near future, this can be used for the same or similar project.

vi. To engage in an academic exercise beneficial to human intellectual development and gains, thereby laying foundation and foresight for other developments that would follow later in the years ahead.

vi. To allow for the researcher's noble contribution to past efforts towards the establishment of Information System in health care delivery in Nigeria and the world over.

1.6. Definition of Concepts

1.6.1 Algorithm

A mathematical procedure, or series of steps followed in performing an activity or solving a problem.

1.6.2. Computer System

A collection of resources, both human and material, including digital electronic processing devices, stored programs and sets of data, which, under the control of the stored programs, automatically inputs, processes, stores, retrieves and outputs data and information, and may also transmit and receive data and information.

1.6.3 Data

Coded or raw facts that are relatively meaningless in isolation but can be combined to represent people, objects, ideas and events which are acceptable for input to, and processing by, a computer system.

1.6.4 Data Security

The application of safeguards to prevent data from loss, alteration or unauthorized access.

1.6.5 Database

An integrated collection of data representing entities important to the functioning of an individual or organisation, organised to reflect logical relationships among data elements and supports shared access by multiple users and is protected and managed to retain its value over time.

1.6.6 DBMS

Database Management System - The software used for all aspects of the creation, accessing and updating of a database.

1.6.7 File

A collection of related data organised on a storage medium for convenient access and retrieval.

1.6.8 Health

A state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.

1.6.9 Information

Data in a useful form.

1.6.10 Lobby

The use of strategic means such as information by a group or individual for the purpose of seeking for support towards a cause of action.

1.6.11 Password

A security word or symbol used to prevent unauthorised access to a computer or to data stored in it.

1.612 Program

A set of instructions written in a language understood by the computer in order for it to carry out a task automatically.

1.6.13 Record

A set of data items which are related in some way, generally forming the unit of data in a larger structure such as a file.

1.6.14 Subsystem

A part of a system which accomplishes a part of the goals of the system.

1.6.15 System

A collection of parts working together towards some common goals.

1.6.16 System Analysis

The study of how systems should and do work.

1.6.17 System Design

Process of developing a plan for implementing the set of functional requirements for a new system as a completely operational hardware/software system.

1.7. Scope of the Study

The study is aimed at managing health information from all CHAN member institutions distributed throughout the entire country. It makes use of the existing CHAN network for easy flow of data.

Because of the extensive nature of health, the study is focussed only on data that will favour its effective use by CHAN management for decision, planning, advocacy, monitoring and evaluation. It shall however provide a basis for health systems research at the non-government level.

1.8. Research Methodology

In this study, great reliance is placed on the use of questionnaire method for data collection. However, visits are made to sampled member institutions for data verification and validation.

Carefully designed questionnaires are sent to member institutions on a routine basis, the filled forms are returned to the MIS Unit of CHAN through the Zones. The number of non response are minimized because the routine visits of CHAN staff to member institutions are also used to collect such questionnaires.

The MIS Unit of CHAN upon the receipt of the questionnaires edits and codes them into the computer. The analysis follows the pattern suggested in this study.

CHAPTER TWO

LITERATURE REVIEW

2.1. The Nature of Information System

The principles of Information System rest on the concept of the General System Theory (GST). A fuller appreciation of the nature of Information System begins with a look at the general systems theory.

The General System Theory is connected with the general properties of systems. A system can be defined as ***the assemblance of elements joined together according to predetermined rules and forming a whole that works towards a result***. A system therefore, is an organised or complex whole. It is an entity which consists of interdependent parts (subsystems) which work (interact) together. For example, an organisation (system) consists of departments and sections (subsystems) which have the status of an entity but must work together with each other for the organisation to achieve its goals. A system can be a collection of men, machines and methods organised to accomplish a set of specific functions. Every boundary is usually expressed in terms of areas of constraints that separates it from its environment. As a matter of fact, any arrangement which involves the handling, processing or manipulation of resources of whatever type can be represented as a system.

T. Lucey, 1993, [13] gave the following as characteristics of systems.

i. They are composed of inter-related parts (subsystems) and can only be explained as a whole. This is otherwise called the law of ***holism*** or ***synergy***. This law states that any whole is more than the sum of its individual parts.

ii. They are hierarchical in that the parts of subsystems are made up of other smaller parts. For example, the accounting system of an organisation may be a subsystem of the information system which is itself a subsystem of the organisation as a whole.

iii. The parts of a system cannot be altered without affecting other parts.

iv. The subsystem work together towards the goal of their higher systems and do not pursue their own objectives independently.

v. They contain *hard* and *soft* properties. Hard properties are those that can be assessed in some objective way. Examples are: the number of components in a storage bin; the amount of PAYE tax a person will pay with tax code of 250 the size of a product. The soft properties of a system are those that cannot be assessed by any objective standard or measuring process. They are a matter of individual values or taste.

In their own contribution, Brightman R.W. and Dimsdale J.M. (1986)[7]presented the nature of systems as cyclically repetitive. One must be careful however, to generalize the repetitive feature of systems, for we know that not all systems are so rigidly tied to repetitive output. The beauty of their contribution is however shown by their observation of a four - feature characteristics for all systems, viz, input, processing, output and feedback. The figure below illustrates their idea:

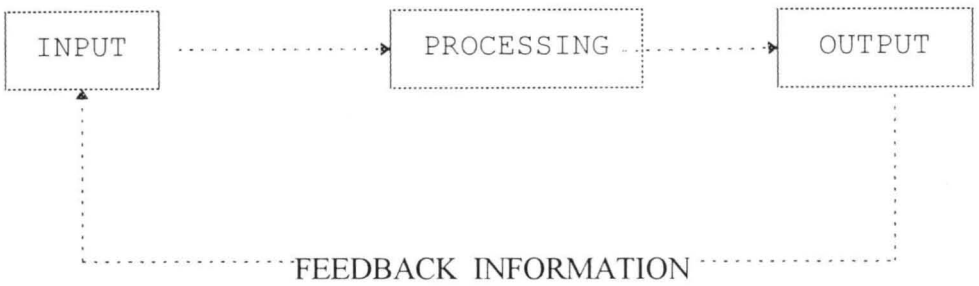


Fig. 2.1.1. Operational Features of Systems

This is for example easily seen in a manufacturing system where input consist of raw materials, labour and equipment and the raw materials are processed to produced an output (the finished goods). The feedback loop is a formal or informal process by which the output of the system is evaluated, and the result of the evaluation are referred to the system as are of the system's inputs.

All systems have a boundary that separates them from their environment. The boundary defines the scope of activities to be supported by the system. Lucey (1993), rightly pointed out that a system boundary can be properly determined by management and vary from organisation to organisation. As such when defining a system, one must also need to establish a boundary. Lucey further observed that boundary alterations are an inevitable consequence of organisations adapting to change which is essential if they are to survive. He warned however that changes at the margin of interacting systems can be a source of friction if not handled properly.

It has been established that information system has all the features of the general system. Information System is cyclically repetitive with the elemental input, processing, output and feedback. It receives as input, data and information and produce as input, information. Boland R.J. and Hirschheim (1993) [6], in their contribution to the nature of information system said there is need for the proper knowledge of the system concept to serve as a guide in making consistent decisions and to resolve conflicts in information system design. By concept, they mean the rationale or underlying theme of the system. This is worthy of note because an elaboration of what the system should do is not the concept. The concept is a distillation of the system, its essence - analogous to the design idea used by industrial designers.

Brightman R.W. and Dimsdale J.M. [7] define an information system as a subsystem within a system specializing in processing data and information to produce new information. Information is data (or information) that is organised in a form that is useful in making decision.

In doing its work, an information system performs several routine tasks which include editing and checking data files, updating data files, producing transaction documents and producing routine operational documents and various management reports.

No wonder Michael J. Earl [14] in his contribution to information systems development said information system should no longer be considered as just a support activity serving management's planning and control needs and automating business operations. He said they should also be harnessed to support the firm's strategy and structure, (Scott Morton and Rockart, 1984: Parsons (1983), be managed and exploited as a potential strategic weapon (McFarlan, 1984; Porter and Millar, 1985) and even be considered as inseparable from strategy in general (Kantrow, 1980).

Information System can be divided into two types - ***operational information systems*** which produce the information and documents needed for the routine operations of the organisation, and ***management information systems*** which produce information needed for effective decision making. Many decisions must be based upon operational information and most operations follow management decisions. Since our study of interest bothers on management information system, it suffices to give an illustration of operational information system in the diagram below:

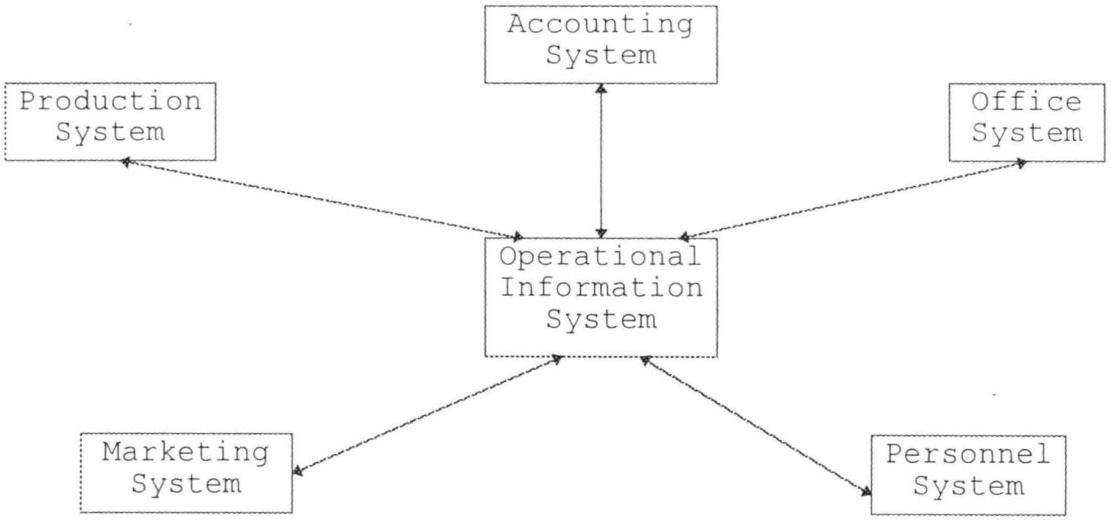


Fig. 2.1.2. An illustration of Operation Information System

As seen from the diagram above the distinction between operational information systems and management information systems lies more in their emphasis than in their operation.

We now devote the rest of this study on management information system with emphasis on health - the interest of this study.

2.2. The Concept of Management Information System

The emergence of this aspect of information system is no doubt due to the lack of performance of the traditional information systems. Donald H. Sanders (1979) [8], advanced six problems with the traditional information systems. These are:

i. High cost

ii. Time and effort consumption

iii. Improper integration

iv. Not concise

v. Little or lack of conformity with established formats

vi. Little or no relevance to modern developments.

To reduce the difficulties experienced with traditional approaches, Sanders argued in favour of a new management information concept which operates a management information system (MIS). He defined MIS as:

> ***A network of computer-based data processing procedures developed in an organization and integrated as necessary with other manual, mechanical, and/or electronic procedures for the purpose of providing timely and effective information to support decision making and other necessary management functions.***

He justified the use of the word computer-based in the definition by the fact that an MIS is expected to produce information that is more timely and more complete than that produced by a traditional information system. He argued that only a computer-based information system can possess such capabilities.

Andrew L. Friedman (1993) [4], in support of this production-oriented definition of MIS posited that systems to produce some elements of control information led to an early realization that the computer had great potential for enhancing management information. He however observed that there is a clear logical priority between computerization of operational clerical procedures first, and then computerization of management information, since the product of operational system is the processing of transactions or data while the product of management information systems is information. The latter is basically the same data, structured and manipulated in such a way that it is useful for management control or strategic functions. Once operational systems have been computerized, infrastructure of basic data is then available in a computer-accessible form. He concluded his argument by saying that a computerized MIS use the computer to structure and manipulate the data in order to produce information. One must not overlook the obvious advantage of computerized MIS in that it helps in structuring the data in so many different ways with different degrees of details.

In his own contribution, Lucey believed that there is no universally accepted definition for MIS and that those that exist reflect the emphasis and its prejudices of the people concerned. For example, the term MIS has become almost synonymous with computer-based data processing and indeed many

books with MIS in the title turn out to be exclusively concerned with topics such as systems analysis, file design and various other technical facets of computer-based system. The above definition of MIS by Sanders and the one below by Kelly are examples of these production-oriented definition of MIS:

> ***MIS is the combination of human and computer-based resources that result in the collection, storage, retrieval, communication and use of data for the purpose of efficient management operations and for business planning.***

Lucey argues that the means of producing information, whether by computer or manual methods, is a secondary consideration compared with the importance of ensuring that the current problems are addressed and that relevant information is available when, where and in the form required to be usable by management. He said then, and only then, should the means of producing the information be considered. He therefore suggested a decision-oriented definition of MIS as follows:

> ***MIS is a system that uses formalized procedures to provide management at all levels in all functions with appropriate information, based on data from both internal and external sources, to enable them to make timely and effective decision for planning, directing and controlling the activities for which they are responsible.***

In the opinion of the researcher, any definition of MIS should involve the two orientations - production and decision. The aim of MIS is to make decision that is sound and effective towards achieving the goals of the organisation. On the other hand, sound decisions cannot come from the air. Good decisions are based only on good procedures. Even though computers have its own problems, its proper use will no doubt give a set of procedures whose product will lead to a sound and effective decision making. We therefore define MIS as follows:

> ***MIS is the technique, the process, as well as the structure concerned with systematic, accurate and speedy organization and control of relevant signals, data, or messages from the different parts and environments of an activity unit, through appropriate collection, editing, analysis, display, storage and retrieved of such signals or messages in manners that would be useful for managerial decision making.***

Kor Koi (1991) [11] gave five conditions for a successful establishment and operation of an MIS. These are:

i. Availability of a system and the inter-play of its subsystems

ii. The existence of an information system

iii. Existence of a management structure which must support the MIS and should be involved

in its design

iv. The systematic use of information

v. The influence of information technology on the information system

Points (ii) and (iii) can be termed the necessary and sufficient conditions. A good information system and innovative management structure is a great impetus to any MIS. Lucey and BPP's study text on Systems Analysis and Design (1987), give the following as qualities of a good information:

i. Relevance for its purpose

ii. It should be sufficiently accurate for its purpose

iii. It should be complete for its purpose

iv. It should be clear to the user

v. It must be from a source in which the user has confidence

vi. It should be communicated to the right person

vii. It should be communicated in time for its purpose

viii. It should contain the right level of details

ix. It should be communicated by an appropriate channel of communication

x. It should be provided at a cost which is less than the value of the benefits it provides.

In addition to possessing the above qualities, a good MIS should also have the quality of management by exception. By this, we mean the emphasis on critical factors controlling the firms successes rather than the total volume of information. From study, five branches of MIS are identified. This is illustrated in the diagram below:

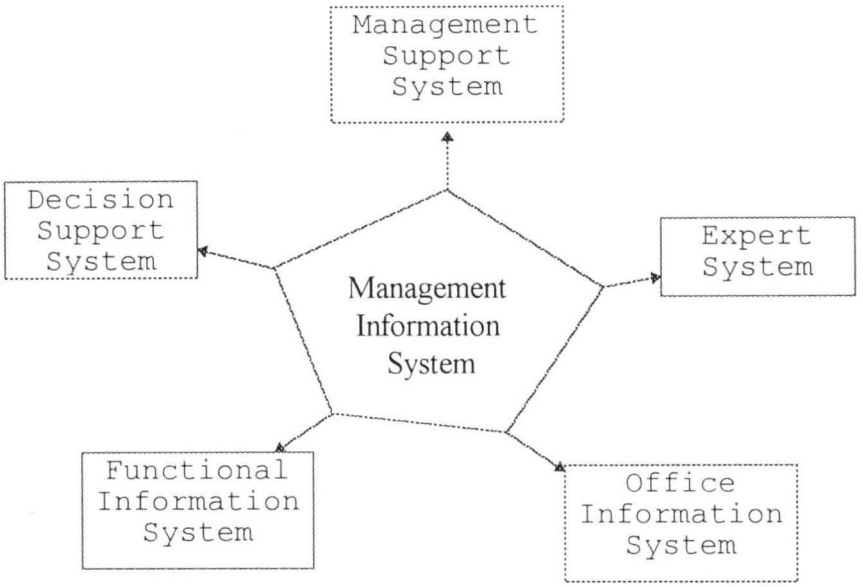


Fig. 2.2.1. Branches of Management Information System

i. ***Management Support System*** - This is the aspect of MIS that is aimed at helping managers make effective decisions by providing them with reports that are timely and accurate. Operational managers depend a great deal on the information from the report generated through Management Support System (MSS). While tactical (middle level) and strategic (upper level) managers also use reports generated by the MSS, their decisions are not easily programmed like those of operational managers since decisions at these higher levels of management largely depends on intuition and problem solving talents.

ii. ***Decision Support System (DSS)*** - This is the branch of MIS which supplies information on which top-level policy decisions and plans can be based. DSS outputs permit executives to project likely results of decisions. It provides top-level managers with the ability to ask "*what if....?*" types of questions (sensitivity analysis) and to receive results under various assumptions and scenarios. DSS outputs can project results of such alternatives in terms of revenues, profits, costs share of market and other measures of business performance.

iii. ***Function Information System (FIS)*** - This aspect of MIS centres on information from each functional area of a system. For example, in a business organisation, functional units (subsystems) such as marketing, production, personnel, accounting, etc, need their own information subsystem in order to carry out their operations.

iv. ***Office Information System (OIS)*** - This is a machine or machines combined with a communication system used to make more efficient the job of obtaining, organising, storing, retrieving and preparing needed information. Examples of machines that can be linked for OIS are wordprocessors, VDU and terminals, teletext, microfilm, electronic mail, telecommunications, tele-conferencing, fax and computer networks.

v. ***Expert System*** - This is a computer system which is able to draw reasoned conclusions from a body of knowledge in a particular field, and communicate to the user the line of reasoning by which it has reached a conclusion. The computer is able to do the ***expert reasoning*** by the use of the heuristic problem solving approach. Heuristic methods represent a departure from traditional computer programming techniques in which problem solving is algorithmic. Heuristic problems solving is responsive to encountered situations. The purpose of an expert system is to provide reasoned advice at a comparable level to that provided by a human expert. This capability has two main aims: to enhance the abilities of leading experts in certain fields, and to make a high level of expertise available to less highly qualified practitioners.

