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PROTOTYPE COMMUNITY HEALTH INFORMATION RETRIEVAL SYSTEM FOR JIMMA ZONE: A CASE STUDY OF JIMMA INSTITUTE OF HEALTH SCIENCES.

GETACHEW HAILEMARIAM

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A Thesis submitted in partial fulfillment of the requirements for the degree Master of Science in information Science.

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DEDICATION

To Jesus, the savior, to whom honor and glory belong ever and forever.

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List of acronyms

AIDS	Acquired Immunio Deficiency Syndrom
CBE	Community Based Education
CBTP	Community-Based Training Program
CHA	Community Health Attendants
CHIS	Community Health Information System
CHIRS	Community Health Information Retrieval System
CHS	Community Health Service
COME	Community Oriented Medical Education
DFD	Data Flow Diagram
EPI	Expanded Program for Immunization
ERM	Entity Relationship Modeling
HFA/2000	Health For All by the year 2000
HC	Health Centers
HIRS	Health Information Retrieval System.
HIS	Health Information System
HS	Health Stations
IPO	Input Process Output
JIHS	Jimma Institute of Health Sciences
MCH	Mother and Child Health
MOH	Ministry of Health
PHC	Primary Health Care
RDM	Relational Data Analysis
RHD	Regional Heath Department
RHO	Regional Health Office

TGE	Transitional Government Of Ethiopia
TTBA	Trained Traditional Birth Attendants
TTP	Team Training Program
UNICEF	United Nations Children Fund
WHO	World Health Organization

Abstract

For the enhancement of the economic development of a country, healthy and productive human resources are extremely needed. People should get adequate health care services to enable them to lead productive and meaningful life. In a third world country like Ethiopia, although many of the prevailing health problems are potentially preventable through the provision of appropriate primary health care services, the deteriorating health care service has made it difficult to control the existing health problems. One of the factors that is responsible for the deteriorating health care service is the absence of accurate, relevant and timely health information.

In Ethiopia, the health information flows from regions to the center. At the regional level, the source of health information is the health facilities-based recording system. This form of information has failed to show the true picture of the health status of the people of the country. The other sources of health information such as community-based health information system and special studies have not been strengthened. Currently, Jimma Institute of Health Sciences has shown an endeavor to establish community-based health information system through its community-oriented/based educational program. This educational program is conducted in the actual or similar communities where students will serve after graduation. In this educational program, among other things, students gather health and health related data from both rural and urban communities in Jimma zone.

The main objective of collecting such data is to integrate training, research, and health care services. However, this information has not been effectively used for the stated objective beyond the immediate academic exercises that students undertake. Piles of data collecting forms containing community health data collected for the past fourteen years are found in the data processing unit of the community-based educational program coordinating office. Although some efforts have recently been witnessed to enter the data into a computer, the conversion process had been undertaken before proper investigation was carried out.

The main purpose of this study is to analyze the existing system and propose the design and development of appropriate computer-based information system. To this end, an effort has

been made to understand what is being carried out by the current information system and identify the requirements of the improved system using different fact finding instruments. Specifically, facts were gathered through questionnaire, interview, discussions, document analysis and through critically observing the activities of the existing data processing unit. The findings of the survey reveals that:

- the overall usage of the community health information is so minimal. Only 35.6% of the total respondents have used the data.
- users are less satisfied with existing system.
- 73.3% of the total respondents recommended change in the existing information system.
- duplicate and redundant files were identified in the existing system.
- the absence of standardized data collection formats have seriously affected the data storage, processing, and output generation.
- Poorly organized community health information system is currently in place.

The analysis of the facts collected has facilitated the identification of users requirements and databases to be designed and implemented. Based on the response of users, among the identified databases, detailed analysis and design of the socio- demographic database have been carried out. Conceptual data modeling techniques such as Entity Relationship Modeling and Relational Data Analysis have been employed to identify entities and to undertake analysis.

Furthermore, to test the conceptual design and demonstrate how the improved system can be implemented, prototype databases and user interfaces are physically designed using Microsoft Access. Finally, recommendations are made for implementing the improved system and further studies to be carried out.

CHAPTER ONE

1.0 . INTRODUCTION

1.1 BACKGROUND OF THE STUDY

The prime resource of a given nation is its people. To reach at the desired level of economic development, healthy and productive human resource is highly needed. Many people have defined the term health in different ways and from different perspectives. According to WHO (1950), Health is not merely the absence of disease; but it encompasses the overall mental, physical, and social well-being. It is from healthy family or community that healthy and productive work force emerges to play a decisive role in the economic activities of a nation.

To enhance the health status of their citizens through the provision of adequate health services, many governments have formulated various policies and strategies. The globally renowned strategy is the one that was formulated by WHO, i.e., "Health for all by the year 2000, (HFA/2000)". To achieve this goal, WHO has proposed Primary Health Care activities. This strategy has been advocated in many countries since its inception a couple of decades ago. The strategy basically centres on Primary Health Care and it is intended to reach everybody, particularly those in great need, and to the home and family level.

To rectify the health problems of a given community, accurate, relevant, and timely information should be obtained from that particular community. The meagrely available health information flows from health facilities or institutions throughout the country to the centre. This kind of information which comes from health facilities doesn't signify the exact health status of people

residing in a given community, region or country. This is because of the fact that health facility-based information is generally a consolidation of patient records that have visited the health facilities. When we look at the reality, many people use the various kinds of home-based treatments such as traditional medical services instead of going to the modern health care institutions.

However, information that is periodically gathered at a community level, if properly organised, managed, and used, would help policy makers in the course of formulating policies and setting up strategies. Moreover, a community level health information is very important and could reveals details about the studied communities especially the rural communities which are usually settled in scattered manner and whose members lead miserable life in remote areas where there are no health and other essential facilities. Once the felt health needs of a given community are identified, it would be easier to launch appropriate intervention programmes which presupposes the availability of accurate and relevant information.

Community-based health information incorporates the socio-economic, demographic and other variables. Hence, it provides complete picture about the health status of a given community and serves as an indicator to carry out preventive and remedial actions at the right time. To obtain this information whenever the need arises, proper storage and retrieval system becomes mandatory. However, informatics application in the area of community health information system is a relatively underdeveloped and newly evolving (WHO 1988). Especially, Third World countries are very backward concerning IT application in the community health as well as in the health information system.

Ethiopia, in spite of being a popular country for its long history, diversity of peoples cultures as well as spectacular topography and climatic conditions, has remained backward in socio-economic development. The protracted civil war added to natural calamities of drought have seriously devastated the country. When one comes to the health status of the people, conventional health parameters: Infant Mortality Rate(IMR) 110 per thousand life births, child mortality rate 99 per thousand children aged 1-4 years, Maternal Mortality Rate 500-700/100,000 live births, average life expectancy 53 years; these and other indicators place Ethiopia in the category of the least developed nations in the world (Damtew 1997).

The health service coverage in Ethiopia has been reported to be about 45 percent (TGE 1993). Moreover, the prevailing health problems are potentially preventable by provision of potable water, appropriate waste disposal system and taking nutritional correctives. During the past regimes different strategies were formulated to enhance the health status of citizens of the country. However, none of them have been fully implemented. The present government is trying to pursue a decentralised mode of administration which allows regions to handle their own affairs by themselves. Accordingly, Ethiopia has been divided into nine regional states and the regions are subdivided into zones. Jimma Zone is found within Region 4 which is also called Oromiya.

1.1.1. **Jimma Institute of Health Sciences (JIHS)**

Jimma Institute of Health Sciences (JIHS) is an innovative community oriented training institution of health professionals in Ethiopia. It was established in 1983, in Jimma town which is situated about 335 km south-west of Addis Ababa. JIHS is a national pioneer of community based education and has a unique educational effort. During the first batch medical students graduation ceremony the then minister of health stated that JIHS was conceived and developed

out of the awareness of the need for innovative training which would be responsive to the health needs of the country in general and those of the local communities in particular (Gizaw 1990).

By the time Jimma Institute of Health Sciences (JIHS) was established, there were already two medical science faculties under Addis Ababa University. However, it was felt that the health workers trained in these two faculties were not appropriately prepared and responsive to the goals of "Health For All by the year 2000". Thus, it was stated that the establishment of JIHS is one of the prominent measures taken at a national level in order to facilitate the goal of expanding health services for Ethiopian citizens through the strategy of Primary Health Care (PHC).

To achieve its objectives, JIHS pursued a strategy of training different categories of health workers based on the principles of community based, team approach and integratcd tcaching to solve health problems. Gizaw (1990) stated that this approach is contrary to conventional medical training which is hospital based and disease oriented curative training. The institute trained more than 2,500 health professionals and supplied to the Ministry of Health until March 1998. Currently, the institute has about 199 academic staff of which more than ten are expatriates. Moreover, the institute has more than 130 administrative and support staff.

As of August 1997, the institute provides the following health sciences training programme:

- Public Health and Clinical Nursing (Degree and Diploma).
- General Medical Practitioners (Degree).
- Pharmacy Technician (Diploma).

- Medical Laboratory Technology (Degree and diploma).
- Environmental Health Science (Degree and Diploma).

In the academic year 1997/98 three new programmes in Business and Technology disciplines have been started in the institute. They have widened the size of the institute tremendously. The Ministry of Education has recently announced that the institute soon will be upgraded to a university level.

The establishment of Jimma Institute of Health Sciences (JIHS) in this zone has brought a significant contribution especially for rural communities. As a result of the community based educational programme which is carried out by the joint endeavours of the institute and the Zonal Health Department, the rural communities have gained benefits from the productive services such as diagnostic, spring water development, latrine construction etc. provided by the students.

At the end of each phase of the Community- Based Training Programme (CBTP), students are expected to prepare formal reports by analysing and interpreting the data they have collected from the selected communities. To gather, store, and process data, the CBE office has established one data processing centre. After concluding their works and presenting their findings on a periodically organised symposium in the institute, students submit the report along with the raw data, which are usually in the form of a completed questionnaires, to the co-ordinating office.

1.2. **Statement of the Problem.**

In the Community-Based Training Programme (CBTP) of JIHS, one of the major tasks to be carried out is collecting data from target communities in order to undertake an activity called community diagnosis. Over the past fourteen years, huge data have been collected from about 43 communities of five districts of Jimma Zone including, Jimma Town.

A focus group discussion was held with officials of the institute who have actively taken part in the endeavours of initiating and implementing Community-Based Education in the institute. During the discussion, it was learnt that the main objective of collecting and storing community health data were basically to integrate training, service, and research activities. In addition, the data were supposed to help in the preparation of teaching materials and for designing health science courses that are tailored to the health needs of communities in the region and in the country at large. Besides, it was envisaged that the data could provide baseline and longitudinal information for researchers of different disciplines who want to pursue research works in the zone.

To achieve the aforementioned objectives, the institute and the zonal health department need a well co-ordinated and appropriate computer-based information system. However, when one looks at the existing system, the data have not been organised and managed properly in order to meet the stated objectives. Piles of completed questionnaires containing community health data are found in the data processing unit of CBE co-ordinating office.

Recently, the officials of the institute and the CBE co-ordinating office decided to convert the data into machine readable form. Two data encoders were hired on a temporary/contractual basis

and started entering data into two 486 processors personal computers using SPSS/PC+ software package. This conversion was started without proper study. Hence, it has involved a problem.

One of the causes of the problem is a frequent changes made on the data collecting forms. During each CBTP attachment, an opportunity is given to students to brainstorm on the developed data collecting tools. That is, students and supervisors comment on each variables of the already developed data collecting tools. In this process, there is a case where some variables are dropped out and others are included. Eventually, the suggestions forwarded by students and supervisors are incorporated and new data collecting forms are developed. Consequently, the data collecting formats are subject to change and modification from time to time. For SPSS/PC+ software package cannot accommodate such changes, it is difficult to append, for instance this year, data on demographic and socio economic variables to same data collected last year.

The aforementioned problem forced the data encoders to design new database structure in order to enter the newly collected data. As a result, there are so many fragmented and duplicate files that refer to the same issue and could be kept in one database. On the other hand, this fragmented mode of data storage has made it difficult to undertake longitudinal study which the health professionals and other researchers want to observe the trend in the health status of a given community over certain period of time.

The problems that the existing data processing centre faces are of two fold: in the first place, SPSS/PC+ does not provide sophisticated search and retrieval facility. Moreover, it is not flexible enough to accommodate slight changes frequently being made on the data collection forms or questionnaires. Secondly, about three fourth of the collected data are still kept in

completed questionnaire. Furthermore, massive data are being collected from the community each year which create a considerable inconvenience to users browsing through the manual files and forms and obtain the required information.

1.3. **Justification of the Study**

The provision of adequate health care service at individual, family, and community levels requires knowledge of the felt health needs and prevailing health problems at the various levels which surely cannot be achieved without accurate and timely information. Information generated by community-based/oriented educational programme is collected at a grassroots or community level. It encompasses health and other associated factors such as the socio economic, demographic, environmental, etc., situations of a given community. However, the mere collection of data from the community is not an end in itself. The collected data have to be properly organised, processed, and retrieved to yield the needed information on time.

This study attempts to create an awareness and sensitise the officials of the institute and zonal health bureau to recognise the value of information system so that they can properly manage and utilise the untapped information resource at their disposal. The study is also believed to bring about some inputs by proposing ways and means whereby community-based health information systems could be managed and utilised in order to help students, researchers and health service planners in their academic research, and the provision of health care services.

1.4. Objectives of the Study

1.4.1 General objective

The general objective of the study is to assess the activities of the existing Data Processing Centre under the CBE co-ordinating office, the way community health data are acquired, organised, and retrieved in order to seek ways and means whereby the prevailing problems will be ameliorated.

1.4.2. Specific Objectives

To achieve the general objectives, the following specific objectives are drawn:

1. to identify the potential user groups and their information requirements and the extent of awareness of users about the available information resources,
2. to assess how users interact and get access to the existing information system and make use of the available information,
3. to describe the existing methods and formats of data collection, storage, retrieval of community health information,
4. to undertake the design of alternate system based on the requirement of users and identify the feasible technology (hardware and software) that suits and is able to solve the prevailing problems,
5. to seek ways as to how the already available information technologies can be used in an integrated manner in order to develop proper management for the information system,
6. to design prototype databases using one of the available software packages to test the conceptual design and communicate with the users,
7. to seek ways and means whereby the database management and statistical packages can be used in an integrated manner to facilitate storage, retrieval, and analysis of data, and

8. to recommend on the implementation of the improved system.

1.5. **Significance of the study**

The outcome of this study is eventually an appropriate computer- based community health information retrieval system. In Ethiopia, community level health information system has not been given due attention. The existing health information system at a national level has not been well organised and functioning. Besides, the decentralised mode of administration which the country is trying to pursue, requires strong information system among other things. Regarding the health management information system, the health policy of the Transitional Government of Ethiopia TGE, (1993:36) stated that the health information shall be organised by:

- making the system appropriate and relevant to decision making, planning, implementing, monitoring, and evaluation,
- maximising the utilisation of information at all levels, and
- developing central and regional information documentation centres.

Thus, it is assumed that this study would serve as a model to build health management information system at a regional level. The health policy of the government (TGE 1993) gives special attention to the health needs of the rural communities which account for more than eighty percent of the total population of the country. The government's endeavour to expand health service through primary health care strategy will be enhanced through appropriate and timely information support systems. Finally, the information system at the disposal of community based educational programme helps not only in setting priorities for intervention programmes but also assists in the course of evaluating the effect of the intervention programme in that particular community.

1.6. Methodology

1.6.1. Population and sampling methods

1.6.1.1 Population

In this study, population refers to target groups about which the researcher trys to obtain the necessary information. Gay (1981) stated that population is a group of interest to which the study is generalizable.

The target population of this study constitutes students and faculty members of JIHS as well as health professionals at Jimma Zone Health Department. Although all students and faculty members are potential users of community health information., there exists some heterogeneity among them and their information requirements vary accordingly. As pointed out earlier, the institute trains students in five categories of health sciences disciplines. Besides, students in the same training program are found at different levels. As a result, the information requirements of students vary on the basis of their levels of education in the institute.

Taking into account the discussions made with faculty members that have long experience in the teaching and learning activities of the institute, final year medical science and post- basic degree program students are considered to be subjects of this study . During the time of this study, the final year medical science students were doing their internship and have already gone through about 90 percent of their training program. Furthermore, they have already concluded about 70 percent of their research works. Final year post-basic* degree program students are also required to conduct problem-based research as a partial fulfilment of the requirements for their

* Post basic students are advanced standing students who are working for degree program after having earned diploma in health science disciplines such as Nursing, Environmental health, Laboratory technology

graduation. Many of them were on finalising their research work and getting ready for graduation while this study was being conducted .

During the study, the institute has 199 academic staff. Out of this, 152 instructors have their first degree and above in health sciences and other disciplines. The remaining 47 are diploma holders and are considered as technical assistants. Thus, they are excluded from the population. By and large, the source population identified for the questionnaire survey was the following:

Table 1.1 Potential users of community health information.

Category of Users	Total number	Percentage to total population (274)
Faculty members		
B.Sc./BA	41	
M.Sc./MA/Mph	50	
MD	35	
MD+	25	
PhD	1	
Sub total	152	55.5%
Senior students		
Intern	35	
Post basic Nurse	15	
" " Saniterian	20	
" " Health Officer	37	
" " Laboratory Tech.	15	
Sub total	122	44.5%
Total source population	274	

Source: Registrar and Personnel offices of JIHS

Finally, potential users at the zonal health department including program officers as well as head departments of different categories of health services were considered as subjects of study. From among these potential users, discussions were held with head, the vice-head, head planning and programming office and the head of health institution and manpower training unit. For they were

few in number and have slightly different information requirements, separate sets of interview questions or schedule were prepared and all of them were interviewed.

1.6.1.2. **Sampling**

To cope up with time and financial resource constraints under which the study was conducted, sampling was employed. An attempt was made to select an adequate number of respondents so that the result can be generalizable to the population. The challenge in the process of sampling is determination of an optimum sample size. Gay (1981) pointed out that the minimum number of subjects believed to be acceptable for a study depends up on the type of research involved. For descriptive survey research, a sample of ten percent of the population is considered minimum. For smaller population, 20 percent may be required. For correlational studies at least 30 subjects are needed to establish the existence of a relationship.

Based on the suggestion given by Gay (1981), 20% (55) of the source population were taken as a sample for the questionnaire survey. The fundamental assumption made was that the study population is well-oriented and knowledgeable about the community-based educational program of the institute and the importance of community health information. Hence, it is presumed that the respondents would offer reliable and accurate response that could be generalizable.

A stratified sampling technique was employed to distribute the total sample size to each sub groups or strata. As the table above denotes, the source population is subdivided into two major strata based on their academic status. Besides, there is professional difference among the study population. Hence, efforts were made to classify the source population into different sub classes thereby sample was selected from each strata in the same proportion they exist in the population.

From each strata, individual sample elements or respondents were taken randomly to respond to the questions. The following table summarises the process of stratified sampling undertaken

Table 1.2 **Sample stratification**

Position/status	Population	Proportion	Sample size
Faculty member	152	55.5%	55 x 55.5 =31
Senior students	122	44.5%	55 x 44.5 =24
Total	274	100%	55

1.6.2. **Data collection Methods**

In an attempt to establish an improved information system, the first step is to understand what the existing system accomplishes and the problems inherent and the limitation of the existing system. Therefore, understanding the existing system is the starting point of system analysis work. For this purpose, facts need to be obtained about the prevailing system. This is achieved through the use of different methods and techniques. The methods used to collect data were basically questionnaire, interview, and observation.

By and large, the analysis part of this study mainly emphasizes on gathering facts about:-

- purpose of community health information.
- the users of the community health information in the institute and at the Zonal health bureau.
- sources of community health information.

- information requirements of users.
- awareness of users about the existing community heath information..
- access to the existing community health information.
- problems in the existing community health information system.

In addition to the aforementioned facts about the existing system, the following information are required about the proposed system.

- the input requirement and the data elements to be stored by the system.
- the process requirement of the proposed system to generate the defined outputs.
- the hard and software requirements to accomplish the task.

To collect information on the stated issues, the following techniques or tools were used.

1.6.2.1. **Questionnaire**

The main rationale for selecting questionnaire as a means of data collection was basically because of its merits. According to (Gay 1981, 159), in comparison to use of an interview procedure, a questionnaire is much more efficient in that it requires less time, less expense and permits collection of data from a much large sample. The questionnaire was constructed based on the suggestions provided by Boutledge (1994), Gay (1981) and Kothari (1990).

The questionnaire was prepared in view of addressing the objectives stated above. Firstly, based on the objectives and problems of the study, variables to be measured were drawn. Then, the construction of questions was carried out in the way that addresses the formulated variables from different perspectives. The styles of the questions were adopted by referring to different

questionnaires prepared by the community based educational programme of JIHS and the survey questions prepared by Berhane and Hassan (1997).

Finally, the questionnaires were pretested on the faculty members of JIHS who are currently pursuing graduate studies at the Faculty of Medicine and Department of Anthropology here in Addis Ababa University. Eight sample questionnaires were distributed and five of them were received on the intended time. Four questionnaires were completed as intended and some modifications were made based on the feedback. In addition, the questionnaires were further reviewed and modified with the assistance of some faculty members at the Biostatistics Unit of the institute.

1.6.2.2. **Interview**

To complement the data collected through the questionnaire, interviews were held with some officials of the institute, with technical staff such as data encoders at the data processing unit of CBE co-ordinating office and statisticians supervising the data entry and analysis tasks of the unit. The main reason for conducting interview was in view of obtaining complete answers from different categories of the sampled respondents. Moreover, personal opinions and attitudes were presumed to be investigated.

Interview guide was prepared to facilitate the discussion. In addition, separate schedules were prepared to collect data through interviewing the department heads and program officers at the Zonal health bureau. The sets of questions prepared for these categories of users are structured in a similar way as those in the questionnaire and distributed ahead of the interview date. Some of

the interviewee had already answered the questions before the interview time and further enquires were made to get detailed information on the questions that require detailed answers.

1.6.2.3. **Observation**

An attempt was also made to observe the way data are collected by students in their field works. The investigator had the opportunity to participate in one of the orientation programmes organised for post basic health officers degree program students before they were deployed into the community for data collection. This orientation program was started on July 28 1997 and lasted for two days.

In these sessions, students were briefed about the objectives of community-based training program. Besides, some papers related to the program were presented by various speakers. At the end, discussions and brainstorming were made on the data collection formats or tools. Suggestions were also forwarded by the participants of the orientation program.

In addition, observation was made as to how data are entered into computers and the way analyses and report generation were made using SPSSPC software package. The points noted during this time of observation are summarised and presented in the systems analysis part of this study.

