DESIGN AND DEVELOPMENT OF TRACHOMA PATIENTS' MONITORING AND TRACKING SYSTEM FOR KAJIADO COUNTY, KENYA

BY

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DECLARATION

DECLARATION BY THE STUDENT

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DEDICATION

I dedicate this work to my dear husband Godfrey Naliali, son, Brian Naliali, daughters Purity and Nicole Naliali.

ACKNOWLEDGEMENT

I would like to thank the Almighty God for His endless blessings that have enabled me achieve this. I would like to express my gratitude and heartfelt thanks to my supervisors Mr. Reuben Oyamo, Prof Joseph Kiplang'at and Prof. David Gichoya for the guidance, constructive and invaluable suggestions, motivations and kindness throughout my thesis. I could not do much without your support. I would like to convey my sincere thanks to Mr. Okatch and Mr. Lusichu for their assistance, advice and support that boosted my research idea. I also take this opportunity to thank my friends and colleagues for their support and feedback throughout my thesis. I am thankful for their responses and cooperation of the people who participated in my qualitative study. Your cooperation was important to the success of this thesis. I would also like to express my gratitude to my lovely husband, children, brothers and sisters who have been encouraging and supporting me throughout my studies. Your wisdom and love have been a motivation for my success. God bless you always.

ABSTRACT

Geographical Information System (GIS) mapping software provide powerful tools for management and analysis of infectious diseases control programs. The use of this technology can be tailored to suit a wide range of applications. These include: practical operational maps to assist with location, and analytical tools to facilitate program monitoring and evaluation. The study aimed at designing and developing a monitoring and tracking system for Trachoma patients within Kajiado County. The specific objectives of the study were: to undertake a feasibility study on the need for the GIS system in Kajiado County; to undertake a system analysis for the development of a GIS application system to monitor Trachoma patients; to design and develop a GIS system to monitor and manage Trachoma patients in Kajiado County; to test the GIS system for efficiency and reliability. The requirements specifications for the system included: to improve the collection and reporting of aggregated health data of Trachoma patients through mobile technologies; to identify specific locations vulnerable to Trachoma within Kajiado County; to identify congregate groups targeted for preventive measures of Trachoma disease; to create maps to help stakeholders to establish the location of the patients within Kajiado County. This study was based on the Susceptible Infected Recovered (SIR) model.The research design used was Experimental and the system methodology used was Evolutionary prototyping. Data was collected using face to face interviews and document analysis from Bissil, Mile 46, Kitengela and Isinya which were used to test the system. The following ethical issues were considered: respect for the dignity of (research participants) which included medical practitioners, CHW and patients was prioritised; Full consent was obtained from the Doctor in charge of Kajiado prior to the study; adequate level of confidentiality of the patient data was ensured. Cross case analysis was used to analyze the data within the areas. The Android operating system and Java programming were used to develop the user interface for capturing the data by the CHW through the use of a GIS enabled phone (Samsung). Google map application was used to identify the locations of the patient on a map. Visual Basic.net programming language was used to generate the reports to be used by AMREF Coordinators for decision making.The findings of the study were as follows; Reporting of Trachoma Patients using the GIS enabled mobile phones led to reduction of the spread of Trachoma by improving the data collection, the use of maps enabled the medical practitioners and the AMREF coordinators to quickly identify the location/household of Trachoma Prevalence areas. Developing of the Trachoma monitoring and tracking system provided accurate information concerning Trachoma patients leading to fast policy and decision making by the concerned personnel. It is concluded that developing of Trachoma Monitoring system was a quick and effective solution for reporting patients infected with Trachoma. The system should be adapted to replace the current manual paper based way of reporting patients infected with Trachoma by CHW. The study further recommends developing of a GIS Cloud Mobile Data Collection system for web and mobile devices which would allow collection of Trachoma patient data in real time mode.

ABBREVIATIONS

AFSKC	AMREF FIELD STATION IN KAJIADO COUNTY
AMREF	THE AFRICAN MEDICAL AND RESEARCH FOUNDATION
AMPATH	ACADEMIC MODEL FOR THE PREVENTION AND TREATMENT OF HIV
AMR	AUTOMATED MEDICAL RECORD
CBHC	COMMUNITY-BASED HEALTH CARE
CBO	COMMUNITY-BASED ORGANISATION
CCDU	CHINESE CENTER DISEASE UNIT
CDF	COMMUNITY DEVELOPMENT FUND
CHV	COMMUNITY HEALTH VOLUNTEERS
CHW	COMMUNITY HEALTH WORKER
CO	CORNEAL OPACITY
CTM	COMMUNITY TRACHOMA MONITOR
DBMS	DATABASE MANAGEMENT SYSTEM
DTP	DISTRICT TRACHOMA PROGRAMME
EHR	ELECTRONIC HEALTH RECORD
EMR	ELECTRONIC MEDICAL RECORD
E & M	EVALUATION AND MANAGEMENT CODES
GIS	GEOGRAPHICAL INFORMATION SYSTEM
IAPB	INTERNATIONAL AGENCY FOR THE PREVENTION OF BLINDNESS

MAPCATS	MULTI ATTRIBUTE PRIMARY CARE TARGETING STRATEGY MODEL
MDG	MILLENNIUM DEVELOPMENT GOALS
MOH	MINISTRY OF HEALTH
PDU	PROTOCAL DATA UNIT
RTA	RAPID TRACHOMA ASSESSMENT
S A F E	SURGERY, ANTIBIOTICS, FACIAL CLEANLINESS & ENVIRONMENTAL IMPROVEMENT
TF	TRACHOMATOUS FOLLICULAR
TI	TRACHOMATOUS INFLAMMATION
TS	TRACHOMATOUS SCARRING
TT	TRACHOMATOUS TRICHIASIS
UK	UNITED KINGDOM
WHO	WORLD HEALTH ORGANISATION

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CHAPTER ONE

INTRODUCTION AND BACKGROUND TO THE STUDY

1.0 INTRODUCTION

The chapter presents the following topics: background study, statement problem, aim of the study, research objectives, research questions, research assumptions, significance of the study, scope and limitations of the study.

1.1 BACKGROUND TO THE STUDY

According to World Health Organization (WHO), health is a "state of complete physical, mental and social well-being and absence of disease or infirmity." The health of a nation is a very important factor since so much is dependent on it and has far-reaching implications on socio-economic development. A healthy labour force is a prerequisite for increased production and productivity. A Nation's economic activities can be affected by diseases such as: HIV AIDS, Tuberculosis, Cancer, and Trachoma amongst others. Health is influenced by an individual perception of their place within society and their ability to achieve pre-defined goals.

Sight is an important factor for one to achieve desirable goals and for a nation to be stable economically. Trachoma is one of the diseases that lead to lose of sight worldwide. The infectious disease leads to scarring and turning in of the eyelid causing blindness. "The Right to Sight" is a global declaration launched by (WHO) and international partners to help save people from blindness by 2020.

Ministry of Health (MOH) has a responsibility to provide quality health services, promotion of equity in access, financial risk protection and overall governance and stewardship of the health sector. To implement this function there is an absolute need for information to guide policy making, intervention options, programming and effective management of health facilities. The Ministry therefore needs to improve data management and strengthen the use and application of information technology in data management. To successfully do this, there is need to develop standards that will ensure quality of software, compatibility of data sharing, ease of maintenance and common understanding among the workforce. The use of Geographical Information Technology is one of the methods that can help them maintain accurate data and make interpretation of data clearer. The emphasis on population-based health care has resulted in increased interest in GIS to aid in the delivery of health programs. GIS have been used to map the occurrence of disease, identify risk factors and identify access to health care services (Cromley & McLafferty, 2002). Advances in GIS technology have aided in the detection of disease clusters (Foody, 2006) and aided health care professionals and decision makers in effectively targeting diseases.

Managing health provision requires improvement in health care services through management of a disease in its early stage. This can be achieved by improving information channels of delivering health related information in rural areas. Great impacts in diseases such as: HIV/AIDS, malaria, diarrhoea, trachoma and water related illnesses can be achieved by improving information channels in rural areas. GIS can help flow of information by providing fast tracking of areas where the diseases is severe, fast retrieval of information and query databases for relevant decision making.

1.1.0 Trachoma in Developing Countries

Trachoma in developing countries is still referred to as a serious health problem leading to blindness. In countries like Egypt, severe active Trachoma was more common among rural children than urban children. Cicatrizing Trachoma led to blindness in 8% of the adult population and accounted for visual impairment in 13% of the survey members. This means that one out of five individuals above the age of 50 years in one rural community of Egypt suffer from visual loss because of Trachoma. https://www.k4health.org/.../**trachoma**.../controlling-blinding-**trachoma**-**e**...

In Kenya, Trachoma is most prevalent in the poor underprivileged communities such as Samburu, Narok, West Pokot, Kajiado, Baringo and Meru North. Many factors are indirectly linked to the presence of Trachoma in these places which include lack of water, absence of latrines or toilets, flies, close proximity to cattle, over crowding and poverty in general. The organism Chlamydia Trachomatis is transmitted through contaminated fingers and cloths used to wipe discharge on the faces of children.
www.uonbi.ac.ke/journals/.../856-3236-1-SM.pdf `

In most developing countries governmental authorities have ignored diseases such as Trachoma and focused on diseases like: infant diarrhoea, tuberculosis, and mass vaccination for rubella, diphtheria, measles, and mumps. The Vision 2020 programme of the World Health Organization (WHO) and the International Agency for the Prevention of Blindness (IAPB) for the elimination of avoidable blindness by the year 2020 places Trachoma on the high priority list for the prevention of blindness in developing countries.