There are numerous factors which influence the structure and scope of an organization's MIS. This is illustrated by Lucey in a diagrammatic form as presented below:

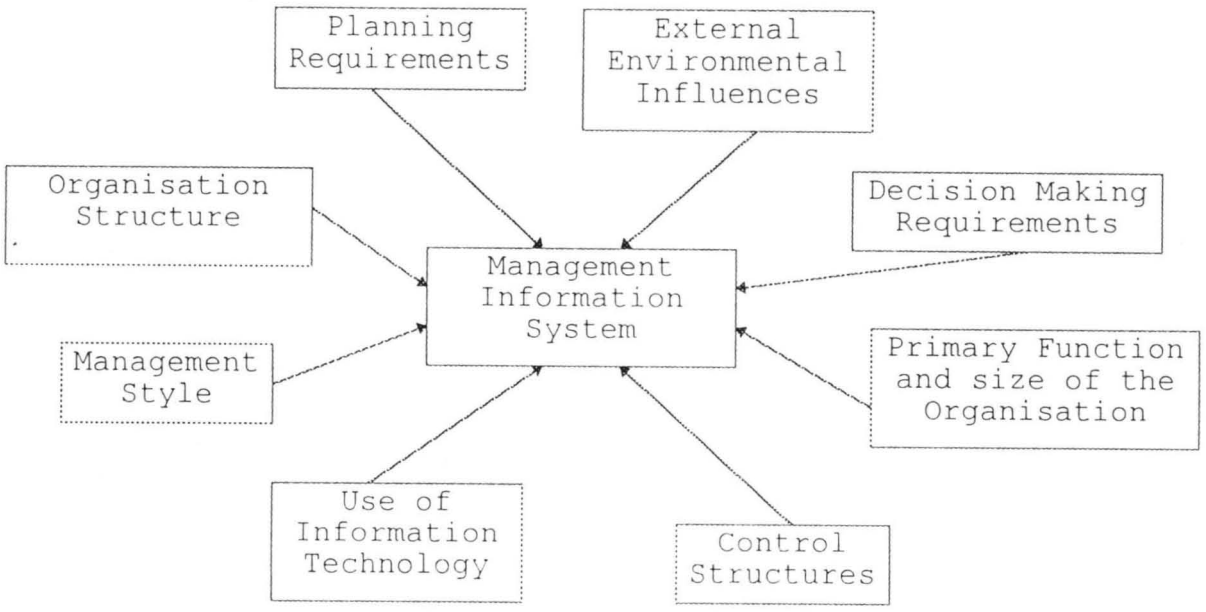


Fig. 2.2.2. Major Influences on an Organization's MIS

In order to design an MIS, it must be borne in mind that in practice, different systems vary enormously and problems of design are dominated by practical problems, be they political, financial or psychological. It is therefore necessary to develop a strategy that takes care of all these problems before an actual MIS is designed.

From study, there are six approaches which can be used usually individually or in conjunction with any other:

i. ***The Organizational Chart Approach*** - Where an assumption is based on the premise that the system in view has boundary and structure whose functional areas will normally include finance, production, marketing, personnel, sales, research and development.

ii. ***The Integrate Letter Approach*** - This is essentially a *laissez-faire* approach where systems are developed in an organization as and when required and no attempt is made to conform to any preconceived motion of how an MIS will develop in the organization. This approach can be used in an organization with parts of its sub-units physically removed from it. The problem with this approach is that the independent subsystem can eventually evolve into complex system and the subsequent integration, and hence could be expensive to maintain.

iii. ***The Data Collection Approach*** - This approach stresses the gathering of all data that may be relevant in the MIS as the first step in the design.

iv. *The Database Approach* - This involves the collection, storage and maintenance of a large pool of data and the use of a Database Management System (DBMS) to maintain the database.

v. *Top-Down Approach* - This involves defining information needs for successive layers of management, starting from an appraisal of management needs and overall business goals of the organization.

vi. ***The Total System Approach*** - This is also called the ***Green Field Approach*** which rests on the assumption that prior to the implementation of the system we can define and recognize the interrelationship of all the basic information in a meaningful way.

There is abundant evidences that show that an existing MIS which was designed with the use of advanced computer systems have relatively little success in providing management with the information it needs. Lucey gave the following six reasons for such.

i. Lack of management involvement with the design of the MIS

ii. Narrow and/or inappropriate emphasis of the computer system

iii. Undue concentration on low level data processing applications particularly in the accounting area

iv. Lack of management knowledge of computers

v. Poor appreciation by information specialists of management's true information requirements

and of organizational problems

vi. Lack of top management support.

In their own contribution to MIS design and output, Adams D.R. and Wagner G.E. (1985) [1], warned that MIS is not designed to report business situations that are considered normal, rather, they should direct management's attention to the exceptional, or out-of-line conditions that must be corrected. They went ahead to give the following three categories of MIS outputs:

i. ***Scheduled Output*** - These are MIS reports that are issued at regular intervals such as annually, biannually, quarterly, monthly, weekly or even more frequently. These reports normally summarize trends and serve as the basis for comparing projected, current, and past levels of business activity.

ii. ***On Demand Output*** - These are MIS reports that are produced at the specific request of managers who have immediate information needs. These reports are used to monitor special events.

iii. ***Exception Output*** - These are MIS reports that are produced whenever operations or activities are not proceeding according to plan.

2.3. Conceptual Basis of Health Management Information System

The Alma Ata (USSR) conference of September 1978 helped to refocus attention on health as a priority for national and international development strategies. The resulting ***Health for all by the Year 2000*** strategy stresses the need to provide Primary Health Care (PHC) redirecting resources towards rural community-oriented health delivery rather than the widespread hospital-based approach (World Health Organization, 1978). Since then, many governments claim to have adopted this strategy (Hill, 1987), and progress has been made in some countries (Gowers, 1987; Heggenhougen, 1987). These developments have led many to ask questions about the level of progress attained, whether that level is satisfactory, and how to move forward. There is the need for feedback on inputs to health care delivery through the measurements of its outputs. This has led many health facilities to routinely collect patient statistics on attendance, disease and treatment (World Health Organization, 1982; Kulakow, 1983; Wilson et al; 1988). This requirement obviously has brought additional burden on health care providers at the various levels, distracting them from normal duties. Protti D.J. et al; (1992) [16], reported that thirty percent or more of hospital activities and costs involve handling information. Health information aims at determining the relationship between health and development, and the operational aspects of putting the strategy into practice. There is therefore the need to balance the energy of resources expended in data collection and compilation and their ultimate use in planning and routine management (Forster D., 1992) [10].

The gains of health information are invaluable - particularly when it has been properly analyzed and interpreted. Health information can serve the following purposes:

i. To provide relevant information to draw profile of community by age, sex, disease, mortality and morbidity. This helps in the understanding of people and their health problems.

ii. To provide information for comparison purposes so that the health situation of a community at a particular time can be compared with that at another time for the same community. Comparison can also be made between different regions of a country, occupation or socio-economic classes. This can help in the decision on distribution of resources.

iii. To provide a surveillance system that can be used to monitor, recognize, diagnose and control at an early stage of disease outbreak. This will help in the rational decision on preventive and control measures.

iv. To help in determining priorities in health development. Information is needed to determine the severity and frequency of the occurrence of any health problem so that a good health programme capable of solving such health problem can be drawn up.

v. To provide useful and appropriate sources of data for health workers and thus help to determine deviations from the norm e.g. birth weights, mental capacity/capability, blood pressure levels, etc. and what to do about them.

vi. To help in the development of meaningful and essential health research programmes and referral systems and designing of appropriate educational programmes.

vii. To improve increase output and coverage of health programmes

viii. To improve standards of quality of health care

ix. To provide a basis for medical handling and more efficient use of resources

x. To increase the acceptability of health programmes and services to the community and create room for active involvement of the community in health planning and management.

Health services throughout the world invest significant resources in collecting data. Of recent too, there has been a greater awareness of the strategic needs of management to which proper use of health information can contribute immensely. In their work on hospital information systems and management, Bullas S. and Scott T. (1992) [8], presented a conceptual management model of a typical hospital. This is illustrated in the diagram below.

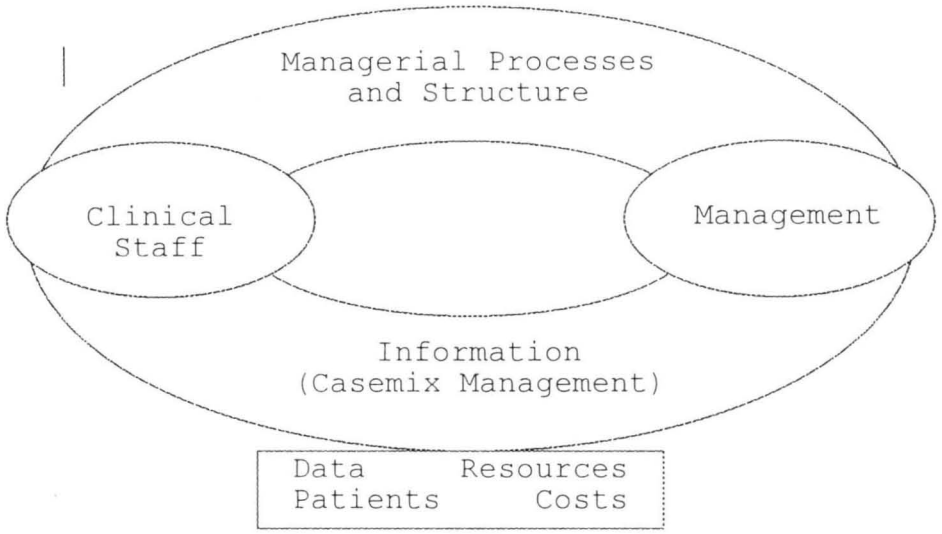


Fig. 2.3.1. A Conceptual Hospital Management Model

This concept divides all hospital staff into two distinct groups labelled ***clinical staff*** and ***management (or administration).*** The first group are often professionally qualified and perform either a direct patient care role as with surgeons and nurses or a secondary patient care as with pathologists, anaesthetic technicians. The second group of staff are part of the organizational infrastructure and support, maintain and develop the environment within which health care is delivered. In general, communication between these different groups is through the organizational structure and the organizational processes. There will be a variety of management processes such as budget setting, strategic planning, monitoring, and so on. For these to work effectively, they require support from a common information system.

Information is the key element in information systems. The single most distinguishing feature of an information system is its emphasis upon the flow of information within the organization. Information is the common link binding the organization subparts. An information system within the health system in order to play its role well therefore have the following perspectives:

i. Patient
ii. Health care workers (personnel)
iii. The health care system (facility)
iv. External

This brings about the recognition of the fact that information is a resource that is subject to management planning and control in the same way as other resources such as land, labour and capital. Traditionally, subsystems within health system are discrete in nature, serving departmental needs with little regards for those of a wider audience. Information was rarely used beyond the department except in the form of data pertaining to a specific patient. It was almost never used to provide strategic support to the organization as a whole except in the limited sense of activity reporting. This is because

of the fact that in a health system, information processes lack strong identity, management did not give them the same attention as they give other organization activities. The information manager must therefore play a leading role in seeking out and going the requisite commitment from the senior management to ensure patronage and sponsorship.

Today, the story is quite different. The health system has grown and still growing in complexity. The need for better and more timely information and for improved decision making techniques are becoming critical giving place for Management Information System (MIS) within the health system. This will enable management to be able to fully answer the crucial questions of ***what do we do?*** and ***what do we do well?***.

2.4. Contents and Structure of Health Management Information System

The dynamic nature of health does not make easy, the issue of the contents and structure of its information system. There is generally speaking, little agreement amongst academics, managers and professionals as to what type and volume of data is required for resource allocation decision in both the public and private sector. This is further compounded by the ambiguities surrounding the definition of essential care and effective treatment outcomes both in terms of longevity and quality of life (Ogunbekun I.O., (1992) [15]. Economists have sought to overcome some of the ambiguities by the use of valuation tools like cost-benefit analysis and cost-effectiveness analysis in assessing the value and cost of various public health programs and treatment modules in clinical medicines. These efforts are however confronted with major procedure difficulties that limit their application in practice.

Ogunbekun suggested the following as consideration for the content of a Health Management Information (HMIS) in a private sector.

(a) Internal Analysis

i. Patient or utilization of services provided. Indicators to consider here include: Number of patient visits; number of antenatal bookings and deliveries, immunization records, bed occupancy rates, etc.

ii. Patient characteristics - These include classified age group of patients, disease pattern, payments made by patients, etc.

iii. Manpower situation - Indicators to be considered here include physician characteristics - admission and prescription patterns, number of full - times/part timers, staff distribution classified by status, type of employment and rank, etc.

iv. Financial Situation - Monthly recurrent or operating expenses (including cost of supplies, manpower and equipment maintenance); revenue generated by departments and outstanding financial obligations.

v. Evaluation of Facilities - This include inventory and physical state of building equipment and utilities

(b) External Analysis - This involves the use of national statistics and indicators in assessing opportunities created by the trends in the economic and social environment. The categories of data and indicators commonly applied here include:

i. Demographic data

ii. Economic data

iii. Health policy data

iv. Epidemiological data

v. Data on competition

The above is exhaustive for an HMIS. If attention is not paid, such an exhaustive system could give rise to a problematic MIS where health workers would spend most of their time collecting data at the expense of their primary function. As such, the contents of an HMIS if it is to be effective should:

i. bear relation with the aims and objectives of the system

ii. have indicators whose selection are based on the objectives and goals of the system

iii. provide information that is usable and useful to the existing structure

iv. have instruments for data collection for the HMIS. Such instruments should be as much as possible be uniform at the various levels of the system

v. have a simple structure which is clear to all in the management team. Infact, it should be acceptable to all. The determination of the structure should therefore involve all so that no member of the team or system is left out.

2.5. Resource Implications for HMIS

Traditionally, information system in health is assumed to help improve the operational efficiency of the organization. But more recently there has been a greater awareness of the strategic needs of management, and a different approach has begun to evolve. This development in information system has also paved way for a significant change in the resource requirements of modern information system. Resource implication of HMIS can only be truly defined after an agreed scope structure and data needs of such a system had been determined.

It is however clear that the setting up of an HMIS could involve a sizeable capital outlay. Bola Ayeni (1992) [5], points out that the major infrastructure and equipment needs for an HMIS are essentially material, equipment, hardware and software. As at today in Nigeria, all of these resources are imported into the country. Kluzer (1990) [12], noted that computer import growth rates have been high (above the average for all machine imports), with total purchases increasing between 1978-1986.

He also stated that over the period 1981-1986, Nigeria alone accounted for 20% of all computer imports in Black Africa. Unfortunately, this is not reflected in the value of our national HMIS.

Apart from the above named HMIS resource needs, one must be quick to add to it human resource, which is an important resource input to HMIS. Adewole I.B. (1992) [3] listed three main important groups of personnel involved in HMIS as follows:

i. Statisticians

ii. Computer specialists

iii. End-users - health professionals

Even though he did not spell out in clear terms the roles of these groups, we note with interest the three cardinal areas of any information system:

i. Data generating and manipulation

ii. Data processing using the computers

iii. Information usage

Professor S.O. Adamu in a conference on HMIS in 1992 [2] argued that the manpower needs of an HMIS are varied in terms of job content and skill. He maintained that in terms of professional relevance, apart from management capability and supporting services, an HMIS manpower need will include the following occupational groups:

i. Statisticians

ii. Computer system designers and analysts

iii. Computer programmers

iv. Others (hardware and software specialists)

(a) Computer assistants
(b) Computer equipment operators
(c) Statistical associated professionals
(d) Clerks - coding clerks and wordprocessing clerks
(e) Data entry operators
(f) Calculating machine operators
(g) Statistical clerks

Discussion on manpower resource for HMIS is not complete without the consideration of its development. Manpower development means updating staff skills in a continuous manner - through staff attending appropriate conferences, seminars, symposia, etc.

Another important resource implication for HMIS is fund. Walsham G.; Symons V.; and Waema T. already stressed funds as an important factor in information system development. If an HMIS is to function properly and continuously, adequate funding will be required. In Nigerian health sector, information system is always given a low priority in funding. For example, during 1975-91 plan period, information system took only 0.08% of the total expenditure on health (Shehu S., 1996) [17]. Time has come for information system to take its fair share of the organization's funding.

Information systems in turn should be able to justify such investment in them by their timely, accurate information for sound decision making.

organization have often failed to provide the needed leadership and support in order to bring about an information-conscious system. Data processing on lower priority tasks.

iii. Failure to specify objectives. In some of the departments and units where the need for a system of information had been expressed, the formulation of objectives to carry out the information collection objectives are not made. Such units are usually satisfied with purchase of computers. It is the responsibility of users to specify what they want in the way of quality management information. Computer usage should be considered only when objectives can best be reached by electronic means.

iv. Some flaws in the reporting system of the management structure. Even though the restructuring was done to remove major administrative lapses of CHAN, one still observe that there is a situation where an officer by design has to report to a superior officer who may not be able to appreciate his subordinate's technical needs. This makes for poor technical reporting system.

v. Excessive reliance on vendors of machines and accessories. Management and heads of department rely excessively on vendors. These vendors who may not be objective are given the job of supplying computers, accessories and other machines for processing information without adequate consultation. This has resulted in the supply of substandard machines.

vi. Hardware Approach Phenomenon. Management is fond of approving the purchase of computer first before it decides on how it should be used. This is the major reason why the effects of the purchase of such computers are so intangible and unappreciated by personnel. Prestige should not be the goal of purchasing computers.

vii. Inadequate Qualified Staffing. The kind of information system suitable for CHAN is far beyond what a single individual can cope with. This is responsible for the inability to keep to data processing standards.

viii. Unsatisfactory Information System within CHAN. This is the core problem that brought about the need for this study.

ix. Inadequate use of information generated systematically.

x. Inconsistent Method and time of Date Collection: Scientific methods are not used in data collection.

xi. Information system is based entirely on activity reporting. Information on impact of activities are based on estimates and no actual studies are made.

3.3. System Analysis

3.3.1. System Specifications

Before we give specifications for the system under study, it will help to look at the basic information needs of each of the functional arm of CHAN. This will enhance the identification of required outputs through which the input requirements can be obtained.

S/N	Department	Information Needs
1.	National Secretariat	a. Personnel - Staff distribution and availability, Identification, Rank and Location. Staff status - Promotion, performance, indebtedness (loans), salary, etc.
		b. Finance - Budget monitoring, reports, Income/Expenditure statements, Departmental accounts - Secretariat, CHANPHARM, PHCS and the Zones.
		c. Member Institutions - Identification membership status, services, financial contribution, staff distribution, contact person.
2.	CHANPHARM	a. General information on member institutions regarding Drug Revolving Fund (DRF), Essential Drug Management (EDM), membership status
		b. Drug - Orders, list, stock sales.
		c. Finance - Members ledger, debt monitoring and control.
3.	PHCS	a. General information member institutions regarding health care services rendered (HIS) - Disease reporting.
		b. Training - No of participants, institutions and evaluation on zonal basis.

From the above, the system under study should be able to produce information on the following:

a. Member institutions of CHAN
b. Staff of CHAN

c. Accounting system in CHAN
d. Drug orders, inventory and distribution
e. Health care delivery activities of member institutions

We thus illustrate the proposed system as follows:

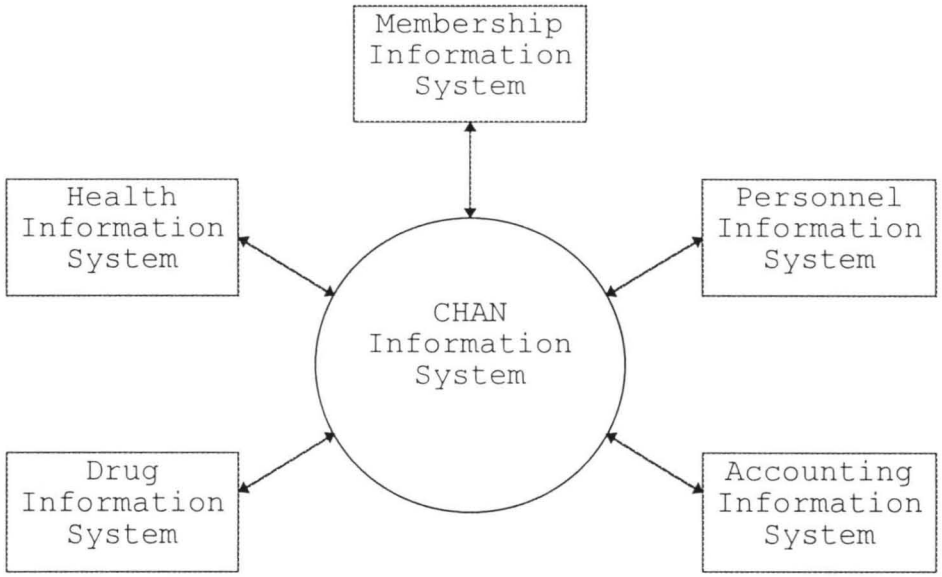


Fig. 3.3.1.1. CHAN Information System Showing the Various Functional Sub-system.