1.6.2.4. **Literature review**

Various literatures pertaining to health information system and systems analysis and design were reviewed and used to draw the theoretical framework of the study. Some of the literatures have served as the basis of the study. Literatures pertaining to health and community health

information system were obtained from Ministry of Health. Besides, articles published in various domestic and international journals were reviewed. The Internet (WWW) has also served as an important source of information.

On top of that, documents used to collect, analyse and summarise community health information at the data processing unit of JIHS were analysed. These documents include: Community-based training program manuals, data collection forms, and various reports generated by students and officials of the unit. Finally, review of theses written on health information system and related areas at SISA was made and their differences and similarities with the current work have been pointed out. By and large, chapter three is predominantly devoted to literature review of this study.

1.6.3. Data Analysis Methods

The data collected through the questionnaire were edited and entered into SPSS/PC computer program. Simple descriptive statistical method was used to analyse the data and the results are summarised in tables.

1.6.4. Systems Analysis and Design Techniques

These days, different tools and techniques are evolving for the design and development of information systems. Techniques or approaches such as object-oriented systems analysis and programming are flourishing and are used by many analysts. Nevertheless, structured systems analysis and design technique is still popular and widely used. This method basically uses graphical models to document or represent the outcome of each stages in the systems development life cycle.

According to Rowley (1990) and Eardley et al (1991), as cited by Berhane (1997), the structured design tools are categorised into three major groups: functional decomposition, data- and process description, prescriptive methodologies. These tools or methodologies are used by analysts to serve different purposes. Some of them are used to develop software. There is no one best way or methodology that is universally recommended for the design and development of an information system. Systems analysis and design tools have their own strengths and weaknesses. Some tools lay much emphasis on processes where as others emphasise data. In addition, some provides a system overview, while others define details. Because of these reasons, analysts usually use multiple tools. Hence, the wise way in dealing with such intimidating situation is just to select the best feature of each methodologies that fulfil the purposes at hand.

In this study, structured tools such as data flow diagrams (DFDs), data dictionary and entity relationship modelling are used to analyse the existing system and logical design of the proposed system. Furthermore, Microsoft Access version 7 was used to create the prototype database and design the user-interface. The basis for the choice of this software was because of its easy application, its flexibility and the less programming skill it requires. Besides, the survey result reveals that some of the subjects of the study have some skills in using database management systems software packages.

1.7. Scope and limitation of the study.

The overall goal of this study was to lay down a framework for developing health information system at community, district, and zonal levels. This is believed to rectify the prevailing problem in the current health information system which is mainly health facilities based and disease oriented. However, due to time and resource constraints, the study emphasis on

enhancing the existing system at the data processing centre of CBE co-ordinating office of JIHS. The study did not take into account the health information system at the health facility levels of Jimma Zone. Earlier it has been mentioned that the CBE (Community-Based Education) has two parts : Community-Based Training Program and Team Training Program. However, this study focuses on the information generated by the Community Based Training Program.

Besides, potential users of community health information such as Planning and Economic Development Bureau in Jimma Zone, Regional Health Bureau and Ministry of Health level are not covered by this study.

1.8 Operational Definitions.

For the purpose of this work, the following working definitions have been used.

Community : a group of individuals and families living together in a defined geographical area usually comprising a village, town or city.

Family : a social institution comprising of parents and their children as well as other individuals sharing accommodation and other facilities.

Community Health Information System : is a system that provides information about the health status and factors associated with the health conditions of a given Community.

Community Oriented Medical Education : is an educational system which is focused on population groups and individual persons taking into account the health needs of the community.

Information : Organised and summarised meaningful facts.

Information retrieval : the process of selecting information from files/databases.

Information retrieval system : the system that stores information and retrieves it in response to users query.

Community diagnosis : the process of collecting and updating, analysing, interpreting and drawing inferences using appropriate techniques in order to assess the health status of the community.

Community intervention : measures taken to rectify the identified health problems of the community.

Kebele : the lowest administrative unit in Ethiopia, with a minimum population of about 2,000 for an urban and 1,000 for a rural peasant association.

Prototype : working model of a system.

Model : graphical representation of a system.

CHAPTER TWO

2.0. Community-Based Educational Program and its implementation in Jimma Zone

2.1. **Background Information of Jimma Zone**

Currently, Ethiopia has been divided into nine regional states, one council and one administration area. Region 4 which is also called Oromyia is the largest of all the regional states. The region has twelve Zones and Jimma is one of them. Jimma accounts for 4.1 percent of the total area of the region with a total population of more than two million (Bureau of Planning 1996).

Jimma is found in the South Western part of Ethiopia. Its geographical location lies between 7° 23 - 8 °47N Latitude and 36° 4 - 37° 0E Longitude. The zonal administration regions bordering Jimma are, West shoa on the North-East, East Wellega on the North -West and Southern Nations and Nationalities Regional State along the south and east.

Most parts of Jimma Zone are bounded by three main rivers which are Gibe, Didessa, and Gojeb. The total area of the Zone is 14, 950 Square Kilometres and consists of thirteen districts or Weredas (Regional state of Oromya 1996).

Climatically, Jimma Zone is characterised by tropical climate of heavy rainfall, warm temperature and long wet period. The main rainy seasons are during summer (Keremt) which lasts from late may to early September and constitutes about 70 percent of the total annual rainfall reaching the area. Generally, average annual rainfall in the Zone ranges between 1,200 - 2,000 mms. Temperature in Jimma Zone, on the average, is maximum from January to April and

reaches 25° - 30°c. The minimum temperature is between 7°c - 12°c during the months of October and December. The zone is relatively in a better condition regarding forest cover. More than one fifth of the total land or about 21.8 percent of the total area is covered with forest (Bureau of planning 1994). The climatic condition of the zone is ideal for cash crop production especially coffee. Hence, Jimma is the leading coffee producing zone in the country.

As of July 1997, the total population of Jimma zone was 2,096,037. Out of the total population 1,882,863 people, i.e., 90 percent reside in the rural areas. Jimma is a densely populated zone in Oromya which accounts for about 137 persons per square kilometre. Relatively speaking, the towns in the zone have better transport and communication facilities. There are about eighteen towns, in the zone with a total population of 213,174. Among the eighteen towns eleven are accorded an urban status by the Ministry of Works and Urban Development. Out of these, Jimma, Agaro and Limu Genet have better infrastructural facilities.

Regarding transportation services, eleven towns are located on the main asphalt road. All urban settlements have telephone network of which over 90 percent is manual telephone system. Television and Microwave services are available at Jimma, Agaro, and Deneba towns. However, the majority of the rural areas have problems of transport and communication services.

2.2. Health Care Services

The health care facilities available in the zone are fewer as compared to the total population residing in the area. As of December 1996, government owned health facilities in the zone were the following.

Table 2.1. **Health facilities in Jimma Zone.**

Types of Health institutions	quantity
Hospital	1
Health Centres	6
Clinics	71
Health Posts	173

Source: Jimma Zone Health Bureau 1996.

There are a total of 304 beds to serve admitted patients. Out of these, 250 are beds available at Jimma Hospital. The ratio of health centres to total number of people served is 1:375,791 and that of clinics is 1: 22,105.

In addition to the aforementioned health institutions, there are some health care services that are run by non governmental organisations and governmental organisations other than the Ministry of Health. Following is the list of non governmental health facilities currently offering health care services in the zone.

Table 2.2. **Non Governmental Health Facilities.**

Health Facilities	Quantity
Drug store	1
Army Hospital	1
Rural Hospital	1
Maternal clinics	6
Clinics	26
Rural Drug shops	67

2.3. Health Professionals in the Zone.

Ethiopia lacks adequate quantity and quality of health professionals. Jimma is relatively in a better position regarding health facilities and availability of health professionals. However, the available health professionals are insufficient to render the required health services for the communities in the zone. Following is the list of health professionals working in hospitals, health centres and community health service areas.

Table 2.3. **Health professionals in the zone.**

Types of professionals	**Total number**
General Practitioners	34
Nurses	105
Pharmacy technicians	9
Saniterians	17
Laboratory technicians	18
X-ray technicians	9
Health assistants	301
Pharmacist	3
Community Health Workers	218
Trained Traditional Birth Attendants	171

Source: Jimma Zone Health Bureau.

The table above doesn't include the health professionals working as instructors in Jimma Institute of Health Sciences.

2.4. Disease Distribution

Most of the diseases that prevail in the zone could be easily preventable if there were-well organized primary health care services in place. The top ten diseases prevalent in the zone and that were the acute health problems for the past two years are listed hereafter.

Table 2.4. **The top ten diseases in the zone**

	1988 E.c.			1989 E.c.		
	Types of Disease	**#of patients**	**%**	**Types of diseases**	**#of Patients**	**%**
1	Disease of respiratory system except (TB)	32,149	6.8	Disease of respiratory system	28,514	18.2
2	Helmintheasis of all form	23,361	5	Helminthesis all forms	15,806	10.1
3	Disease of skin cellular tissue	18,704	4	Malaria all types	9711	6.2
4	Dysentery (all types)	16,666	3.5	Disease of skin	7888	5.0
5	Malaria (all types)	14,562	3.1	FUO	6636	4.2
6	Gastro Entritis and colitis	8795	2.0	Dysentery all types	6239	4.0
7	Gastritis and dedunites	7114	1.5	TB all types	5764	3.7
8	TB (all types)	7063	1.5	Accidental causes all types	4758	3.0
9	FUO	6087	1.2	Gastritis and dedunites	4737	3.0
10	STD (all types)	3430	0.7	Gastro enteritis and colitis	3974	2.5

Source: Jimma Zone Health Department 1987.

2.5. Community-Based Educational (CBE) Programme: Initiation, Rationale and Implementation.

Various working definitions have been provided for the term community and the concept Community- Based Education. According to WHO (1987:2), the term community can be taken to refer to group of individuals and families living together in a defined geographical area, usually comprising a village, town or city. On the first meeting of the Network of Community-Oriented Educational Institutions, as cited by (WHO 1987), Community-Oriented Education was described as education that takes into account the health needs of the community concerned.

2.5.1. Initiation

Community-Based Educational Programme was initiated by WHO before two decades. In order to achieve the goal of "Health For All by the year 2000", WHO was looking for appropriate educational programme. Thus, CBE was advocated as an educational programme of health professionals that is responsive to the health needs of the population.

2.5.2. Rationale

The underlying rationale of the programme is that the training of health professionals should be carried out in the actual communities in which they are to serve after graduation. It is presumed that this will provide an opportunity to understand the health problems and needs of the communities that the graduates will be serving. The programme involves the integration of education and productive work. Moreover, since the health situation of a given community can be affected by different factors, the programme encourages intersectoral collaborations.

2.5.3. **Implementation**

Community Based Education can be conducted wherever people live. That is to say, the programme can be carried out in a rural, suburban or urban areas. These days, many tertiary level medical science teaching institutions both in developed and developing countries are trying to implement the concepts of community - based education.

According to WHO (1987:5), an educational programme or curriculum can be called community-based if,

- it is implemented through the entire duration of the programme.
- it consists of an appropriate number of learning activities in a balanced variety of educational settings including both the community and diversity of health care services.

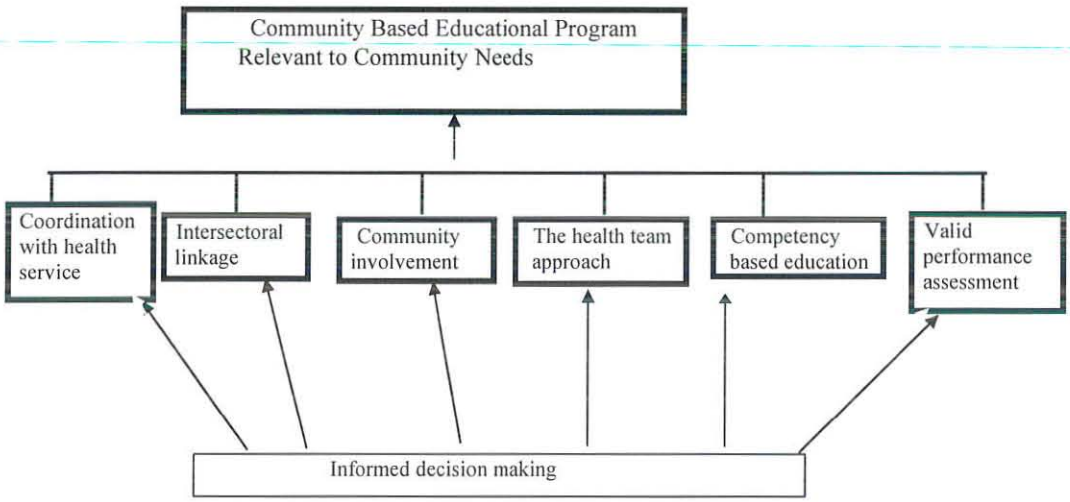
By and large, Community-based learning involves educational activities that use the community as a learning environment in which students, teachers, members of the community, and representatives of other sectors actively engage throughout the educational programmes. In this model of education, it is presumed that, the student is more than passive receiver of information provided by the teacher in the lecture halls; he/she rather plays an active role in the learning process. Depending on the level of competence achieved at each stage of learning, the learner is supposed to be able to identify the community health problems and seek appropriate solutions.

WHO (1987) proposed that in order to be able to plan a community-based educational programme, qualitative information must be available on the following of issues:

- the degree of co-ordination of educational planning and health services.
- the functioning of intersectoral linkage.
- the measurement of students performance in a valid way.

The information needs and information flow of the CBE program are depicted as follows:

Figure 2.1 **Flow of information in CBE program**



Source: WHO technical report series 746 1987

The prototype information retrieval system which this study has attempted to develop is based on the by- product of the Community Based Educational Programme of the Institute. Hence, one can recognize the importance of sound information system to undertake this educational philosophy.

The Community-Based Educational Programme of JIHS has two parts. The first one is Community-Based Training Programme (CBTP). This Programme is conducted in rural, suburban, and urban communities of Jimma zone. At the end of this programme, students are expected to:

- define the demographic, socio economic, and environmental aspects of a given community.
- make community diagnosis and draw action plan.
- Organise health intervention programmes.
- Conduct problem oriented and community based research etc.

To carry out the aforementioned activities, students collect raw data pertaining to health and related issues. The second part of Community-Based Educational Programme is Team Training Programme (TTP). In their final year, students are organised or grouped as a team in four teaching health centres of which three are located at 50 km radius from Jimma Town. In this programme, students collect, analyse, and interpret health information to draw action plan that lasts for ten weeks, perform environmental health activities and communicable disease control, anti epidemic service, and early case detection, etc.

The Community-Based Educational Programme of the institute has a co-ordinating office where the co-ordinator of the office directly reports to the dean of the institute. Although administratively the institute and the zonal health department are independent organisations, the very nature of the training and its philosophy call for the active participation of the community local governors and all other concerned bodies. Consequently, both the institute and the zonal health department have been committed themselves to the integration of service, training and research which benefits the community at large.

2.6. **Communities Covered by the Community Based Training Program**

Various urban and rural communities located within 50 km distance of Jimma Town have been studied since the program was started some fourteen years ago. Some of these communities have got the opportunity to have public health services such as: springs development, latrine construction, hand dug wells, etc., through student follow-up and intervention programs. Generally, the services offered to the community are classified as diagnostic and public health service. List of communities covered by the CBTP program is presented in Appendix D.

Fekadu and Mirgissa (1997) indicated that raw data collected by the students of different years and the resultant reports were classified based on areas of study. In addition, among the different categories of data collected from communities, 18,000 socio- economic and 13,200 environmental and morbidity data are entered into a computer using SPSSPC+ software packages.

CHAPTER THREE

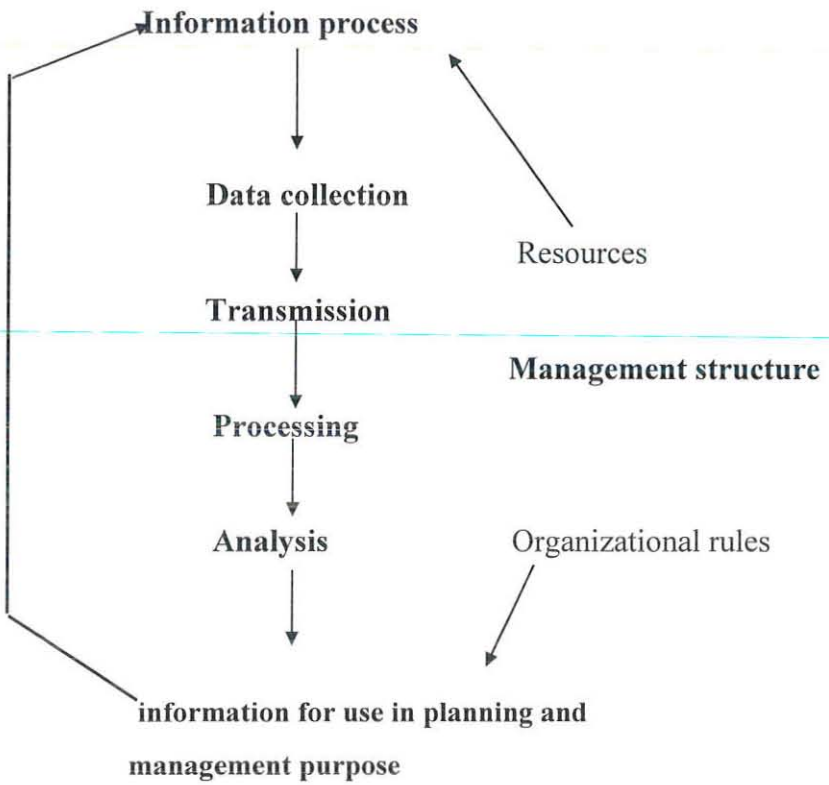
3.0. AN OVERVIEW OF HEALTH AND COMMUNITY HEALTH INFORMATION SYSTEMS.

3.1. Health Information System (HIS) in Ethiopia

According to MOH(1994:1), Health Information System is the process of data collection, analysis, presentation and utilization by the health personnel involved in the management and provision of health service at all levels. The health information of a country is the basis for rational policy making towards its health services (Tesfaye 1993). Without a sound information system, good planning is impossible. Where there is no planning, there will be problem in the utilization and allocation of scarce resources. Therefore, the development of strong health planning within the health administration requires a well organized Health Information System (HIS) as a prerequisite since objective decision making is not possible without valid, relevant, and timely information.

A health information system comprises an information process and management (Lippeveld et al 1997). Therefore, designing a health information system requires proper attention to each component of both the information process and management structure. The following figure shows the component of health information system and the interrelationships between these components.

Figure 3.1 Components of Health Information System



Source: WHO, 1997.

The figure denotes that through the information process, raw data or inputs are transformed into information that can be used in decision- making. The information process involves data collection, transmission, processing, and analysis. The ultimate end of the production of information is for use in planning and management of health services. The management structure ensures that quality information is produced. The resources part of the structure include the people (such as planners, managers, statisticians, epidemiologists, and data collectors), hardware, software, and finance. On the other hand, the organizational rules are procedures for supplying management and computer maintenance, definition of staff responsibilities, etc., aimed at ensuring the efficient use of the resources.

A national health information is a necessary instrument for the proper management of health services by serving as an important input that reduces uncertainties and thereby enabling responsible individuals to make informed decisions regarding the health care services. According to (WHO 1979), as cited in Tesfaye (1993,16), a national health information system is a combination of procedures and resources for collecting, processing and communicating data to generate information and provide services to health planners, health workers, and the community.

Basically, the purpose of having health information system is to collect, compile, analyze, document and utilize health information so as to be able:

- to identify the health problems of the population concerned,
- to plan health service activities to be performed at different levels of health services,
- to prioritize and tackle the crucial health problems, and
- to monitor performances at different levels of health system.

To materialize the aforementioned purposes, information required includes:

- information on population along with the demographic and other characteristics,
- health status of the population,
- information on health care activities such as preventive, curative, and promotive etc. information on the economic sector such as agriculture, education etc.

To obtain, the information listed above, the mainly adopted strategy in Ethiopia is routine data collection.

The HIS in Ethiopia has been developed centrally by Ministry of Health (detailed explanations have been provided in section 3.1.6 and 3.1.7). The major source of information on health in Ethiopia is health facility-based record system which includes information on a variety of individual contacts between various health institutions and on technical and management support activities such as , clinical, laboratory, radiological, and administrative services.

According to Tesfaye (1993:22), the existing health information system in the country is basically disease-oriented and hospital-based and are designed to provide national level officials with aggregate data for statistical reports. This health facility-based record system which is the predominant source of health information in Ethiopia, has been criticized to have major short comings. The first pitfall of such information is that it is generally restricted to medical care services. Secondly, it provides information only about those persons who actually used the health facilities, and tells nothing about the health status or health needs of people who are not using the facilities.

The other sources of health information are community-based and special studies. These sources of information have not been strengthened and they are very limited scope in Ethiopia. The writer strongly believes that this study would serve as an input in the course of initiating and developing health information systems at a community, Zonal, and regional levels.

The flow of health information in Ethiopia is a multilevel process. The information flow starts at a grassroots or community level and proceed step by step through the health system to the national level. The duties accomplished at each level is briefly described as follows :

3.1.1. **Community Health Level**

The basis for the Health Information System (HIS) at this level are the Community Health Services (CHS) staffed with Community Health Agents (CHA) and/or Trained Traditional Birth Attendants (TTBA). Community health services are the first contact unit especially the rural communities make with health system. This health service level is organized to serve a population of about 5,000. Some of the main functions of the community health service are :

- to provide promotive and preventive services such as health education, environmental health, safe and adequate water supply.
- to provide maternal and child health services at their levels.
- to give first aid and refer those patients who could not be treated at this level.

For reporting health information, standardized formats were developed. The data collected at this level is mainly aimed at identifying the health problem in the area. The major types of data that are collected at this level are :-

- number of births and deaths by age and sex.
- data on activities such as maternal and child health service, health education.
- recording of selected illnesses.

The over all mechanism for collecting the data includes :-

- census of households and population.
- routine registration of vital events /births and deaths occurring in the community
- recording and reporting of health activities undertaken.

The main problem observed in collection and reporting of health data is that the reporting form is complicated to the CHAs who, in most cases, have completed only fourth grade (Tesfaye 1993). Moreover, due to lack of support for CHAs from the community and the health care unit, the community health services is not strengthened and functioning properly.

3.1.2. **Health Station Level**

At this level, a monthly reporting forms were developed which includes data on: health education, material and child health including family planning, environmental health etc. Moreover, there are different types of data collection forms dispatched by different departments of MOH. Besides, the community health agents report to the health station. Then the health station compiles and sends the report of CHAs under it to the next health facility - health centers or hospitals. By and large, at health stations level at present, there is no unified reporting system which includes all the activities undertaken by the health care unit (MOH 1994).