1.1.1 Trachoma Elimination: The Safe Strategy

The SAFE strategy is a way of eliminating Trachoma by categorizing it according to the treatment provided. The SAFE strategy involves surgery, antibiotic treatment, facial cleanliness and environmental improvement.

Surgery

Surgery is an important step in eliminating blinding Trachoma. The S or surgery component of the SAFE strategy aims to correct TT and reduce the risk of progressive corneal opacity (CO) and blindness (Burton, 2007).

Antibiotic Treatment

It is the A component involving administering of mass antibiotic treatment to all individuals in a community mainly for preventive measures. It is recommended by the WHO when active Trachoma prevalence in children aged one to nine years exceeds 10% (Mabey, 2008). A single oral dose of azithromycin or six weeks of twice daily tetracycline ointment should be administered annually for three years (Burton et al (2007).

Facial Cleanliness and Environmental Improvement

The F component involves face washing and its relation to Trachoma. It is important to wash the face so that no Trachoma can spread through unwashed face. This has been seen to reduce Trachoma considerably.

The SAFE strategy component F and E are often grouped together because their primary purpose is prevention as opposed to treatment (Emerson et al (2000). A study in Vietnam comparing two communities where the full SAFE strategy was implemented and the other where just the S and A components were implemented found an additional decline

in Trachoma prevalence of 5.8% due to the addition of the F and E components (Khandekar, Thanah, & Thi, 2006).

1.1.2 Trachoma and the Millennium Development Goals (MDGs)

Implementing SAFE strategy will contribute to the attainment of all the MDGs. Patients diagnosed with TT if taken for surgery can prevent blindness and contribute to poverty reduction. Administering antibiotics treatment to the community and providing hygiene promotion on facial cleanliness helps children to have clean faces without eye discharges and itching and therefore healthier. MDGs aim at providing water and household sanitation facilities to all communities in the rural areas which lead to reduction in the spread of Trachoma.

1.1.3 Role of AMREF in Eradicating Trachoma in Kajiado.

AMREF‘s aim is to provide better health care in Kenya, and it’s mission is to ensure that one enjoys the right to good health by forming networks of informed and empowered communities and medical care providers. Although AMREF strives to reach all communities, they are faced with challenges such as human capacity to deliver health facilities, funding problems and insufficient community involvement. Due to the high increase and spread of Trachoma, AMREF in conjunction with the Kenya government, have taken the initiative to fight the disease. AMREF has started capacity to enable the communities have tools to help themselves eradicate the disease. They have pioneered training for primary Community Based Healthcare (CBH) who in turn trains others at community and village levels. They have also engaged specialized trained surgical specialists who work within the communities in order to combat the disease.

AMREF have found communication to be a major hindrance in sharing information and a reluctance to guarantee communities a voice in decision-making. In the hot, dry Kajiado County of Kenya, the nomadic Maasai people suffer from a high rate of the blinding eye disease Trachoma, causing 16% of all blindness in Kenya. AMREF has worked with the Maasai for over 20 years providing comprehensive health education, maternal/child health programmes and hygiene improvements. In the case of Trachoma AMREF has trained a network of Community Health Workers (CHW). The volunteers help to detect Trachoma among the members of the community who are very illiterate and may not know that they are infected. They are immediately referred to the AMREF Trachoma worker who applies antibiotic eye ointment or recommends for further treatment or surgery. Due to the high numbers of people infected, it is important to apply GIS technology to enable AMREF to monitor and track the patients infected with Trachoma.

1.1.4 ROLE OF WORLD HEALTH ORGANIZATION IN ERADICATING TRACHOMA

WHO was established on 7th April 1948 with headquarters in Geneva, Switzerland as a specialized agency that is concerned with international public health. The WHO and its partners are supporting implementation of the SAFE strategy in the endemic countries that decided to eliminate Trachoma. WHO states that investment in health information systems help decision makers to detect and control emerging and endemic health problems, empower individuals and communities with timely and understandable health related information.

1.2 STATEMENT OF THE PROBLEM

Trachoma disease is seen as one of the most infectious disease in the semi arid areas of Kenya. The effect of Trachoma has been known for over 3600 years, Forty two million people suffer from active Trachoma infection and over 8.2 million have Trichiasis (International Trachoma Initiative, 2009). Globally, Trachoma is responsible for a loss of approximately 2.9 billion in productivity per year (International Trachoma Initiative, 2009). This loss of workforce causes a major burden on already stressed communities and families throughout the developing world.

Due to the high number of infected people and the high rate of new infections, Medical practitioners and the Community Health Workers are unable to provide adequate preventive services to the affected patients leading to high rate of blindness within the infected areas.

Controlling and managing the disease has proved to be very cumbersome due to lack of mechanisms for identifying patients immediately and no accurate records for references in case of treatment by the Medical practitioners. This study therefore develops a monitoring and tracking system for Trachoma patients in Kajiado County.

1.3 AIM OF THE STUDY

The study aimed at designing and developing a System that is able to monitor and manage Trachoma patients within Kajiado County.

1.4 RESEARCH OBJECTIVES

(i) To undertake a feasibility study on the need for a GIS system to monitor and track Patients in Kajiado County.

(ii) To undertake a system analysis for the development of a GIS application system to monitor Trachoma patients.

(iii) To design and develop a Geographical Information System that will monitor and manage Trachoma patients in Kajiado County.

(iv) To test the system for efficiency and reliability.

1.5 RESEARCH QUESTIONS.

(i) Is there need for a GIS system in monitoring Trachoma patients in Kajiado County?

(ii) What are the systems requirements suitable for development of a GIS application system to monitor Trachoma patients within Kajiado County

(iii) Which system design methodology and programming platform will be used when coming up with the GIS system to manage trachoma patients in Kajido County?

(iv) How will the GIS system be tested?

1.6 RESEARCH ASSUMPTIONS

The study had the following assumptions:

The CHW had the capacity to provide essential spatial data necessary for this research and the database would relay reliable data from patients who are predominantly nomadic.

Current system is inadequate to provide relevant information necessary for proper decision making concerning Trachoma Patients. Eradication of Trachoma is hampered by lack of reliable data. Areas where Trachoma patients have sufficient telecommunication networks to enable transmission of data to the database.

1.7 SIGNIFICANCE OF THE STUDY

Through accurate record keeping, the AMREF Coordinators were able to know how many patients were to be budgeted for at a particular time in terms of drugs, eye surgical operations , facial cleaning and what medical services were required for each patient. They were able to identify the most infected areas to allocate the necessary preventive measures required leading to early treatment of the disease.

Through the result of this research study, the Community Health Workers were able to capture data from particular locations by using mobile phones making the data in the database very accurate and up to date. Summarised data presentation from the reports helped the policy makers to make critical decisions concerning eradication of Trachoma.
The patients information in the database server was shared among the Medical practitioners enabling them attend to the patients promptly.

These suggests that the study was beneficial to the AMREF Coordinators who were facing challenges of receiving accurate data concerning the patients in the rural areas of Kajiado County.

1.8 SCOPE OF THE STUDY

The most commonly infected areas with Trachoma in Kenya are Samburu, Narok, West Pokot, Kajiado, Baringo and Meru. www.uonbi.ac.ke/journals/.../856-3236-1-SM.pdf . The study was limited to Kitengela, Isinya, Bissil and Mile 46 parts of Kajiado County. The study was confined to reporting Trachoma patients in the various households to the AMREF Coordinators and the Medical Practitioners.

1.9 LIMITATION OF THE STUDY

The major limitations of the study were:

(i) **Time constraint.** Most Trachoma patients were found in the remote areas of Kajiado and to get access to the areas needed more time as the interviews were done alongside other engagements.

(ii) **Language barrier.** Most of the Maasai do not understand Kiswahili or English, hence to gather information from some CHW required an interpreter.

(iii) **Transport problem**. There was a challenge of moving from one household to the next due to lack of transport and long distances from one homestead to the other.

CHAPTER TWO

LITERATURE REVIEW

2.0 INTRODUCTION

Literature review is" information written by an author and includes findings as well as theoretical and methodological contributions to a particular topic " ,Galvan (2009). It helps to focus and refine research question by articulating the knowledge gap, provide the intellectual context for the work and situate it within the field. It recognizes researchers in the same field and appreciates the contribution the research makes to a study.

2.1 THEORETICAL FRAMEWORK

Kumar (2005) states that a theoretical framework of the study is a structure that supports a theory of a research work and provide a framework for data analysis. This section reviews literature on various models that have been used for managing and monitoring of diseases.

2.1.1 Models

Models of infectious diseases help in understanding the spread of infection of the diseases within a population over time. Due to the natural random nature of contact between individuals in the population, diseases can spread at different rates over time. Models are used to check the transmission of infections and to evaluate the potential impact of control programmes in reducing morbidity and mortality. Modeling was used extensively in the UK during the recent swine flu pandemic to monitor the extent of ongoing transmission and vaccination.

2.1.2 Multi attribute Primary Care Targeting Strategy Model (MAPCATS)

MAPCATS is a model that uses mapping technology. It describes the theoretical aspects used in the approach and shows how they apply to the population.

Limitation

The limitation of this model is the lack of validation at the individual level. The data collected cannot be used to determine the number of individuals that live in the same vicinity who are also at risk.

2.1.3 Spatial-Transmission Model (Steven Riley, Large-Scale Spatial Transmission Models of Infectious Disease, 2007)

Spatial models of infectious disease transmission provide the only experimental system in which knowledge of the location of hosts and their typical movement patterns can be combined with quantitative description of the infection process and disease natural history to investigate observed patterns and to evaluate alternative intervention options. This model was used to track measles breakout.

Four models were reviewed for infectious diseases under the model.