It is observed that part of the existing information system has been automated. Our proposal is geared towards this direction such that all or most of the existing system will be automated. Also, the centralization of the information system is strongly recommended. This will help to avoid the problems of searching for highly qualified technical staff to man the information arms of the subunits. It will reduce costs of information processing and maintenance within the organization and also enhance data control. New features are introduced to eliminate some of the obsolete traditional steps of data collection, processing and information dissemination.

Presented below is a diagram showing sources of data and information flow within CHAN.

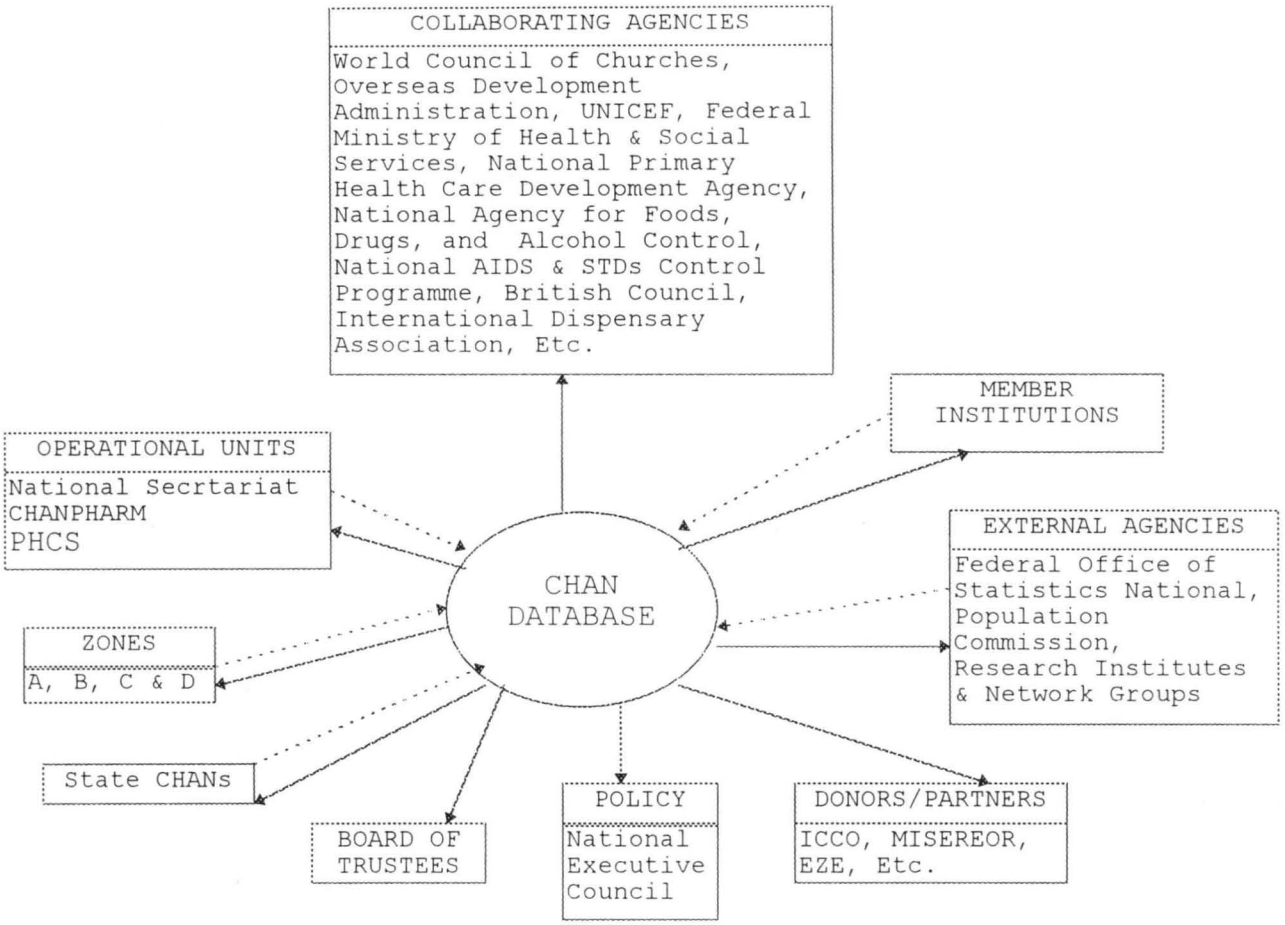


Fig. 3.3.1.2. Data and Information Flow in CHAN

3.3.2. Analysis of Alternatives

The alternatives identified by the analyst are summarised as follows:

a. Leave things the way they are and continue to endure the problems

b. Discard the entire existing system and start a new one.

c. Identify the good parts of the existing system, introduce them into the proposed system along with the new features. This option, implies the entire core activities of the information system being proposed will be automated with the use of computers.

In considering the alternatives, the analyst applied educative judgments about change and its economic, operational, technical and behavioral impacts on the organization. Alternative (c) is recommended based on the following:

i. It will save time and effort

ii. It will save cost

iii. It will reduce waste

iv. Even though it is a new system, it has old features such as machines, personnel and data flow pattern. This will make easy the implementation stage.

v. Because of its broaden scope, it enhances the participation of a larger number of personnel in the decision making process of the organization.

3.3.3. Cost Benefit Analysis of the Proposed System

Costs of the alternative system solutions were projected based on the following criteria:

a. Equipment costs (capital costs) of
   - i. Computer and peripherals
   - ii. Ancilliary equipment
   - iii. System initial consumables such as disks, paper printer ribbons, etc.

b. Installation costs and the required environment

c. Development costs (software/consultancy work on programming and changeover costs

d. Personnel costs
   - i. Staff training
   - ii. Staff recruitment/relocations
   - iii. Staff salaries and pensions
   - iv. Redundancy payments
   - v. Overheads

e. Operating Costs
   - i. Consumable materials (disk, stationery etc)
   - ii. Maintenance
   - iii. Accommodation costs
   - iv. Power/insurance/telephone
   - v. Backup services

f. Incidental Costs - This was estimated at 10% the total costs and includes:
   - i. Accidents
   - ii. Forgotten items
   - iii. Inflation

Based on the need to establish the cash outflows arising from the systems and the annual charge against profits, a distinction between capital revenue costs was made. This was made in order to make reasonable cost implication of each of the alternatives. We thus have the breakdown of the cost analysis as follows:

a.	Capital cost items	i.	Hardware cost
		ii.	Working capital - supplies of consumable such as disks, stationery, etc.
		iii.	Accommodation and environmental requirement cost
		iv.	Installation costs
b.	Revenue costs	i.	One-off revenue cost items - system development (consultancy, programming, changeover, etc - Staff recruitment - Initial staff training
		ii.	Regular annual revenue costs - Operating cost - Consumable - Maintenance - Backup services - Regular staff training - Overheads

The determination of the benefits of the alternative systems were based on the following criteria:

a. Savings in staff operating costs

b. Revenue benefits due to improvements or enhancements that the system will bring

c. Revenue benefits from sale of some of the equipment of the old system where the new system would not need.

d. Value of the proposed system. To determine this we merely considered what the organization stand to loose or gain with the absence or presence of such system

e. Performance in terms of output of each of the alternatives

f. Resource requirement and availability

3.4 System Design

3.4.1. System Description

The proposed system is implemented by the action of four core databases. These are briefly described below:

a. *Membership database*:- This database captures data on all member institutions. The data include Name of facility, Type of facility, location, membership status, owner, contact person, dues paid and balance. The database is meant to essentially give the directory of member institutions, their membership status and monitor their financial contribution to the Association.

b. *Health database*:- This database captures data on health activity of member institutions. The data include Name and type of facility, location, number of patients treated per disease in a year and their age. The database is meant to give a health activity report of member institutions. The disease reporting is based on indicator disease as spelt out in the national health information system. The database is also designed to report diseases based on age distribution. The output of this database will bring to focus the contribution of the church health care work to health care delivery in Nigeria.

c. *Drug database*:- The database which is designed to monitor drug stock and distribution among member institution has as its contents the following data: Name of drug, opening stock, stock received and closing stock.

d. *Personnel database*:- This database which has to do with the internal processes of CHAN monitors staff details and attempts to generate a simple payroll of all staff for the accounts department. Some of the data captured here are: Name of employee, employee number, rank, department, location, qualification, employment data, basic salary and employment status. The information obtained here are useful in staff appraisal and evaluation processes.

Each of the above mentioned database is maintained by program files. The database approach is recommended for this system because of the following reasons:

i. To achieve data integration. This means that different applications can be written for one type of data. This will allow for many departments to use a particular data.

ii. Reduction of elimination of data redundancy. This will take care of data repetition in every database file as there is the possibility of linking up with a type of data within a database from another database file. This leads to saving of storage space that would have been otherwise wasted.

iii. Attainment of data independence. This means that under the system, application programs can be insulated from the physical or logical storage of data. This allows for the modification of application programs or the data without affecting the other.

iv. Attainment of data integrity. The use of database approach reduces the risk of data duplication and thus enhances the integrity of the data and the information generated from the data

v. Centralized system. The database approach ensures that data are centrally controlled. This means that data which are collected with huge costs are properly controlled. Data security is maintained and data standards can be easily enforced.

vi. Flexibility of access to data. Databases are managed by Database management systems (DBMS). DBMS provides many different processing routes for extracting data from a database. The processing methods under DBMS are easily available to computer novices as well as for computer professionals.

vii. Report generation. With the use of DBMS, one can easily generate customised reports that can be used at any time for decision making

viii. Access to the use of a Fourth Generation language (4GL) which can be used for development of applications and file management.

3.4.2. Design Approach

In describing the approach used in this design, we shall use the following sequences:

a. Output (results)
b. Input (data)
c. Files
d. Procedures

a. Output

The major outputs of this system are:

1. Listings of CHAN registered institutions, location, type, membership status and statement of their updated financial contribution to CHAN.

2. Outputs of activities of member institutions on the following health activities
   i. Antenatal and pregnancy outcome
   ii. Immunization programme
   iii. In-patient services
   iv. Outpatient services
   v. Disease surveillance
   vi. Pharmaceutical inventory and utilization

3. Listing of CHAN staff, department, rank, basic salary and other information necessary for appraisal and evaluation of staff

b. Input (data)

The input data expected to generate the above named output are as follows:

i. Data collected from member institutions on a routine basis. This is based on major activities of member institutions on a routine basis. This is based on major activities of member institutions such as location, health care delivery services and drug utilization.

ii. Data on staff members of CHAN

c. Files

Files under this system are divided into two; data files and program files.

1. The database files comprise the following:

   i. Member.dbf - captures data on membership directory and their status.

   ii. Membert.dbf - a coding database file for Member.dbf.

   iii. Disease.dbf - a coding database file for Maind.dbf.

   iv. Maind.dbf - captures data on routinely notifiable diseases reported in CHAN member institutions.

   v. Drug.dbf - a coding database file for Maind2.dbf.

   vi. Maind2.dbf - captures data on drug inventory and utilization of member institutions.

   vii. Personel.dbf - captures data on staff of CHAN.

   viii. Temp.dbf - a temporary database file used for processing in the Health Information System.

   ix. Temp2.dbf - a temporary database file used for processing in the Drug Information System.

2. Program files - These are designed to activate the above named database files. The program files include:

   i. Data entry routine files - Addrec1.prg, Addrec2.prg, Addrec3.prg and Addrec4.prg

   ii. Data deleting routine files - Delrec1.prg, Delrec2.prg, Delrec3.prg and Delrec4.prg

   iii. Data editing routine files - Editrec1.prg, Editrec2.prg, Editrec3.prg and Editrec4.prg.

   iv. Menu and Sub Menu files

   v. View files - Viewrec1.prg, Viewrec2.prg, Viewrec3.prg and Viewrec4.prg.

   vi. Data control files and

   vii. Report (output) files

d. Procedures

The procedures used in this design is illustrated in the diagram below.

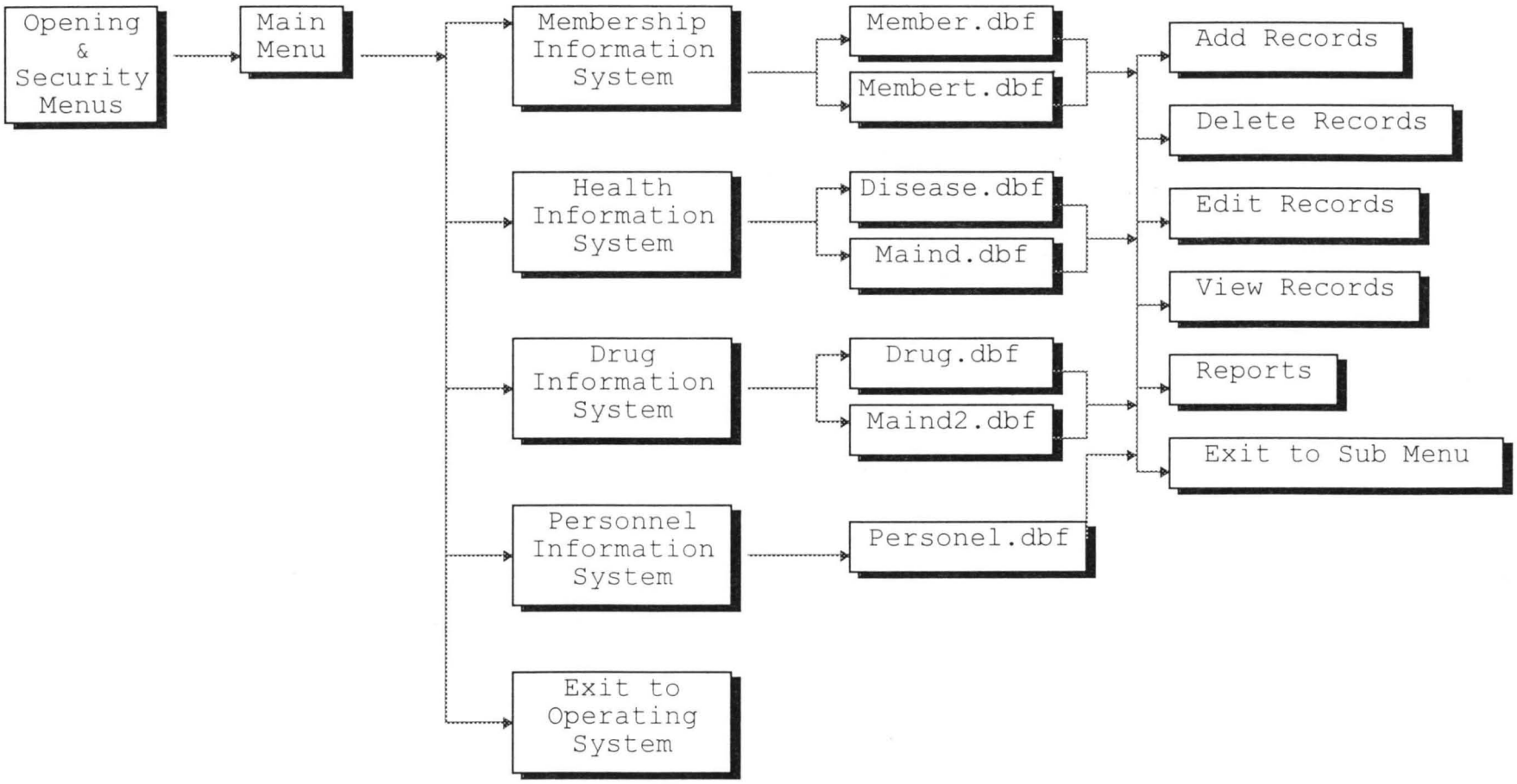
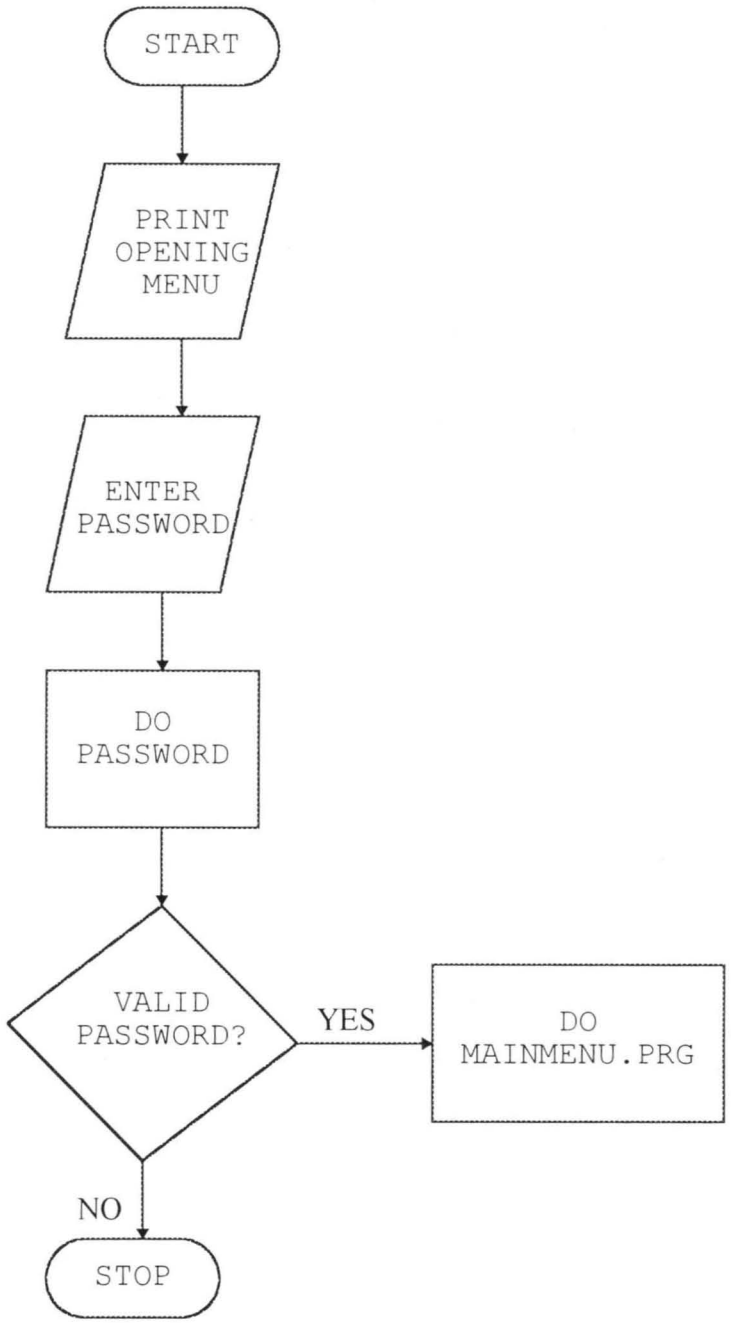