3.1.3. **Health Centers and Hospital Level**

At the hospitals and health center, there are three types of reports; these are:

- the CHAs report which are compiled and sent by designated health stations to concerned hospitals and health centers.

- the health stations report which is compiled at this level.
- the hospital and health centers report.

At this level, detailed information is being collected. Moreover, there are also different forms dispatched by units other than HIS such as Expanded immunization program, sexually transmitted disease (STD) etc. Like the health station level, at this level there is no unified monthly reporting form. In addition, all health centers and most of the hospitals do not have statistical technician who would process and report data to higher echelons.

3.1.4. **Zonal Health Department**

At Zonal level reports are often received on monthly basis. Besides, the weekly notification of diseases, monthly and quarterly morbidity reports include:

- the community health service report
- the health station report
- hospitals and health centers report

These three types of reports are usually used to monitor Public Health Care(PHC) activities and health care services undertaken or accomplished in the region. The Zonal health office is the most important place where almost all type of data are to be compiled, analyzed and sent to the regional health bureau.

3.1.5. **Regional Health Bureau**

The decentralization of the health care service system vested much power to regions to handle their affairs on their own. Hence, the major decisions concerning the health status of the region is made at regional level. As a result, organizing, planning, implementing, and

monitoring of health services is the major role of the regions health bureau. To carry out the enumerated duties, information on: the health status of the population, the level of health service rendered to the population, the human resource required for the delivery of the health service care need etc. are required.

3.1.6. **Ministry of Health (Central)**

Currently, at central level there is health information unit under the planning and project department. This unit is responsible for collection, processing, and presentation of data useful for planning, monitoring and evaluating health services. The unit collects and compile data on :

- health status (mainly morbidity, mortality and nutritional status of the population.
- resource available, such as health facilities, manpower, budget.
- activities performed at all levels of health service etc.

The main sources of the aforementioned data are the annual report received from the regional health departments. After the data is processed and analyzed, various reports are generated. These value-added comprehensive information for the entire country is prepared and sent back to all regions from which the data were collected. The predominant means of information dissemination are printed reports such as the Comprehensive health service directory, outpatient and inpatient summary reports.

3.1.7. **Flow of Health Information in the Health Care Systems**

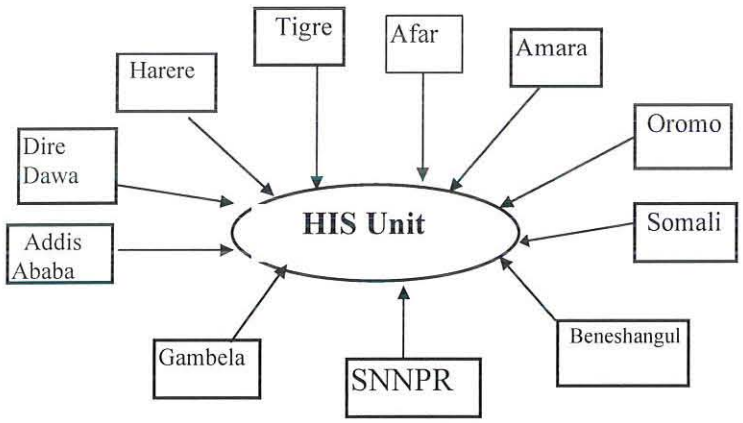
Flow of information in this context implies the movement of health information through the entire health system. The flow starts from the community level and goes up to the national level with all the necessary selection of data to be used at each level. Due to the change in the

organizational set up of the MOH, the flow of information has been changed. Before the decentralization the flow of information was as follows:-

CHS----->HS------>HC and Hospitals---->RHD----->MOH

presently as, Ethiopia has been divided into nine regional states, one council and one administration area i.e. Addis Ababa, each regional states has its own autonomous health bureau. These regional health bureau compile and submit health information to the center i.e. Ministry of health. The overall flow can be represented as follows:

Figure 3.2 **Flow of Health information in Ethiopia**



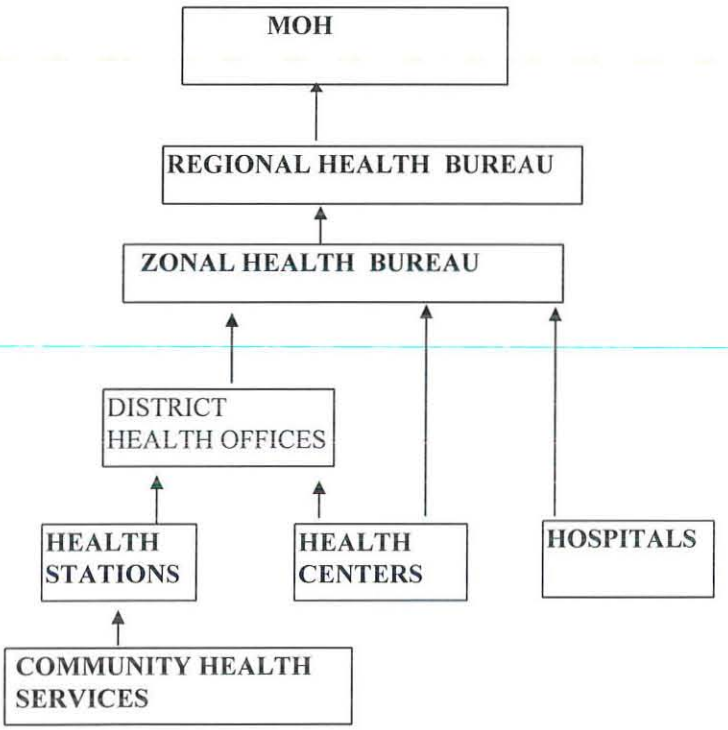
Key

SNNPR: Southern Nations Nationalities and Peoples Regional State.

HI S : Health Information System (unit).

Starting from the grassroots or community health service level until it reaches to the ministry of health, the health information passes through the following levels.

Figure 3.3 **Levels in the flow of health information**



Source : MOH 1994.

The community health services are many in number and their reports are usually submitted to the immediate health facilities next to them, i.e. to health stations. Each level which receives report required to give feedback in the form of correction if wrong information is received, by comparing the actual and planned performance or activities, acknowledging for good performance undertaken etc.

The other point one needs to note is that the flow of information is not merely vertical as denoted by the diagram, it is also expected that there would be horizontal reporting to the concerned administrative offices such as the community, district, Zonal and regional office of the council of the representatives when the need arises.

A question one likely to ask is that what happens to the data after it has reached to the ministry of health? The routine periodically sent data from the regions to the center are usually verified, validated, and processed by the health information processing unit and various reports are generated. As has been pointed out earlier, the outputs are usually printed reports which show the over all health status of the country. These outputs are sent back to the regions. This provides regions the opportunity to compare their performance against each other and enables them share experiences. This process can be depicted as follows:

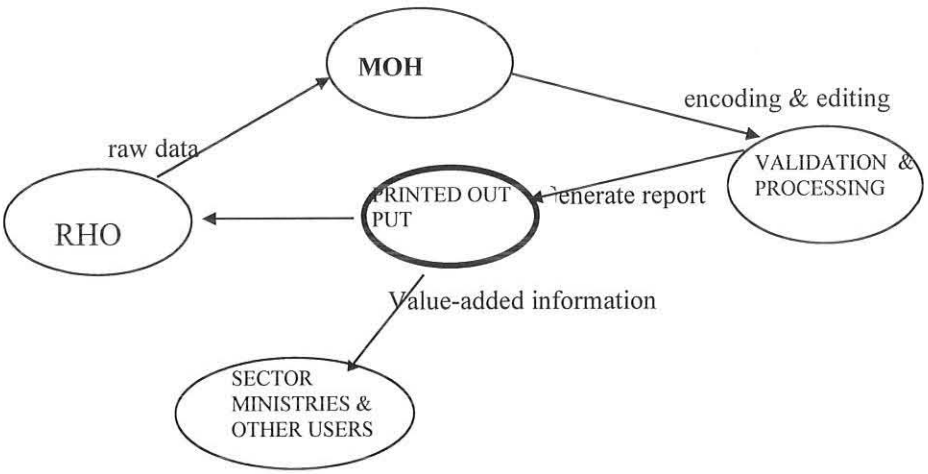


Figure 3.4. **Health information processing**

Key

RHO: Regional health office

MOH: Ministry of Health

Many scholars stated that the existing National health information is incomplete, in accurate, and untimely. Tesfaye (1993) has identified the following major shortcomings in the existing health information system:

1. lack of information on target population; social and environmental determinants of health, and non governmental organization engaged in the delivery of health care activities.
2. poor quality, quantity and utilization of available data.
3. Lack of timeliness of the information.

First and foremost, the reporting instrument do not contain the size of the target population the programs are attempting to serve. Besides, environmental and social determinants of health are not fully included as part of the information base. However, such data are required for adequate understanding of the health situation. The other problem is that there is no adequate information about non governmental and private health care services such as hospitals which are playing a considerable role in the health care service. Furthermore, the majority of the rural population where there are no modern health care services, use traditional medical treatments and services where the current system failed to take into account.

One of the factor that is responsible for the poor quality of existing health information is that in most health institutions registration of patients at the out patient services is carried out by lay persons who are less educated , less skilled and less paid to carry out such a task. Because of this problem, researchers, planners, policy makers are reluctant to use the available information. Furthermore, analysis and reports are generated years after the data have been collected which put in question the timeliness of the information. The health information units especially at regional and Zonal level are not backed up by the state- of- the -art modern

information technology and still using manual system to compile and analyze mountains of records.

Finally, the national health information in Ethiopia has failed to provide accurate and reliable service to the public. To cite a typical example, in the middle of August 1997, the Ministry of health released information through the Ethiopian Radio concerning the AIDS patients in the country based on the patient data collected from 54 Hospitals through out the country. The Ministry stated that there are about 21,000 AIDS patients throughout the country. Out of which 9,183 patients are found in Addis Ababa. Four days later, the Health Bureau of Region 14 (Addis Ababa) protested the information released by the Ministry and stated that there are more than 20,000 AIDS patients in Addis Ababa alone and this was the debate of that week.

3.2.. Community Health Information System (CHIS)

The community health information system is a repository of information related to health and factors that impact health status in the community. The goal of the CHIS is to provide information in order to monitor, assess, and improve the health status of the community. For CHIS encompasses various aspects of the community what exactly it should constitutes is a debating issue.

The Houston area Community Health Information System work group (1997) proposed that the CHIS should be designed to contain the following information:

1. **Population Statistics**

- census population and population estimates.
- vital statistics (births and deaths).
- demographic profiles (e.g. Socio-economic status, educational level, wage and salary information.
- Morbidity, disability, and injury incidences prevalence.

2. **Health services utilization data, including**

- preventive and primary care utilization.
- hospital discharges by ICD-9(International Classification of Disease) codes.
- medical procedures.
- numbers of patients and/or clients.
- prescriptions written.

3. **Health resources, including:**

- manpower (e.g. physicians, physicians assistants, registered nurses, certified nurse practitioners, dentists, social workers, psychologists)
- facilities (e.g., hospital beds, outpatient clinics)
- services (e.g. preventive health services, health education).

4. **Health care financing, including:**

- source and amount of revenues and funds.
- allocation and distribution of revenues and funds.
- Medicare and medical cost reports.

5. **Community information (data may be helpful in interpreting health status and priorities in the community).**

- police reports on violence and drug-related arrests.
- unemployment statistics
- population migration

6. **Population survey data**- Information from periodic population surveys to assess disease prevalence and charges in health needs and priorities in the community. Surveys will also be used to collect information on health behaviors (e.g., smoking, drug abuse, alcohol abuse).

3.3. Review of Related Works.

In this part an attempt has been made to review and analyze theses written in the health information and related areas in this School (SISA). The intent is just to review previous works in view of determining what has been already done that relates to the ongoing research.

Gay (1981) stated that review of related works tells the researcher what has been done and what needs to be done. Accordingly, three theses are selected for review. The objective, accomplishment, and the scope of each work have been briefly described hereafter.

1. Information support system for the medical unit of Ethiopian Airlines (EAL).

This thesis was written by the 1994 graduate of SISA, Ato Zemedebrahan G/Giogris. The aim of the work was to improve the information services and management in the medical unit of Ethiopian Airlines through the application of modern information technologies.

As the writer pointed out, by the time, the medical unit of Ethiopian Airlines was accomplishing its information related duties using the traditional pencil and paper-based system. This includes both patient registration, admission and the book keeping activities, inventory control of drugs etc. This had brought some serious drawbacks. Among these, searching for a piece of information was a major practical problem. Apart from this, the medical unit of EAL deals with aviation medicine in which flight crew members (specially pilots) are to be checked periodically for their physical and mental fitness and other related health conditions. For this end, fast access to previous information about the crew members is required.

The overall objective of the work was to investigate the major problems of the existing information system in the medical unit of EAL. Then, to plan and design an alternative information support system which can help the potential users to make gainful decisions.

2. Information support system for All African Leprosy and Rehabilitation Training Center (ALERT).

This thesis was done in 1995 by graduate student Mohammed Sied Salih. The study aimed at the development and implementation of Micro- computer based system designed for collecting and summarizing clinical information on leprosy visits to the hospital of ALERT.

The problem in the system, as stated, was that the medical records of leprosy patient were handled in a traditional hand written card called a patient record. This had made it difficult to get a summary of diagnosis, treatments, sensation and muscle changes etc. Besides, the manipulation of data for statistical analysis and make available for administrative educational and research purpose was difficult.

The objective of the study was to support the clinical activities involved in the diagnosis of leprosy patients in the hospital division of ALERT. The study aimed at the development of a prototype leprosy patient case history databases called LEPRO database. The overall purpose is just to demonstrate and lay down certain guidelines and design a computer based information support system in ALERT.

3. An Information Retrieval System for Health Care Services in Somalia.

This work was done last year by Mohammed H. Hassen on the north western Zone of Somalia (Somaliland) which was relatively in a stable situation. The researcher pointed out that from 1992 onwards, the number of health facilities in Somaliland have increased. This high rate of expansion of health facilities created a considerable problems in planning for the provision of

adequate health care services and the distribution of resources including drugs. The problem stated was that the information gathered from health facilities are not easily accessible because of lack of an efficient retrieval system.

The objective of the study was to analyze the existing system in order to establish an information retrieval system which will strengthen the health care services by facilitating access to timely and accurate information to users. Hence, prototype of the proposed system was developed using dBase IV database management software.

To sum up, the aforementioned two studies (the one that is done on EAL and ALERT) concentrate on automating clinical information. Though there is similarities among these three works, the last one deals with establishing health information system at a macro or national level. There is a fundamental philosophical difference between the discussed three works and the ongoing research.

As has been pointed out in the preceding sections, the basis for national health information system in many countries is health facility-based routine reporting system. According to (lippoeveld et al 1997, 176), health information system in most countries provide vast amount of information on patient and disease. Besides, data collection tends to focus on disease reporting and only partially address service functions at health unit or patient/client level. Apart from this, data analysis and presentation is so protracted that by the time reports are prepared, the data become already obsolete.

Nowadays, the global trend concerning health care services is towards decentralization and focusing on disease preventive strategies. WHO has promoted decentralized health system based on primary care with community participation and delegation of decision making power at the district level. Much endeavors which are geared towards expansion of health care services to communities at a grassroots level are being observed. To materialize this, strong health information system at community and district levels is indispensable. Since the summation of communities give rise to a given nation, strengthening health information system at community level will eventually makes strong the national health information system. The community health information system which this study is trying to advocate will open a new paradigm in the health information system in Ethiopia.

3.4. Design of an Information Retrieval System

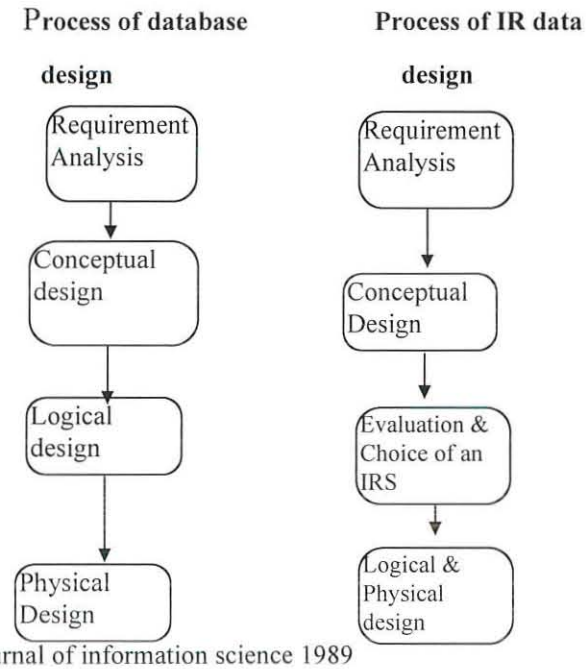
Computers have revolutionized the process of information storage and retrieval. Computers have made it possible to retrieve information needed from dataware houses or from multiple databases incredibly within few minutes or seconds. This has brought a significant improvement in reducing the time and energy devoted to information handling activities in the traditional manual systems. Nowadays, almost it is nearly impossible to find out disciplines or areas of economic activities where computers are not introduced.

An information retrieval system can be broadly categorized into two parts according to the type of data/information they handle : bibliographic and factual. The former handles textual information and the later factual or numeric data types. The software tool which automatically manages the description of the information content of the document is usually identified as an

information retrieval system (Agosti et al 1989). An information retrieval systems are expected to meet different users requirements. For different groups of users, it is necessary to adopt different views of the application, representing different levels of abstraction. Therefore, due attention need to be laid on the needs of the users while designing IR systems. On the other hand, if the users requirements are to be meet, it is necessary to use suitable methodological tools which is sometimes called data models.

Some authors suggest the database design processes for the design of an information retrieval application. According to (Agosti et al 1989, 309), the database design process is used to transform and organize unstructured information and processing requirements concerning the application, through different intermediate representations, to complex representations which defines schema and functional specifications. The design process is usually divided into components which produce intermediate representations.

Figure 3.5 **Design process of database and IR Systems**



Source: Journal of information science 1989

Component one and two of the above database design process are independent of the software system which is going to be used for the implementation of the application. These two components are concerned with the representation of the users general requirements. This study is interested in pursuing the database design approach for creation of prototype databases for the storage and retrieval of community health information.

CHAPTER FOUR

4. SURVEY OF THE EXISTING COMMUNITY HEALTH INFORMATION SYSTEM

4.1. INTRODUCTION

The main purpose of an information system is to provide information services to users. Davis (1994) stated that a system begins with a user. Information system worth nothing if it fails to satisfy information needs of users. An information system can be either manual or computerized. Information technology is proliferating and facilitating the handling and processing of large volume of data. However, information technology is not a panacea. Nowadays, people have come to realize that introducing computers in a " manual mess" will end up leading to a "computerized mess".

Although computers facilitate data handling and processing, wrongly applied they will have deleterious effects. Therefore, the application of computers in an information processing areas require thorough investigation and study of the existing system so that the anticipated benefits can be achieved. This chapter presents facts about the existing information system and users of the system. The discussions made specifically focuses on:

- identification of the information requirement of users.
- the operation of the current system which includes input to and outputs form the system. The way information is stored, volume of data and problems in the system.

The facts gathered through questionnaire, interview, and document analysis are summarized.

4.2. The Development of Community Health Information System (CHIS) in the institute.

From the various discussions made during the time of survey, it was learnt that community health information system at JHIS was not developed purposefully and consciously. It is undeniable fact that information systems usually do not stand by themselves. They are often established in an integrated manner in line with the overall organizational objectives. The core educational philosophy of the institute is the enhancement of community oriented medical education. Chali (1997) has summarized the underlying principles of community oriented/based education as follows:

- the students activities must be related to planned educational goals and objectives.
- the activities are introduced very early in the educational program.
- the activities are viewed not as peripherals or casual experience but as standard integrated and continuing parts of educational process.
- the students work during training must be a real work that is related to their educational needs and also forming parts of the requirement for obtaining a degree.

To materialize the aforementioned principles, JIHS has formulated the following strategies:

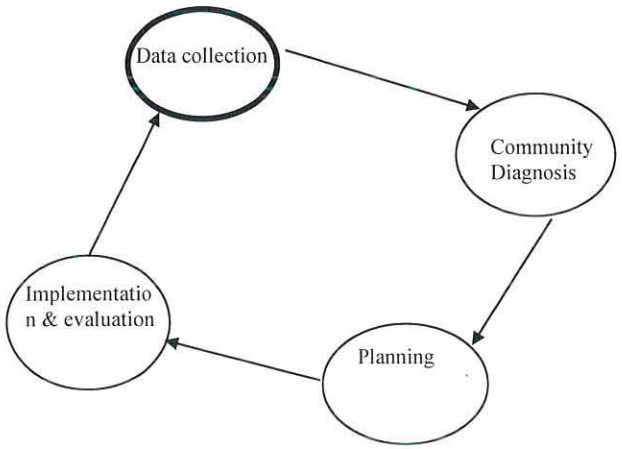
- Community Based Training Program (CBTP).
- Team Training Program (TTP)
- Community-based/problem based student research.

Community based training program has the following features:

- consists of learning activities that uses the community extensively as a learning environment/laboratory.
- the active involvement of students, teachers, community leaders and other sectors are needed.
- it is problem solving and spiral in nature. That is, the program is conducted in phased time duration and the phases are linked with each other. Besides, most of the activities in phase I , which is the first spiral, is extended to the second and so on.
- group of students, mostly (10-12) are assigned at urban, semi urban or rural communities.

The students learning activities in this program are phased and spiral in nature. That is, a particular activity may be repeated. However, the process are viewed as a continuum of activities. The student undergoes through well defined performance phases consisting of the following components.

Figure 4.1 **Phases in CBE**



Fekadu and Mirgissa (1997) have pointed out the following instructional methods and strategies:

* orientation and large group discussions (which includes discussion with community leaders).
* student independent problem identification
* small group tutorials.
* field work (data collection).
* group work.
* geport writing.
* grawing of action plan.
* presentation and discussion at a symposium.
* implementation follow up.

Moreover, the team training is aimed at introducing students the importance of working in a team to achieve common objectives. To this end, the institute is training different categories of health professionals. This program is so far conducted within four districts of Jimma zone namely, Seka chekorsa, Goma, Kersa, Omo Nada. These districts cover 39% of the total area 45% of the population of the Zone. In view of enhancing problem solving skills of students final year medical science and post basic degree program students carry out research projects.

It is in the endeavor of achieving this educational philosophy that community health information has come to picture. In each phase of the CBTP, information on the socio-economic, environmental factors, health conditions etc. are gathered from the communities.

The data collected are firstly used to meet the immediate objectives of each CBTP phase. Then, it was presumed that the data generated during each phase can be used for future educational and research activities. Thus, the idea of permanently storing and managing community health data arised.