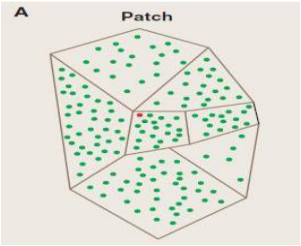


Figure 2.01: Patch Models
https://www.sciencemag.org/content/316/5829/1298/F2.expansion.html

Distance-Transmission Models

This model is individual-based. Each farm is assigned a precise location. Any given infectious individual can infect all susceptible individuals within range. It states that the probability of infection is usually a monotonically decreasing function of distance.

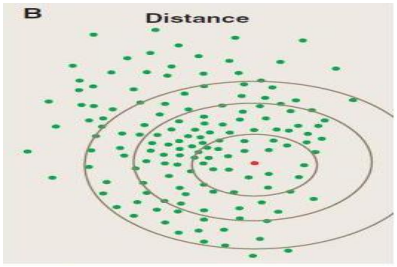


Figure 2.02: Distance-Transmission Models
https://www.sciencemag.org/content/316/5829/1298/F2.expansion.html

Multi-Group Models

Transmission is determined entirely by group membership, if household is shared with infectious individual or susceptible individual, there is a high probability of transmission occurring between the two. Spatial patterns of spread are determined by the locations of households and workplaces/schools and by the typical distribution of journeys between them.

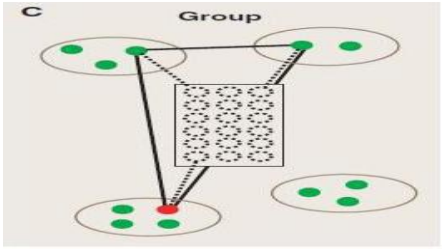


Figure 2.03: Multi-Group Models
https://www.sciencemag.org/content/316/5829/1298/F2.expansion.html

Network Models

Transmission experienced by susceptible individuals is zero, unless they share an arc with an infectious individual.

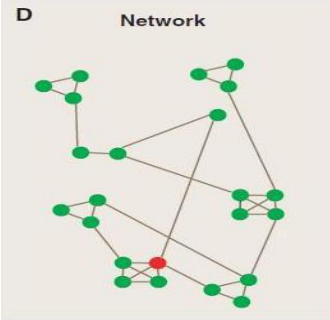


Figure 2.04: Network Model
https://www.sciencemag.org/content/316/5829/1298/F2.expansion.html

2.1.4 Agent-Based Modeling (ABM)

This model offer the ability to specify agents within the system, program them with rules to govern their behavior and then analyze the simulated results.

Advantages of using ABM over traditional models

- An epidemic can be introduced into a dynamic and detailed social context**.**
- ABSM is the stochastic nature of the modeling technique which allows randomness involved.

2.1.5 Susceptible-Infected-Recovered (SIR Model)

The Model was formulated by Lowell Reed and Wade Hampton Frost in the 1920s.

Classical SIR model assumes that individuals that leave one class must enter another.

States: *Susceptible(S), Infectious (I),* and *Recovered(R)*

The assumptions are:

Basic SIR models make the following assumptions:

- ✓ Individuals are born into the susceptible class.
- ✓ Susceptible individuals have never come into contact with the disease and are able to catch the disease, after which they move into the infected class.
- ✓ Infected individuals spread the disease to susceptible, and remain in the infected class (the infected period) before moving into the recovered class. Individuals in the recovered class are assumed to be immune for life.

Figure 2.05: Sir : Source (Http://Plus.Maths.Org,)

Schematic representation of the flow of hosts between S, I and R .Using a fixed population, $N = S(t) + I(t) + R(t)$, Kermack and McKendrick derived the following equations:

$$\frac{dS}{dt} = -\beta SI$$

$$\frac{dI}{dt} = \beta SI - \gamma I$$

$$\frac{dR}{dt} = \gamma I$$

β, is a transmission parameter.

According to the model, an individual in the population must be considered as having an equal probability as every other individual of contracting the disease with a rate of β,

which is considered the contact or infection rate of the disease. Therefore, an infected individual makes contact and is able to transmit the disease with βN others per unit time and the fraction of contacts by an infected with a susceptible is S/N. The number of new infections in unit time per infective then is $\beta N(S/N)$, giving the rate of new infections (or those leaving the susceptible category) as $\beta N(S/N)I = \beta SI$ (Brauer & Castillo-Chavez, 2001). For the second and third equations, consider the population leaving the susceptible class as equal to the number entering the infected class. However, a number equal to the fraction (γ which represents the mean recovery rate, or $1/\gamma$ the mean infective period) of infective are leaving this class per unit time to enter the removed class. These processes which occur simultaneously are referred to as the Law of Mass Action, a widely accepted idea that the rate of contact between two groups in a population is proportional to the size of each of the groups concerned (Daley & Gani, 2001).

JUSTIFICATION FOR USING SIR

SIR allows members of the recovered class to be free of infection and rejoin the susceptible class

2.2 DATA COLLECTION METHODS

Data collection is an important component of public health programs. To make accurate decisions, policymakers and medical practitioners at the community, district and, level need accurate data in order to gauge the effectiveness of existing policies and programs and to form new ones. In the developing world, collecting field information is

particularly important since most of the populations are rarely able to visit a hospital even in the case of severe illness. Gathering data where patients live is vital, and information should be updated and accessible on a real-time basis. The data collection process is more efficient and reliable if conducted via Smartphone, PDAs, or mobile phones, Banerjee (2013). rather than paper-based surveys that must be submitted in person and manually entered into the central health database.

2.2.1 Mobile Technologies in Health Systems

Advancement of mobile technology has brought new opportunities of improving social lives in developing countries. Societies are becoming mobile oriented hence increased pressure on the efforts of exploiting mobile technology in improving social services. Usage of mobile technologies could now be able to handle many existing problems in health systems such as data collection process which improves the accuracy and efficiency of the process as a whole Hameed (2003). The benefits of exploiting mobile technologies in health care systems includes assurance of quick processing of the collected data and it does not require complicated IT infrastructure to set up. Mobile applications are usually simple and user friendly. Finally, the financial cost of developing mobile application is relevant and can be afforded by many organizations in developing countries. However there are also challenges in adoption of mobile technologies such as privacy and security of the health data in ubiquitous networks (Hameed (2003).

Android Software

Android was built to enable developers to create mobile applications that take full advantage of all a handsets operations. Android is built on the open Linux Kernel. Furthermore, it utilizes a custom virtual machine that was designed to optimize memory

and hardware resources in a mobile environment. Android is open source; it can be liberally extended to incorporate new cutting edge technologies as they emerge. With Android, a developer can build an application that enables users to view the location of their friends and be alerted when they are in the vicinity giving them a chance to connect. Below is a health care worker collecting data using a Smartphone which uses Android Operating system.

Figure 2.06: Data Collection Using Smartphone:
Https://Digital-Campus.Org/Data-Collection-Using-Smart-Phones/

Some benefits achieved from using Smart phones for Data Collection include:

- Cutting down cost.
- Reduced errors.
- Duplication of mistakes easily spotted.
- More accurate results.

Cell Phone-based Reporting System Setup developed by China Cellphone Development code (CCDC)

The cell phone-based reporting system is pre-installed on the cell phone .The system is used for data collection and transmission. MAJiaQi, ZHOUMaiGeng, LIYanFei,etal (2009).

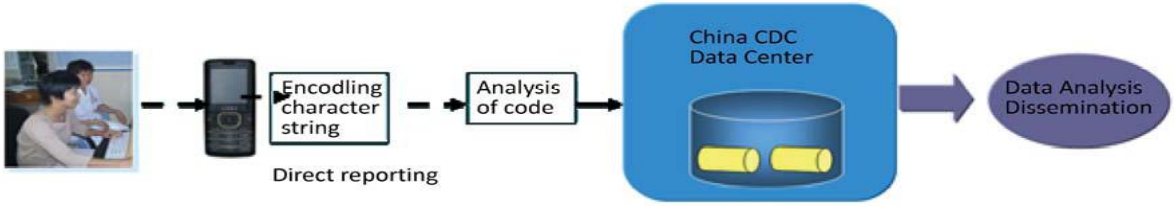


Figure 2.07: Cell Phone-Based Reporting System Setup Developed By Ccdc: https://digital-campus.org/data-collection-using-smart-phones/

The transmission is from the mobile terminal via the GSM/GPRS network. The database server converts the Protocol Data Unit format code, and transmits the data to other terminals or phones using this system. The standard character string should be restored to the content of the reported information, and then entered into the web-based reporting system database of the surveillance network for summary, analysis and interpretation.

Table 1 shows the mobile data collection technologies and type of data that can be captured.

Table 1: Data Collection Devices:

Device/ Technology	**Description**
Paper based	**Paper based method:** It is collecting data by using pen and paper.
Cell Phones	**Cell phone:** It is the portable wireless device that has basic telephony functionalities such as making calls, receiving calls, sent and receive text messages.
PDA	**PDA:** It is the portable device enabled with internet connection, storage and digital visual display capabilities used to conduct simple computing tasks.
Smartphones	**Smartphone:** It is a device that offers telephony functionalities and adds more features such as web access, ability to send and receive emails, reading and editing documents.

Data Collection Devices: https://digital-campus.org/data-collection-using-smart-phones/

2.3 Environmental Risks that lead to Trachoma Infection in Developing Countries

Eye-Seeking Flies

Musca sorbens, an eye-seeking fly, is the most likely insect vector of Trachoma (Emerson et al.,2000 ; Emerson et al., 2004). In 2001, a study was completed on how faeces (both human and other) serve as breeding media of the Trachoma vector. *M. sorbens*. Through this study, Emerson, Bailey, Walraven and Lindsay (2001) found that the preferred breeding medium of *M .sorbens* is isolated human faeces lying on the ground (although *M. sorbens* was also found to breed in calf, cow, dog and goat faeces).Construction of latrines was recommended in order to decrease fly density (by reducing the number of human faeces available for breeding), lower the corresponding number of fly to eye contacts and ultimately reduce Trachoma prevalence.