Fig. 3.4.2.1. Management Information System Design for CHAN

3.5. Health Management Information System Algorithms

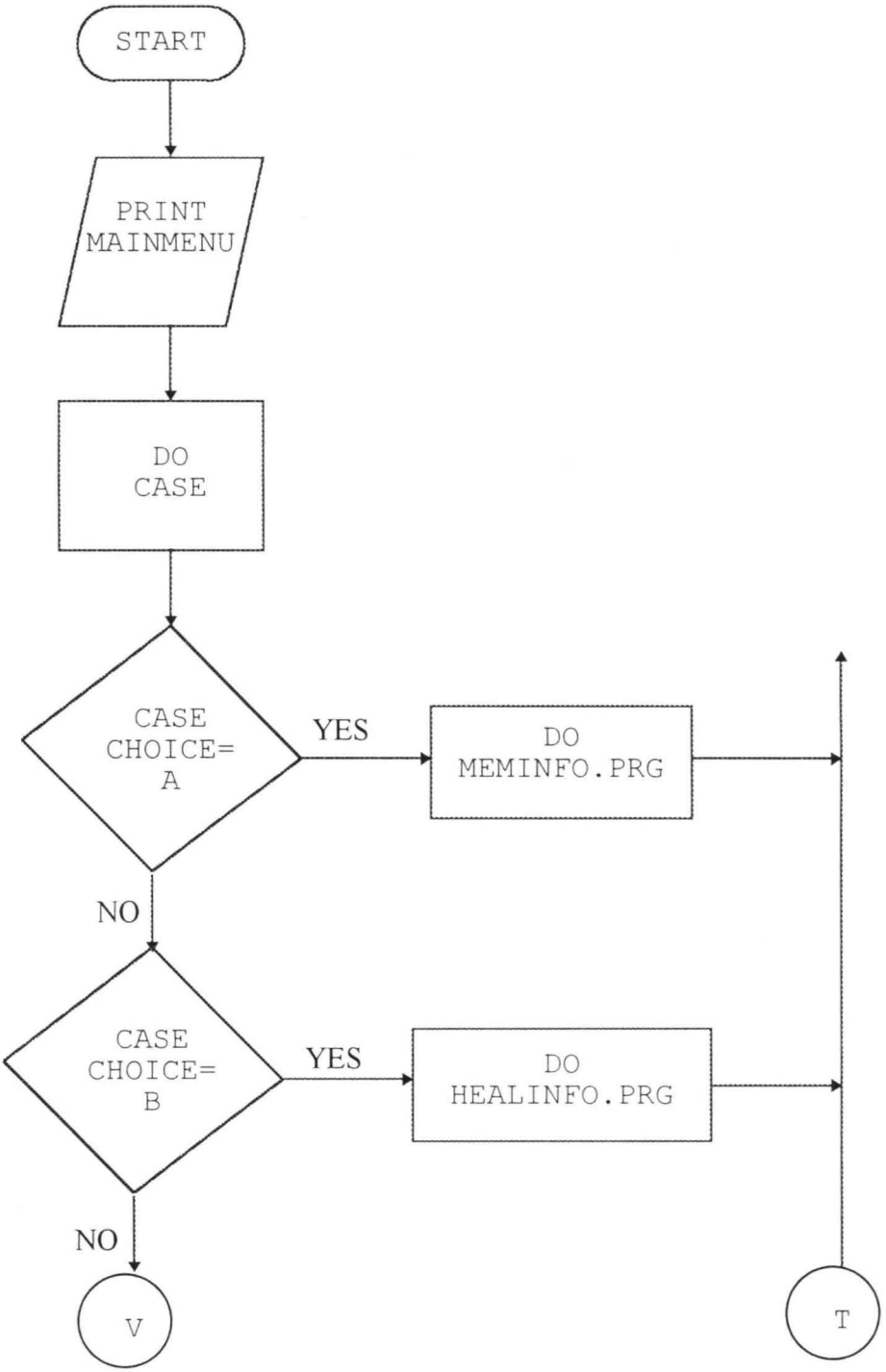
3.5.1. Opening Menu Flowchart (Chanmis.prg)

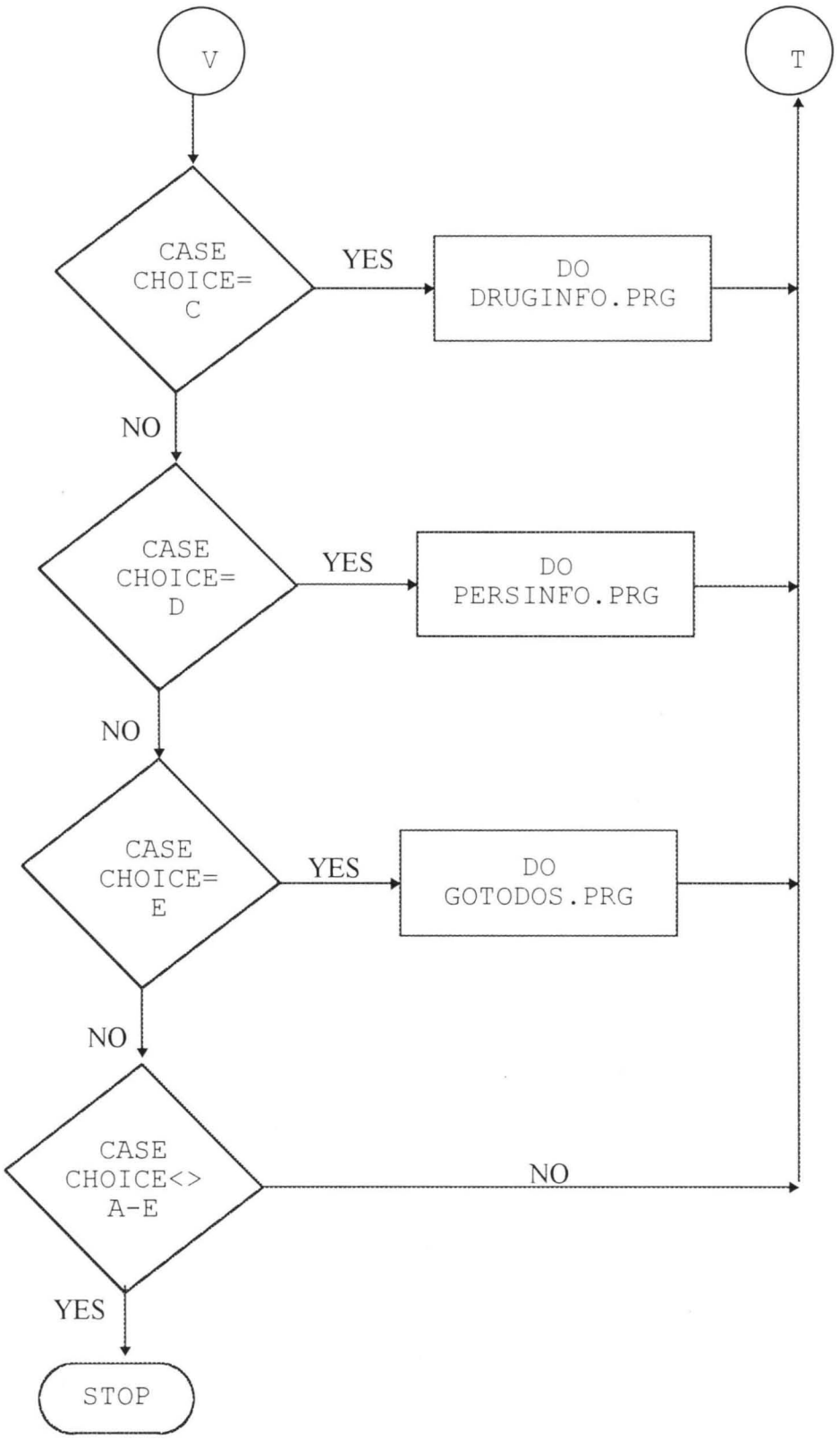
This is the opening menu and security program flowchart:



3.5.2 Main Menu Flowchart (Mainmenu. prg)

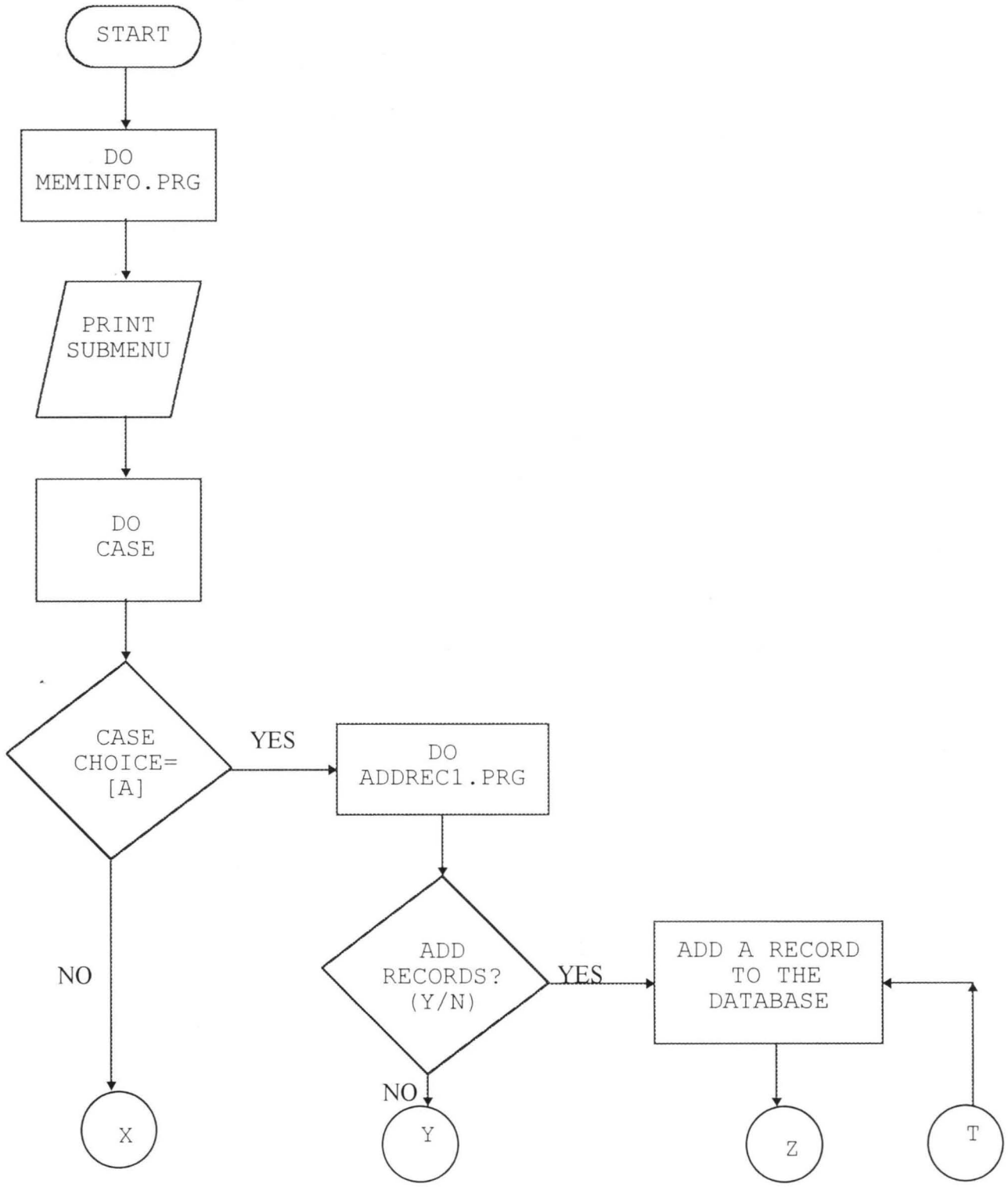
This is the Main Menu program flowchart which introduces one to the entire information system.

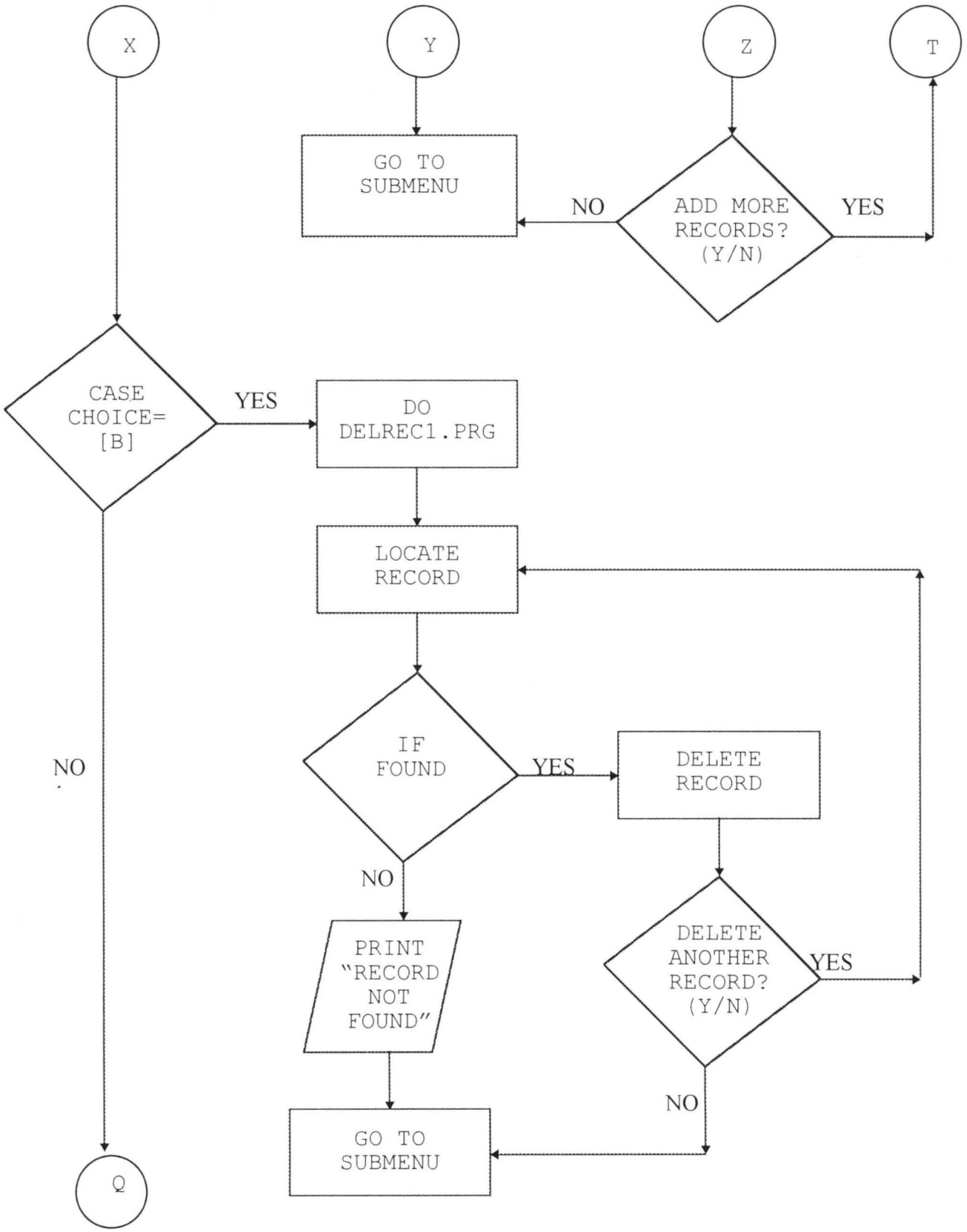


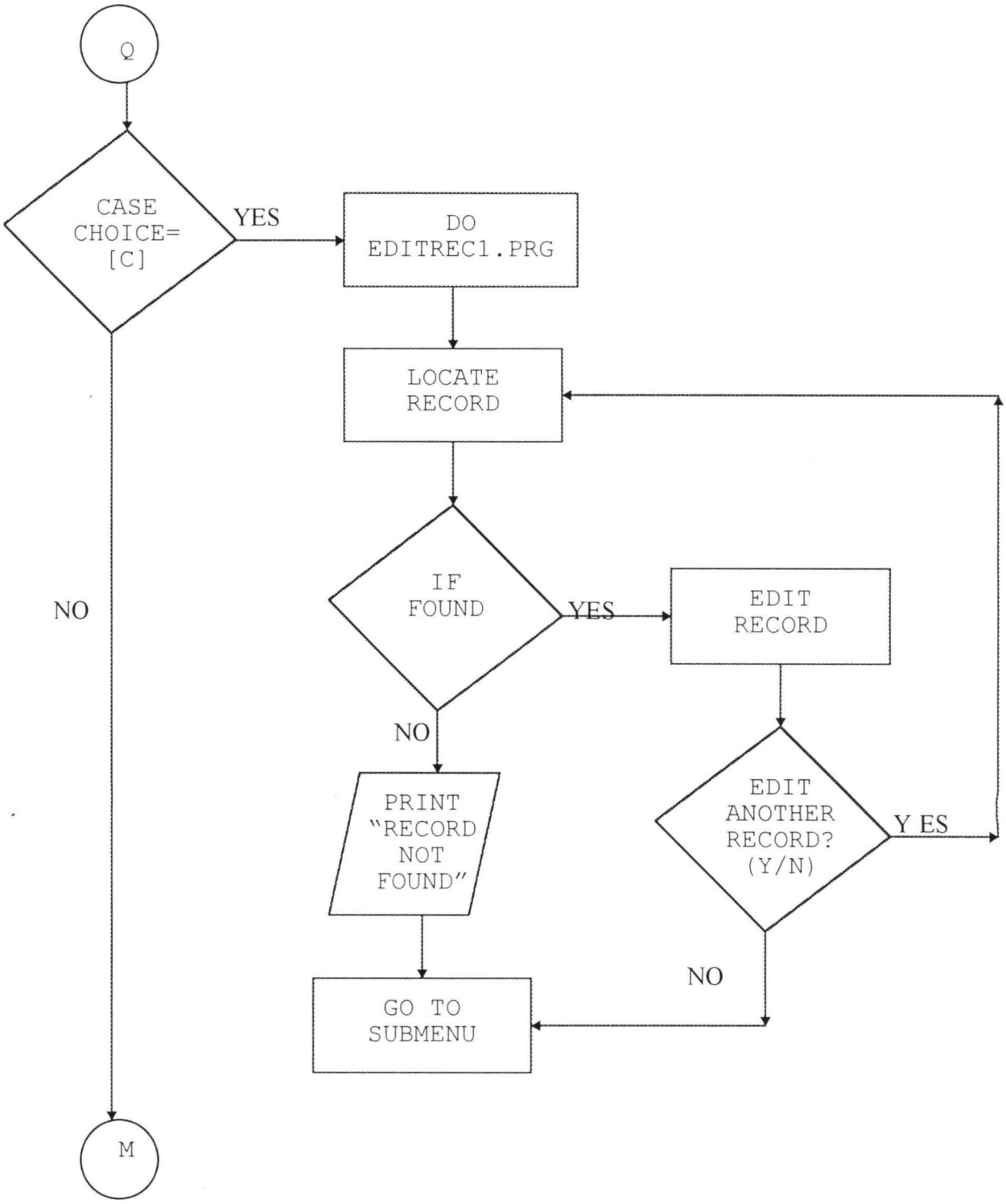

V
T
CASE CHOICE= C
YES
DO DRUGINFO.PRG
NO
CASE CHOICE= D
YES
DO PERSINFO.PRG
NO
CASE CHOICE= E
YES
DO GOTODOS.PRG
NO
CASE CHOICE<> A-E
NO
YES
STOP