4.3. Organization and Management of CBE Program

CBE has a coordinating office which is responsible for managing the overall activities of the program. By the time, the program was started, it was under the supervision of the department of community health. As has been pointed out in chapter two page 30 and 31, both the institute and the Zonal health department have been involved in implementing the program with an ultimate objectives of integrating training, research, and services. The chart below shows the place of CBE in the organizational structure of JIHS.

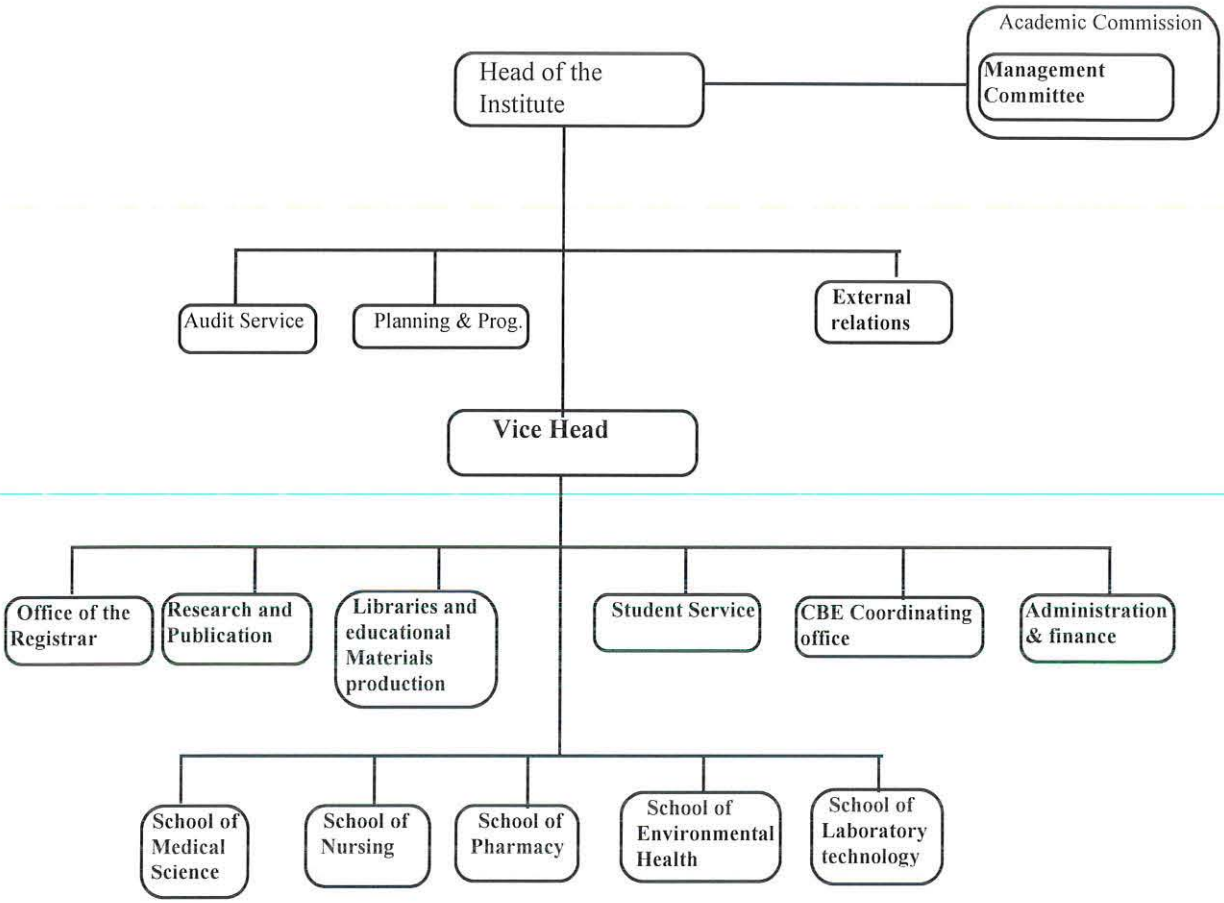
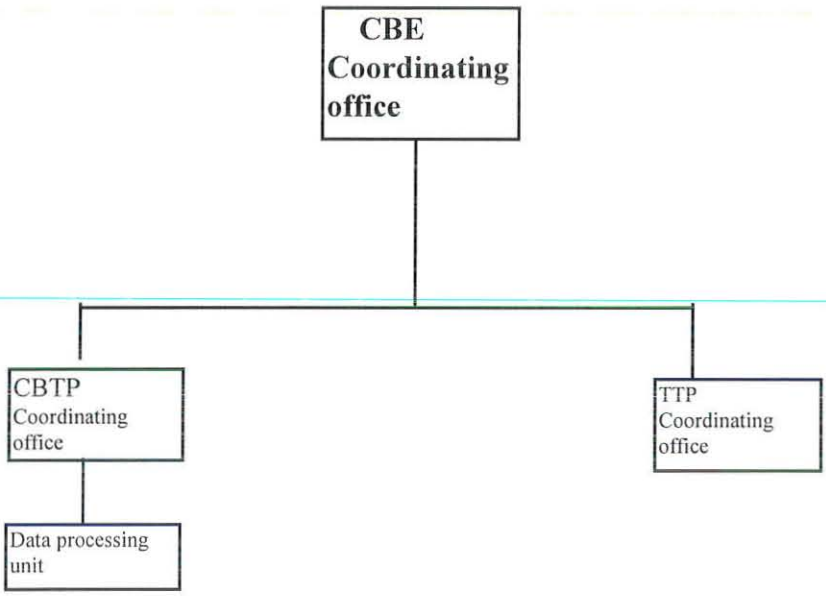


Fig 4.2. Organizational chart of JIHS

Earlier, the head of the Zonal health department was at the same time the coordinator of the CBE program. Presently, the vice head of the Zonal health office has been assigned to lead the CBE program coordinating office. Under its auspices, CBE has two program coordinating offices. The following chart shows the internal organization of CBE office.

Fig 4.3. **Internal organization of CBE Coordinating office.**



The coordinator of the CBE program reports to the dean of the institute and the major duties and responsibilities of the office are the following :

- Coordinates community-based educational program of the institute.
- Facilitates the integration of students into the community for training and the services students offer to the community.
- Monitors the community attachments of students are in line with educational philosophy and plan of the institute.
- Enhances and maintain the intersectoral linkage of the institute with sectors such as Health, Agriculture, and Education.
- Coordinate the relationship established between the institute and the communities and the teaching and learning activities held in the community.

- Participate in other teaching and research programs of the institute as the need arises.

4.4. **Analysis and Presentation of Survey Results**

This section deals with presentation, analysis and discussion of the survey results. The main purpose of the survey was to gather facts that serves as a stepping stone for the solutions the study recommends eventually. More specifically, the intent is to understand the existing system and the information requirements of users.

The methods or tools used for data collection have been mentioned in the first chapter of this study. Firstly, the response obtained through the questionnaire will be analyzed and interpreted.

4.4.1. **Data Interpretation**

A self administered questionnaire was distributed to respondents on 6th march 1998. After five days adequate number of questionnaires were filled and returned . Generally, the questionnaires were administered to 55 sampled respondents. Out of which 48 were received on time. This accounts 88% response rate and 45 of the 48 filled questionnaires were found usable. Some of the major variables which the questionnaire tried to address from different point of view are the following :

- potential users of the community health information,
- sources of the community health information,
- information requirements of users,
- awareness of users about the existing community health information,
- access to the existing community health information, and

- problems in the system.
- improvements needed to enhance the existing system etc.

4.4.1.1. **Users of the Community Health Information.**

The principal users of the community health information are those who are highly engaged in the research activities. Faculty members, intern (final year medical science students), and post basic degree program students are the main users of the community information. Accordingly, questionnaires were administered to 31 faculty members and 24 senior students. Out of the 31 sampled faculty members, 21 have completed and returned the questionnaire on the right time. All the 24 sampled senior students have responded on the time. This is mainly because the survey questionnaire was administered while Internship students were in the morning sessions and final year post basic students were on rehearsal program of graduation.

In terms of their qualification, the respondents are from different categories of health sciences. The highest number of respondents were from Community health program which accounts for 31.1% followed by Medical science that accounts for 28.9 percent. Figure 4.4 and table 4.1 summarize the result.

Figure 4.4. Potential users of community health information

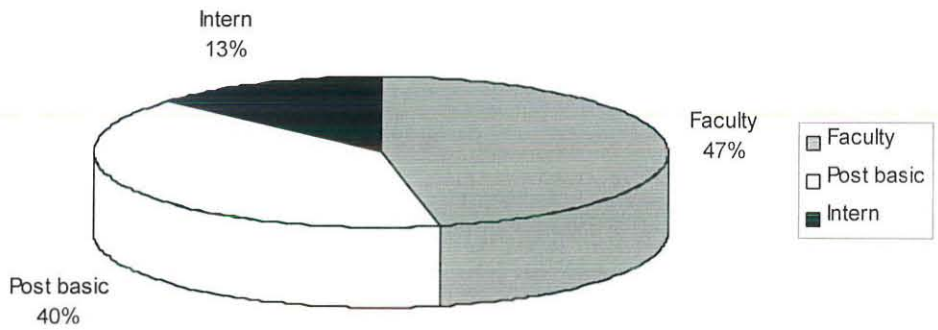


Table 4.1. **Classification of respondents by schools or departments.**

Category of users	Frequency	Percentage
Medical Science	13	28.9
Nursing	8	17.8
Environmental Health	4	8.9
Community Health	14	31.1
Laboratory Technology	5	11.1
Basic Natural and Social Sciences	1	2.2
Total	45	100

4.4.1.2. **Sources of Information.**

Efforts were made to know the sources of community health information users currently utilize. The underlying objective was to see indirectly the pattern of use of community health information available at the data processing unit of CBE coordinating office. Five options were given in the survey questionnaire in order to help users mention their information source from the alternatives provided. Most users have mentioned more than one sources of information. The response gathered are summarized as follows.

Table 4.2. **Sources of community health information.**

Sources of information	Frequency	Percentage
1. From Zonal health bureau	1	2.2
2. From department of community health	1	2.2
3. From CBE office	1	2.2
4. From JIHS Library	15	33.3
5. By conducting survey	6	13.3
6. 1,4, & 5 **	7	15.6
7. 2, 3, & 4	3	6.7
8. 1, 2, 3 & 4	7	15.6
9. 3 & 4	4	8.9
Total	45	100

** 6-9 are summaries of responses of users who have used information from more than one source(i.e. from the sources listed 1-5).

The above table indicates that altogether 15 respondents that accounts 33.3% of the total response have indicated JIHS library as their sources of information. When we look at the overall response, 33.4 respondents (i.e. 15.6 + 15.6 + 2.2) have stated CBE coordinating office as their source of information. To cross check the response obtained in this section, users were asked if they have ever used the community health information available at CBE coordinating office. The response obtained reveals that 35.6% respondents have used the data available at the data processing unit of CBE coordinating office. Besides, users were asked to mention the type of community health information they have used. This is because there are three formats in which the community health information have been made available at the data processing unit. These are reports, raw data, and computerized data. Following are summaries of the response obtained.

Figure 4.5. Types of community health information used

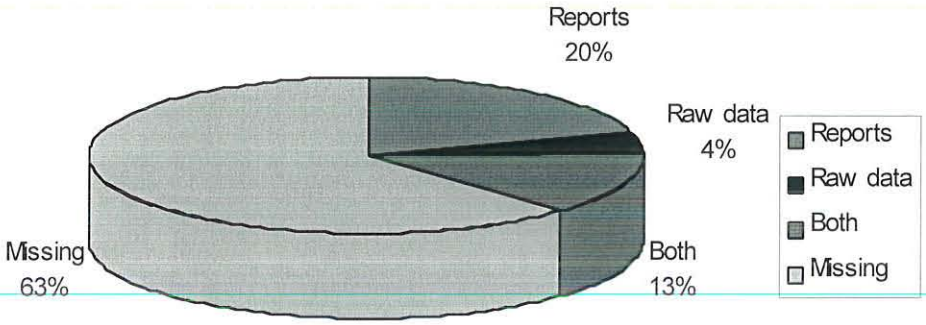


Table 4.3. **Types of community health information used.**

Types of information	Frequency	Percentage
reports	9	20.0
raw data	2	4.4
reports and raw data	6	13.3
Computerized data	-	-

The table above shows that non of the respondents have used the computerized data available at the data processing center.

4.4.1.3. Users awareness about the Community Health Information

As has been repeatedly stated, the community health information in the institute has closely been associated with the community-based training program of the institute. It is believed that users recognition of the importance of community health information to a great extent depends on their awareness and participation in the community-based training program. To ensure this, first, users were asked whether they have ever participated in the community-based training program of the institute. It was found out that 43 respondents out of 45 indicated that they had participated in the CBTP during their teaching and learning processes in the institute.

Moreover, to understand the attitude and reaction of users about the community health information, question that inquires users whether they think the community health information generated by CBTP is valuable for their future research and health care activities. From the total respondents 97.8% or 44 out of 45 agreed that the information is valuable for future research and health care activities to be carried out in the communities covered by the program. The goal of this question was to find out the real reason in case low usage of the information is discovered later on. This is because one may assume that users failed to use the information due to reluctance and distrust of the quality or reliability of the information.

On the other hand, attempt was made to tackle the same issue from different perspectives. That is, question was raised to the respondents to enlist briefly some of the objectives or purposes of collecting community health data during CBTP field works. The response obtained was summarized as follows:

Figure 4.6. Purposes of community health information

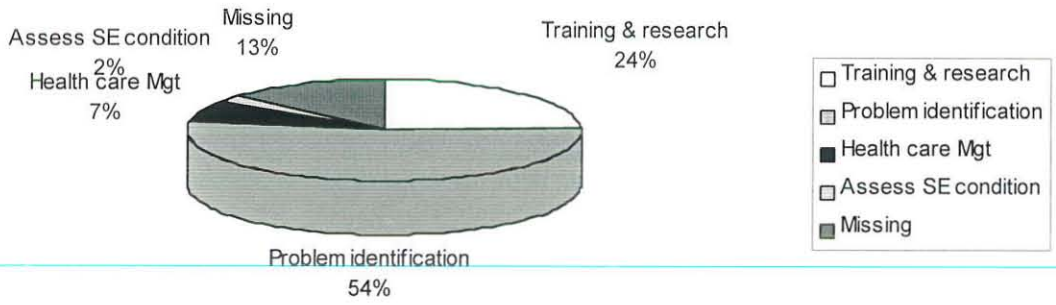


Table 4.4. **Purposes of community health information.**

Objectives or purposes	frequency	percentage
Academic exercise (training and research	11	24.44
Health needs assessment and problem identification	24	53.33
Health care management	3	6.67
To assess socio economic condition	1	2.2
Missing response	6	13.33
Total	45	100

On the basis of the facts drawn so far, one can conclude that the identified potential users are well oriented to the objectives and importance of the community health information at their disposal.

4.4.1.4. Information Requirements

In this context, information requirement implies the purpose for which users need information. In the preceding two chapters, it was mentioned that from the outset, JIHS has been embarked on the endeavor of integrating training, research and services. The information requirements of the faculties and senior students are geared towards materializing the mentioned objectives. The table below summarizes the purpose for which users require community health information.

Table 4.5. **Summary of purposes for which users need community information.**

Purposes	frequency	Percentage
1. To conduct research	9	20
2. For course work	3	6.7
3. For health care services	2	4.4
4. To organize intervention programs	2	4.4
5. 1 & 2	17	37.8
6. 1, 2, & 3	7	15.6
7. 1 & 3	1	2.2
8. 1 & 4	4	8.9
Total	45	100

As it can be shown in the table above, the main purposes of for which the faculty member and senior students of JIHS seek community health information is to conduct research and for course work. When we look at specific responses, 37.8% of the total respondents stated that they use community health information for conducting research and for course work followed by 20% of respondents who need community health information solely to conduct research.

4.4.1.5.. Problems in the Existing System

In the preceding illustrations it was noted that there is a low usage rate of the community health information available at the data processing unit of CBE coordinating office. There are so many reasons that inhibit users from using the information. Lack of awareness of the availability of information, lack of permission, ease of retrieval can be mentioned. In the questionnaire, users were asked if they have ever used the community health information from the data processing unit. A significant proportion of respondents that accounts 64.4% of the total respondents had never used the information.

Further inquiry was made to uncover the reasons for not using the available information. Table 4.6 summarizes the responses provided.

Table 4.6. Reasons for less usage of the available information.

Reasons	Frequency	Percentage
1. The accuracy and reliability of the data	2	4.4
2. Lack of permission	6	13.33
3. Problem in retrieval	3	6.67
4. Lack of awareness	6	13.33
5. 2 and 4	1	2.2
6. Missing	20	44.4
7. Specified reasons	7	15.55
Total	45	100

Figure 4.7. Users satisfaction

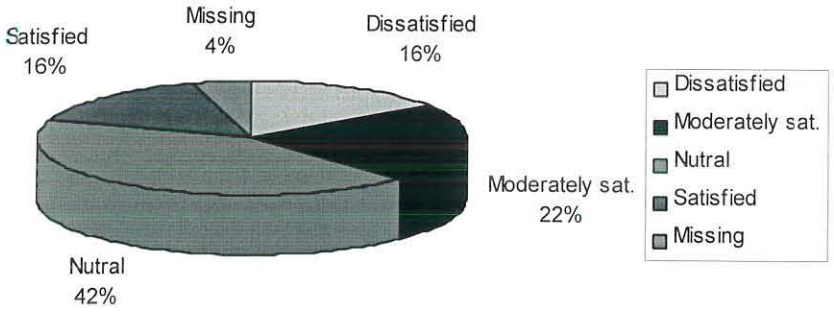


Table 4.7. Level of satisfaction.

Level of satisfaction	frequency	percent
Dissatisfied	7	15.6
Moderately satisfied	10	22.2
Neutral	19	42.2
Satisfied	7	15.6
Missing response	2	4.4
total	45	100

By and large, 37.8% of the total respondents level of satisfaction falls under dissatisfied and moderately satisfied category.

4.4.1.6. Improvements needed to enhance the existing System

While planning the design and development of a new system, the analyst should strive to get the opinion of users. Since the system is designed for users, their participation in the process of system development will have a paramount importance. Hence, frequent communication and exchange of ideas are mandatory if the end product is to be acceptable by users. Above all, the new system developed should rectify the pitfalls of the old system. Both the end users and officials of CBE coordinating office have started sensing that the prevailing system has some flaws. The survey questions were constructed in order to enable get the reaction of users indirectly.

First, users were asked if they want change in the way the current community health information is organized. The response obtained shows that 73.3% of the users responded they need change. The remaining 15.6% of the users failed to respond to this question for unknown reason. Only 11.1% of the users were hesitant to recommend change in the existing system. For those who would like to have change in the existing system, opportunities were given to recommend the change they would like to take place. Figure 4.8 and table 4.8 show the suggestions users forwarded.

Figure 4.8. Poroprtion of users that suggested change

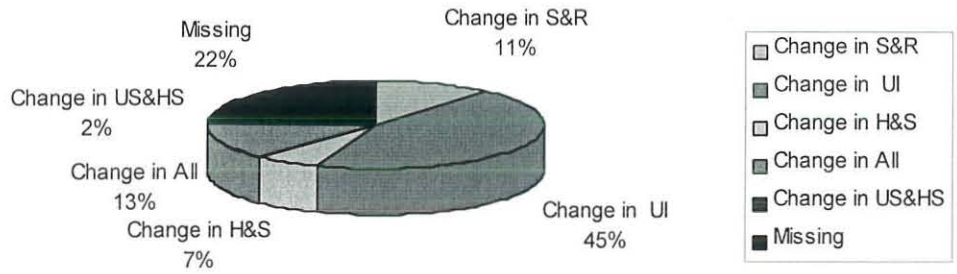


Table 4.8. Proportion of users that suggested change.

Suggestions	Frequency	percent
1. Change in the storage and retrieval system	5	11.1
2. Change in the user interface	20	44.4
3. Change in the computer hardware and software	3	6.7
4. 1, 2, & 3	6	13.3
5. 2 & 3	1	2.2
6. Missing	10	22.2

As it can be seen from the table, large proportion of users have recommended change in the user interface to make the system more users friendly. Besides, 13.3 percent indicated that they need change in the storage and retrieval system, change in the interface, and change in the computer hardware and software currently being employed in the system. In addition, 4.4% of the users specified their own reasons. Among the reasons given, the need for training the faculty how to use computers effectively and free access to the information should be

made for user who are interested in using the available information can be mentioned. On the other hand, 17.8% of respondents refrained from giving any suggestions.

4.4.1.7. **Users Preference and Suggestions on the Information Content.**

There are different categories of community health information which are captured and held at the data processing unit. The CBE coordinating office assumes that all these categories of information are equally important. Nevertheless, some of these information provide baseline data for any kind of research work to be conducted. Furthermore, it is nearly impossible to design an efficient and complete storage and retrieval system for all the categories of information within the short period of time allocated for this thesis work. Hence, strategy was formulated to know the degree of importance of each category of information so that consideration will be given to those category of information that have the highest degree of importance. This is also believed to be helpful for the endeavor of prioritizing the future system development procedures. To this end, users were asked to rank each category of information according their degree of importance.

Table 4.9. **Categories of Community health Information ranked by users**

Category of information	Ranks and percentage of responses									
	1	2	3	4	5	6	7	8	Miss -ing	Total
Socio demographic	48.9	13.3	8.9	4.4	6.7	4.4	4.4	6.7	2.2	100
Health service record	15.6	26.7	22.2	6.7	6.7	8.9	4.4	6.7	2.2	100
Perceived Morbidity	2.2	6.7	11.1	20	24.4	4.4	15.6	8.9	6.7	100
Nutrition	2.2	13.3	20	11.1	11.1	17.8	11.1	4.4	8.9	100
Environmental health	6.7	20	20	8.9	11.1	8.9	2.2	11.1	11.1	100
Family planning/MCH	20	13.3	11.1	4.4	8.9	17.8	6.7	11.1	6.7	100
School health	2.2	2.2	2.2	11.1	13.1	4.4	28.9	24.4	11.1	100
EPI	2.2	8.9	4.4	20	6.7	15.6	8.9	22.2	11.1	100

The above table indicates that 48.9% of the total users ranked first the socio economic information followed by family planning /MCH, health service record and environmental health respectively. To be fair and avoid coincidental situations, the response obtained for the first three ranks are summed and compared. Accordingly, 71.1% of respondents ranked the socio demographic data 1-3, 64.5% health service record, 46.7% Environmental health, 44.4% family planning respectively.

In addition, users were asked to suggest how they would like the aforementioned information/data to be stored and retrieved. Table 4.10 reveals the responses offered.