Climate

Consideration of Trachoma prevalence in relation to climatic factors is necessary because it may provide insight on how global warming will influence the future distribution of the disease. However, the ability to detect the effects of climate change may be hampered by the high degree of success of current strategies to decrease Trachoma prevalence. Trachoma infection has been found to be most common in hot, dry and dusty environments (Polack et al., 2005a; Schemann et al. 2002).

Access to Water and Sanitation

An individual's immediate hygienic and living household environment is one of the most significant indicators of their health and well-being. Epidemiological studies have found that children are at higher risk of Trachoma infection if they have unclean faces which may be due to lack of water. In the developing world women often travel great distances

to retrieve their water. Research done in Tanzania and Gambia shows that children in developing countries are more likely to have unclean faces (and therefore Trachoma) if they live more than 5 km from a water source. (Polack et al., 2005a; Schemann et al., 2002).

Household Cleanliness

In many developing countries, it is common for families to bring cattle into their homes at night for warmth and out of fear of thievery. Children living in households with an animal (cattle) have been found to be more likely to have Trachoma, Abdou et al (2007) due to the cow dung. Thus, to improve the domestic environment and lower Trachoma transmission, alternative safe and secure strategies for keeping cattle are needed.

Crowded Living Conditions

Families with more than two children (Luna et al., 1992) and families where two or more children share a bed (Luna et al., 1992) are at higher risk of Trachoma infection. Further, within households, those individuals living with someone with Trachoma are more likely to have Trachoma themselves (West et al.,1996; West et al., 2005). Similarly, Ngondi et al., (2009a) found that the risk of Trachomatous trichiasis (TT) in children aged one to 14 years increased with increasing proportion of children in the household with Trachomatous inflammation-intense (TI) and with increasing number of adults in the household with Trachomatous trichiasis (TT).

Sanitation Facilities

Installation of pit latrines without any additional health education reduces fly-eye contact by 30% (Emerson et al., 2004). Trachoma risk factor studies have found lower odds of

active Trachoma in children living in households with latrines compared to households without latrines (Cumberland et al., 2005).

2.4 MAPPING AREAS/LOCATIONS INFECTED WITH INFECTIOUS DISEASE USING GIS

GIS as a tool used in predicting infection based on the identification and risk areas of the spreading pattern.

2.4.1 GIS for Early Detection and Response to Infectious Disease

Diseases spread geographically, in relation to human climatic, institutional, human and other kinds of landscapes. Tracking of a disease can be done by GIS since it relates many kinds of data to geographic location.GIS analysis tools offer public health officials with information to make sound decisions at the community, national, and global levels. GIS provides tools that speed the collection of accurate field data and provide relevant information to support sound decisions. It locates a potential disease hot spot and calculate a nearby hospital's ability to handle the expected increase in service demand if an outbreak should occur.

2.4.2 Geographical Information System to Model the Spread of Tuberculosis. Case Study of Nigeria

Tuberculosis (TB) is humanities' greatest killer which is out of controlling many parts of the world. The disease is preventable but it has been grossly neglected and no country worldwide is immune to it (WHO,2005). It is still a major health concern worldwide and the disease spreads more easily in overcrowded settings and in the conditions of malnutrition and poverty. Modeling tuberculosis (TB) transmission facilitates the

understanding of Spatial and temporal patterns of TB infection in a population. In the diagram below, the study for tuberculosis covers Ibadan metropolitan city, which is the largest indigenous city in Africa. The GPS is used to pick the latitudes and the longitudes of the area of the study then it is mapped. This help in knowing the areas that are most infected with tuberculosis hence the necessary treatment is provided.

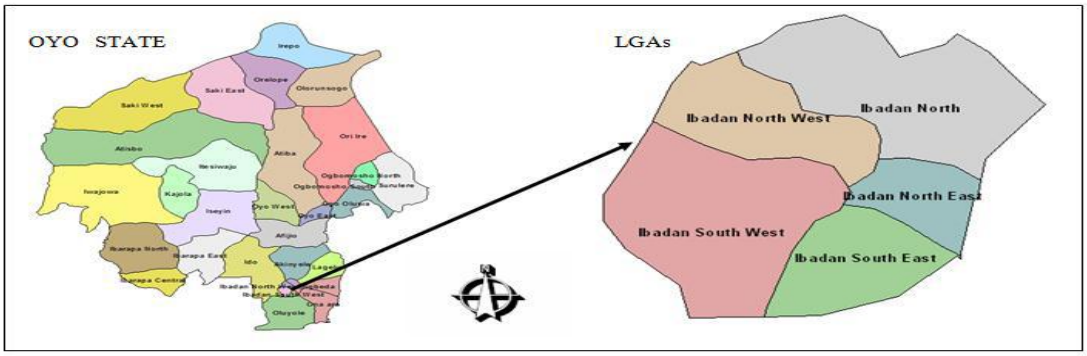


Figure 2.08: Map Showing The Location Of The Study Area Source: **http://www.fig.net/pub/fig2013/ppt/ts03d/TS03D_kosoko_6313_ppt.pdf**

2.4.3 Geographical Information System to Model the Spread of Malaria

GIS software is used to correlate the climatic attributes of the collection localities with the presence or absence of the various species (Weng, 2001)). Malaria is maintained under the influence of diverse ranges of interacting conditions, many of which are not well understood. These conditions are closely related to the habits and lifestyle of different communities; the behavior of the mosquitoes which transmit the disease; as well as climatic and other environmental attributes. These kinds of Spatial information have continuing significance for current malaria control strategies and they are ideally suited for use with modern GIS technology which permits the integration and Spatial analysis of

data from health departments. Digitized data from existing maps can provide base layers (topography, land use, roads, rivers, surface water) on which other data can be overlaid. These could include data on population distribution (towns and villages); location of health centers' and other facilities (hospitals, dispensaries, schools, government offices); meteorological indices (rainfall, temperature, humidity); epidemiological data (morbidity, mortality, parasitological indices, mosquito distribution records); and any other data which can be referenced geographically. GIS databases can be used as operational tools to support planning and implementation of control activities**.** For example, in impregnated bed net programs for community based malaria control, they can constitute simple and practical visual aids for detailed planning of bed net distribution and retreatment schedules. Climatic factors, particularly rainfall, temperature and relative humidity are known to have a strong influence on the biology of mosquitoes. GIS can be used to investigate associations between such environmental variables and the distribution of the different species responsible for malaria transmission.

2.4.4 GIS Application for Early Detection Tracks Hospital Reported Symptoms. Case Study (Ontario Canada) Online, Interactive Maps used to Keep Communities Informed

As a way to keep the community members, community health providers and stakeholders informed, medical centre's and officers in Ontario, Canada, are working with GIS professionals to make health information available online. They use the application, based on ESRI's ArcGIS Server technology, which generates summary maps of real-time respiratory and gastrointestinal data reported in hospital emergency rooms. Online access to these maps gives community stakeholders an at-a-glance picture of where to expect

crisis in these illnesses. The maps serve to inform decisions made by public health workers as well as family physicians, community care access centers, long-term care facilities, school and child care center administrators, and the general public.

2.5 DESIGN METHODOLOGIES USED PREVIOUSLY IN HEALTH SYSTEMS

According to Elliott (2004), a system development methodology refers to the framework that is used to structure, plan, and control the process of developing an information system. A wide variety of such frameworks have evolved over the years, each with its own recognized strengths and weaknesses. One system development methodology is not necessarily suitable for use by all projects. Each of the available methodologies is best suited to specific kinds of projects, based on various technical, organizational, project and team considerations.

2.5.1 A Case Study of the Application of the Systems Development Life Cycle (SDLC) in 21st Century Health Care

The waterfall Model is a linear sequential flow in which progress is seen as flowing steadily downwards (like a waterfall) through the phases of software implementation. This means that any phase in the development process begins only if the previous phase is complete. The waterfall approach does not define the process to go back to the previous phase to handle changes in requirement. The waterfall approach is the earliest approach that was used for software development. (Whitten, Bentley, and Dittman 2004) advocated an eight step series of phases, although the names of the stages changed somewhat. The methodology proceeded through the steps of Scope definition, Problem

analysis, Requirements analysis, Logical design, Decision analysis, Physical design and integration, Construction and testing, and ending with Installation and delivery.

2.5.2 Home Health System and the SDLC

"Home Health, or Home Care, is the portion of health care that is carried out at the patient's home or residence. It is a participatory arrangement that eliminates the need for constant trips to the hospital for routine procedures. For example, patients take their own blood pressure (or heart rate, glucose level, etc.) using a device hooked up near their bed at home. The results are transmitted to the hospital (or in this case, the Home Health facility near General Hospital) electronically and are immediately processed, inspected, and monitored by attending staff. In addition, there is a Lifeline feature available to elderly or other homebound individuals. The unit includes a button worn on a necklace or bracelet that the patient can push should they need assistance ("Home Health", 2010). Periodically, clinicians (e.g., nurses, physical therapists, etc.) will visit the patient in their home to monitor their progress and perform routine inspections and maintenance on the technology.

The author was approached by his neighbor, a retired accounting faculty member who is a volunteer at General Hospital. He had been asked by hospital administration to investigate the acquisition, and eventual purchase, of software to facilitate and help coordinate the Home Health care portion of their business. After an initial meeting to offer help and familiarize ourselves with the task at hand, we met with staff (i.e., both management and the end-users) at the Home Health facility to begin our research".