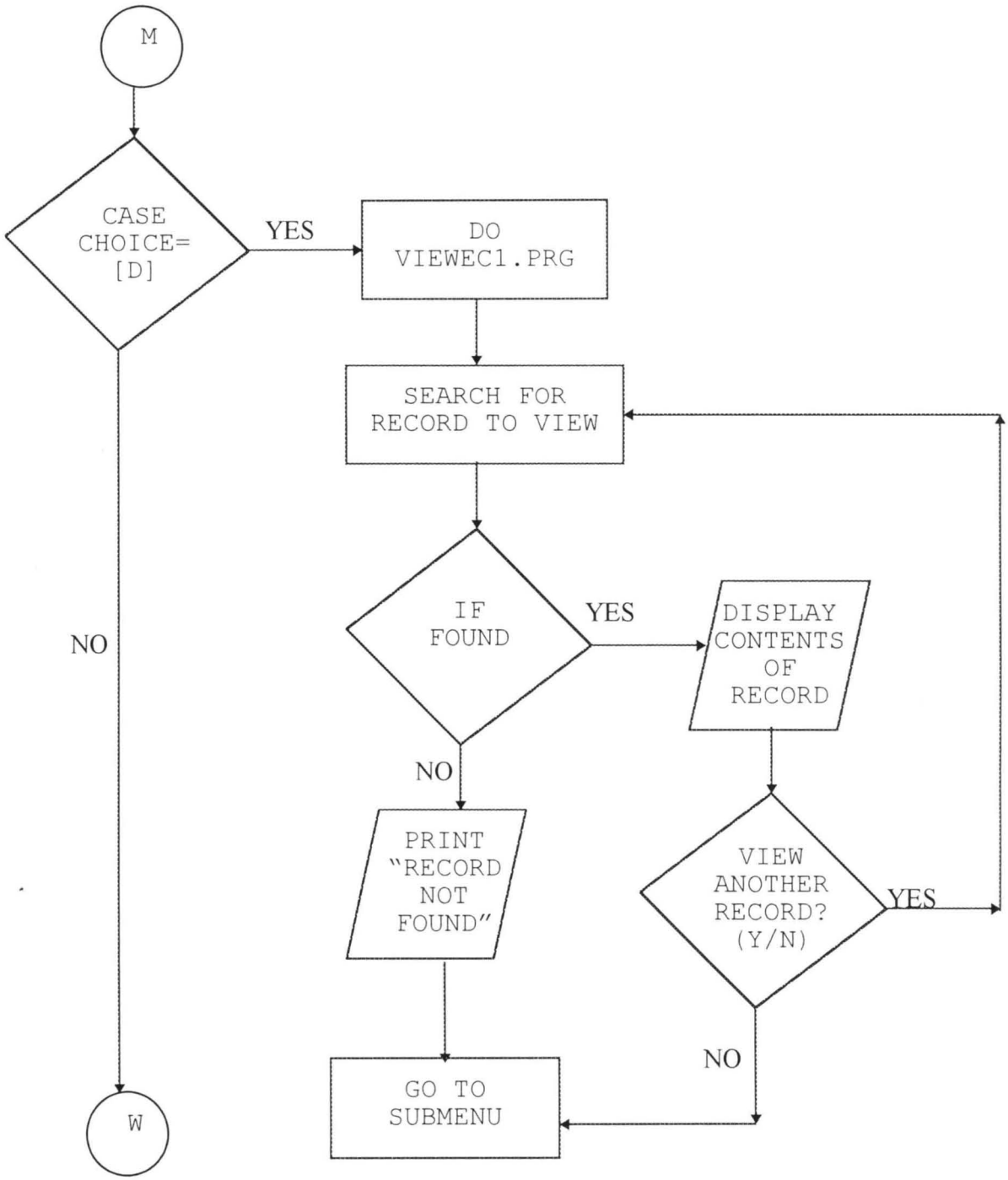
3.5.3. Membership Information System Flowchart (Meminfo.prg)

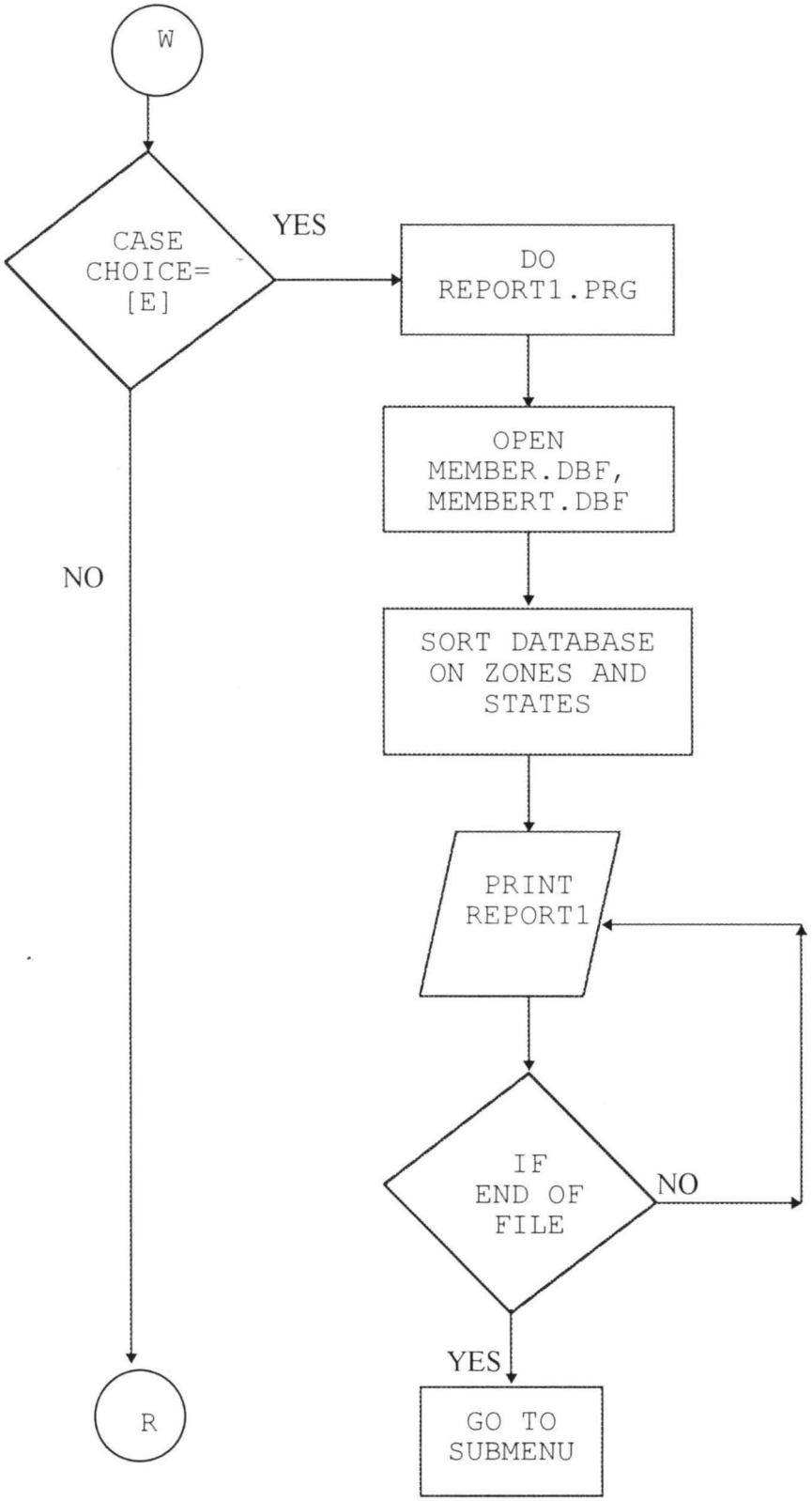
This is the membership program flowchart which activates the membership database files. This program adds, deletes, edits, views records of the member.dbf. It also gives a simple report based on the entered data.

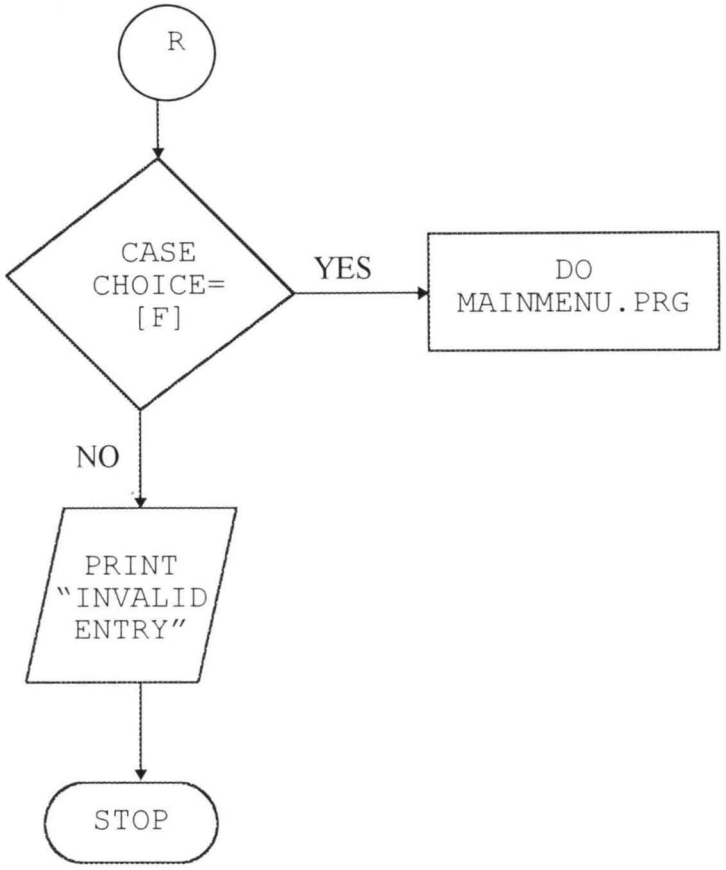



X
Y
Z
T
GO TO SUBMENU
NO
ADD MORE RECORDS? (Y/N)
YES
CASE CHOICE= [B]
YES
DO DELREC1.PRG
LOCATE RECORD
IF FOUND
YES
DELETE RECORD
NO
PRINT "RECORD NOT FOUND"
DELETE ANOTHER RECORD? (Y/N)
YES
NO
NO
GO TO SUBMENU
Q


Q
CASE CHOICE= [C]
YES
DO EDITREC1.PRG
LOCATE RECORD
IF FOUND
YES
EDIT RECORD
NO
PRINT "RECORD NOT FOUND"
EDIT ANOTHER RECORD? (Y/N)
Y ES
NO
GO TO SUBMENU
NO
M


M
CASE CHOICE= [D]
YES
DO VIEWEC1.PRG
SEARCH FOR RECORD TO VIEW
IF FOUND
YES
DISPLAY CONTENTS OF RECORD
NO
PRINT "RECORD NOT FOUND"
VIEW ANOTHER RECORD? (Y/N)
YES
NO
NO
GO TO SUBMENU
W


W
CASE CHOICE= [E]
YES
NO
DO REPORT1.PRG
OPEN MEMBER.DBF, MEMBERT.DBF
SORT DATABASE ON ZONES AND STATES
PRINT REPORT1
IF END OF FILE
NO
YES
GO TO SUBMENU
R



3.5.4. Health Information System Flowchart (Healinfo.prg)

This is the Health Information System Flowchart that activates all the database files on health care activities of member institutions. The routine is similar to that of the Membership Information System (3.5.3) except that different database files are used. There is a sub menu for this level through which data on health care activities of member institutions can be added, deleted, edited, viewed and reports generated. The programs to carry out these functions are titled Addrec2, Delrec2, Editrec2, Viewrec2 and Report2.

3.5.5. Drug Information System Flowchart (Druginfo.prg)

The Drug Information System activates database files on member institutions' drug utilization and inventory. The flowchart follows the same routine as in the case of Membership Information System (3.5.3) above, except the database files that are different. Programs that carry out the routine are titled Addrec3, Delrec3, Editrec3, Viewrec3 and Report3.

3.5.6 Personnel Information System Flowchart (Persinfo.prg)

The Personnel Information System activates the Personnel database file of CHAN and produces updated information on CHAN staff. The flowchart follows the same pattern with the Membership Information System except for the database file which is different. The programs for the routine functions are titled Addrec4, Delrec4, Editrec4, Viewrec4 and Report4.

3.6 Database Files Structures

3.6.1 Member.dbf

Structure for database: C:\DBASE\PROJECT\MEMBER.DBF
Number of data records: 7
Date of last update : 23/02/98

Field	*Field Name*	*Type*	*Width*	*Dec*	*Index*
1	F_NAME	Character	30		N
2	TYPE	Character	2		N
3	TOWN	Character	15		N
4	BOX_PMB	Character	6		N
5	LGA	Character	15		N
6	STATE	Character	12		N
7	CONTACT	Character	15		N
8	TITLE	Character	7		N
9	POSITION	Character	22		N
10	CHURCH	Character	12		N
11	MEMBER	Character	1		N
12	REGNO	Character	6		N
13	DJOINED	Date	8		N
14	BEDS	Numeric	4		N
15	DOCTORS	Numeric	2		N
16	DENTS	Numeric	2		N
17	PCIST	Numeric	2		N
18	NURSES	Numeric	2		N
19	OTHERS1	Numeric	3		N
20	REGFEE	Numeric	8	2	N
21	DEVFEE	Numeric	8	2	N
22	SUBSFEE	Numeric	8	2	N
23	SEXP	Numeric	10	2	N
24	DEXP	Numeric	12	2	N
25	OTHERS2	Numeric	10	2	N
26	DATE	Date	8		N
	** Total **		231		

3.6.2 Membert.dbf

Structure for database: C:\DBASE\PROJECT\MEMBERT.DBF
Number of data records: 7
Date of last update : 20/02/98

Field	*Field Name*	*Type*	*Width*	*Dec*	*Index*
1	CODE	Character	2		N
2	DESC	Character	15		N
	** Total **		18		

3.6.3 Personel.dbf

Structure for database: C:\DBASE\PROJECT\PERSONEL.DBF
Number of data records: 8
Date of last update : 21/02/98

Field	*Field Name*	*Type*	*Width*	*Dec*	*Index*
1	IDNO	Character	10		N
2	SNAME	Character	12		N
3	FNAME	Character	12		N
4	ONAME	Character	12		N
5	SEX	Character	1		N
6	DBIRTH	Date	8		N
7	STATE	Character	12		N
8	COUNTRY	Character	15		N
9	ST	Character	1		N
10	QUAL1	Character	2		N
11	QUAL2	Character	2		N
12	QUAL3	Character	2		N
13	QUAL4	Character	2		N
14	QUAL5	Character	2		N
15	DEMP	Date	8		N
16	DCONF	Date	8		N
17	DEPT	Character	15		N
18	LOCATE	Character	12		N
19	DPRO	Date	8		N
20	RANK	Character	17		N
21	GRADE	Character	2		N
22	BSAL	Numeric	10	2	N
	** Total **		174		

3.6.4 Maind.dbf

Structure for database: C:\DBASE\PROJECT\MAIND.DBF
Number of data records: 24
Date of last update : 23/02/98

Field	*Field Name*	*Type*	*Width*	*Dec*	*Index*
1	REGNO	Character	6		N
2	DCODE	Character	5		N
3	CASES	Numeric	6		N
4	DEATH	Numeric	6		N
	** Total **		24		

3.6.5 Maind2.dbf

Structure for database: C:\DBASE\PROJECT\MAIND2.DBF
Number of data records: 17
Date of last update : 21/02/98

Field	*Field Name*	*Type*	*Width*	*Dec*	*Index*
1	REGNO	Character	6		N
2	DCODE	Character	7		N
3	RECEIVED	Numeric	6		N
4	ISSUED	Numeric	6		N
5	BALANCE	Numeric	6		N
	** Total **		32		

3.6.6 Drug.dbf

Structure for database: C:\DBASE\PROJECT\DRUG.DBF
Number of data records: 10
Date of last update : 21/02/98

Field	*Field Name*	*Type*	*Width*	*Dec*	*Index*
1	DCODE	Character	7		N
2	DESC	Character	25		N
3	MEASURE	Character	5		N
	** Total **		38		

3.6.7 Temp.dbf

Structure for database: C:\DBASE\PROJECT\TEMP.DBF
Number of data records: 0
Date of last update : 23/02/98

Field	*Field Name*	*Type*	*Width*	*Dec*	*Index*
1	REGNO	Character	6		N
2	DCODE	Character	5		N
3	CASES	Numeric	6		N
4	DEATH	Numeric	6		N
	** Total **		24		

3.6.8 Temp2.dbf

Structure for database: C:\DBASE\PROJECT\TEMP2.DBF
Number of data records: 0
Date of last update : 21/02/98

Field	*Field Name*	*Type*	*Width*	*Dec*	*Index*
1	REGNO	Character	6		N
2	DCODE	Character	7		N
3	RECEIVED	Numeric	6		N
4	ISSUED	Numeric	6		N
5	BALANCE	Numeric	6		N
	** Total **		32		

3.6.9 Disease.dbf

Structure for database: C:\DBASE\PROJECT\DISEASE.DBF
Number of data records: 21
Date of last update : 21/02/98

Field	*Field Name*	*Type*	*Width*	*Dec*	*Index*
1	DCODE	Character	5		N
2	DESC	Character	25		N
	** Total **		31		

CHAPTER FOUR

SYTEM IMPLEMENTATION, DOCUMENTATION AND EVALUATION

4.1 Health Management Information System Implementation

Given below is the implementation of newly designed system. Sample data were provided to test run the system. The output are presented in a sequential order from figures 4.1.1 to 4.1.29 in the next few pages as follows:

YOU ARE WELCOME TO

CHRISTIAN HEALTH ASSOCIATION OF NIGERIA (CHAN)

Coordinating Church-Sponsored Health Work in Nigeria

No. 6, NOAD AVENUE, JOS, PLATEAU STATE, NIGERIA

TEL. 073-454044, 457308, 457429

e-mail: chan@hisen.gn.apc.org

Press any key to Continue.....

Fig. 4.1.1.

This is
CHAN Management Information System

Authored by Bamidele Olukayode Samson

B.Sc.(Hons) 1988, PGD (Comp. Sc.) 1997, MNSA, MCOAN

This System was developed in July 1997

WARNING: This Program is Copyrighted .....

Please Do not Copy

Press any key to Continue.....

Fig. 4.1.2.

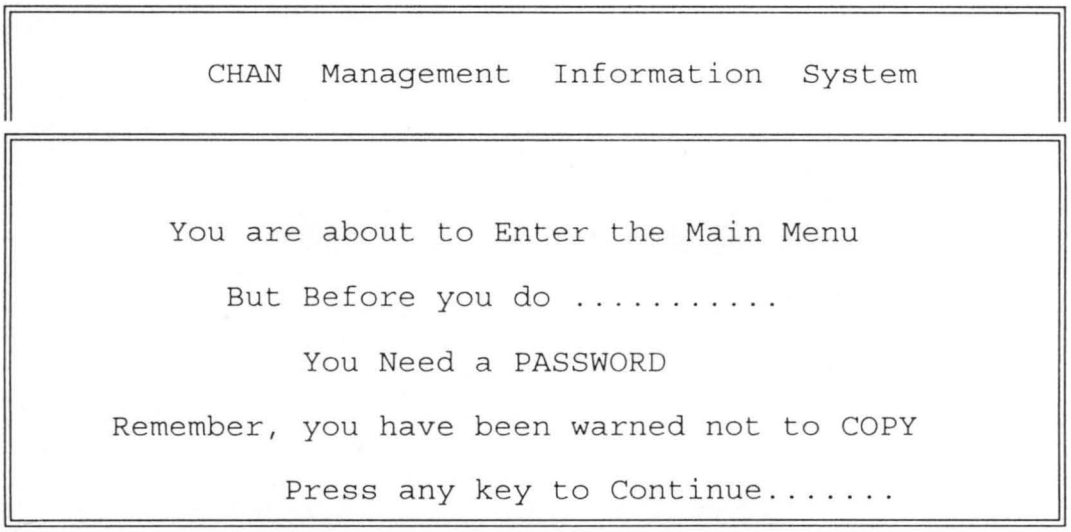


Fig. 4.1.3.

Fig. 4.1.4.