Table 4.10. **Suggestions of users.**

Suggestions	Frequency	Percentage
1. Annual data of each kind of record must be stored separately	11	24.4
2. Data of time series stored separately	17	37.8
3. Selected information from each kind of record should be stored	14	31.1
4. 1, 2 and 3**	9	20
5. 2 & 3	3	6.7
6. 1 & 3**	2	4.4
7. Missing	2	4.4
Total	45	100

** 4-6 are summaries of suggestions of users who have provided more than one suggestions(i.e. from those listed 1-3).

In the table 4.12 above one can see that 37.8% of the respondents pointed out that data of time series under each record should be stored together to facilitate statistical analysis. Moreover, 31.1% of users noted that selected information from the data collection questionnaire of each record should be stored to avoid unnecessary redundancies, complexities and to minimize storage space.

4.4.1.8. Types of reports generated

During the survey period it was noted that wide variety of reports are generated from the collected data. The response obtained reveals that the following reports are usually generated from the collected data.

Table 4.11 **Types of reports generated**

Types of reports	Frequency	Percentage
1. Health status statistics	5	11.1
2. Change in the health status	8	17.8
3. Health needs/ Health problems assessment	15	33.3
4. 2 & 3	3	6.7
5. 1, 2 and 3	9	20
6. 1 & 3	2	4.4
7. Missing	3	6.7
Total	45	100

As has been shown in table 4.13, 33.3% of the total respondents mentioned health problems assessment report as the main type of report that can be generated from the community health data followed by change in the health status statistics report.

4.4.1.9. **Computing Skills of Users**

Knowledge about the computing skills of users is an important input for the system to be designed. The survey result shows that 31.1% of users are computer literate and the remaining 66.7% have no skills in computing and 2% respondents failed to provide their response. Further inquiry was made to those users who have some skills in computing to mention the type of software packages they are familiar with. Table 4.12 summarizes the response obtained.

Table 4.12. **Types of software packages users are familiar with.**

Types of software packages	Frequency	percentage
1. Word processing packages	5	11.1
2. SPSS/PC+	-	-
3. DBMS	-	-
4. SAS	-	-
5. 1&2	8	17.8
6. 1, 2 & 3	1	2.2
Total	14	31.1

By and large, there is high computer illiteracy among the faculty members and senior students.

4.5. **Discussion**

The main reasons users present for their failure to utilize the information available at the national health information unit is the fact that the routinely collected information do not usually satisfy their immediate needs. Besides, lack of the accuracy and reliability of the information created distrust and reluctance to use it for planning, decision making as well as research. As opposed to this fact, in this study, it was found out that 97.8% of the total respondents indicated that the community health information generated by CBTP is useful for their research and health care activities.

The survey result reveals that most users have not used the existing community health information. The reasons users forwarded include : lack of awareness about the availability

and organization of the information, lack of policy concerning the access and use of information, and ease of retrieval.

To enhance the existing system, users suggested among other things, the following improvements :

- change in the user interface.
- change in the storage and retrieval system.
- change in the hardware and software currently used.

In order to validate the response obtained, efforts were made to address the same issue from different perspectives. For instance, 33.3% of the total respondents pointed out CBE coordinating office as their sources of information. On the other hand, 35.6% of the total respondents indicated that they have used the information available at the CBE office. Lastly, 37.7% of respondents mentioned that they have used the information available in reports, raw data or both. The disparity among these response is considered to be insignificant. This is because, only one or two respondents failed to respond consistently. The underlying purpose of these three questions was just to know the extent of use of the existing information.

Discussion were held with selected higher officials at the Zonal health department. As has been mentioned earlier, structured type of interview guide was used to collect the responses of the officials. The interview questions were prepared in light of addressing the following points:

- Sources of health information.
- The purpose for which users require health information.
- The degree of use of health information.
- Problems in the existing system.
- Awareness of users about the community health information of the CBE program.

The sources of information most users under this category mentioned are the following:

- reports of health facilities such as Hospitals, Health Centers, CHAs etc.
- statistics unit of the health department.
- by conducting survey.

Concerning the frequency of use of information, all respondents stated that they frequently use the available information at the Zonal health department. However, they indicated that they are dissatisfied with the available information. Some of the purposes for which user require health information are the following :

- decision making.
- planning.
- to organize intervention programs.
- to identify the health problems in the zone.

The major problems users pointed out regarding health information are:

- The accuracy and reliability of the data.
- Lack of organization and summary of the data.
- Problems in accessing the required information from manual forms and files.

Most users accorded that the community health information available at the CBE coordinating office can be used for planning and intervention of primary health care programs. However, they failed to use the data because of lack of coordination and regular access to the data.

By and large, users in the institute require community health information predominately for research and academic exercises. Since they are partly engaged in the provision of health care services in the zone, they need information to identify the pressing health problems of the community they would serve. Moreover, the information generated from the communities enables them to prioritize the intervention program to be launched with the involvement of the community. To satisfy their information needs, users in the institute have specified their information requirements as indicated in table 4.10. Users at the Zonal health department stated that they need community health information for the management and provision of health services. Particularly, they need information to identify the health problcms in the zone as well as for planning and decision making.

4.6. **Resources available**

Presently, the data processing center has a room furnished with different types of shelves and file cabinets for maintaining raw data. Besides, there are different kinds of file folders used to handle reports. There are also two micro computers dedicated to community health data storage and retrieval. In addition, these computers are also used to carry out duties such as scheduling CBE programs and other word processing and data base management activities. The main activities accomplished in the unit are data entry and preliminary analysis which is usually simple manipulation of data.

The unit has two data encoders hired on a contractual basis to regularly enter data into computer using SPSSPC software packages and accomplish some of the tasks of the office such as scheduling and facilitating the field works of the CBE program. They have good knowledge of SPSSPC+ and some database management software packages. Besides, statisticians from the Biostatistics unit of the institute are a times consulted to supervise the tasks of data editing and analysis.

4.7. **Future Plan**

During the time of discussion, the coordinator of the CBE program disclosed that there is a plan to strengthen and upgrade the data processing center in order to utilize the data for different purposes. The scenarios the coordinator of the CBE program mentioned concerning the utilization and organization of the data processing unit are the following:-

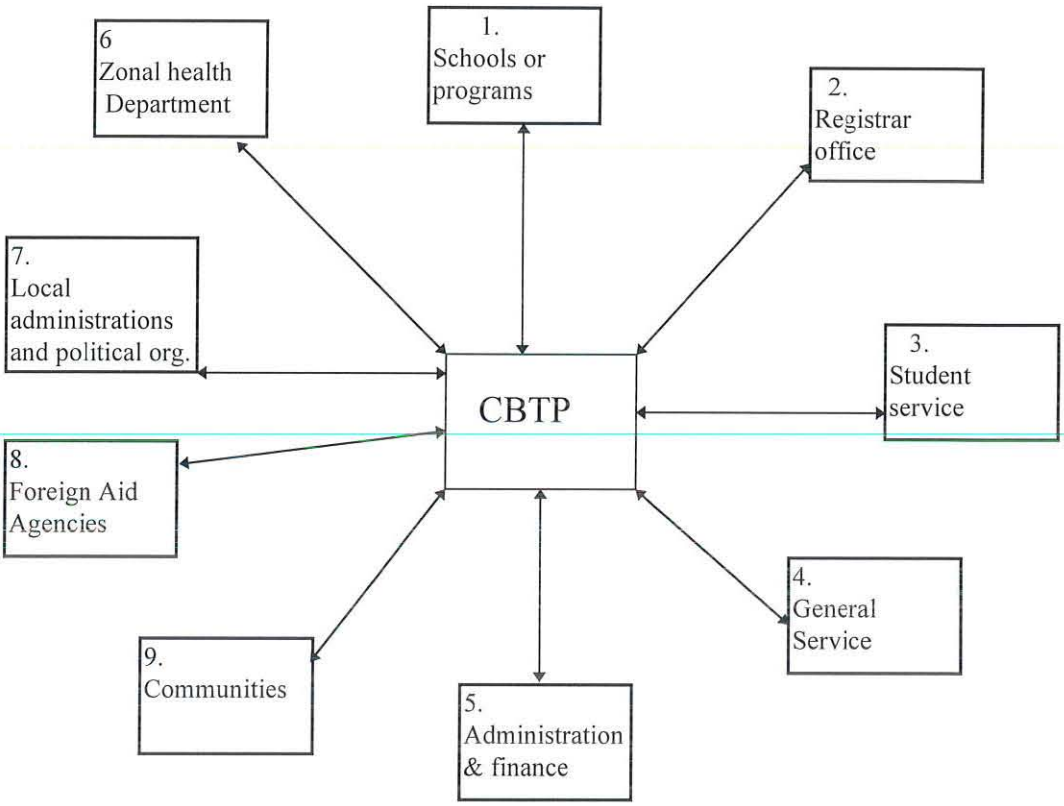
- Intensive utilization of the data for the production of sustainable and regular publications.
- Preparation of health indicators of the zone based on the data. This is planned to be achieved through publications such as leaf lets.
- Facilitating students research activities.
- Production of health education materials and health profiles of the zone using the data.

To undertake the aforementioned activities, the coordinator stated that additional hardware are planned to be acquired. However, there is no plan to change the software package currently used to handle the data.

4.8. Flow of Information to and from the System

Community based educational program calls for the active involvement and interaction of the communities, local administrations and political organizations in the learning, research, and health care services. Without smooth interrelationship with all the concerned bodies, it is impossible to effectively run the program. Hence, the CBTP coordinating office establishes and maintains sound relationship with different departments and sectors both within the institute and with organizations and communities outside the institute. The interactions and communications the CBTP coordinating office undertakes is shown in figure 4.9. The figure is drawn referring the correspondences made between the CBTP coordinating office and the mentioned entities over the past three years. Some of the interactions are made directly with the data processing unit without the need to passing through the CBTP coordinating office (refer figure 4.3 for the internal organization of CBE coordinating office).

Figure 4.9. Relationships CBTP coordinating office forms.



The entities mentioned from #1-5 on figure 4.9 are sections or departments within the institute. In the first place, Schools supply students, team leaders and supervisors to the CBTP Programme. After receiving lists of students and supervisors the CPTP coordinating office forms different teams and assigns each team to different communities. At the end of each phase, the CBTP coordinating office sends grade reports to schools and registrar office.

The student service department supplies meals and other needed facilities to students during their stay in the field work. The general service department provide transportation and other logistics services such as purchase of the necessary materials for the program. The

administration and finance division provides the overall administrative and finance support by hiring the necessary employees when the need arises and settling the financial claims.

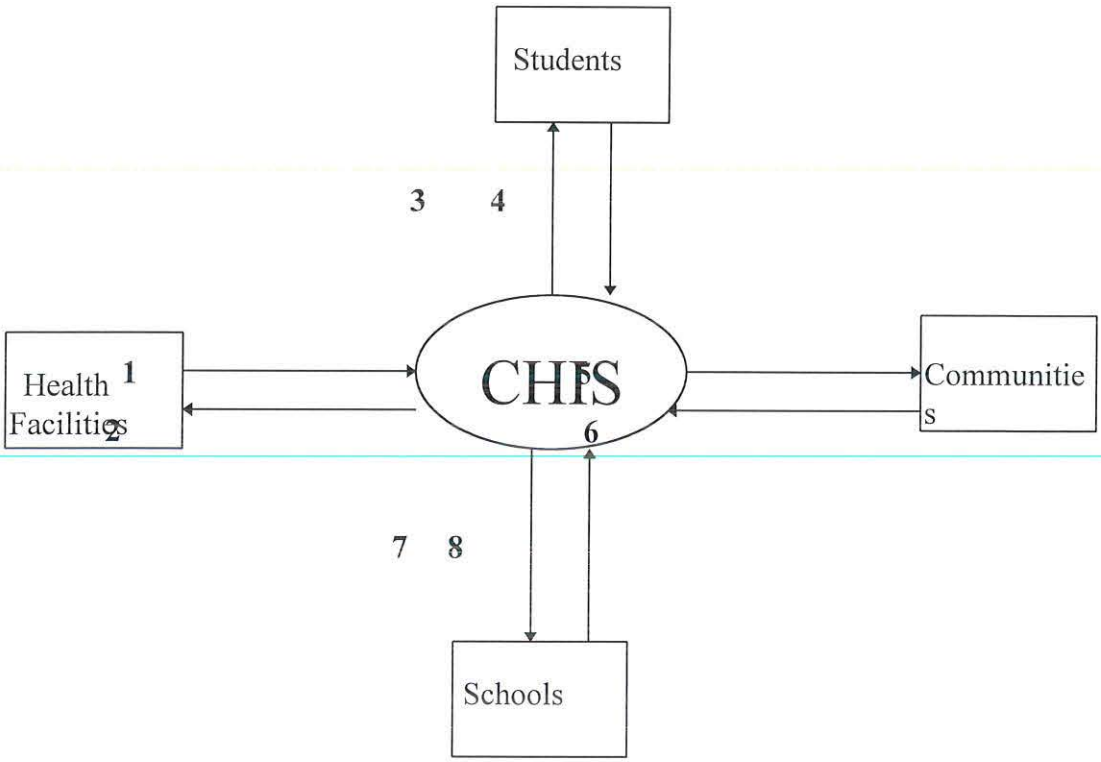
The Zonal health department facilities the utilization of health facilities in the zone for the training purposes. The local administration and political organizations are notified for the deployment of students in the community thereby the necessary backing and security services are obtained when the need arises. Communities in the zone are the subjects of the training program and sources of information. Interactions and discussions are made with community leaders concerning the training program to be conducted within the community and about the involvement of communities in the intervention programs. The overseas organizations like the Irish Aid office to Ethiopia plays a pivotal role in the endeavors of conducting the community based training program and community intervention activities undertaken in the communities. Currently, the Irish government finances the entire program.

Generally, the relationships maintained with some of the above mentioned bodies or external entities are close and frequent. To facilitate the mode of communication with these organizations, standardized letters and forms are developed.

4.8.1. Context Diagram

Davis (1994) stated that a context diagram documents the system's boundaries by highlighting its sources and destinations. In other words, a context diagram documents the system's boundaries. Sources and destinations usually lie outside the systems boundary. This is because the system has no control over the external entities. Fig 4.10 shows the context diagram of the Community Health Information System (CHIS). A context diagram is depicted as a single process to represent the whole community health information system.

Figure 4.10. Context Diagram of Community Health Information System.



The external entities that are represented by a rectangle serves as a source of data for the system. Besides, the external entities receives the output generated from the system. Thus, usually the communication is a two way-process. Figure 4.10 denotes the four external entities identified in the community health information system. These are Students, Communities, Health facilities, and Schools. Health facilities stand for health centers, clinics and hospitals in the zone from which health service data are generated. Communities serves as a class room or laboratory for students and hence various health and health related data are collected from the communities and the report generated are sent back to the communities in view of creating an awareness and invoke corrective actions to be taken.

Schools here refers to elementary and kindergarten where school health survey is conducted. Students stand for trainee of the institute drawn from different departments or schools of the institute who actively engaged in the process of collection, analysis, reporting and follow up activities. Furthermore, at the end of each phase, they evaluate the training program they have gone through. The table below shows the major flow of information in between the mentioned entities and the system (CHIS).

Table 4.13. **Major flow of information between entities**.

Data flow number	**Types of Data/Information**	**Sources**	**Destination**
1	Number of patients visited the health facilities. The ten most common diseases diagnosed. Health education offered. MCH services offered. School health services offered. Epidemic control activity. Communicable diseases. Environmental health activities. Diagnostic activities.	Health facilities.	CHIS
2	Health service statistics report.	CHIS	Health facilities
3	Student research service	CHIS	Students
4	Program evaluation	Students	CHIS
5	Summarized reports	CHIS	Communities

Table 4.13 Continued

6	Socio economic and demographic. Environmental health. Diarrhea Morbidity and treatment. Nutrition. MCH and Family Planning. EPI Parasitology.	Communities	CHIS
7	Summarized reports on school children health status.	CHIS	SCHOOLS
8	School children health: General appearance, eye, hearing, dental, chest, heart, abdomen, skin, extremities.	Schools	CHIS

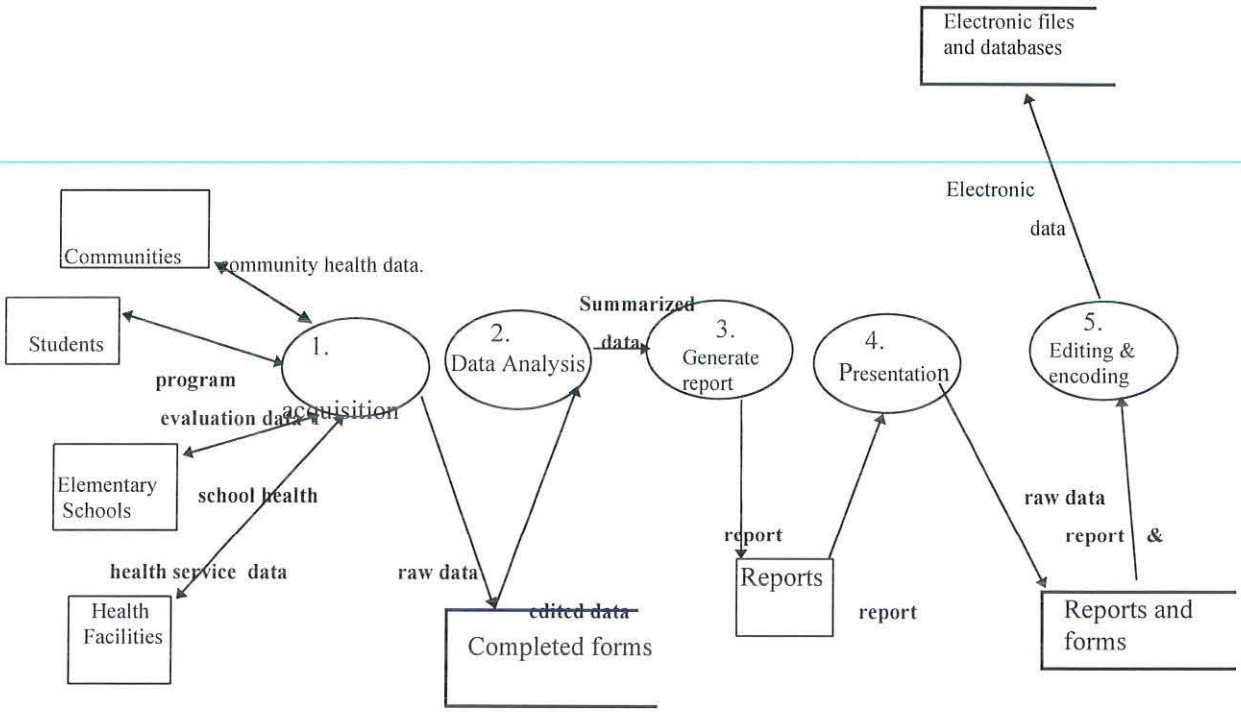
The data flow mentioned in Table 4.14 is too general. It would be difficult to present detailed illustrations on each data flow at this juncture. In the systems design section, i.e. chapter five, detailed analysis will be made on a selected types of information for the design of prototype databases.

4.8.2. **Overview Diagram.**

As a logical modeling tool, Data Flow Diagram (DFD) shows what the system does. However, in this context, DFD does not show how a system actually accomplish activities. The data flow diagram brings together data and processes. It depicts what happens to the data as it passes through certain processes. In the course of conducting community based training program, relevant health and health related data are mainly collected from communities, schools , and health institutions. Analysis is made on the data and the findings are usually

presented on a regularly organized symposium by CBTP coordinating office. Up to this point the duties are performed for academic exercises. Finally, the reports generated along with the raw data are submitted to the data processing unit. Thereafter, editing and electronically encoding the data for future use takes place. Figures 4.11 shows the described process.

Figure 4.11 **Overview diagram**



- **Data acquisition**

There is a strong assumption that health care service can not stand on its own. Rather it affects and being affected by different factors. Taking this into account, socio demographic, environmental and other health related data are collected from communities. Moreover, health service data are collected from some of health facilities in the zone. This is envisaged at enabling students evaluate the activities performed by health care institutions as compared to the capacities of each health institution in terms of manpower and other resources. Besides,

there is an opportunity for students to pinpoint the pressing health problems and the dominant types of diseases diagnosed and treated in each health facilities.

- **Data analysis**

This involves verifying, editing , processing, interpreting and summarizing the data. In this activities leaders of each team and supervisors are involved. At this stage, the data are analyzed manually by tallying the response obtained under each question. The overall process of data analysis are shown using level two data flow diagram presented in Fig 4.11

- **Report generation**

After the raw data have been analyzed, the result are summarized and tabulated. Each team prepares a preliminary report and present it for review and discussion with supervisors. After the necessary amendments are made, the final draft of a formal report is prepared. While preparing the formal report, literature and other similar studies are referred for validation.

- **Presentation**

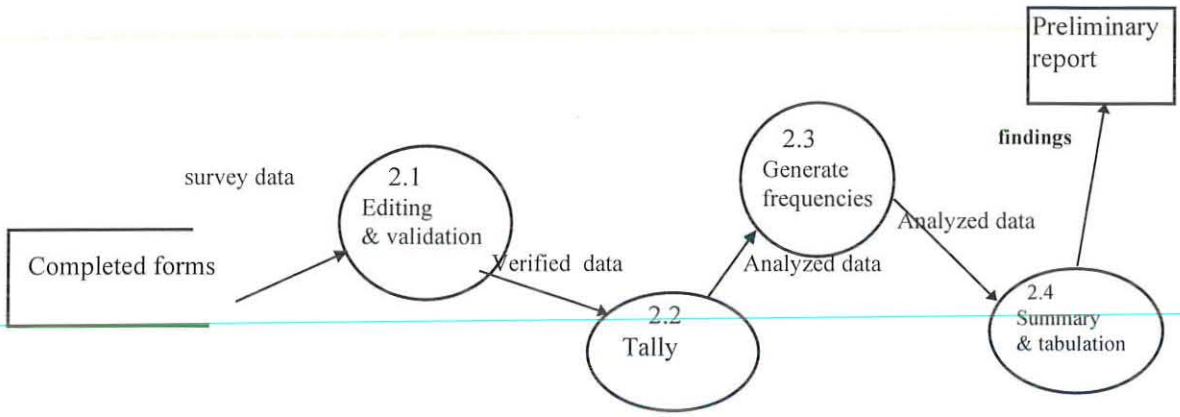
Copies of the formal reports are disseminated to all concerned parties in the institute and outside particularly to communities from which data are generated. At last, the findings are presented on a regularly organized symposium at the end of each CBTP attachment.

- **Encoding and editing**

At the end of the symposium, students submit the report and the raw data to the CBTP coordinating office. There after the data and reports are taken to the data processing unit

where they are shelved and filed. In view of preserving the data from loss, an attempt is being made to enter the data into a computer using SPSSPC software package.