2.5.3 Application of Incremental Prototyping Methodology in Trachoma Grading System

Trachoma Grading system is used in an effort to standardize diagnosis in field surveys and research studies. Dawnson, Jones and Tarizzo 1981 (Dawson, C. R., Jones, B. R., & Tarizzo, M. L. (1981). This grading system was developed "describe more precisely the intensity of active Trachoma. The system is used to diagnose Trachoma by grading the symptoms as follows F_0 for no follicies,F_1 for follicles present,P_1 for minimal individual vascular tufts prominent but deep sub conjunctiva vessels on the tarsus not obscured;P_2 for moderate, more prominent papilla and normal vessels appear hazy even when seen by the naked eye; and P_3 for pronounced conjunctiva thickened and opaque, normal vessels on the tarsus are hidden over more than half of the surface. Conjuctival scarring (C) is graded C_0 for no scarring on the conjuctival;C1 for Mild, fine ,scattered scars on the upper tarsal conjunctiva or scars on the other parts of conjuctiva;C_2 for moderate, more severe scarring but without shortening or distortion of upper tarsus; and C_3 for severe scarring with distortion of the upper tarsus. Trichiasis /entropion T/E is scored as T/E_0 for no trichiasis or entropion,T/E_1 for lashes deviated towards the eye but not touching the globe.T/E_2 for lashes touching the globe but not rubbing the cornea and T/E_3 for lashes constantly rubbing on cornea .Corneal scarring (CC) is scored for CC_0 for absent ,CC_1 for minimal scarring or opacity not involving the visual axis. The system selects the upper tarsal conjunctiva to provide an "index of Trachomatous inflammation in the eye as a whole" This type of system used the incremental prototyping in which the final product is built as separate prototype which is then merged in the overall design.

CHAPTER THREE

SYSTEM ANALYSIS AND DESIGN METHODOLOGY

3.0 INTRODUCTION

Systems design is the process of defining the architecture, components, modules, interfaces, and data for a system to satisfy specified requirements, This chapter outlines the system methodology applied, requirement specifications, user requirement specification, functional and nonfunctional requirements, hardware and software specifications, stakeholders involved in the study, modeling processes, this involves the use case diagram and activity diagram, input into the system, user interface architectural design, output from the design and various output design screens.

3.1 SYSTEM DESIGN METHODOLOGY

The system design methodology that was used to build the system was the Evolutionary prototyping model resulting to the design methodology being experimental. This is because the system is dealing with a sensitive issue which is based on human life; hence all the requirements are to be well placed at the beginning in order to know the actual requirements and the capability of the system.

3.1.1 System Methodology used when Developing Trachoma System

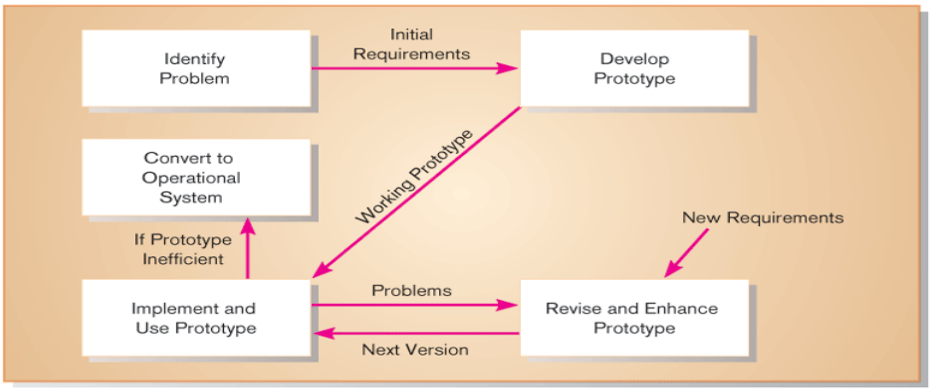
EVOLUTIONARY

In evolutionary development the initial system is rapidly developed from very abstract specifications. The Medical practitioners then refine the input to produce a system which

satisfies their needs. The system is then re-implemented using a more structured approach to produce a more robust and maintainable system.

Benefits of Evolutionary Prototyping in the study

- It allows the researcher to experiment with the system to improve the requirements as per the collection of data in Appendix 1.
- Evolutionary prototyping allows the Community Health Workers to gain a positive impression from the use of the system.
- Evolutionary prototyping allows quicker delivery of the Trachoma Monitoring system.
- Evolutionary prototyping allows refinement of the Trachoma Monitoring system to meet its requirement specification and provide minor improvements, rather than re-writing a whole program incase of any error.
- During the evolutionary prototype for developing Trachoma Monitoring system the following phases were followed:



Source: Adapted from "Prototyping: The New Paradigm for Systems Development," by J. D. Naumann and A. M. Jenkins, *MIS Quarterly* 6 (3): 29–44.

Figure 3.01: Evolutionary Methodology

Phase I: Defining the basic requirements and analysis

Requirement and analysis Phase. This phase included the creation of a concept in which the developing of the Trachoma system revolved on.

Phase II: Developing a working prototype

During the design of the system the technologies used included, Java-Android for mobile client and Visual Basic.net for administration module. The technologies that were used for development of the prototype were:

(i) Android software development kit for creating Android executable application;

(ii) Java language for developing user interface.

(iii) Visual Basic.Net for generating the reports.

(iii) Google API for the maps showing the location of the patient.

Phase III: Testing and implementing

Software can be evaluated with respect to different aspects like functionality, reliability, usability, efficiency, maintainability, portability.

Community Health Worker had to ensure that the module they were using to collect the data was functional and that they were able to collect and forward data to the Medical practitioners for action.

The Medical practitioners ensured that the module for receiving the patients' data was functional and that they were able to locate the patients' household using the latitudes and the longitudes of the location.

The AMREF Coordinators also ensured that the module would provide the position of the patients on the map and that the levels of the patients were displayed on the graph according to the location to enable them locate them in their respective households.

During testing and evaluation, data that was collected from the field were used to ensure that the system was meeting the requirement specifications. Chapter four and five have details on how the system was tested and implemented.

3.2 REQUIREMENT SPECIFICATION

Requirement Specification is the official document that sets out what the system is expected to provide. The requirements should be stated so that there is traceability between the requirements and the final system. This means that it should be possible to take each specified requirement and map it onto the part of system.

In this research the main requirement specification which provides the gap of the study included:

(i) To improve the collection and reporting of aggregated health data of Trachoma patients through mobile technologies to the concerned stakeholders.

(ii) To identify specific locations vulnerable to Trachoma within Kajiado County.

(iii) To identify congregate groups targeted for preventive measures of Trachoma disease.

(iv) To create maps to help AMREF organizations establish the location of a patient and in Kajiado County.

3.2.1 User Requirement Specification

It is a document that defines what a proposed system must be capable of doing to solve the problems of a defined set of potential users of such a system. This was only possible by gathering information from the various stake holders.

To come up with the database, interviews and document analysis/record inspection were used. The Interview guide used are in Appendix (i) and Appendix (ii). They were used to gather information from Community Health Workers and AMREF coordinators. Face to face interviews were used because they provided an opportunity to collect more information through probing. Document analysis was used to collect data on the previously infected patients on existing Trachoma disease within the health centers'. The information was used to generate the fields for the database that was used for analyzing and generating reports.

3.2.2 Functional Requirement Specification

Functional requirements define how software behaves to meet user needs.

- The data collection mobile module provided interface to report Trachoma patient's routine data to the server side module by automatically picking the latitudes and longitudes of where the patient were and offered a feature to send the data to the main database server.
- The server module of the system provided interfaces to visualize and aggregate Trachoma patients' data. It provided centralized data from different locations in a graphical format for easy interpretation and quick decision making by the AMREF coordinators.

3.2.3 Non-Functional Requirements Specification

Nonfunctional requirements define the constraints on the services offered by the system. The development process of the system was described.

- The data collection module operated in Android mobile device (Samsung), the report modules operated in Visual Basic.Net. Android platform was suitable for (GIS applications) hence suitable for the system.
- The GIS application provided access to only authorized users with username and password authentication method.
- Users of the system were to be registered in a database authenticated using the username and password to gain access to the database server.

3.2.4 Hardware and Software Requirement

Table 2 shows the hardware and software required for the system to work.

Table 2: Hardware and Software Requirements

ITEM	**PREFERRED**
Processor and RAM	2.8 Ghz or greater and RAM of 4 Gigabytes
Monitor and Hard Disk	19 inch LCD monitor (not widescreen) with resolution of at least 1024x768 and Hard Disk of 80 GB
Modems	Orange and Safaricom Modems and internet of Broadband 512Mb or faster,
Mobile phones	GIS enabled
Development Platform	Windows 7 Professional, Android Operating System, Visual Basic.net, Java ME, .NET Framework, Microsoft Access

3.3 ETHICAL CONSIDERATIONS

The following ethical issues were considered:

(i) Respect for the dignity of (research participants) which included medical practitioners, CHW and patients was prioritised.

(ii) Full consent was obtained from the Doctor in charge of Kajiado prior to the study.

(iii) A adequate level of confidentiality of the patient data was ensured to safe guard the medical information collected.

3.4 STAKE HOLDERS

Steering committee was formed which consisted of a representative from AMREF, Medical practitioners and Community Health Worker. They played the following roles during the development.

Community Health Workers

Role:

- Collected data using the mobile phones and submitted to the database.
- Provided follow up treatment to the patients depending on the stage of Trachoma.

Medical practitioners

Role

- Received the data sent by Community Health Workers from the field and provided the information to the AMREF coordinators to take action.
- Provided treatment for all the Trachoma patients at different stages.

AMREF Coordinators

Role

- Received the reports from the system on the location of the patients and stages of Trachoma.
- Allocated the Community Health Workers and Medical practitioners to attend to the patients immediately.
- Facilitated treatment of Trachoma patients' by providing antibiotics and surgery facilities to the Community Health Workers and the Medical practitioners.