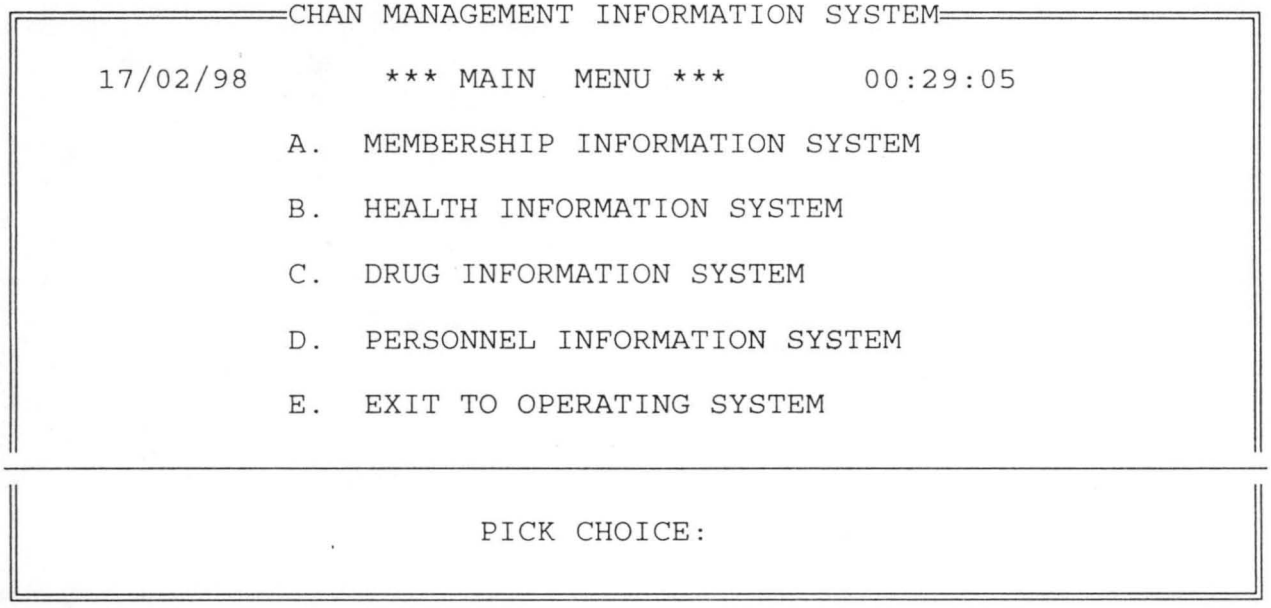


Fig. 4.1.5.

MEMBERSHIP INFORMATION SYSTEM SUBMENU

Task Code		Task
[A]	-	ADD A NEW RECORD
[B]	-	DELETE ONE RECORD
[C]	-	EDIT A RECORD
[D]	-	DISPLAY THE CONTENTS OF A RECORD
[E]	-	REPORTS
[F]	-	EXIT TO MAINMENU

Press any LETTER of your Choice (A -F) :

Fig. 4.1.6.

MEMBERSHIP INFORMATION SYSTEM

ADDING NEW RECORD FORM

REGISTRATION NO: 0001 FACILITY NAME: EVANGEL HOSPITAL

TYPE CODE: 01 TOWN: JOS BOX/PMB: 2880

LGA: JOS NORTH STATE: PLATEAU CHURCH: ECWA

TITLE: DR. CONTACT: KARSHIMA J. POSITION: MEDICAL DIRECTOR

REGISTERED MEMBER (Y/N): Y DATE JOINED: 15/04/87 NO OF BEDS: 200

STAFF STRENGTH:
DOCTORS: 15 DENTISTS: 2 PHARMACISTS: 4 NURSES: 25 OTHERS: 50

REG. FEES: 5,000.00 DEV. FEES: 2,500.00 SUBS. FEES: 1,500.00

EXPENSES:
ON SALARY: 450,000.00 ON DRUGS: 2,000,000.00 ON OTHERS: 600,000.0

SAVE RECORD (Y/N):

Fig. 4.1.7.

```
=========================MEMBERSHIP INFORMATION SYSTEM=========================

                              DELETING RECORD FORM
                              ====================

REGISTRATION NO: 0001          FACILITY NAME: EVANGEL HOSPITAL

TYPE CODE: 01       TOWN: JOS                              BOX/PMB: 2880

LGA: JOS NORTH              STATE: PLATEAU           CHURCH: ECWA

TITLE: DR.       CONTACT: KARSHIMA J.       POSITION: MEDICAL DIRECTOR

REGISTERED MEMBER (Y/N): Y   DATE JOINED: 15/04/87  NO OF BEDS:  200

STAFF STRENGTH:
 DOCTORS: 15   DENTISTS:  2   PHARMACISTS:  4   NURSES: 25   OTHERS: 50

REG. FEES:  5,000.00      DEV. FEES:  2,500.00      SUBS. FEES:  1,500.00

EXPENSES:
 ON SALARY:   450,000.00  ON DRUGS:   2,000,000.00    ON OTHERS:   600,000.0
=============================================================================
                        TO DELETE THIS RECORD? (Y/N):
=============================================================================
```

Fig. 4.1.8.

```
=========================MEMBERSHIP INFORMATION SYSTEM=========================

                              EDITING RECORD FORM
                              ===================

REGISTRATION NO: 0001          FACILITY NAME: EVANGEL HOSPITAL

TYPE CODE: 01       TOWN: JOS                              BOX/PMB: 2880

LGA: JOS NORTH              STATE: PLATEAU           CHURCH: ECWA

TITLE: DR.       CONTACT: KARSHIMA J.       POSITION: MEDICAL DIRECTOR

REGISTERED MEMBER (Y/N): Y   DATE JOINED: 15/04/87  NO OF BEDS:  200

STAFF STRENGTH:
 DOCTORS: 15   DENTISTS:  2   PHARMACISTS:  4   NURSES: 25   OTHERS: 50

REG. FEES:  5,000.00      DEV. FEES:  2,500.00      SUBS. FEES:  1,500.00

EXPENSES:
 ON SALARY:   450,000.00  ON DRUGS:   2,000,000.00    ON OTHERS:   600,000.0
=============================================================================
                          SAVE CHANGES (Y/N):
=============================================================================
```

Fig. 4.1.9.

MEMBERSHIP INFORMATION SYSTEM

VIEWING RECORD FORM

REGISTRATION NO: 0001 FACILITY NAME: EVANGEL HOSPITAL

TYPE CODE: 01 TOWN: JOS BOX/PMB: 2880

LGA: JOS NORTH STATE: PLATEAU CHURCH: ECWA

TITLE: DR. CONTACT: KARSHIMA J. POSITION: MEDICAL DIRECTOR

REGISTERED MEMBER (Y/N): Y DATE JOINED: 15/04/87 NO OF BEDS: 200

STAFF STRENGTH:
DOCTORS: 15 DENTISTS: 2 PHARMACISTS: 4 NURSES: 25 OTHERS: 50

REG. FEES: 5,000.00 DEV. FEES: 2,500.00 SUBS. FEES: 1,500.00

EXPENSES:
ON SALARY: 450,000.00 ON DRUGS: 2,000,000.00 ON OTHERS: 600,000.0

VIEWING RECORD - Press any key to continue ...

Fig. 4.1.10

REPORT ON MEMBER INSTITUTIONS

REG NO	FACILITY NAME	LOCATION	STATE	NO OF STAFF	AMOUNT
234	ST. THERESA MAT. HOME	ONITSHA	ANAMBRA	66	10,000
0002	MANDELA CLINIC	MAKURDI	BENUE	40	4,000
220	BAPTIST HEALTH CENTRE	AIYEGUNLE	KOGI	10	3,500
0003	OLUYORO HOSPITAL	IBADAN	OYO	143	8,500
1234	EVANGEL HOSPITAL	JOS	PLATEAU	132	10,113

Fig. 4.1.11.

HEALTH INFORMATION SYSTEM SUBMENU

Task Code		Task
[A]	-	ADD A NEW RECORD
[B]	-	DELETE ONE RECORD
[C]	-	EDIT A RECORD
[D]	-	DISPLAY THE CONTENTS OF A RECORD
[E]	-	TO GENERATE REPORTS
[F]	-	EXIT TO MAIN MENU

Press any LETTER of your choice (A-F) :

Fig. 4.1.12

HEALTH INFORMATION SYSTEM

ADDING NEW RECORD FORM

REGISTRATION NO: 0001 FACILITY NAME: EVANGEL HOSPITAL

DISEASE CODE	DISEASE NAME	REPORTED CASES	NO OF DEATHS
I/001	CSM	12	2
I/002	CHOLERA	45	5
I/003	LASSA FEVER	10	5
O/001	CSM	25	5
O/004	MEASLES	50	12
A/001	ANTE-NATAL	21	1
I/006	DIARRHOEA	17	1

TO ENTER MORE (Y/N):

Fig. 4.1.13.

HEALTH INFORMATION SYSTEM

DELETING RECORD FORM

REGISTRATION NO: 0001 FACILITY NAME: EVANGEL HOSPITAL

DISEASE CODE	DISEASE NAME	REPORTED CASES	NO OF DEATHS
I/001	CSM	12	2
I/002	CHOLERA	45	5
I/003	LASSA FEVER	10	5
O/001	CSM	25	5
O/004	MEASLES	50	12
A/001	ANTE-NATAL	21	1
I/006	DIARRHOEA	17	1

Press any key to display next screen ...

Fig. 4.1.14

HEALTH INFORMATION SYSTEM

EDITING RECORD FORM

REGISTRATION NO: 0001 FACILITY NAME: EVANGEL HOSPITAL

DISEASE CODE	DISEASE NAME	REPORTED CASES	NO OF DEATHS
I/001	CSM	12	2
I/002	CHOLERA	45	5
I/003	LASSA FEVER	10	5
O/001	CSM	25	5
O/004	MEASLES	50	12
A/001	ANTE-NATAL	21	1
I/006	DIARRHOEA	17	1

Press any key to go to next screen ...

Fig. 4.1.15.

HEALTH INFORMATION SYSTEM

VIEWING RECORD FORM

REGISTRATION NO: 0001 FACILITY NAME: EVANGEL HOSPITAL

DISEASE CODE	DISEASE NAME	REPORTED CASES	NO OF DEATHS
I/001	CSM	12	2
I/002	CHOLERA	45	5
I/003	LASSA FEVER	10	5
O/001	CSM	25	5
O/004	MEASLES	50	12
A/001	ANTE-NATAL	21	1
I/006	DIARRHOEA	17	1

VIEWING RECORD - Press any key to display next screen ...

Fig. 4.1.16.

REPORTED DISEASE CASES IN MEMBER INSTITUTIONS

REG NO	FACILITY NAME	LOCATION	STATE	DISEASE TYPE	CASES
1234	EVANGEL HOSPITAL	JOS	PLATEAU	CHOLERA	50
1234	EVANGEL HOSPITAL	JOS	PLATEAU	CSM	200
0001	ECWA DISPENSARY	MINNA	NIGER	CSM	12
0001	ECWA DISPENSARY	MINNA	NIGER	CHOLERA	45
0001	ECWA DISPENSARY	MINNA	NIGER	LASSA FEVER	10
0001	ECWA DISPENSARY	MINNA	NIGER	CSM	25
0001	ECWA DISPENSARY	MINNA	NIGER	MEASLES	50
0001	ECWA DISPENSARY	MINNA	NIGER	ANTE-NATAL	21
0001	ECWA DISPENSARY	MINNA	NIGER	DIARRHOEA	17
0001	ECWA DISPENSARY	MINNA	NIGER	CSM	23

Fig. 4.1.17.

DRUG INFORMATION SYSTEM SUBMENU

Task Code		Task
[A]	-	ADD A NEW RECORD
[B]	-	DELETE ONE RECORD
[C]	-	EDIT A RECORD
[D]	-	DISPLAY THE CONTENTS OF A RECORD
[E]	-	GENERATE REPORTS
[F]	-	EXIT TO MAIN MENU

Press any LETTER of your Choice (A -F) :

Fig. 4.1.18

DRUG INFORMATION SYSTEM

ADDING NEW RECORD FORM

REGISTRATION NO: 0001 FACILITY NAME: EVANGEL HOSPITAL

DRUG CODE	DRUG NAME	QTY RECEIVED	QTY ISSUED
0001	PCM TAB	1000	100
0002	PCM SYRUP	2000	200
0003	AMPICILLIN CAPS	150	100
0004	CHLORAMPHENICOL SYR	80	50
0005	CHLOROQUINE TABS	105	104
0007	CALAMINE LOTION	20	15
0010	FOLIC ACID	210	201

TO UPDATE FILE (Y/N):

Fig. 4.1.19.

DRUG INFORMATION SYSTEM

DELETING RECORD FORM

REGISTRATION NO: 0001 FACILITY NAME: EVANGEL HOSPITAL

DRUG CODE	DRUG NAME	QTY RECEIVED	QTY ISSUED
0001	PCM TAB	1000	100
0002	PCM SYRUP	2000	200
0003	AMPICILLIN CAPS	150	100
0004	CHLORAMPHENICOL SYR	80	50
0005	CHLOROQUINE TABS	105	104
0007	CALAMINE LOTION	20	15
0010	FOLIC ACID	210	201

TO DELETE RECORDS? (Y/N):

Fig. 4.1.20.

DRUG INFORMATION SYSTEM

EDITING RECORD FORM

REGISTRATION NO: 0001 FACILITY NAME: EVANGEL HOSPITAL

DRUG CODE	DRUG NAME	QTY RECEIVED	QTY ISSUED
0001	PCM TAB	1000	100
0002	PCM SYRUP	2000	200
0003	AMPICILLIN CAPS	150	100
0004	CHLORAMPHENICOL SYR	80	50
0005	CHLOROQUINE TABS	105	104
0007	CALAMINE LOTION	20	15
0010	FOLIC ACID	210	201

TO UPDATE FILE (Y/N):

Fig 4.1.21.

DRUG INFORMATION SYSTEM

VIEWING RECORD FORM

REGISTRATION NO: 0001 FACILITY NAME: EVANGEL HOSPITAL

DRUG CODE	DRUG NAME	QTY RECEIVED	QTY ISSUED
0001	PCM TAB	1000	100
0002	PCM SYRUP	2000	200
0003	AMPICILLIN CAPS	150	100
0004	CHLORAMPHENICOL SYR	80	50
0005	CHLOROQUINE TABS	105	104
0007	CALAMINE LOTION	20	15
0010	FOLIC ACID	210	201

VIEWING RECORD - Press any key to continue ...

Fig. 4.1.22.

REPORT ON DRUG STOCK IN MEMBER INSTITUTIONS

FACILITY NAME	STATE	DRUG TYPE	QTY RCD.	QTY ISS.	BALANCE
EVANGEL HOSPITAL	PLATEAU	CHLOROQUINE TAB	100	20	80
EVANGEL HOSPITAL	PLATEAU	PCM SYRUP	200	23	177
EVANGEL HOSPITAL	PLATEAU	AMPICILLIN CAPS	50	40	10
ECWA DISPENSARY	NIGER	PCM TAB	1,000	100	900
ECWA DISPENSARY	NIGER	PCM SYRUP	2,000	200	1800
ECWA DISPENSARY	NIGER	AMPICILLIN CAPS	150	100	50
ECWA DISPENSARY	NIGER	CHLORAM. SYR	80	50	30
ECWA DISPENSARY	NIGER	CHLOROQUINE TAB	105	104	1
ECWA DISPENSARY	NIGER	CALAMINE LOTION	20	15	5
ECWA DISPENSARY	NIGER	FOLIC ACID	210	201	9

Fig. 4.1.23.

PERSONNEL INFORMATION SYSTEM SUBMENU

Task Code		Task
[A]	-	ADD A NEW RECORD
[B]	-	DELETE ONE RECORD
[C]	-	EDIT A RECORD
[D]	-	DISPLAY THE CONTENTS OF A RECORD
[E]	-	GENERATE REPORTS
[F]	-	EXIT TO MAIN MENU

Press any LETTER of your Choice (A -F) :

Fig. 4.1.24.

PERSONNEL INFORMATION SYSTEM

ADDING NEW RECORD FORM

ID. NO (Press "ENTER KEY" To Exit): NS/0004/92

SURNAME: BAMIDELE FIRST NAME: SAMSON OTHER NAMES: OLUKAYODE

SEX: M DATE OF BIRTH: 28/05/61 STATE OF ORIGIN: KOGI

NATIONALITY/COUNTRY: NIGERIAN MARITAL STATUS: M

ACADEMIC QUALIFICATIONS:
FIRST: 05 SECOND: 06 THIRD: FOURTH: FIFTH:

DATE OF EMPLOYMENT: 01/04/92 DATE OF CONFIRMATION: 01/05/94

DEPARTMENT	LOCATION	DATE OF LAST PROMOTION:
NATIONAL SEC.	JOS	25/05/95

RANK: MIS OFFICER GRADE LEVEL: 12 BASIC SALARY: # 12,000.00

SAVE RECORD (Y/N):

Fig. 4.1.25.

PERSONNEL INFORMATION SYSTEM

DELETING NEW RECORD FORM

ID. NO (Press "ENTER KEY" To Exit): NS/0004/92

SURNAME: BAMIDELE FIRST NAME: SAMSON OTHER NAMES: OLUKAYODE

SEX: M DATE OF BIRTH: 28/05/61 STATE OF ORIGIN: KOGI

NATIONALITY/COUNTRY: NIGERIAN MARITAL STATUS: M

ACADEMIC QUALIFICATIONS:
FIRST: 05 SECOND: 06 THIRD: FOURTH: FIFTH:

DATE OF EMPLOYMENT: 01/04/92 DATE OF CONFIRMATION: 01/05/94

DEPARTMENT	LOCATION	DATE OF LAST PROMOTION:
NATIONAL SEC.	JOS	25/05/95

RANK: MIS OFFICER GRADE LEVEL: 12 BASIC SALARY: # 12,000.00

TO DELETE THIS RECORD? (Y/N):

Fig. 4.1.26.

PERSONNEL INFORMATION SYSTEM

EDITING NEW RECORD FORM

ID. NO (Press "ENTER KEY" To Exit): NS/0004/92

SURNAME: BAMIDELE FIRST NAME: SAMSON OTHER NAMES: OLUKAYODE

SEX: M DATE OF BIRTH: 28/05/61 STATE OF ORIGIN: KOGI

NATIONALITY/COUNTRY: NIGERIAN MARITAL STATUS: M

ACADEMIC QUALIFICATIONS:
FIRST: 05 SECOND: 06 THIRD: FOURTH: FIFTH:

DATE OF EMPLOYMENT: 01/04/92 DATE OF CONFIRMATION: 01/05/94

DEPARTMENT	LOCATION	DATE OF LAST PROMOTION:
NATIONAL SEC.	JOS	25/05/95

RANK: MIS OFFICER GRADE LEVEL: 12 BASIC SALARY: # 12,000.00

SAVE RECORD (Y/N):

Fig. 4.1.27.

PERSONNEL INFORMATION SYSTEM

VIEWING NEW RECORD FORM

ID. NO (Press "ENTER KEY" To Exit): NS/0004/92

SURNAME: BAMIDELE FIRST NAME: SAMSON OTHER NAMES: OLUKAYODE

SEX: M DATE OF BIRTH: 28/05/61 STATE OF ORIGIN: KOGI

NATIONALITY/COUNTRY: NIGERIAN MARITAL STATUS: M

ACADEMIC QUALIFICATIONS:
FIRST: 05 SECOND: 06 THIRD: FOURTH: FIFTH:

DATE OF EMPLOYMENT: 01/04/92 DATE OF CONFIRMATION: 01/05/94

DEPARTMENT LOCATION DATE OF LAST PROMOTION:
NATIONAL SEC. JOS 25/05/95

RANK: MIS OFFICER GRADE LEVEL: 12 BASIC SALARY: # 12,000.00

VIEWING RECORD - Press any key to continue ...

Fig. 4.1.28.