Figure 4.12. Process 2. Data analysis



4.9. Volume of Data

The community based training program was emphasized on medical students. However, the experience gained from the medical science students necessitates the expansion of the program towards other schools and programs in the institute. Presently, the program started to incorporate diploma and post basic degree program students. Medical students involve in the program starting from the first year up to the end of the fifth year of training. Students are supposed to stay in communities for four weeks per academic year except during the first attachment which lasts one week. Table 4.14. summarizes the volume of data collected by students during one academic year CBTP attachments.

Table 4.14 **Volume of data**

SN	Disciplines	Year of study	Types of Study	Total # of formats filled
1	Medical Science	I	General information, Mapping and zoning	100
	" "	II	Socio demographic characteristics	1000
	" "	III	Environmental health survey, Perceived morbidity, Parasitology, Nutrition, Health	2000
	" "	IV	record survey.	1200
	" "	V	EPI, MCH/Family Planning, Diarrhea	1500
			Evaluation on health: EPI, Environmental, MCH/Family planning, Diarrhea, Nutrition	
2	Post basic Health officers	I	Mapping and numbering, General information, Socio demographic characteristics, Environmental health, Perceived morbidity	1200
	" "	II	Nutrition, MCH/ Family planning, EPI, Health record survey,	400
3	Post basic Nursing	II	Socio demographic characteristics, Environmental health survey, MCH/Family planning	500
4	All diploma program students except pharmacy	II	Socio demographic characteristics, Environmental health survey, MCH/Family planning, Parasitology.	1200
			Total	9100

Source: Extracted from files at the data processing unit, JIHS.

Excluding post basic students of environmental health and laboratory technology as well as pharmacy diploma program students, the total volume of data collected annually in terms of questionnaire is 9100. That is, annually at least 9,100 formats are filled. When we convert this figure in terms of Bytes 145.6 Megabytes hard disk space is needed to store the data.

4.10. Sample Files

Towards the beginning of this chapter in section 4.5.1.7, it was mentioned that of all the collected data described in table 4.9, 18000 socio demographic and 13,200 Environmental health records are entered into two 486 processor 8 Megabyte Ram computers. Following are lists of some of the files.

Table 4.15 List of Sample files.

SN	Files in PC #1	Description	Files in PC #2	Description
1	DEMOS	Demographic and socio economic	MORBENU.DAT	Morbidity & environmental data
2	CBTPPEV	CBTP Evaluation data	DIARMO1.DAT	Diarrhea morbidity data1
3	MCH	Mother Child Handling data	EDITMOE4.DAT	Edited Morbidity data
4	SUPERPE	Supervisors evaluation data	EVAL.DAT	Evaluation data
5	Y I EV	Year I program evaluation data	DIARAMO2.DAT	Diarrhea morbidity data2
6	MCH2	Mother & Child health 2 data	EVA.DAT	CBTP evaluation data
7	EVAL	CBTP Evaluation data	MOR.DAT	Morbidity data
8	Y4MCH	Year four Mother and & child	DIARMO3.DAT	Diarrhea morbidity data3
9	DIAMORB	Diarrhea morbidity data	CBTPYEH2.SYS	CPTP evaluation year2

Source: Data Processing unit CBTP coordinating office.

4.11. Automation Boundary

The data flow diagram presented in figure 4.11 section 4.8.1, denotes five major functions or processes in the community health information system. Process 1-4 are carried out mainly by students as an academic exercises. To maintain the objectives and philosophy of CBE, this

processes can remain in the existing state. The major enhancement and improvements to be made should focus on process number five and beyond.

4.12. **Requirement Specification**

Davis (1994) stated that analysis ends with a detailed set of requirement specifications that clearly defines what the system must do. The survey result connotes that there is a gap between the objectives envisaged and the actual performance of the existing system. The overwhelming majority of the data collected for the past 14 years are still in manual files and completed questionnaires. The problem inherent in the system makes it difficult the utilization of the available data for the envisaged purposes of training, research, and health care services. The major flaws identified in the system are:

- The activities carried out in the system are basically manual with a recent endeavor witnessed to computerize the system. However, rigorous analysis and investigation have not been conducted as to the selection and acquisition of the appropriate hardware and software to support the system.
- The existing system has not been equipped with the necessary IT and manpower to offer efficient and sustainable information services.
- Lack of standardized formats for the collection of community health data. For instance, to conduct socio demographic and environmental health studies, there are multiple data collection formats used by students of different disciplines participating in the CBTP.
- As table 4.15 shows there is duplication of the data in different files.

In view of enhancing the existing system and shed light on the appropriate and feasible system to be developed in the future, the following requirements are specified.

4.12.1. **Input/out put Requirements**

As has been mentioned above, there are no standardized formats developed for data collection. The input formats eventually affects the processing and the output to be generated. Therefore, there is a need for standardized input formats.

The survey result and the various discussions made with officials and technical personnel of the data processing unit reveal that various reports are generated from the community health data. Hence, the new system is expected to produce the reports mentioned in chapter five section 5.3.3.

Concerning the output formats, discussion was made with a statistician who supervises the activities of data processing. He stated that there is no standard format developed for the summary of output. This is because various studies are conducted with different objectives. Thus, there is no need of having standard output formats as different studies require different output formats. Therefore, to suit to the stated purposes, the system to be developed required to enable the generation of outputs in a flexible and variety of formats. For various data are collected from the community during a certain period of time, the new system expected to provide search facilities at least using fields or search terms like "study area" and "year of study".

4.12.2. Performance Requirements

One of the problem that discouraged users from using the system was the longer time required to go through manual forms and files to extract the needed information. From the volume of data collected within one year, one can judge how far the data processing unit is overwhelmed by piles of forms and reports generated for the past fourteen years. Thus, properly introduced computer system will reduce the time required to search and retrieve the needed information.

4.12.3. Efficiency Requirements

A considerable financial and material resources are invested each year to generate community health data and to run community based educational program. Besides, resources are being deployed to run the existing data processing unit which involves mainly manual and paper work activities. Properly introduced computer system is a remedy for activities of data processing unit which mainly handles structured types of information. Thus, there is a possibility to enhance the efficiency of the current system.

CHAPTER FIVE

5.0 DESIGN OF THE PROPOSED SYSTEM

In chapter four attempt was made to enlist systems requirements. As discussed in the same chapter section 4.12, requirements of users are the deriving force behind the design of a new system. Before the analyst begins the process of design, the problems to be solved or objectives to be satisfied by the new system must be established (Hawryskiewyez 1991).

Design is a problem solving process and it investigates ways of meeting objectives.

The challenge in systems design is that it is difficult to come up with "correct design" and "standard solution" from which one can select a good design for any system. Generally, a good design depends on the situation of a particular system. What is good for one may be bad for another. Hence, design requires creativity and participation of users to some extent in order to come up with a new system that is acceptable to users and easier to implement.

5.1. **Objectives of the new system**

In chapter one, section 1.4 objectives of the study, the general objectives to be meet by the new system has been discussed. Particularly, the prime objectives of the design is to create a prototype system that rectifies the problem in the existing system and meet the users requirements. By and large, the design is aimed at achieving the following specific objectives :

1. to provide easier search and retrieval facilities.
2. to avoid duplicate files which the current system is maintaining.

3. to enable the storage and retrieval of longitudinal and time series data.
4. to reduce the manual activities and time required for search and retrieval of information.
5. to provide user- friendly interface that serves both novice and expert users.
6. to provide control facilities.

5.2. Design components

Design consists of the following components : inputs, functions, databases, outputs, controls, technology, and user interfaces. For clarity and simplicity, the entire design process has been subdivided into two major parts: logical and physical design. The design components mentioned above will be dealt with in both stages of design.

5.3. Major functions

The system, among other things, accomplishes the following major functions.

5.3.1. Data entry and storage

Electronic forms and tables are designed to facilitate data entry. Particularly, the forms designed will be interactive that enable users to browse and view related and detailed information kept in other forms and tables on click of button on the current form. Problems created due to the absence of standardized data collecting forms have been recognized by the officials of the CBE programme. During the survey the coordinator of the CBTP program stated that the issue about designing standard data collecting forms will be addressed on the CBE program workshops planned to be organized in the near future. The socio demographic study data collecting form indicated in the appendix B has been enhanced by incorporating some data elements identified during the analysis. Sample of the physically designed data entry form has been presented in section 5.8.3.

5.3.2. Data access and analysis

The system provides interactive interfaces to end users to browse and search the databases. However, for security purpose, the system will be password protected and the tasks of data entry, editing, and updating will be accomplished only by authorized personnel.

5.3.3. Output generation

Different types of reports can be generated from the databases instantly based on the interest of users. When the entire databases which the system accommodates are developed, it is possible to generate various outputs in health and related issues of the community. To mention some of the reports:

- population size summary report.
- family relationship to the head of the house hold.
- population by marital status.
- population by occupation.
- population by literacy status.
- perceived morbidity within a specified period of time.
- the major types of disease in the zone.

Some of these reports are generated when the entire databases of the system are designed.

5.4 Proposed Databases

There are about ten databases need to be designed in order to give complete community health information. Each database will be made up of several files. Each file will have indexed or linking fields to facilitate searching and retrieval. The major databases to be designed are described as follows:

1. **General community information database.**

General community information is collected when students begin community based training program. The information collected at this level serves as a foundation for the subsequent studies to be conducted in the community. The general community information database should be designed to contain the following information:

- general location of the study community.
- distance of the study community from the institute.
- status of the community (i.e. rural, urban).
- climatic condition.
- description of physical features (topography).
- estimated area.
- total population.
- means of livelihood.
- basic services (education, electric light, health facilities etc.)
- availability of health facilities.
- common community felt health problems.
- communication facilities.
- culture of the community.

2. **Socio demographic database**

Socio demographic study is conducted to generate complete socio demographic information at family level. Following are the contents of this category of information which the database is supposed to maintain:

- identification particulars.
- detail information of family members including (age, sex, religion etc.).
- income.
- vital events (birth or death).
- facilities.

3. **Health services database**

MCH Health facilities are treated as one group of communities. As a result, health service records are gathered from health institutions within the zone. Hence, this gives clear pictures of the prevailing health status of communities within the zone. Files need to be created in order to keep the following sub class of information :

- identification particulars of the health care facilities.
- the ten most common diseases diagnosed (CDD).
- health education services offered.
- mother and child care services offered.
- school health services offered.
- epidemic control activities carried out.
- communicable diseases treated.
- environmental care services offered.

- diagnosed services carried out.

4. **Perceived Morbidity.**

Perceived Morbidity study is conducted to find out the number of family members who are sick during the last two weeks before the survey period. Besides, the treatments made to heal the patient is investigated. To maintain this information, one separated database need to be created.

5. **Nutrition.**

Nutritional situations are one of the determinant factors of the health condition of a community. Mal nutrition is one of the pressing problems which is also responsible for the prevalence of many types of diseases. Nutritional studies are conducted to uncover facts about the type of food items eaten, special food taboos of community and methods of feeding babies are studied. Therefore, to keep this information a separate database is need to be created.

6. **Environmental health**.

The environment is one of the important area required to be investigated for the control of disease agents. Identification of the possible disease agents is the basis for preventive measures to be taken. To achieve this, there is a need for deeper understanding of the community, the people, their life style, culture, attitude towards disease prevention and control. To conduct environmental health studies, the following sets of data are collected which need to be maintained in a separate file :

- housing conditions.

- waste disposal (excreta).
- refuse disposal.
- rodents and insects.
- water supply.

7. **Family planning and Mother and Child Health Care(MCH).**

This information is gathered for mothers of fertile age group 15-44. The study is made to examine thoroughly the family planning practices of the community. Following are the major sub classes of information which should be kept separately.

- identification.
- general information.
- family planning.
- pregnancy and delivery practices.
- child care practices.

8. **School health.**

The health status of the children learning at elementary and kindergarten schools are being studied. Based on the study, the necessary intervention measures are at times taken to curb the health problem before the disease prolonged and pass to the adulthood stage. The contents of the information includes, general appearance, eyes, hearing, dental, chest, heart etc. situations of the children. Separate database need to be created to maintain this category of information.

9. **EPI assessment**

For the prevention of childhood diseases, children below age two are required to be immunized periodically. EPI assessment study is conducted to ensure how far children are fully immunized and free from communicable childhood diseases. The data collected to assess the level of immunization need to be stored separately.

10. **CBTP evaluation.**

At the end of each CBTP attachment, students evaluate the execution of the program. This evaluation serves as a feedback for the CBTP coordinating office. On the basis of this evaluation, appropriate remedial actions are taken. Since CBE is a newly evolving educational method or philosophy, the reactions of students are used as an input for the research being conducted on this educational philosophy. Hence, separate database file is needed to store evaluation data.

5.5 Database Design.

The process of database design involves two stages: logical and physical design. There are different approaches or techniques to database design. In this study, Entity-Relationship Modeling (ERM) and Relational Data Analysis (RDA) are used. The main distinction between them is that ERM takes a top down approach to data modeling. That is, it begins by taking a wide view of the subject under consideration, and progressively adding levels of details. Relational data analysis takes a bottom up approach, starting with a close examination of the raw data and progressing towards a general design.

5.5.1. Entity-relationship modeling.

ERM is a graphical method of data modeling. It results in the production of an entity-relationship diagram (ERD) which serves as a conceptual model for the database. The conceptual model is described in terms of logical components of known as entities, attributes, and relationships. Entities are the objects in which one is interested in and about which data are held. They may be tangible object like patient and physician or intangible objects such as disease and treatments. Eventually, when the database is implemented, each entity will be represented by a table in the database. At the same time, each attribute is represented by a field in relational table.

Because of time and resource limitations, it is difficult to design a database for all the ten categories of community health information enumerated under section 5.4. The survey result reveals that about 48% of the total users ranked first and 71.1% ranked 1-3, the socio demographic information. On the basis of this response detailed analysis and design of the socio demographic database have been carried out. Figure 5.1 shows the E-R diagram of the socio- demographic database. To identify the entities and their relationships illustrated on the diagram, reports and "CBE/CBTP/HOPDEM" data collection form attached at the appendix B were thoroughly analyzed. Following is list of entities and unnormalized data structures.

Entity : Identification Particulars

Data elements: Region
Awraja
Woreda
Peasant Association
Town
Kefetegna
Kebele
Zone
House No

Entity : Teenagers and adults

Data elements: Marital Status
Single
Married
Widowed
Divorced

Literacy Status
Highest grade completed

Occupational status
Farmer
Government employee
Soldier
Maid
Student
Shepherd
Merchant
Black Smith
Potter
Unemployed
Bar tender
Carpenter
Tella seller
Weaver
Other

Entity : Family Members

Data element: Full Name of household members
Relation to the house hold
Head
Spouse
Son/daughter
Other relatives
Non relatives
Sex
Age
Religion

Entity: Vital Events

Data elements: Births
Sex
Age
Death
Sex
Age

Entity : Means of communication

Data element : Radio set
Private TV
Private Telephone
Public Telephone
Postal Service

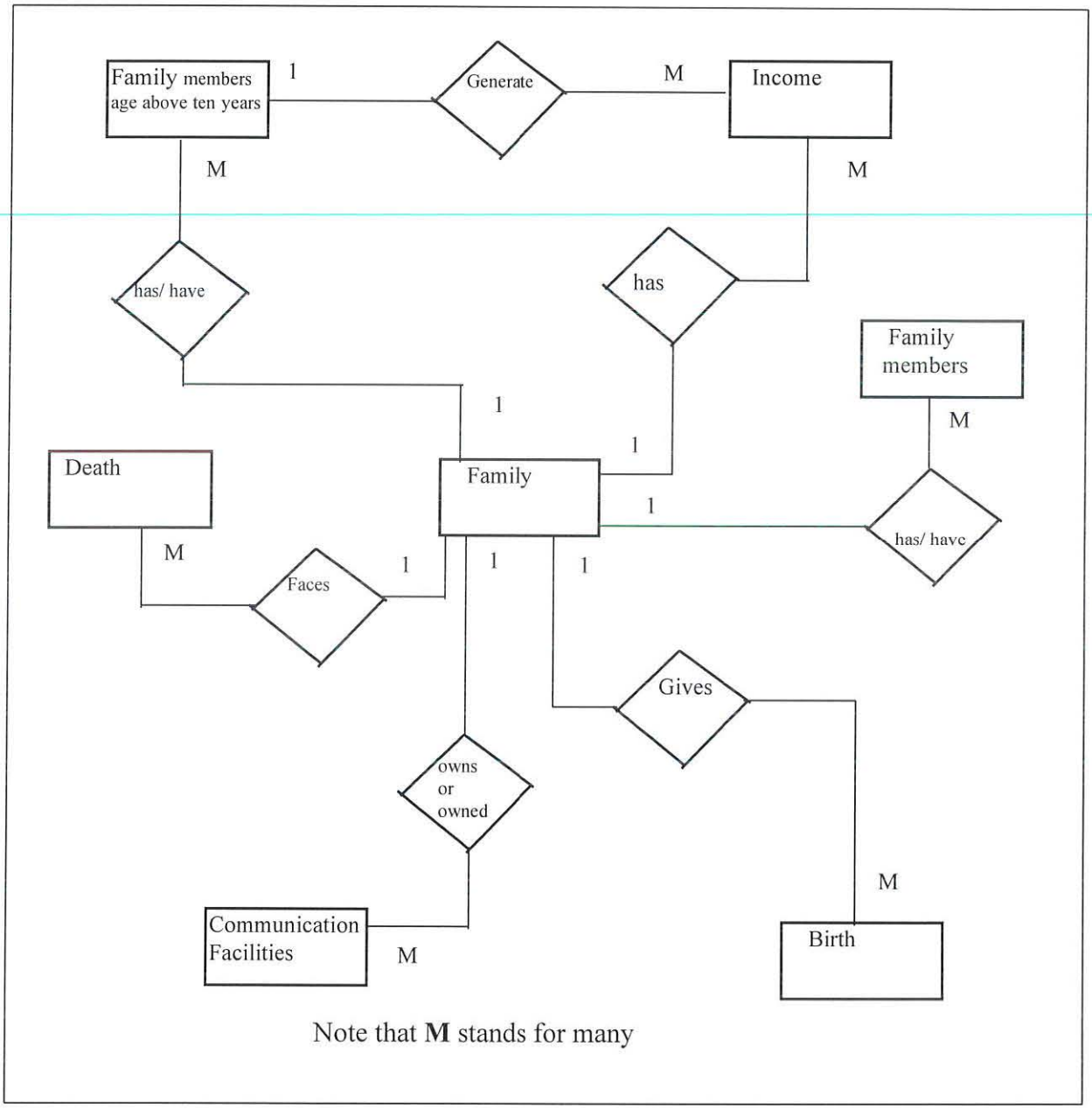
Entity : Income
Average annual income
Additional income

Some date elements which are not included in the existing data collection form however found to be important are identified in the system analysis phase and included. For instance, for the sake of clarity the entity "Identification Particulars", has been changed to family identification and data element such as Household Id and Community status have been included.

Likewise, Individual code is included in the data structure of family members to identify details of each family members. The entity named "vital statistics" is divided into two

independent entities called "Birth" and "Death". Data element "cause" is added to better describe the entity "Death" These data elements are further refined using techniques called data analysis and the results are presented in section 5.5.2.

Figure 5.1 **E-R Diagram of the socio demographic database.**



On figure 5.1, the rectangular boxes denote entities and the diamond indicate the relationship established between entities. The cardinality, type of relationship, between most of the entities

is one to many. That is, one occurrence of the first entity class is associated with many occurrences of the second. On the other hand, each occurrence of the second is associated with one or more occurrence of the first.

As can be seen from the figure all the six entities have relations with entity "Family". Family is the root node when it comes to the hierarchical database structure. Following is the explanation of the entities and the relationships established between entities.

- Family has many sources of income in a specified period of time and a given income belongs to only one or more family.
- A given family may have many family members. However, one family member has only one or more family within a given period of time.
- In a family many births may occur within a one year period of time. A given birth occurs to one or more family.
- A given family may owns many communication facilities. A given communication facility may belong to one or more families.
- A given family may face many death incidents within one year period of time. An incidence of death may happen to one or more family and family members.
- A family members 10 years and above may generate many income annually. Conversely, one income belongs to one or more family members.

5.5.2. Relational Data Analysis

As indicated in section 5.1 one output of the new logical design is the E-R model of the new system. At the stage of design, the E-R model is converted to a database. This conversion process usually proceeds through two steps. The first is to undertake rigorous analysis of the

data. The underlying intent here is to remove any redundancies from the data structure. This is achieved by organizing the data items into a set of organized records so that unwanted redundancies are removed. Eventually, this process helps to avoid update anomalies such as problems associated with modifying, inserting and deleting of records maintained in a database. Usually, this process of removing redundancies is known as normalization.

Davis (1994) stated that data normalization is a technique for designing easy-to-maintain efficient, logical data structures. Normalization is a multi stage process. Most analysts recommend three stages of normalization. In the first stage, attention is laid on removing repeating sets of data elements from data structure. When this is achieved, the data is said to be in the first normal form. In the second stage, the data in the first normal form is further analyzed. Emphasis is laid on those records with concatenated key and any data elements that depends on any part of the key are moved to a new entity. At last, to be in third normal form, each data element in the structure must be the function of the key. That is, each data element in the structure should be entirely dependent on the key. The E-R diagram presented in figure 5.1 is drawn after the data have gone through the necessary data normalization stages. Following is the list of normalized data structures.

Table 5.1 **Normalized data structure**

ENTITIES	DATA ELEMENTS
FAMILY	HOUSEHOLD ID , RESIDENCE_ AREA, STATUS, ZONE, KEFETENA, KEBELE, HOUSE_NO, FAMILY_SIZE.
FAMILY MEMBERS	HOUSEHOLD_ID, INDIVIDUAL_CODE, MARITAL_STATUS, OCCUPATION, LITERACY_STATUS.
DEATH	HOUSEHOLD_ID, AGE, SEX ,CAUSE.
BIRTH	HOUSEHOLD_ID, INDIVIDUAL_CODE, AGE, SEX.
FAMILY MEMBERS 10 YEARS AND ABOVE	HOUSEHOLD_ID, INDIVIDUAL_CODE, MARITAL_STATUS, OCCUPATION, LITERACY_STATUS.
COMMUNICATION FACILITIES	HOUSEHOLD_ID, RADIO, TV, TELEPHONE, POSTAL_SERVICE, NEWS_PAPERS.
INCOME	HOUSEHOLD_ID, PERMANENT, ADDITIONAL, TOTAL.

Entities are denoted by bold letters. The data elements underlined are primary and foreign keys linking one entity with another. According to shepherd (1990) as cited by (Mohammed 1997, 92), it is a general convention to capitalize the names of entities and attributes ,and use underscore between words.