Household Heads.

Informed the Community Health Workers of any existence of Trachoma patients within the Households.

3.5 MODELLING PROCESS

Unified Modeling Language was used to provide a comprehensive notation for communicating the requirements, architecture, implementation, deployment, and states of the system.

3.5.1 Use Case Diagram

Fig 3.02 is a use case diagram showing how the Community Health Worker communicates with the system. The Community Health Workers Mobile is installed with the system. The CHW logs into the system by using the mobile pin number. He activates

the system and enters the patients' data and sends it to the server for report generation by AMREF coordinators' and the Medical Practitioners.

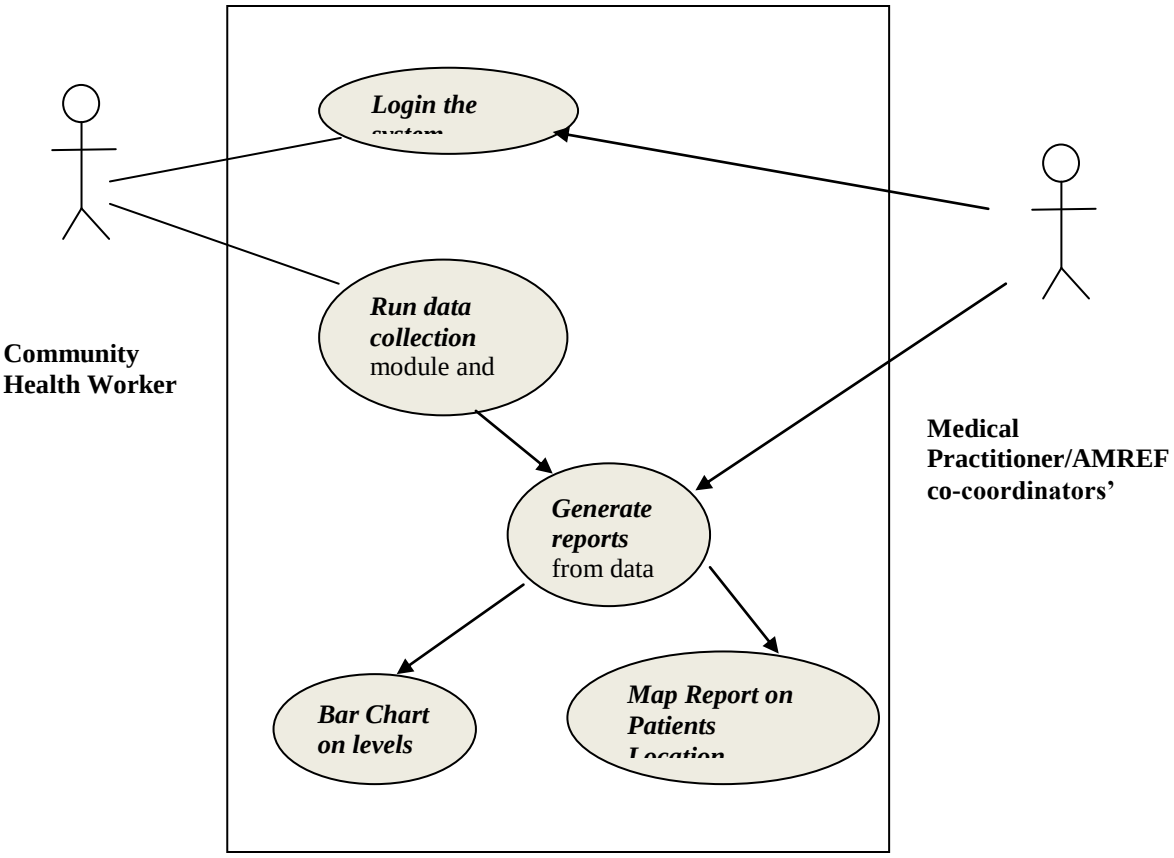


Figure 3.02: Use Case Diagram For Trachoma System

3.5.2 Activity Diagram

Activity diagram shows the flow of events through a use case diagram. It defines: where the workflow starts, what activities occur during the workflow, in what order the activities occur and where it ends. In Fig 3.03, the CHW captures and sends patient's information to the database server. The Medical practitioners and the AMREF coordinators' are able to view the reports showing the location and the stage of Trachoma. This helps them to take necessary action towards the patients' treatment.

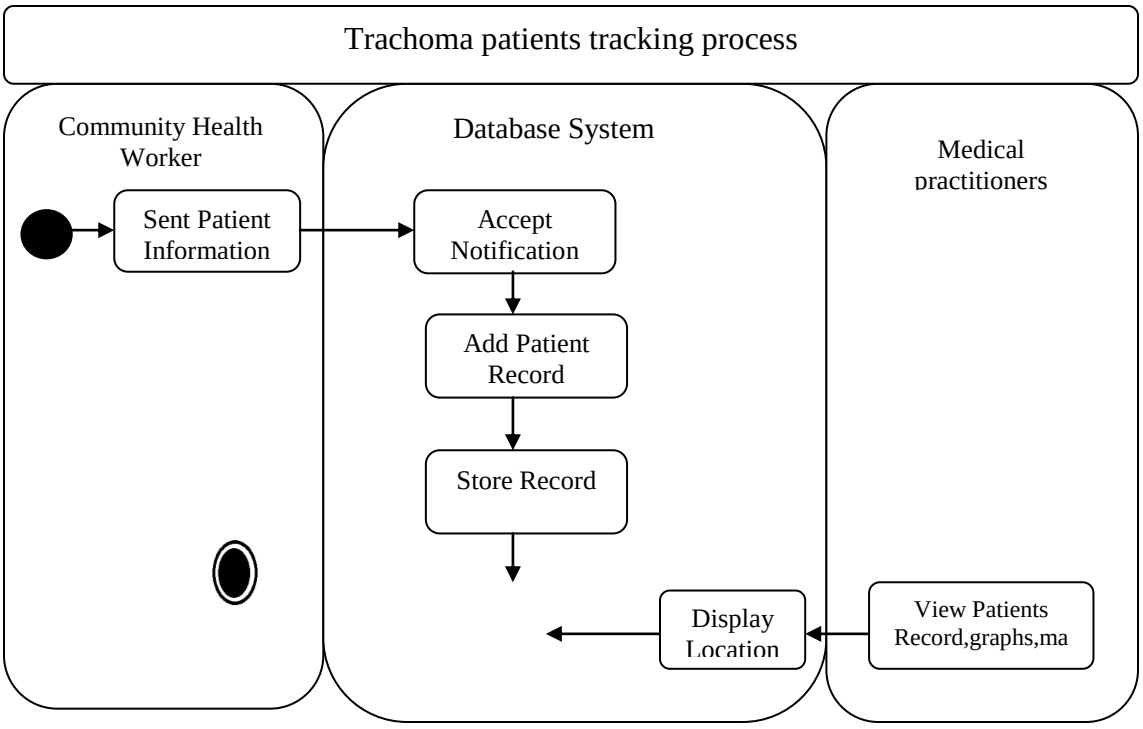


Diagram showing activity diagram of the GIS Trachoma Patients Tracking system.

Figure 3.03: Activity Diagram For Trachoma System

3.6 INPUT INTO THE SYSTEM

Input into the system defines the data needed by the system. The data captured into the system included details about the patient such as household name/id, patient name, age of patient, location, Community Health Worker concerned and stage of Trachoma patient.

3.5.1 User Interface Design

The Community Health Workers had mobile telephones which were GIS enabled and installed with the system. The user interface in fig 3.04 was used to aid in collection of the data having the latitudes and longitudes(co-ordinates) for the exact locality for patients and other information. The data was forwarded to a central database server which

needed to be online for the Medical practitioners to receive information. With the new system, the Community Health Workers' were able to provide accurate and instant information about the patients' leading to speedy attendance which then enabled the Medical practitioners to act promptly by providing treatment.

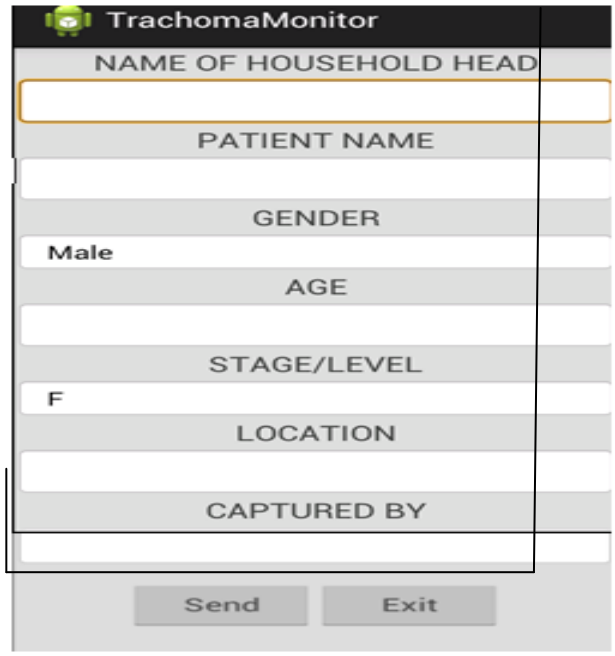


Figure 3.04: User Interface Screen Shot

3.7 PROCESSING

3.7.1 Architectural Design for the Trachoma System

Fig 3.05 shows the architecture design which shows the components, modules, interfaces, and data for The Trachoma system used to satisfy specified requirements.