REPORT ON STAFFING SITUATION OF CHAN

ID. NO.	STAFF NAME	STATE	DATE EMP	DEPARTMENT	BASIC SALARY
NS/0004/92	BAMIDELE S.O.	KOGI	01/04/92	NATIONAL SEC	12,000.00
CD/0004/91	BANWAT S.B.	PLATEAU	12/07/91	CDSS	15,000.00
PH/0010/94	TSADO J.F.	KWARA	25/04/89	PHCS	8,000.00
ZA/0012/95	JELLASON A. .	TARABA	21/03/95	ZONE A	12,500.00
ZB/OOO5/94	ANGWE M.T.	BENUE	21/03/94	ZONE B	8,000.00
ZC/0011/93	OBICHERE B.C.	IMO	24/02/93	ZONE C	8,900.00
ZD/0003/89	OLOYEDE A.A.	OYO	08/09/89	ZONE D	7,500.00

Fig. 4.1.29.

4.2 Health Management Information System Documentation

The newly designed system has been developed to run in the dBASE III Plus and later versions environment. Even though it has been made standard for dBASE IV, the programs can run under dBASE III Plus environment. This is to allow for the compilation of the programs with common compilers such as the one in Clippers. The idea here is to make the system flexible enough to run in the DOS environment. This means to run this system, one must have any version of dBASE as from dBASE III Plus.

To enter into the system, at the DOS prompt, type:

CD\DBASE <Enter>

this will give the prompt:

C:\DBASE>_

At the prompt, type:

DBASE <Enter>

This takes one into the dBASE Assistant Menu after few seconds. At this juncture, press:

Esc key twice to take you into the *dot prompt* of dBASE. At the dot prompt, type:

. do chanmis <Enter>

The system takes you through three introductory menus before it asks you to supply the *password* for you to continue. Without the supply of the password, the system will come to a halt at this point. This is to ensure that only a legal user can access the system. Provision is also made for one to change the password set in case there is a leakage of the current one.

The initial password set is ***Olukayode***. If you type this word, the system takes you into the ***Main Menu***, where you can make a choice of which Information Subsystem you want to use.

For example, to go into the ***Membership Information System***, Press:

A

and you are taken into the ***Membership Information System*** Submenu, where again, you can perform any of the following actions:

a. Add a new record to the Membership Information System database

b. Delete one record at a time from the Membership Information System database

c. Edit one record at a time in the Membership Information System database

d. Display the contents of any given record within the Membership Information System database

e. Generate reports based on CHAN membership and obtain the hard copy of such reports

f. Exit from the Membership Information System submenu to the preceding screen (the ***Main Menu***)

This routine is the same for all other information subsystems within the system, i.e

i. Health Information System
ii. Drug Information System
iii. Personnel Information System

To quit from the system, go back to the ***Main Menu*** and choose:

Exit to Operating System

This takes you to the ***dot prompt*** of the dBASE where you can quit to the ***Operating System*** as desired.

You will notice the ease of using the new system. An advance knowledge of DOS or dBASE is not required to operate the system.

4.3. Health Management Information System Evaluation

At the completion of the implementation of the system, one needs to make provision for its review. This has to do with the maintenance of the system against environmental changes which may affect the computer or other computer-based systems such as logistics.

It is expected that proper evaluation of the system will lead to the improvement of the system functions and the correction of faults which arise during operation It is a fact that systems do not and can not stay unchanged.

The recommended method of evaluation for this system is two-fold:

i. *Initial Audit* - this is the type of evaluation that is to be carried out in order to examine the performance of the system against the standards and benchmarks established during the design stage. Here, the degree to which the new system effectively meets its objectives will be assessed. Also, the initial audit could help to ascertain the resource needs of the new system. It is recommended that the initial audit for this system be done after one month of use.

ii. *Feedback* - this is the continuous process of evaluation which provides information about the system's effectiveness. It is to be borne in mind that the effectiveness of an information system is measured by the quality of information delivered by it to its decision makers.

Other factors to note during evaluation include:

a. whether user service requirements have been met, while simultaneously reducing errors and cost.
b. whether known, unexpected or ensuing limitations of the system needs attention.

In this study, the amendment procedure suggested for the new system is directly through the operators (users). This is because the users are expected to identify any problem areas or external requirements of the system. Based on this, the system will further be designed to meet the requirements.

CHAPTER FIVE

SUMMARY AND RECOMMENDATIONS

5.1 Summary

The contribution of CHAN to the health sector of Nigeria is estimated at 40% of the total health services provided in the country. It has been shown that CHAN is capable of generating, through its network of health facilities across the country, 40% of health services data. The value of the information generated from these data are of great import as they can be used in planning, health system research and monitoring of health programmes and activities.

It was shown that the logistics of transforming data into information is not an easy one, let alone its capital intensive nature. This project made an attempt at suggesting a cost-effective method of data collection and the systematic usage of information so generated.

A detailed study of the information system of CHAN was carried out and a new one designed. The new design shows preference for a computerized CHAN Management Information System. This is in view of the need for accuracy, time and effort-saving and cost-effectiveness in the bid to tackle the problems of information explosion facing our generation.

CHAN will benefit from the new system in the following ways:

i. Enhancement of the efficient operation of its drug, health, personnel and membership information systems.

ii. Integration of the various subsystems of the CHAN Information System.

iii. Creation of speedy, accurate and cost-effective processing of data and the generation of necessary reports for lobbying and advocacy strategies.

iv. Laying of a scientific basis for health systems research and effective monitoring and evaluation of CHAN activities.

v. Elimination/reduction of the constant problems associated with the existing system.

vi. Introduction of some procedures which reduces the task of the users as well as making provision for the facilities required by the system.

vii. Maintenance of data security and attainment of data security.

5.2 Recommendations

Given the above benefits of the newly designed system, it is highly recommended that the hardware requirements for the new system as stated in the preceding chapters be provided immediately. This will allow for the commencement of the system conversion as from June 1998.

It is recommended that the intending users of this new system be trained for a period of three weeks on the use of the system.

The laid down procedures for logistics and maintenance of the system should be strictly adhered to.

Conclusively, the pursuance of the installation of this newly designed system needs to be absolute as all the procedures have been tested and confirmed efficient. Therefore its application in CHAN will meet both present and future needs of the organization.

REFERENCES

1. Adams D.R. and Wagner G.E. (1986), *Computer Information Systems: An Introduction.* South-Western Publishing Co., Cincinnati, Ohio.

2. Adamu S.O. (1992), *Manpower Needs of National Health Management Information System.* Proceedings of National Conference on Health Management Information System, Abuja, Nigeria, 11-15 February, 1992.

3. Adewole I.B. (1992), *National Health Management Information System: The Role of Health Professional Associations.* Proceedings of National Conference on Health Management Information System, Abuja, Nigeria, 11-15 February, 1992.

4. Andrew L. F. (1993), *Computer Systems Development: History, Organisation and Implementation*; John Wiley & Sons Ltd., England.

5. Bola A. (1992), *Infrastructural and Equipment Needs for a National Health Management Information System in Nigeria.* Proceedings of National Conference on Health Management Information System, Abuja, Nigeria, 11-15 February, 1992.

6. Boland R.J. and Hirschheim (1993), *The In-formation of Information Systems in Critical Issues in Information Systems Research*; Wiley & Sons Ltd., New York.

7. Brightman R.W. and Dimsdale J.M. (1986), *Using Computers in an Information Age.* Delmar Publishers Inc., Albany, New York.

8. Bullas S. and Scott T. (1992), Hospital Information Systems and Management, *in Hospital Information Systems: Scope-Design-Architecture.* Proceedings of International Medical Informatics Association (IMIA), Germany, 7-11 September, 1991.

9. Donald H. S. (1979), *Computers in Business* (4th Edition); McGraw-Hill Book Company, New York.

10. Forster D. (1992), *Expert Systems in Health for Developing Countries: Practice, Problems and Potentials*. International Development Research Centre, Nairobi.

11. Koi K. (1992), *Operational Guide to CHAN MIS*. A Manual developed for the operation of CHAN MIS under the sponsorship of ICCO.

12. Kluzer S. (1990), Computer Diffusion in Black Africa: A Preliminary Assessment, *in Information Technology in Developing Countries (Eds. S.C. Bhatnagar and N. Bjorn - Anderson)*, North Holland, pp.175-188.

13. Lucey T. (1993), *Management Information Systems*; DP Publications Ltd., London.

14. Michael J. E. (1987), Information Systems Strategy Formulation, *in Critical Issues in Information Systems Research*; John Wiley & Sons Ltd., New York.

15. Ogunbekun, I.O. (1992), Information Support for Health Planning and Management: A Private Sector Perspective, in Proceedings of National Conference on Health Management Information System, Abuja, Nigeria, 11-15 February, 1992.

16. Protti D.J. and Haskell A.R. (1992), Managing Information in Hospitals: 60% Social, 40% Technical? *In Hospital Information Systems: Scope-Design-Architecture*. Proceedings of the International Medical Informatics Association (IMIA), Germany, 7-11 September, 1991.

17. Shehu S. (1996), Health Projects Management, *Nigerian Journal of Health Planning and Management*, July-December, 1996.

Appendix

Programs

1. Chanmis.prg

```
** This program opens the new HMIS software developed for CHAN**
*** author: Bamidele O.S.
set talk off
set echo off
set statu off
set safety off
set scoreboard off
clea
set colo to gr+/b,r*
@ 1,1 clea to 20,70
@ 2,5 to 18,65 double
*set colo to gr
@ 3,27 say "YOU ARE WELCOME TO"
@ 5,15 say "CHRISTIAN HEALTH ASSOCIATION OF NIGERIA (CHAN)"
@ 7,15 say "Coordinating Church-Sponsored Health Work in"
@ 8,30 say "Nigeria"
@ 10,15 say "No. 6, Noad Avenue, Jos, Plateau State, Nigeria"
@ 12,20 say "Tel. 073-454044, 457308, 457429"
@ 14,23 say "e-mail: chan@hisen.gn.apc.org"
@ 17,24 say "press any key to continue....."
set cons off
wait
set cons on
clea
set colo to rb
@ 2,9 to 20,64 double
set colo to g
@ 3,32 say "This is"
@ 4,20 say "CHAN Management  Information  System"
@ 7,22 say "Authored by Bamidele Olukayode Samson"
@ 9,11 say "B.Sc.(Hons) 1988, PGD (Comp. Sc.) 1997, MNSA, MCOAN"
@ 12,18 say "This System was developed in July 1997"
@ 15,13 say "WARNING: This Program is Copyrighted ....."
@ 17,25 say "Please Do not Copy"
@ 19,24 say "Press any key to continue....."
set cons off
wait
set cons on
@ 6,9 clea to 15,65
@ 3,32 clea to 3,40
@ 17,0 clea to 22,79
set colo to w/b*
```

```
@ 6,9 to 18,64 double
@ 9,18 say "You are about to enter the Main Menu"
@ 11,21 say "But before you do ....."
@ 13,25 say "You need a PASSWORD"
@ 15,15 say "Remember, you have been warned not to COPY"
@ 17,24 say "Press any key to continue....."
set cons off
wait
set cons on
clea
do password
clear
return
```

2. Password.prg

```
*** This is a PASSWORD program ***
*** Author: Bamidele O.S.
clea
store "OLUKAYODE" to mpass
mmpass = space(9)
set colo to r,b
@ 9,15 clea to 15,56
@ 9,16 to 15,55 double
set colo to gr+/r,w/r,gr*
@ 12,23 say "enter password please ....."
set colo to n,n
@ 13,38 get mmpass pict "@!"
set colo to
read
if mmpass <> mpass
set colo to b/w*
do password
endif
if mmpass = mpass
do mainmenu
endif
return
```

3. Mainmenu.prg

```
*** This program gives the MAIN MENU of CHAN MIS ***
*** Author: Bamidele O.S. ***
choice = space(1)
do while .t.
  clea
  set colo to gr+/r,w/r,gr+
  @ 4,5 to 22,70 double
  @ 4,20 say "CHAN MANAGEMENT INFORMATION SYSTEM"
  @ 6,25 SAY "*** MAIN  MENU ***"
  set colo to *
  @ 6,50 say time()
  set colo to gr+*/r
  @ 6,10 say date()
  @ 6,50 say time()
  set colo to
  @ 8,20 say "A.  MEMBERSHIP INFORMATION SYSTEM"
  @ 10,20 say "B.  HEALTH INFORMATION SYSTEM"
  @ 12,20 say "C.  DRUG INFORMATION SYSTEM"
  @ 14,20 say "D.  PERSONNEL INFORMATION SYSTEM"
  @ 16,20 say "E.  EXIT TO OPERATING SYSTEM"
  @ 18,5 to 18,70
  @ 20,30 say "PICK CHOICE:" get choice pict '!'
  read
  do case
    case choice = 'A'
        do meminfo
    case choice = 'B'
        do healinfo
    case choice = 'C'
        do druginfo
    case choice = 'D'
        do persinfo
    case choice = 'E'
        do gotodos
        exit
    otherwise
 endcase
enddo
clea
*set colo to
return
```

4. Meminfo.prg

```
* This is Membership Information System Submenu ***
* Author: Bamidele O.S.
set talk off
set echo off
set score off
set statu off
choice = space(1)
do while .t.
  clea
  set colo to b/w
  @ 2,5 to 23,70 double
  @ 4,20 say "MEMBERSHIP INFORMATION SYSTEM SUBMENU"
  @ 5,20 to 5,56
  @ 7,12 say "Task Code"
  @ 7,40 say "Task"
  @ 8,12 to 8,20
  @ 8,40 to 8,43
  @ 9,15 say "[a]      -      ADD A NEW RECORD"
  @ 11,15 say "[b]      -      DELETE ONE RECORD"
  @ 13,15 say "[c]      -      EDIT A RECORD"
  @ 15,15 say "[d]      -      DISPLAY THE CONTENTS OF A RECORD"
  @ 17,15 say "[e]      -      REPORTS"
  @ 19,15 say "[f]      -      EXIT TO MAINMENU"
  @ 21,15 say "Press any letter of your Choice (A -F)  :" get choice
  read
  do case
    case upper(choice) = "A"
       do addrec1
    case upper(choice) = "B"
       do delrec1
    case upper(choice) = "C"
       do editrec1
    case upper(choice) = "D"
       do viewrec1
    case upper(choice) = "E"
       do reports1
    otherwise
       exit
  endcase
enddo
return
```

5. Addrec1.prg

```
*** This Program adds record to membership database file
*** Author: Bamidele O.S.
select a
 use member index member
select b
 use membert
do while .t.
 clear
 @ 0,0 to 24,79 double
 @ 22,1 to 22,78 double
 @ 0,25 say 'MEMBERSHIP INFORMATION SYSTEM'
 @ 2,29 say 'ADDING NEW RECORD FORM'
 @ 3,29 to 3,50 double
 mregno=space(6)
 @ 5,2 say 'REGISTRATION NO (Press "ENTER KEY" To Exit):' get mregno
 read
 if mregno=space(6)
  exit
 endif
 select a
 seek mregno
 if found()
  @ 23,15 say 'DUPLICATE REGISTRATION NUMBER - Press any key ...'
  set cons off
  wait
  set cons on
  loop
 endif
 @ 5,18 clear to 5,60
 @ 5,17 say ':' get mregno
 clear gets
 mf_name=space(30)
 mtype=' '
 store space(15) to mtown,mlga,mcontact
 store space(12) to mstate,mchurch
 mbox_pmb='     '
 mtitle='      '
 mposition=space(22)
 mmember=' '
 store ctod(' / / ') to mdjoined
 store 0 to mbeds,mdoctors,mdents,mpcist,mnurses,mothers1
 store 0 to mregfee,mdevfee,msubsfee,msexp,mdexp,mothers2
 @ 5,31 say 'FACILITY NAME:' get mf_name pict '@!'
 @ 7,2 say 'TYPE CODE:' get mtype
```

```
@ 7,21 say 'TOWN:' get mtown  pict '@!'
@ 7,55 say 'BOX/PMB:' get mbox_pmb
@ 9,2 say 'LGA:' get mlga pict '@!'
@ 9,28 say 'STATE:' get mstate pict '@!'
@ 9,51 say 'CHURCH:' get mchurch pict '@!'
@ 11,2 say 'TITLE:' get mtitle pict '@!'
@ 11,18 say 'CONTACT:' get mcontact pict '@!'
@ 11,44 say 'POSITION:' get mposition pict '@!'
@ 13,2 say 'REGISTERED MEMBER (Y/N):' get mmember pict '!'
@ 13,31 say 'DATE JOINED:' get mdjoined
@ 13,54 say 'NO OF BEDS:' get mbeds pict '9999'
@ 15,2 say 'STAFF STRENGTH:'
@ 16,3 say 'DOCTORS:' get mdoctors picture '99'
@ 16,17 say 'DENTISTS:' get mdents picture '99'
@ 16,32 say 'PHARMACISTS:' get mpcist picture '99'
@ 16,50 say 'NURSES:' get mnurses picture '99'
@ 16,63 say 'OTHERS:' get mothers1 picture '99'
@ 18,2 say 'REG. FEES:' get mregfee picture '99,999.99'
@ 18,27 say 'DEV. FEES:' get mdevfee picture '99,999.99'
@ 18,52 say 'SUBS. FEES:' get msubsfee picture '99,999.99'
@ 20,2 say 'EXPENSES:'
@ 21,3 say 'ON SALARY:' get msexp picture '9,999,999.99'
@ 21,28 say 'ON DRUGS:' get mdexp picture '999,999,999.99'
@ 21,56 say 'ON OTHERS:' get mothers2 picture '9,999,999.99'
clear gets
@ 5,46 get mf_name pict '@!'
read
select b
do while .t.
 @ 7,13 get mtype
 read
 go top
 locate for mtype=code
 if .not. found()
  @ 23,22 say 'INVALID CODE - Please try again ...'
  set cons off
  wait
  set cons on
  @ 23,20 say space(40)
  myupe=' '
  loop
 endif
 exit
enddo
select a
@ 7,27 get mtown  pict '@!'
```

```
@ 7,64 get mbox_pmb
@ 9,7 get mlga pict '@!'
@ 9,35 get mstate pict '@!'
@ 9,59 get mchurch pict '@!'
@ 11,9 get mtitle pict '@!'
@ 11,27 get mcontact pict '@!'
@ 11,54 get mposition pict '@!'
read
do while .t.
 @ 13,27 get mmember pict '!'
 read
 if mmember $ 'YN'
  exit
 endi
 @ 23,23 say 'WRONG DATA - Please try again ...'
 set cons off
 wait
 set cons on
 @ 23,20 say space(40)
 mmember=' '
enddo
@ 13,44 get mdjoined
@ 13,66 get mbeds pict '9999'
@ 16,12 get mdoctors picture '99'
@ 16,27 get mdents picture '99'
@ 16,45 get mpcist picture '99'
@ 16,58 get mnurses picture '99'
@ 16,71 get mothers1 picture '99'
@ 18,13 get mregfee picture '99,999.99'
@ 18,38 get mdevfee picture '99,999.99'
@ 18,64 get msubsfee picture '99,999.99'
@ 21,14 get msexp picture '9,999,999.99'
@ 21,38 get mdexp picture '999,999,999.99'
@ 21,67 get mothers2 picture '9,999,999.99'
read
@ 23,30 say 'SAVE RECORD (Y/N):'
do while .t.
 ch=' '
 @ 23,49 get ch pict '!'
 read
 if ch $ 'YN'
  exit
 endif
enddo
if ch='Y'
 append blank
```

```
   repl regno with mregno,f_name with mf_name,type with mtype
   repl box_pmb with mbox_pmb,lga with mlga,state with mstate
   repl town with mtown,church with mchurch,title with mtitle
   repl contact with mcontact,position with mposition,member with mmember
   repl djoined with mdjoined,beds with mbeds,doctors with mdoctors
   repl dents with mdents,pcist with mpcist,nurses with mnurses
   repl others1 with mothers1,regfee with mregfee,devfee with mdevfee
   repl sexp with msexp,dexp with mdexp,others2 with mothers2
   repl subsfee with msubsfee
  endif
enddo
close all
clear
return
```