5.6 Data Dictionary

A data dictionary is a collection of data about data (Davis 1994, 81). Its purpose is to rigorously define each and every data element, data structure, and data transform. While preparing a data dictionary, the first step is to compile a list of fields (data elements). The next step is to define each data element in order to indicate the element's purpose and clearly distinguish it from the system's other data elements.

Defining the data elements of the entire system under study will leads to voluminous report. To cope up with the page limitation of this thesis, the data dictionary for the socio demographic database have been compiled. The data dictionary developed contains the name, type, size, and short description of data elements.

Table 5.2. **data dictionary**

Name of Data elements	Type	Size	Description
Household_ID	Text	20	This a code assigned to identify one family from the other.
Residence_area	Text	50	It stands for the name of the study area or community from which data are being collected
Date	Date/time	8	The date on which the study (survey) is collected
Family_size	Number	integer	The number of people living together in a given family or household.
Zone	Text	50	The name of the zone in which the family is found
Kefetegna	Text	10	Sub class of a town in which the family is found
Status	Text	100	Identifies whether the study area is urban or rural
Kebele	Text	10	Lower level town and rural administration in which the family is found.

Table 5.2 Continued

Individual_code	Text	20	Unique code assigned to identify the records of each family members.
Marital_status	Text	20	Describe whether the family member is single, widowed, married or divorced.
Occupation	Text	30	The economic activity in which a family member is engaged in to earn for living.
Literacy_status	Text	30	The educational level of a family member.
Age	Number	integer	The age of a family member in years months from the time of birth up to the study period.
Causes	Text	50	The reasons or factors for the death of a given a given family member.
Radio	Text	10	Communication media through voice.
Television	Text	10	Audio visual communication media.
Postal_ service	Text	10	Service for the exchange of message through envelops.
Newspapers	Text	10	Periodicals containing fresh new or information.
Permanent_income	Number	Integer	regular earning a given family generates within a year or twelve months.
Additional_income .	Number	integer	Extraordinary income a family generates beyond the permanent income.
Total	Number	integer	The summation of permanent and additional income

5.7. Process Description

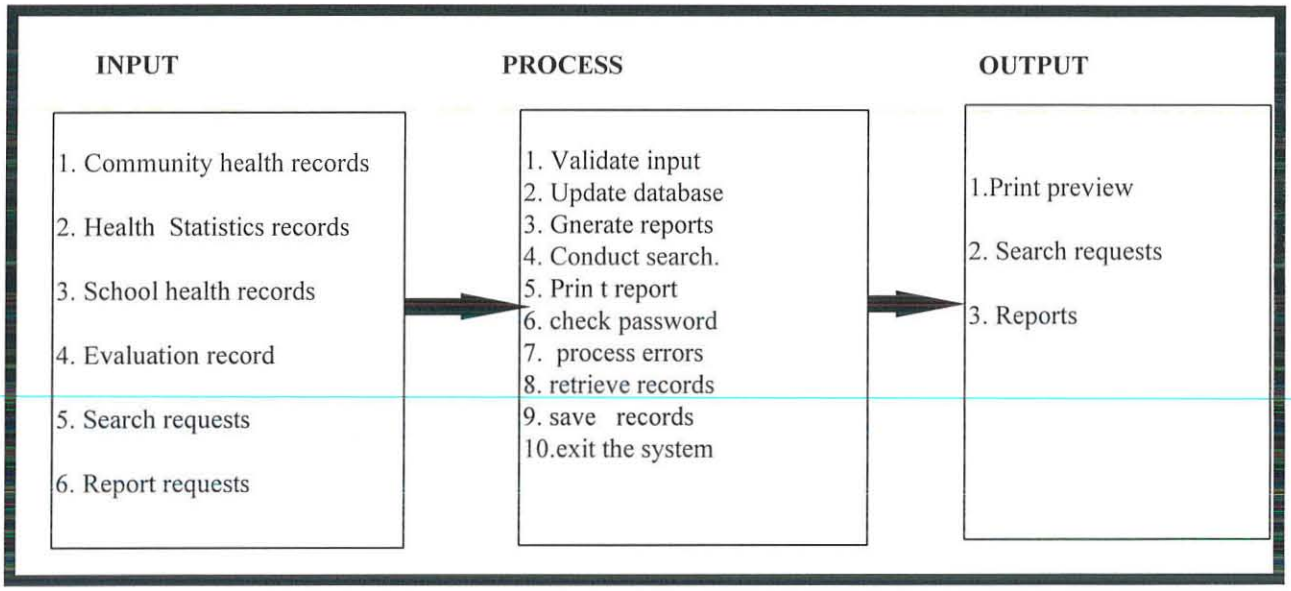
Process is the third component of the system. In the preceding illustrations, attempts have been made to describe and document the two main components : data flows and data structures. Different methods can be used to describe system processes. Some of the methods are used to describe top level processes. There are also methods used to describe detailed processes. Top level processes are usually described using natural language as in the case of

process description in the data flow diagram presented in figure 4.11 and 4.12 in chapter 4 section 4.9.1. The process is usually described by one sentence that states what the process does.

Natural language processes is not usually used to describe processes at detailed levels. This is because low level processes involve detailed computations that must be defined precisely. Natural language descriptions can easily lead to ambiguities (Hawryszkiawycz, 1991). The main techniques proposed for the purpose of documenting detailed level processes are structured English, decision tables, and decision trees. Structured English is a tool for describing procedures. Decision tables and trees are particularly effective for describing policies.

When it comes to the case of this study, there is lack of well- articulated procedures for accomplishing tasks. That is, there are no procedure manuals adhered for the process of data collection, entry and analysis. Thus, an attempt is made to describe the major processes applied on the data to get the needed output. To suit this purpose IPO chart has been chosen. IPO charts are the other alternate tools and techniques for documenting process descriptions. Following is IPO chart that describes the input, process, output description of CHIRS.

Figure 5.2. **IPO Chart**



5.8. Physical Design

In the preceding sections, a logical model was designed. The intent was to design a database model that is independent of the physical implementation of the database. In this section, the logical design will be tested using a particular database management software package. During the relational analysis, entities were converted to relations or tables. These tables designed on paper will be converted into tables and forms in the physical system. The relationship established between entities during the logical design will be implemented in the same manner.

Microsoft Access version 7 has been chosen to implement the database. Microsoft Access is a relational database management software and hence found to be appropriate to test the logical design. Furthermore, it is flexible, user-friendly, and has many self-contained built-in

functions called Macros which enables the development of prototype applications within a shorter period of time.

5.8.1. **Input / Output format design.**

With a large information system serving many users for many different purposes, it is difficult to personalize output (Kendall and Kendall 1991). Nevertheless, it is possible to design output that addresses what many, if not all, users need and prefer. In chapter 4 section 4.12.1 it was indicated that the output generated by the new system need to be flexible to meet different purposes. Besides, the document analysis made on sampled reports prepared by different groups of students denote that there is a defacto report formats pursued for summarizing community health data. On the basis of this finding, standardized reports to be generated by the system are listed in section 5.4.3.

To open a room for flexibility, the files/databases, tables, queries, reports etc. created and maintained by Microsoft Access can be exported to other programs such as Microsoft excel and other statistical packages to perform statistical analysis and generate outputs in graphical formats. Furthermore, the system is supposed to extract data from multiple files or tables in the database.

The quality of system input determines the quality of system output. The input requirement of CHIRS are the data items identified in the existing system. This includes the data items available on the existing forms and reports as well as some additional data items identified during analysis.

5.8.2. Prototype Development

Prototype is a working model of the new system to be developed. Prototype is being used to improve the physical design phase of system development life cycle and to complement the logical design. Usually, it is difficult to create a complete logical model through conducting survey. This is because end users may not fully know and articulate their requirements until they see them implemented.

prototypes are an active, not passive model that end users can see, touch, feel, and experience. Bentley et al (1989) stated that if a picture such as DFD is worth a thousand words, then a working model of a system is worth a thousand pictures. Therefore, the principal purpose of a prototype should be to clarify the systems requirements. Unless, this purpose is not clearly pointed out, prototyping encourages premature or ill-defined short cuts through the system development life cycle.

Due to time constraints, it is difficult to develop application program for the entire system. Indeed, it is undesirable to come up with a complete application for the sake of prototyping. Hence, prototype application is developed for the socio demographic information system which is the sub system of CHIRS. The prototype is envisaged to serve as a means to gather the reactions and suggestions of users thereby further requirement specification will be uncovered which were not evident during the survey period.

5.8.2.1. Data structure

One of the steps in the course of designing a prototype is to define the data structure. The logical data structures presented in table 5.1 are converted into physical data structure. The data elements are extracted from the data dictionary. The physical data structure designed in Microsoft Access is shown in Appendix C

5.8.2.2. User interface design

A user interface refers to those facilities designed in the system in order to enhance the interaction of human being with the computer. The interaction can be direct, for example, a user might access a computer through a screen and key board. On the other hand, Printed reports and forms designed to capture data for subsequent input and indirect user interfaces. Davis (1994) pointed out that the interface can incorporate hardware, software, procedures, and data.

The user interface has two fold functions. It serves as both a connector and a separator. That is, it serves as a mechanism for linking the user to the computer and protecting the computer from the user. While designing the user interface, the skills and training of users and task requirements should be taken into account. CHIRS is designed to be interactive so that users manage to use the system effectively with minimum training. To this end, the user interface of the prototype system is backed by Graphical user interfaces and pointing devices. Command buttons are used to organize the main functions of the system. All the user need to do is to point to the button and click using a mouse.

5.8.2.3. Screen and Forms Design

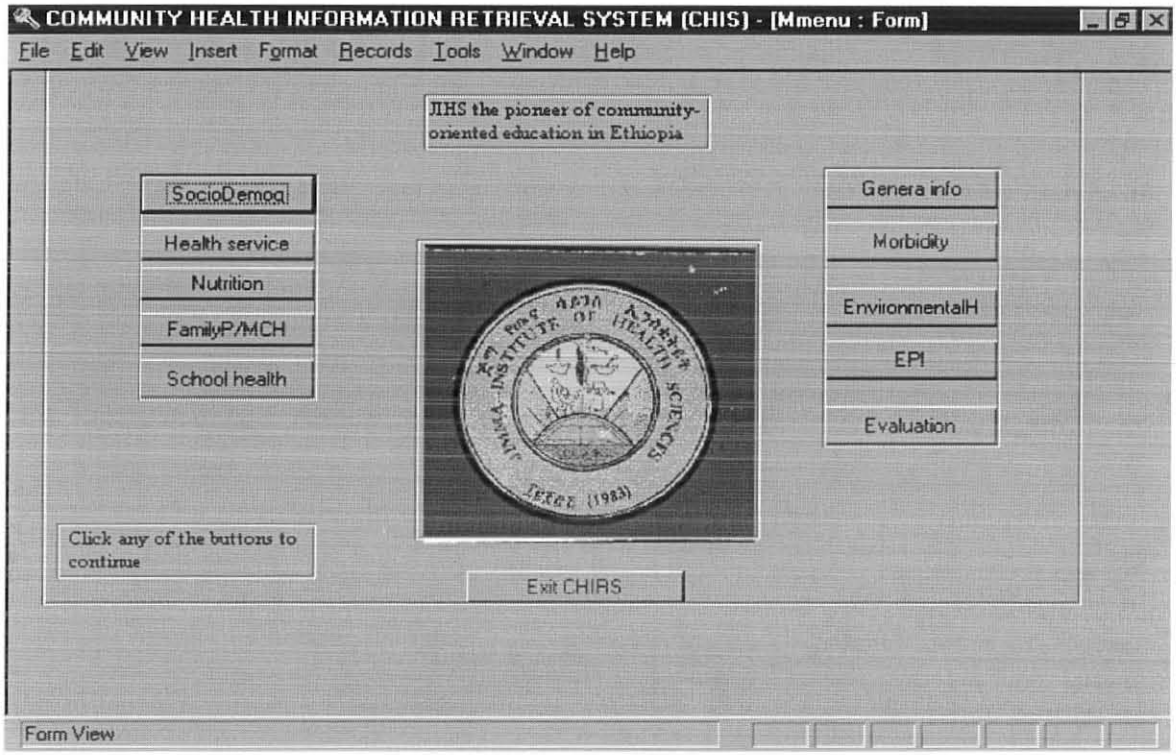
Screens are designed to support user access to the system through a keyboard/display device. Commonly used screen elements include windows, icons, menus and pointers and popular data capture techniques. A screen can be used to display a report or simulate a paper form. Features like color, lines, boxes, shapes, graphics, animation etc. are used to capture the users attention. The screens of CHIRS are designed in consistent display layouts. The background color, command buttons, size etc. are the same as one go through displaying different screens by clicking command buttons placed on each screen. The screen flows of CHIRS are presented in sections 5.9.3 .

Forms are used to capture data. A form image can be displayed on a screen and used as a template for data entry. Forms can be used both as a medium of input or output from a computer-based system. In CHIRS, forms are designed to be interactive and acts as an application interface. On click of buttons on forms, users can open another forms or tables. Besides, record operations and search can be conducted just by clicking command buttons on a form.

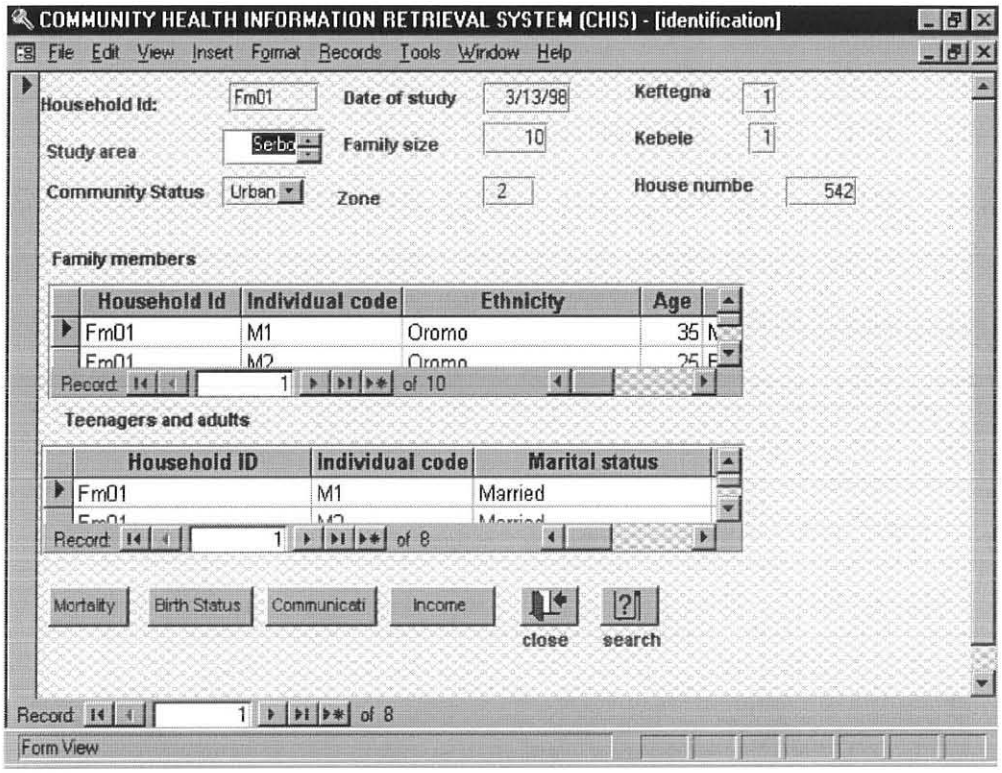
5.8.3. Functions of the Prototype

To activate CHIRS, first one has to run Microsoft Access Application program. When CHIRS is supplied to Microsoft Access, the screen containing the welcome message appears. This screen is displayed for a few seconds and closed on its own without the need to invoke any command or any key stroke. The welcome screen presents the name of the application and the picture of a women lactating her child. The picture connotes that at the family as well as community level women and children are highly suspitable to health problems. Therefore, in

an endeavor to improve the health status of the family, community, and the citizen at large, special attention need to be due to women and children. On close of the welcome screen, the screen presented below is displayed.



This screen displays the emblem of JIHS and contain the list of the major databases of CHIRS and facility to exit from the system. On click of any of the buttons from the list, the system is supposed to direct users to another screen containing sub menus and commands. However, due to time constraint, only the socio demographic database has been developed. When the button with a label "Sociodemo" is clicked, another screen containing sub menus and commands used to manipulate the socio demographic data appears. The buttons presented on this screen accomplish three major functions. These are data entry, reports, and report printing functions. On click of the button labeled "Data entry", the following data entry window is displayed.

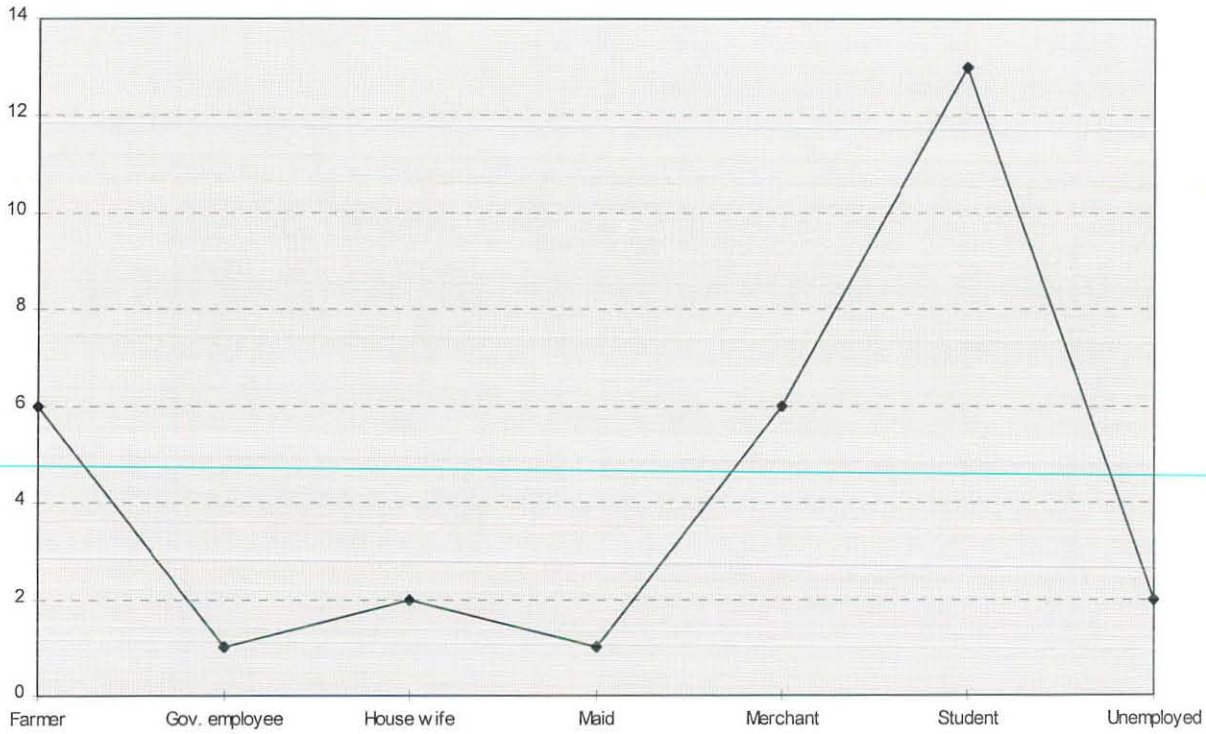


This window contains three forms. The first form is used to enter family identification details and presented in a "form view". The remaining two forms are displayed in a "data sheet view" and used to enter family members detail information. There are four buttons attached beneath these two forms. These buttons stand for Births, Deaths, Income, and Means of communication data entry form. The user can click any of the buttons and display one of the mentioned forms at a time to enter and view data. The other window to be displayed on click of a button is the reports window. It shows lists of standardized reports and queries. The user can view and prints each of these reports.

The improved Community Health Information System is expected to generate reports in a wide variety of flexible formats. Among these, there is a need for outputs to be presented in a graphical formats. Microsoft Access can generate outputs in some graphical formats. However, one of the specific objectives of this thesis is to seek ways and means whereby the database management and statistical packages can be used in an integrated manner.

An attempt has been made to integrate CHIRS with Microsoft Excel. This package performs many descriptive as well as inferential statistical analysis. CHIRS can work together with Microsoft Excel in two ways. In the first place, the query results from CHIRS can be saved and exported to Excel using the available import/export facilities. Besides, standardized reports and queries from CHIRS can directly be sent to Excel for further analysis just on click of "Run Excel" button. Following is a graphical report generated by Microsoft excel using the query result exported by CHIRS.

Figure 5.3 Population by occupational status



CHAPTER SIX

6.0. CONCLUSION AND RECOMMENDATIONS

6.1. CONCLUSION

The health information system of a country is a basis for the provision of efficient health care services. In Ethiopia, health information flows from the health facilities through out the country to the center after being summarized and aggregated by Zonal and regional health offices. At the health facility levels, the health information recording system includes a variety of patients contacts with the health facilities and technical and management support activities such as clinical, laboratory, radiological and administrative services.

The existing health information system has been criticized for a long period of time. Among other things, it has the following serious pitfalls:

- it is generally restricted to medical care facilities.
- it provides information only about those persons who actually used the services of the health facilities .
- it is unable to provide information on a non governmental organization engaged in the delivery of health care services and the activities they have carried out.
- delay in the analysis and generation of reports for the data passes through several channels in the health care system.
- the data being collected are not tailored to the needs of the users and the data collection and reporting methods are defective.

The other sources of health information such as community-based health information and special studies have not been strengthened and are very limited in the country. Currently,

health care planning and management in Ethiopia is being decentralized. Accordingly, health information systems need to meet the new needs being created as a result of the decentralization. It has now become mandatory to develop and strengthen health information system at a regional and community levels. It is evident that when the health information system at a regional and community level is strengthened, the central health information system will eventually become strong.

Community-based health information system is a repository of information related to health and associated factors of a given community. That is, it incorporates the socio demographic and other variables that can affect the health status of the community. Recently, an endeavor has been witnessed by JIHS to develop community-based health information system through its community-based educational program. The nature of this educational program is information intensive and uses the community as a class room or a laboratory where students closely study the overall living conditions of communities, their culture and the impact of these factors on the health status of communities.

In this new educational program, the major tasks to be accomplished are collection of health and health related data from the community. During the survey it was found out that the main purpose of collecting and storing community health data are:

- to integrate training, health care services, and research activities.
- to use the data for the preparation of teaching materials.
- to use the data for designing health science courses tailored to the health needs of communities in the region and in the country at large.

Nevertheless, the data was not properly managed and organized to meet the stated objectives. With a view of organizing the data and undertake statistical analysis for various studies, the CBE coordinating office has established data processing unit. In this unit, there are piles of completed questionnaires containing community health data collected for the past fourteen years.