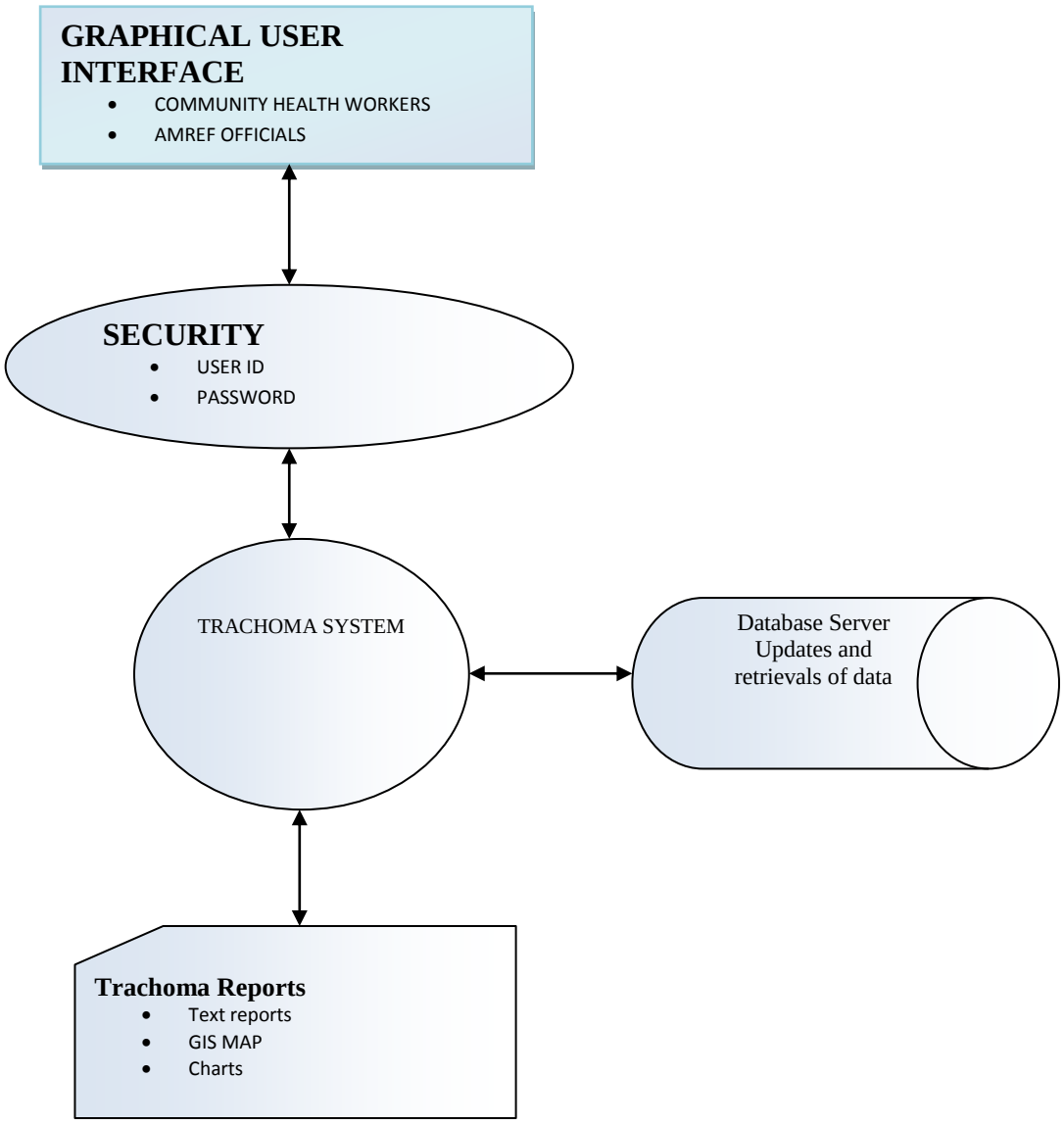


Figure 3.05: Architectural Design For Trachoma System

3.8 OUTPUT FROM THE SYSTEM

After the process, the output was generated which consisted of the visual map showing the location of the patient and the level. The design screens for the output are as shown in fig 3.06(a) It shows a report showing the details of "Trachoma level by patients' age report" generated as shown in Appendix (iii).

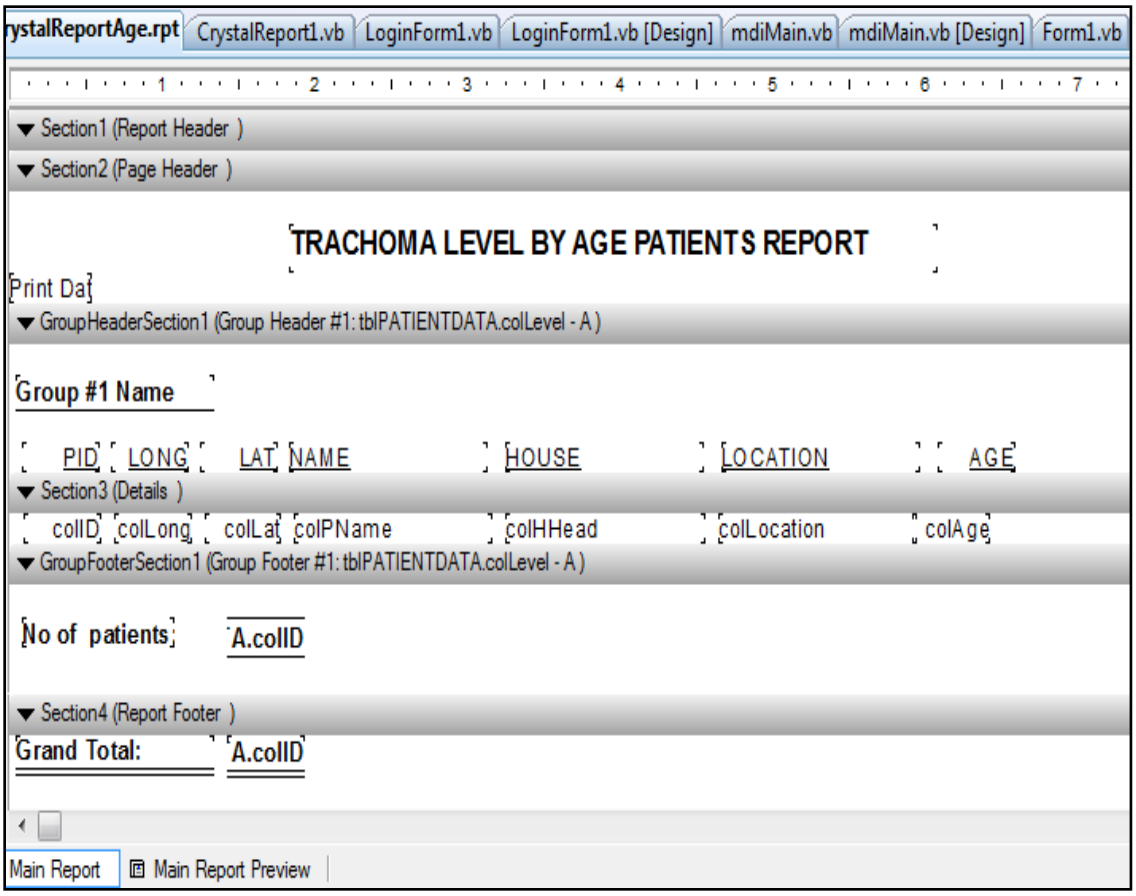


Figure 3.06 (A): Design Screen For Level By Patients Age Report

Fig 3.06(b) enables the Trachoma level by patients age report to be generated as a graph as shown in Appendix iii (b).