6. Delrec1.prg

```
*** This Program deletes a record from the Membership database file
*** Author: Bamidele O.S.
select a
 use member index member
select b
 use membert
do while .t.
 clear
 @ 0,0 to 24,79 double
 @ 22,1 to 22,78 double
 @ 0,25 say 'MEMBERSHIP INFORMATION SYSTEM'
 @ 2,30 say 'DELETING RECORD FORM'
 @ 3,30 to 3,49 double
 mregno=space(6)
 @ 5,2 say 'REGISTRATION NO (Press "ENTER KEY" To Exit):' get mregno
 read
 if mregno=space(6)
  exit
 endif
 select a
 seek mregno
 if .not. found()
  @ 23,16 say 'INVALID REGISTRATION NUMBER - Press any key ...'
  set cons off
  wait
  set cons on
  loop
 endif
```

```
@ 5,18 clear to 5,60
@ 5,17 say ':' get mregno
clear gets
mf_name=f_name
mtype=type
mtown=town
mlga=lga
mcontact=contact
mstate=state
mchurch=church
mbox_pmb=box_pmb
mtitle=title
mposition=position
mmember=member
mdjoined=djoined
mbeds=beds
mdoctors=doctors
mdents=dents
mpcist=pcist
mnurses=nurses
mothers1=others1
mregfee=regfee
mdevfee=devfee
msubsfee=subsfee
msexp=sexp
mdexp=dexp
mothers2=others2
@ 5,31 say 'FACILITY NAME:' get mf_name pict '@!'
@ 7,2 say 'TYPE CODE:' get mtype
@ 7,21 say 'TOWN:' get mtown  pict '@!'
@ 7,55 say 'BOX/PMB:' get mbox_pmb
@ 9,2 say 'LGA:' get mlga pict '@!'
@ 9,28 say 'STATE:' get mstate pict '@!'
@ 9,51 say 'CHURCH:' get mchurch pict '@!'
@ 11,2 say 'TITLE:' get mtitle pict '@!'
@ 11,18 say 'CONTACT:' get mcontact pict '@!'
@ 11,44 say 'POSITION:' get mposition pict '@!'
@ 13,2 say 'REGISTERED MEMBER (Y/N):' get mmember pict '!'
@ 13,31 say 'DATE JOINED:' get mdjoined
@ 13,54 say 'NO OF BEDS:' get mbeds pict '9999'
@ 15,2 say 'STAFF STRENGTH:'
@ 16,3 say 'DOCTORS:' get mdoctors picture '99'
@ 16,17 say 'DENTISTS:' get mdents picture '99'
@ 16,32 say 'PHARMACISTS:' get mpcist picture '99'
@ 16,50 say 'NURSES:' get mnurses picture '99'
@ 16,63 say 'OTHERS:' get mothers1 picture '99'
```

```
 @ 18,2 say 'REG. FEES:' get mregfee picture '99,999.99'
 @ 18,27 say 'DEV. FEES:' get mdevfee picture '99,999.99'
 @ 18,52 say 'SUBS. FEES:' get msubsfee picture '99,999.99'
 @ 20,2 say 'EXPENSES:'
 @ 21,3 say 'ON SALARY:' get msexp picture '9,999,999.99'
 @ 21,28 say 'ON DRUGS:' get mdexp picture '999,999,999.99'
 @ 21,56 say 'ON OTHERS:' get mothers2 picture '9,999,999.99'
 clear gets
 @ 23,24 say 'TO DELETE THIS RECORD? (Y/N):'
 do while .t.
  ch=' '
  @ 23,54 get ch pict '!'
  read
  if ch $ 'YN'
    exit
  endi
 endd
 @ 23,20 clear to 23,60
 if ch='Y'
  delete
  pack
  @ 23,15 say 'RECORD IS DELETED - Press any key to continue ...'
 else
  @ 23,13 say 'RECORD IS NOT DELETED - Press any key to continue ...'
 endif
 set cons off
 wait
 set cons on
enddo
close all
clear
return
```

7. Editrec1.prg

```
*** This program edits the membership database file
*** Author: Bamidele O.S.
select a
 use member index member
select b
 use membert
do while .t.
 clear
 @ 0,0 to 24,79 double
```

```
@ 22,1 to 22,78 double
@ 0,25 say 'MEMBERSHIP INFORMATION SYSTEM'
@ 2,31 say 'EDITING RECORD FORM'
@ 3,31 to 3,49 double
mregno=space(6)
@ 5,2 say 'REGISTRATION NO (Press "ENTER KEY" To Exit):' get mregno
read
if mregno=space(6)
  exit
endif
select a
seek mregno
if .not. found()
  @ 23,16 say 'INVALID REGISTRATION NUMBER - Press any key ...'
  set cons off
  wait
  set cons on
  loop
endif
@ 5,18 clear to 5,60
@ 5,17 say ':' get mregno
clear gets
mf_name=f_name
mtype=type
mtown=town
mlga=lga
mcontact=contact
mstate=state
mchurch=church
mbox_pmb=box_pmb
mtitle=title
mposition=position
mmember=member
mdjoined=djoined
mbeds=beds
mdoctors=doctors
mdents=dents
mpcist=pcist
mnurses=nurses
mothers1=others1
mregfee=regfee
mdevfee=devfee
msubsfee=subsfee
msexp=sexp
mdexp=dexp
mothers2=others2
```

```
@ 5,31 say 'FACILITY NAME:' get mf_name pict '@!'
@ 7,2 say 'TYPE CODE:' get mtype
@ 7,21 say 'TOWN:' get mtown  pict '@!'
@ 7,55 say 'BOX/PMB:' get mbox_pmb
@ 9,2 say 'LGA:' get mlga pict '@!'
@ 9,28 say 'STATE:' get mstate pict '@!'
@ 9,51 say 'CHURCH:' get mchurch pict '@!'
@ 11,2 say 'TITLE:' get mtitle pict '@!'
@ 11,18 say 'CONTACT:' get mcontact pict '@!'
@ 11,44 say 'POSITION:' get mposition pict '@!'
@ 13,2 say 'REGISTERED MEMBER (Y/N):' get mmember pict '!'
@ 13,31 say 'DATE JOINED:' get mdjoined
@ 13,54 say 'NO OF BEDS:' get mbeds pict '9999'
@ 15,2 say 'STAFF STRENGTH:'
@ 16,3 say 'DOCTORS:' get mdoctors picture '99'
@ 16,17 say 'DENTISTS:' get mdents picture '99'
@ 16,32 say 'PHARMACISTS:' get mpcist picture '99'
@ 16,50 say 'NURSES:' get mnurses picture '99'
@ 16,63 say 'OTHERS:' get mothers1 picture '99'
@ 18,2 say 'REG. FEES:' get mregfee picture '99,999.99'
@ 18,27 say 'DEV. FEES:' get mdevfee picture '99,999.99'
@ 18,52 say 'SUBS. FEES:' get msubsfee picture '99,999.99'
@ 20,2 say 'EXPENSES:'
@ 21,3 say 'ON SALARY:' get msexp picture '9,999,999.99'
@ 21,28 say 'ON DRUGS:' get mdexp picture '999,999,999.99'
@ 21,56 say 'ON OTHERS:' get mothers2 picture '9,999,999.99'
clear gets
@ 5,46 get mf_name pict '@!'
read
select b
do while .t.
 @ 7,13 get mtype
 read
 go top
 locate for mtype=code
 if .not. found()
  @ 23,22 say 'INVALID CODE - Please try again ...'
  set cons off
  wait
  set cons on
  @ 23,20 say space(40)
  myupe=' '
  loop
 endif
 exit
enddo
```

```
select a
@ 7,27 get mtown  pict '@!'
@ 7,64 get mbox_pmb
@ 9,7 get mlga pict '@!'
@ 9,35 get mstate pict '@!'
@ 9,59 get mchurch pict '@!'
@ 11,9 get mtitle pict '@!'
@ 11,27 get mcontact pict '@!'
@ 11,54 get mposition pict '@!'
read
do while .t.
 @ 13,27 get mmember pict '!'
 read
 if mmember $ 'YN'
  exit
 endi
 @ 23,23 say 'WRONG DATA - Please try again ...'
 set cons off
 wait
 set cons on
 @ 23,20 say space(40)
 mmember=' '
enddo
@ 13,44 get mdjoined
@ 13,66 get mbeds pict '9999'
@ 16,12 get mdoctors picture '99'
@ 16,27 get mdents picture '99'
@ 16,45 get mpcist picture '99'
@ 16,58 get mnurses picture '99'
@ 16,71 get mothers1 picture '99'
@ 18,13 get mregfee picture '99,999.99'
@ 18,38 get mdevfee picture '99,999.99'
@ 18,64 get msubsfee picture '99,999.99'
@ 21,14 get msexp picture '9,999,999.99'
@ 21,38 get mdexp picture '999,999,999.99'
@ 21,67 get mothers2 picture '9,999,999.99'
read
@ 23,30 say 'SAVE CHANGES (Y/N):'
do while .t.
 ch=' '
 @ 23,50 get ch pict '!'
 read
 if ch $ 'YN'
  exit
 endif
enddo
```

```
 if ch='Y'
  repl f_name with mf_name,type with mtype,subsfee with msubsfee
  repl box_pmb with mbox_pmb,lga with mlga,state with mstate
  repl town with mtown,church with mchurch,title with mtitle
  repl contact with mcontact,position with mposition,member with mmember
  repl djoined with mdjoined,beds with mbeds,doctors with mdoctors
  repl dents with mdents,pcist with mpcist,nurses with mnurses
  repl others1 with mothers1,regfee with mregfee,devfee with mdevfee
  repl sexp with msexp,dexp with mdexp,others2 with mothers2
 endif
enddo
close all
clear
return
```

8. Viewrec1.prg

```
*** This program views each record of the membership database file
*** Author: Bamidele O.S.
select a
 use member index member
select b
 use membert
do while .t.
 clear
 @ 0,0 to 24,79 double
 @ 22,1 to 22,78 double
 @ 0,25 say 'MEMBERSHIP INFORMATION SYSTEM'
 @ 2,31 say 'VIEWING RECORD FORM'
 @ 3,31 to 3,49 double
 mregno=space(6)
 @ 5,2 say 'REGISTRATION NO (Press "ENTER KEY" To Exit):' get mregno
 read
 if mregno=space(6)
  exit
 endif
 select a
 seek mregno
 if .not. found()
  @ 23,16 say 'INVALID REGISTRATION NUMBER - Press any key ...'
  set cons off
  wait
  set cons on
```

```
 loop
endif
@ 5,18 clear to 5,60
@ 5,17 say ':' get mregno
clear gets
mf_name=f_name
mtype=type
mtown=town
mlga=lga
mcontact=contact
mstate=state
mchurch=church
mbox_pmb=box_pmb
mtitle=title
mposition=position
mmember=member
mdjoined=djoined
mbeds=beds
mdoctors=doctors
mdents=dents
mpcist=pcist
mnurses=nurses
mothers1=others1
mregfee=regfee
mdevfee=devfee
msubsfee=subsfee
msexp=sexp
mdexp=dexp
mothers2=others2
@ 5,31 say 'FACILITY NAME:' get mf_name pict '@!'
@ 7,2 say 'TYPE CODE:' get mtype
@ 7,21 say 'TOWN:' get mtown  pict '@!'
@ 7,55 say 'BOX/PMB:' get mbox_pmb
@ 9,2 say 'LGA:' get mlga pict '@!'
@ 9,28 say 'STATE:' get mstate pict '@!'
@ 9,51 say 'CHURCH:' get mchurch pict '@!'
@ 11,2 say 'TITLE:' get mtitle pict '@!'
@ 11,18 say 'CONTACT:' get mcontact pict '@!'
@ 11,44 say 'POSITION:' get mposition pict '@!'
@ 13,2 say 'REGISTERED MEMBER (Y/N):' get mmember pict '!'
@ 13,31 say 'DATE JOINED:' get mdjoined
@ 13,54 say 'NO OF BEDS:' get mbeds pict '9999'
@ 15,2 say 'STAFF STRENGTH:'
@ 16,3 say 'DOCTORS:' get mdoctors picture '99'
@ 16,17 say 'DENTISTS:' get mdents picture '99'
@ 16,32 say 'PHARMACISTS:' get mpcist picture '99'
```

```
 @ 16,50 say 'NURSES:' get mnurses picture '99'
 @ 16,63 say 'OTHERS:' get mothers1 picture '99'
 @ 18,2 say 'REG. FEES:' get mregfee picture '99,999.99'
 @ 18,27 say 'DEV. FEES:' get mdevfee picture '99,999.99'
 @ 18,52 say 'SUBS. FEES:' get msubsfee picture '99,999.99'
 @ 20,2 say 'EXPENSES:'
 @ 21,3 say 'ON SALARY:' get msexp picture '9,999,999.99'
 @ 21,28 say 'ON DRUGS:' get mdexp picture '999,999,999.99'
 @ 21,56 say 'ON OTHERS:' get mothers2 picture '9,999,999.99'
 clear gets
 @ 23,17 say 'VIEWING RECORD - Press any key to continue ...'
 set cons off
 wait
 set cons on
enddo
close all
clear
return
```

9. Reports1.prg

```
*** This program generates report from the membership database file
*** Author: Bamidele O.S.
use member
sort on state to member2
use member2
clea
@ 15,24 say 'PRINTING IN PROGRESS - Wait ...'
set devi to prin
@ 1,25 say 'REPORT ON MEMBER INSTITUTIONS'
@ 2,25 say repl('=',29)
@ 3,1 say repl('-',80)
@ 4,1 say 'REG NO|  FACILITY NAME'
@ 4,29 say '|  LOCATION'
@ 4,45 say '|  STATE'
@ 4,58 say '|NO OF STAFF|AMOUNT DUE'
@ 5,1 say repl('-',80)
r=5
do whil .not. eof()
 r=r+1
 mregno=regno
 mf_name=rtrim(f_name)
 mtown=town
```

```
 mstate=state
 mdoctors=doctors
 mdents=dents
 mpcist=pcist
 mnurses=nurses
 mothers1=others1
 mregfee=regfee
 mdevfee=devfee
 msubsfee=subsfee
 mstaff=mdoctors+mdents+mpcist+mnurses+mothers1
 mamount=mregfee+mdevfee+msubsfee
 @ r,1 say mregno
 @ r,7 say '|'
 @ r,8 say mf_name
 @ r,29 say '|'
 @ r,30 say mtown
 @ r,45 say '|'
 @ r,46 say mstate
 @ r,58 say '|'
 @ r,62 say mstaff pict '999'
 @ r,70 say '|'
 @ r,71 say mamount pict '999,999.99'
 r=r+1
 @ r,7 say '|'
 @ r,29 say '|'
 @ r,45 say '|'
 @ r,58 say '|'
 @ r,70 say '|'
 skip
endd
ejec
use
eras member2.dbf
set devi to scre
clea
retu
```

10. Healinfo.prg

```
*** This is the Health Information System Submenu ***
*** Author: Bamidele O.S. ***
set talk off
set statu off
set echo off
set score off
choice = space(1)
do while .t.
  clea
  set colo to b/w
  @ 2,5 to 23,70 double
  @ 4,20 say "HEALTH INFORMATION SYSTEM SUBMENU"
  @ 5,20 to 5,52
  @ 7,12 say "Task Code"
  @ 7,40 say "Task"
  @ 8,12 to 8,20
  @ 8,40 to 8,43
  @ 9,15 say "[A]       -       ADD A NEW RECORD"
  @ 11,15 say "[B]       -       DELETE ONE RECORD"
  @ 13,15 say "[C]       -       EDIT A RECORD"
  @ 15,15 say "[D]       -    DISPLAY THE CONTENTS OF A RECORD"
  @ 17,15 say "[E]       -       TO GENERATE REPORTS"
  @ 19,15 say "[F]       -       EXIT TO MAIN MENU"
  @ 21,15 say "Press any letter of your choice (A-F)  :" get choice
  read
  do case
    case upper(choice) = "A"
        do addrec2
    case upper(choice) = "B"
        do delrec2
    case upper(choice) = "C"
        do editrec2
    case upper(choice) = "D"
        do viewrec2
    case upper(choice) = "E"
        do reports
   otherwise
       exit
  endcase
enddo
return
```

11. Druginfo.prg

```
*** This is the Drug Information System Submenu ***
*** Author : Bamidele O.S. ***
set talk off
set statu off
set echo off
set score off
choice = space(1)
do while .t.
  clea
  set colo to b/w
  @ 2,5 to 23,70 double
  @ 4,20 say "DRUG INFORMATION SYSTEM SUBMENU"
  @ 5,20 TO 5,50
  @ 7,12 SAY "Task Code"
  @ 7,40 SAY "Task"
  @ 8,12 TO 8,20
  @ 8,40 TO 8,43
  @ 9,15 SAY "[A]       -      ADD A NEW RECORD"
  @ 11,15 SAY "[B]       -      DELETE ONE RECORD"
  @ 13,15 SAY "[C]       -      EDIT A RECORD"
  @ 15,15 SAY "[D]       -      DISPLAY THE CONTENTS OF A RECORD"
  @ 17,15 SAY "[E]       -      GENERATE REPORTS"
  @ 19,15 SAY "[F]       -      EXIT TO MAIN MENU"
  @ 21,15 SAY "Press any LETTER of your Choice (A -F)  :" get choice
  read
  do case
    case upper(choice) = "A"
       do addrec3
    case upper(choice) = "B"
       do delrec3
    case upper(choice) = "C"
       do editrec3
    case upper(choice) = "D"
       do viewrec3
    case upper(choice) = "E"
       do reports3
    otherwise
       exit
       do mainmenu
  endcase
enddo
return
```

12. Persinfo.prg

```
*** This is the Personnel Information System Submenu ***
*** Author : Bamidele O.S. ***
set talk off
set statu off
set echo off
set score off
choice = space(1)
do while .t.
  clea
  set colo to b/w
  @ 2,5 to 23,70 double
  @ 4,20 say "PERSONNEL INFORMATION SYSTEM SUBMENU"
  @ 5,20 to 5,55
  @ 7,12 SAY "Task Code"
  @ 7,40 SAY "Task"
  @ 8,12 to 8,20
  @ 8,40 to 8,43
  @ 9,15 say "[A]       -       ADD A NEW RECORD"
  @ 11,15 say "[B]       -       DELETE ONE RECORD"
  @ 13,15 say "[C]       -       EDIT A RECORD"
  @ 15,15 say "[D]       -       DISPLAY THE CONTENTS OF A RECORD"
  @ 17,15 say "[E]       -       GENERATE REPORTS"
  @ 19,15 say "[F]       -       EXIT TO MAIN MENU"
  @ 21,15 say "Press any LETTER of your Choice (A -F)  :" get choice
  read
  do case
    case upper(choice) = "A"
       do addrec4
    case upper(choice) = "B"
       do delrec4
    case upper(choice) = "C"
       do editrec4
    case upper(choice) = "D"
       do viewrec4
    case upper(choice) = "E"
       do reports4
    otherwise
       exit
       do mainmenu
   endcase
enddo
return
```

13. Gotodos.prg

```
*** This program enables the operator to exit to the operating system
*** Author : Bamidele O.S. ***
do while .t.
    clea
    @ 5,5 say "You are about to quit to the OPERATING SYSTEM"
    wait  "Do you want to CONTINUE  (Y/N) ? " to ans
    if .not. ANS $ 'YyNn'
       @ 10,20 SAY "You have pressed the wrong letter....."
       @ 12,20 say "Please Enter 'Y' or 'N' "
       @ 15,22 say 'Press any key to continue.....'
       set cons off
       wait
       set cons on
       loop
    else
       if ans = 'Y' .OR. ANS = 'y'
         close all
         return
       else
          do mainmenu
       endif
     endif
enddo
retu
```