The main objective of this study was particularly to assess the activities of the existing data processing unit and to examine the way community health data are acquired, organized and retrieved. To this end and to identify the information requirements of users, various fact gathering methods and techniques were employed.

The findings of the survey reveal that the overall usage rate of the collected data to meet the aforementioned objective was so minimal. The main reasons for the witnessed low usage rate were:

- problems in the storage and retrieval system.
- lack of awareness of users the existing information resources at the data processing unit.
- lack of permission and policy to use the information.

To ameliorate problems pertaining to storage and retrieval system, structured system analysis and design tools and techniques were employed. These tools and techniques were particularly used to analyze and document the activities of the existing system, the flow of information in the system and finally to design the proposed databases of the system. About ten databases

were identified to be designed for the implementation of complete community health information system for Jimma Zone. Entity relationship modeling and relational data analysis were used for the design of the database.

Finally, prototype information retrieval system called Community Health Information Retrieval System (CHIRS) was developed using Microsoft Access software package. CHIRS has easy to use and interactive user interfaces. It accomplishes major functions such as searching, query formulation, report generation, data validation. CHIRS has control facilities. The data entry and editing duties are password protected and accessed only by authorized personnel. It should be noted that CHIRS has been developed just to demonstrate how the system can be implemented and to uncover further requirements which were not evident during the survey period.

The community health information system developed for Jimma Zone can be replicable. That is to say, other regions and zones in the country can adapt the approach and design method of community health information system in this study. By and large, this study is presumed to serve as a new paradigm in the course of managing and developing community-based health information system in the region and in the country at large.

6.2. RECOMMENDATIONS

As it was explained through out the body of this work , especially in chapter three, community-based health information system has not been developed in Ethiopia. JIHS has became the pioneer of both the community-based health information system and community-based educational methods in Ethiopia. The health Policy of the country (TGE 1993) highly resembles the Philosophy of JIHS. Mirgssa (1997) stated that the training philosophy of the institute has reached a level where it can influence the attention of policy makers. Therefore, it is high time that JIHS share its experience with other educational institutions through out the country and abroad.

For the implementation of community health information retrieval system proposed in this study, the backing and commitment of the institute and the Zonal health department are extremely important. It should be noted that this work is not exhaustive and detailed enough for the full implementation of CHIRS in Jimma Zone. Detailed systems analysis and design activities need to be carried out. Therefore, for the complete design and implementation of CHIRS, the following points need to be considered:

1. **Organizing System implementation team**

The team to be organized can directly reports to the dean of the institute or vice dean for academic affairs. The team shall be composed of health statistician, community or public health specialists, information professionals, programmers and CBE program coordinators. The team can base its duties on the outcome of this study and use the prototype application developed for demonstration and further identification of users requirements. Due to time

constraint, the prototype system (CHIRS) could not have been demonstrated to users at JIHS and Jimma zone health department.

Although the prototype system is developed only for the socio demographic system, the remaining databases can be designed in the same manner. Microsoft Access or other similar commercially available database management software packages can be used for physical implementation of the system. Microsoft Access has user- friendly interfaces and can be used in an integrated manner with other statistical, database management and word processing packages. This integration is crucial to provide flexibility which is required of the new system. The team can evaluate database management software packages specially developed for health information system. For instance, during the literature review, the investigator has got a chance to browse the CDC (Center for Disease Control) Home page, an agency of the United States government. CDC has developed application software called HIRS. The software is made available for every body interested and can be downloadable free of charge. Efforts made by the investigator to down- load this software was not successful due to time constraint. The team, therefore, needs to take time and down load the software and thoroughly examine the facilities and features of the software. HIRS can be accessed through the following address (http://www.hpya.com/hirs.htm)

2. Reorganizing the data processing unit.

Although the CBE coordinating office has strived to establish data processing unit, the office has not been accredited by the management of JIHS. The duties and responsibilities of the unit, the jobs and manpower requirements have not been clearly worked out. Currently, the unit has two data encoders hired on a contractual basis. The salary for these employee is paid

from the fund granted to the institute by the Irish Aid office in order to carry out the community-based training program. Therefore, the unit needs to be upgraded, strengthened, and equipped with the necessary hardware, software and manpower. Particularly, the existing computers in the office are not in a position to handle on the average 146.5 Megabytes of data being collected each academic year.

3. **Developing standardized data collection formats**

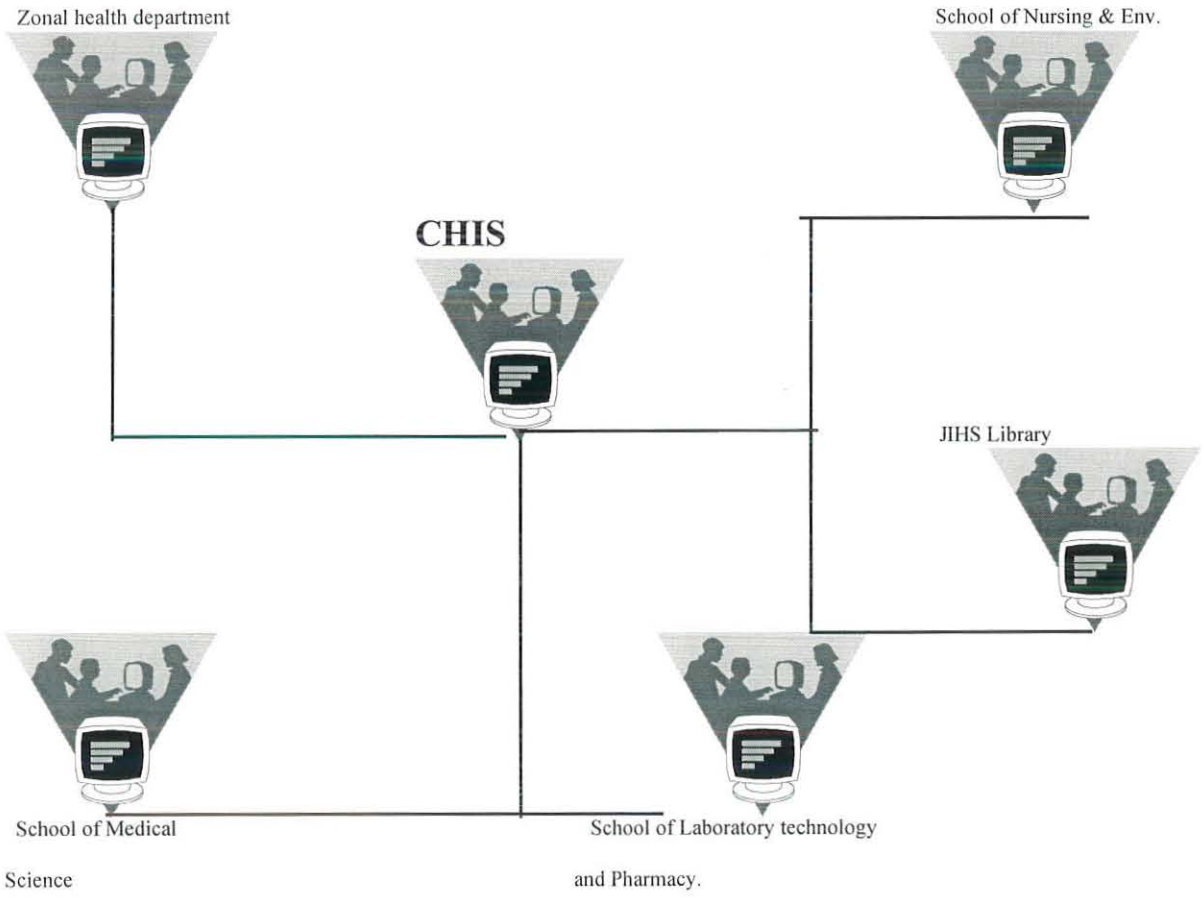
In chapter four section 4.12.1, it was mentioned that there is lack of standardized formats developed for data collection. Each categories of students use different formats to conduct the same type of study. Taking into consideration the objectives of the study, ways whereby standardized format could be developed should be sought. Care should be made not to modify the data collection formats frequently. Instead of trying to modify the data collection formats during each CBTP attachments, if it is deemed mandatory, it is possible to modify the formats after thorough study is made during a specified period of time. While developing data collecting tools or formats, the experience of other institutions globally need to be taken into consideration. For instance, in chapter three section 3.2 of this study, it has been indicated that the Houston area of community health information system work group has proposed some suggestions on the contents of CHIS. Therefore, this and other similar studies should be taken into account to develop CHIS that provides complete information of communities.

4. **Introducing Local Area Network (LAN).**

Accessibility was one of the problems identified by the survey. Problem to access the community health information emanates because of two reasons. In the first place, there is lack of policy that guides the access and use of the information. Besides, potential user groups

are located a bit away from the data processing unit both within and outside the premises of the institute. To reach the users and encourage them use the data, LAN need to be designed. The intricacies involved in designing a LAN is beyond the scope of this study. The technical team to be organized need to consider the design and implementation of LAN. LAN has a significant advantage in sharing data and other resources. It enables the utilization of the available hardware and software resources in an integrated manner. The LAN can be designed having the following topology and encompassing the major schools of the institute and the Zonal health bureau. This will provide the opportunity to students, staff, and employees of the Zonal health bureau to effectively use the community health information for the envisaged purposes.

Figure 6.1 Proposed LAN for Community Health Information System.



5. **Retrospective conversion.**

While implementing the new system, the first point that needs attention is how to convert or enter into the computer the data collected for the past fourteen years. To undertake this duty, budget and manpower need to be allocated. The effort currently being made to enter the data into a computer need to be terminated for a while until the appropriate hardware and software are identified.

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Appendices

Appendix A

Survey questionnaire.

School of Information Studies for Africa
Addis Ababa University

Information Needs Survey Questionnaire

Dear sirs:

This is a survey questionnaire on the topic " **Prototype Community Health Information Retrieval System for Jimma Zone: A Case study of Jimma Institute of Health Sciences.** The research is basically conducted for partial fulfillment of the requirements for the degree of Master of Science in Information Science. It is the strong conviction of the researcher that the outcome of this research will have a paramount importance for the subsequent efforts of the institute and Jimma Zone Health Bureau in the course of managing community health information system.

The information you provide is valuable and it enhances the endeavors of the researcher to understand the existing system, the information requirement, information sources, and the prevailing problem in the current system. The collected data are useful for designing an alternative system that is geared to satisfy the information needs of users. Therefore, your prompt and genuine response is appreciated. I need your response not later than 11th 1998. Thank you in advance for your patience, willingness and kindness to spare your time and respond to the questions stated in this questionnaire.

Information on how to fill the questionnaire

Circle your choice from the alternatives provided. If you think the alternatives provided are not exhaustive enough and if you face difficulty in responding, use the blank space at the end of each question and provide your answer there. Besides, in some questions, if you find more than one possible answers, you can circle accordingly.

Sincerely yours

Survey of Community Health Information Needs of Faculty and Senior Students at JIHS

1. Position:

    1) Faculty member
    2) Intern
) post basic

2. School, Department, or program

    1) Medical Science
    2) Nursing
    3) Environmental Health
    4) Community Health
    5) Laboratory Technology
    6) Pharmacy
    7) Basic Natural and Social Sciences

3. Where do you get community health information/data for your teaching, learning and/or research activities?
    1) from Jimma Zone Health Bureau
    2) from Community Health Department of JIHS
    3) from CBE Coordinating Office
    4) from JIHS Library
    5) by conducting survey
    6) if others, specify _____

4. For what purpose(s) do you need community health data/information?
    1) to conduct research
    2) for course work and training
    3) for health care service management
    4) to organize intervention programs
    5) if others, specify _____

5. Have you ever participated in the Community- Based Training Program of the institute?
    1) Yes 2) No

6. If your response to Question #5 is "Yes", would you briefly list some of the objectives or purposes of collecting community health data during CBTP field works?

---

7. Do you think the community health information generated by CBTP is valuable for future research and/or health care activities in the communities covered by the program?
    1) Yes 2) No

8. Have you ever used the data available at the CBE coordinating office?

1) Yes 2) No

10. If your response to Q#8 is "Yes" which of the following data/information have you used?

1) reports
2) data available in questionnaire format
3) Computerized data/information
4) if others, specify

11. If your response to question #8 is "No", what was/were your problem(s)?

1) the accuracy and reliability of the data/information
2) lack of permission to use the data
3) problems in retrieving and analyzing the data
4) lack of awareness
5)if others, specify _____

12. If you have used the data entered into the computer at the data processing center of CBE coordinating office, did you manage to search, retrieve, and analyze the information/data you needed from the databases?

1)Yes 2)No

13. If your response to Q#12 is "No", would you mention some of the reasons

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---

14. What is your level of satisfaction concerning the current community health information system at the CBE office?

1) Dissatisfied
2) Moderately satisfied
3) Neutral
4) Satisfied.

15. Do you want change in the way the current community health information is organized?

1) Yes 2)No

16. If you want change in the way the current community information is handled, which of the following changes do you recommend?

1) change in the data storage and retrieval system
2) change in the interface to make it more user friendly
3) change in the computer hardware/processor
4) if others, specify _____

17. Which of the following categories of community health information do you think is more useful to your research and other educational activities? rank by assigning (1,2, 3....8) according to their degree of importance. (One means highest).

_____ 17.1 Socio demographic

_____ 17.2 Health status record
_____ 17.3. Perceived morbidity and diarrhea
_____ 17.4. Nutrition
_____ 17.5. Environmental health
_____ 17.6. Family Planning/MCH
_____ 17.7. School health
_____ 17.8. EPI

18. How do you want the aforementioned information/data to be stored and retrieved?

1). annual data of each kind of record must be stored separately
2). Data of time series under each record should be stored together to facilitate statistical analysis.
3). Selected information from the data collection questionnaire of each record should be stored to avoid unnecessary redundancies, complexities and to minimize storage space.
4) if others, specify _____

19. What type of reports do you generate using the Community health data mentioned in question #17?

1) Health status statistics or report
2) change in the health status of the Community
3) Health needs of the community (problem identification)
4) if others, specify _____

20. Do you have some skills in using computers?

1) Yes 2) No

21. If your response to Q#20 is "Yes", circle the type of software package(s) you are familiar with

1) Word processing packages
2) SPSS/pc+
3) Database management packages such as dbase and Microsoft Access
4) SAS
5) if others, specify _____

APPENDIX **B**

Sample of data collection form

CBE/CBTP/HOPDEM

JIMMA INSTITUTE OF HEALTH SCIENCES

COMMUNITY BASED TRAINING PROGRAM DEMOGRAPHIC AND SOCIO-ECONOMIC SURVEY FORM.

Part I DEMOGRAPHIC CHARACTERISTICS

Date _____ Group _____

1. Identification Particulars

Region _____ Awraja _____ Woreda _____ Peasant Association _____

Town _____ Kefetegna _____ Kebele _____ Zone _____ House No.____

S.N	Full Name of the household member (i.e. usual members)	Relation to the head of the household	Sex		Age	Religion	For people 10 years of age and above			In the month househ	
			M	F			Marital Status	Literacy Status	Occupation	Birth M	F

1. head
2. spouse
3. Son/doughter
4. other relatives
5. non relatives

1. Orthodox
2. Chaotic
3. Muslim
4. Others

1. Single
2. Married
3. Widowed
4. Divorced

* highest grade completed

1 Farmer 6. Shepherd 11. Bar te
2. Gov. emp. 7. Merchant 12. Woo
3. Soldier. 8. Black Smith 13. Tell
4. Maid. 9. Potter 14. Wea
5. Student 10. Unemploed 15. Oth

NB. Link birth with mother by recording live birth information in the same raw with mother.

Means of communication

1. Do you have Radio set ? Yes_____ No____

2. Do you have private TV set ? Yes_____ No____

3. Do you have telephone ? Yes____ No___

4. If no, do you have access to public telephone? Yes ____ No ___

5. Do you get newspapers fairly in time (within a month after their dissemination)?

   Yes _____ No _____

6. Do have access to postal service? Yes____ No____

Income

7. What is the average annual income of your family?

   (in money or kind)_____

8. Do you have additional source of income? Yes____ No ___

9. If yes, specify _____

APPENDIX C.

Database structure

1. **Birth**

Field	Field Name	Data type	Length
1	Household Id	Text	20
2	Individual code	Text	20
3	Age of the child	Number	integer
4	Sex	Text	10

2. **Communication facilities.**

Field	Field Name	Data type	Length
1	Household Id	Text	20
2	Radio	Yes/no	Yes/no
3	Television	Yes/no	Yes/no
4	Postal service	Yes/no	Yes/no
5	News paper	Yes/no	Yes/no
6	Telephone	Yes/no	Yes/no
7	Others	Text	50

3. **Death**

Field	Field Name	Data type	Length
1	Household Id	Text	20
2	Age	Number	integer
3	Sex	Text	10
4	Cause	Text	30

4. **Income**

Field	Field Name	Data type	Length
1	Household	Text	20
2	Permanent annual income	Number	20
3	Additional income	Number	integer
4	Total	Number	integer

4. **Family members**

Field	Field Name	Data type	Length
1	Household Id	Text	20
2	Individual code	Text	20
3	Ethnicity	Text	20
4	Age	Number	integer
5	Sex	Text	10
6	Religion	Text	20
7	Relation to household	Text	20

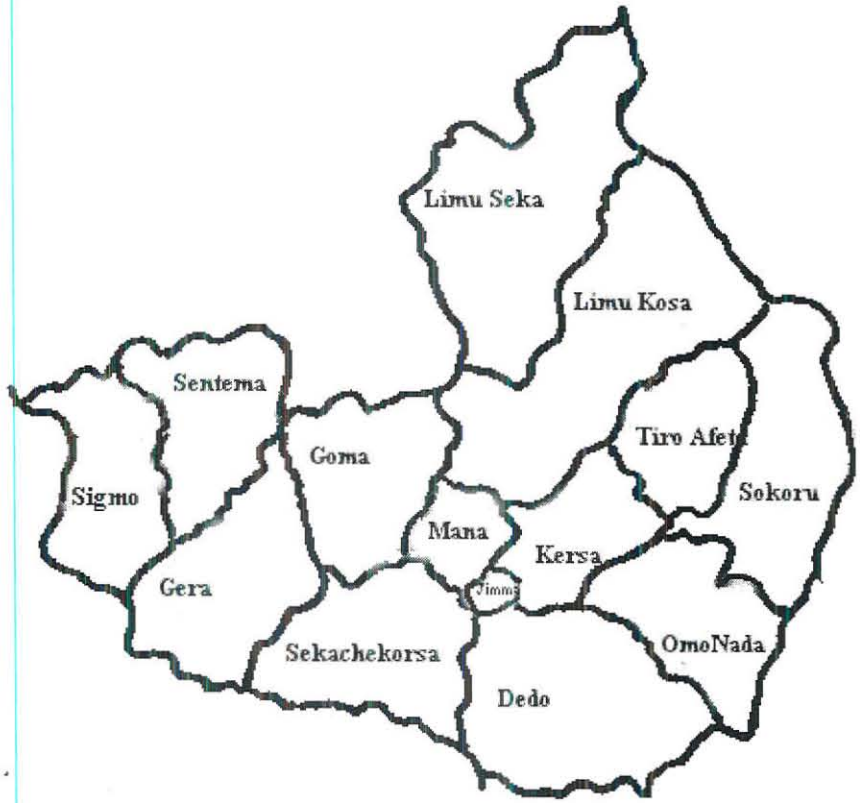
6. Family identification

Field	Field Name	data type	Length
1	Household Id	Text	20
2	Name of study area	Text	20
3	Stutus of the community	Date/type	Date/type
4	Family size	Number	integer
5	Zone	Text	30
6	Keftegna	Text	10
7	Kebele	Text	30
9	House No	Text	20

7. **Teenagers and adults**

Field	Field Name	Data/type	Length
1	Household Id	Text	20
2	Individual code	Text	20
3	Marital status	Text	30
4	Occupation	Text	30
5	Literacy status	Text	30

Skech Map of Jimma Zone



Appendix D

List of communities covered by CBTP

District	Site	Distance from Jimma town	Services provided	Total population
MANA	Ela-Dale	9 kilometers	-	1227
	Geruke-Jemata	11" "	Spring	2657
	Geruke-Abujedi	12" "	development.	2446
	Yebu	21" "	-	3059
	Lalo Bilo	23" "	-	1033
	Meti	24" "	Spring " "	2463
	Afeta	25" "	" "	2695
	Dawa Birbirsa	27" "	" "	2173
			-	
SEKA CHEKORSA	Kofe	7 Kilometers	Spring	3205
	Kechema	10" "	"	1195
	Seka	18" "	4 Latrines	4076
	Olmeyebu	31" "	(V.I..P)	2903
	Gibe Hursa	18" "	Spring	655
	Buyo Chala	15" "	" "	2529
	Gura Ulauke	32" "	" "	1952
	Tilku Bore	12" "		1882
	Tinishu Bore	10" "		1779
KERSA	Welege	11 kilometers		728
	Merewa	10 " "		1228
	Abu Kako	17" "		2265
	Serbo	20" "		3398
	Serbo Akababi	21" "		1505
	Kitnmble	24" "		3212
	Bul-Bul	32" "		2937
	Rusa-Gelo	40" "		1159
	Bala Wajo	45" "		1639
	Hurgidema	25" "		1300
	Saredp	7" "		2772

Declaration.

This thesis is my original work and has not been presented for a degree in any other University.

Getachew Hailemariam

22 May 1998

The thesis has been submitted for examination with our approval as university advisors:

1. _____

   Dr. Taye Tadesse

2. _____

   Ato Sisay Fisseha

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ADDIS ABABA UNIVERSITY
Addis Ababa, ETHIOPIA

SCHOOL OF INFORMATION STUDIES FOR AFRICA (SISA)

ቀን
Date 18 June 1998

ቁጥር
Ref.No. SISA/182/90

To: The Dean
School of Graduate Studies

From: Getachew Birru
Dean, SISA

Subject: **Master's Theses of Graduating Students**

This is to inform you that of the twelve theses that were presented and defended this year, the following eight were accepted as presented:

	CGPA	Thesis Grade
Bantie Workie	3.59	Satisfactory
Dawit Yimam	3.86	Excellent
Ermias Abebe	3.55	Excellent
Kula Kekeba	3.23	Good
Getachew H/Mariam	3.50	Good
Mesfin Wolle	3.32	Satisfactory
Worku Gedlie	3.64	Good
Yalew Gizaw	3.45	Good

The following four theses were accepted with some minor changes:

Joyce B. Nyumba	3.55	Good, subject to change
Getahune Semeon	3.27	Good, subject to change
Seid Ali	3.45	Good, subject to change
Shimelis Getu	3.77	Excellent, subject to change

The four students just mentioned have now done the required changes in their thesis to the satisfaction of their examiners and advisors.

Please accept the thesis of all of the twelve students mentioned above.