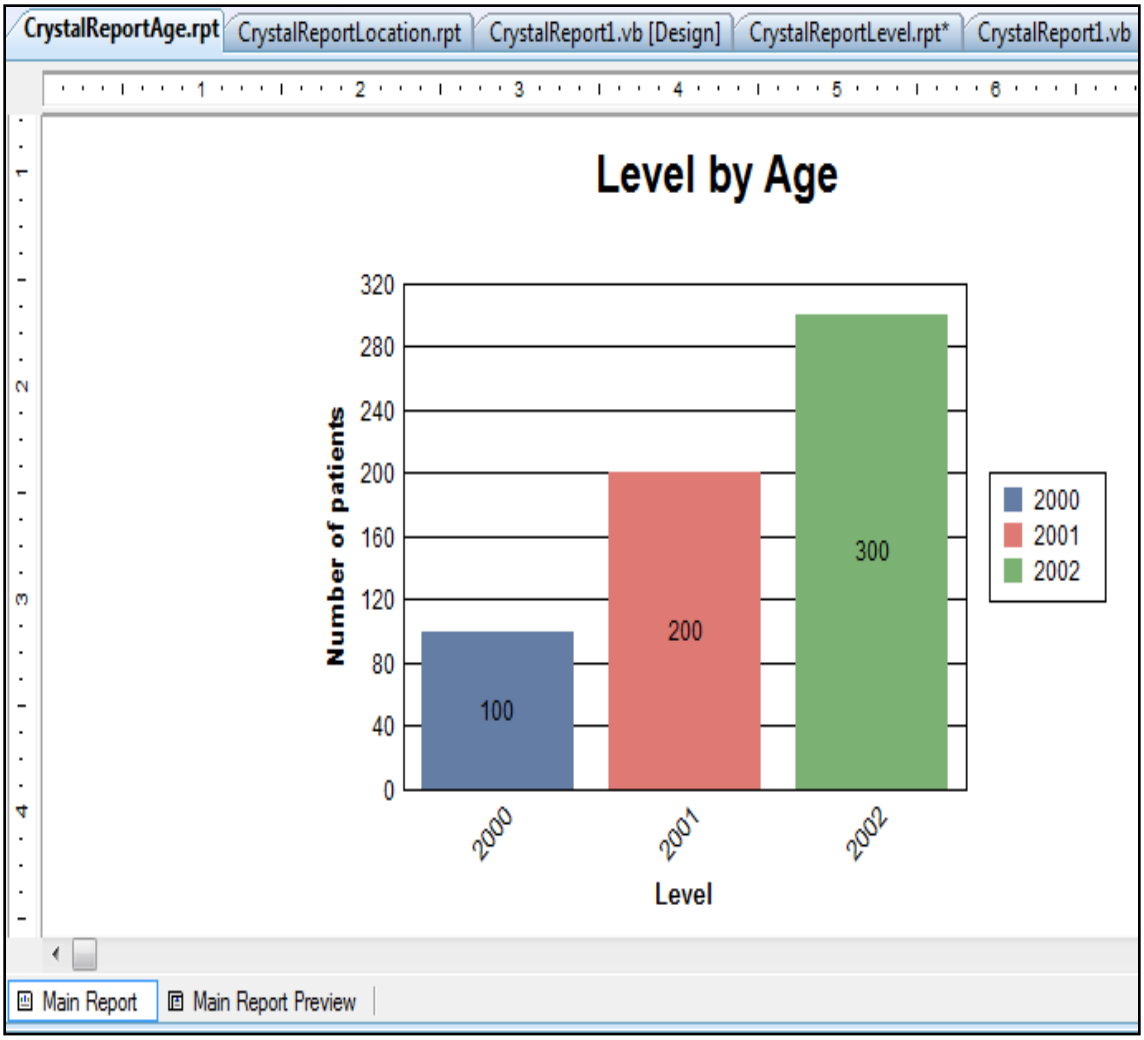


Figure 3.06 (B): Design Screen For Level By Age Bar Chart Report

Fig 3.07(a) enables the Trachoma patients report to be generated as per the gender as shown in Appendix (vi).

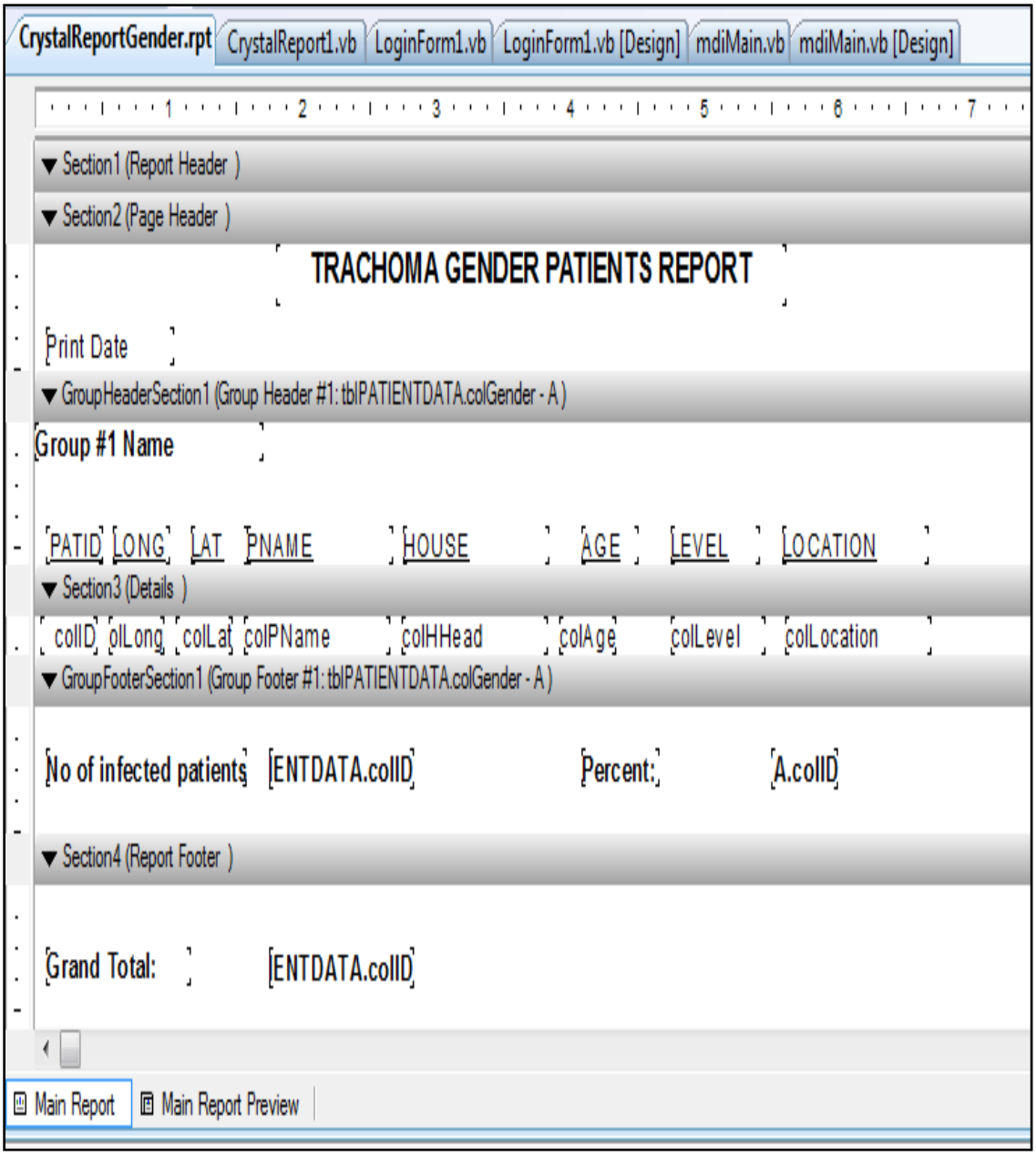


Figure 3.07(A): Design Screen For Gender Report

Fig 3.07(b) enables the Trachoma by gender report to be generated as a graph as shown in appendix (vi).

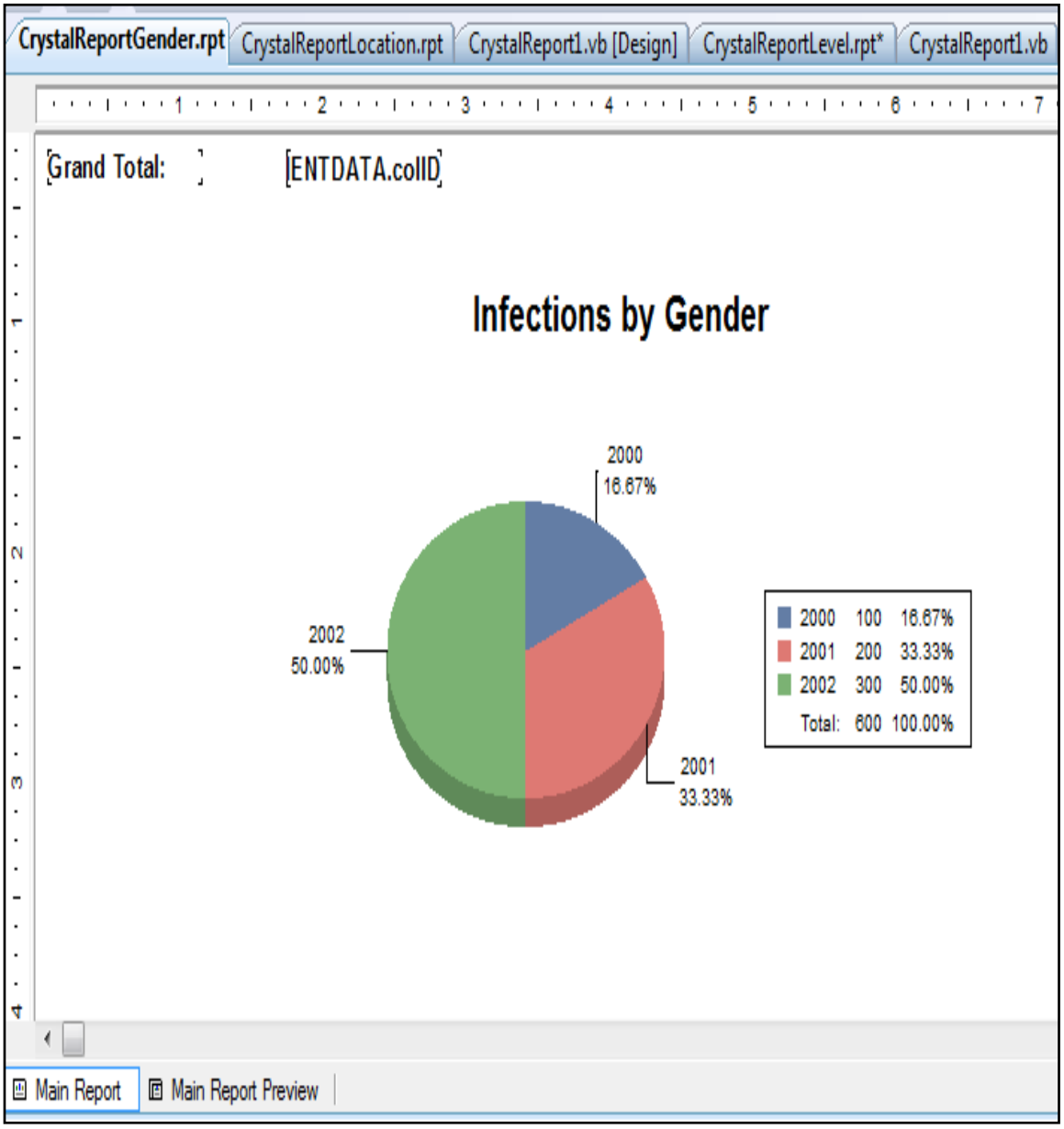


Figure 3.07(B): Design Screen For Gender Pie Chart Report

Fig 3.08(a) enables the Trachoma patients report to be displayed as per the location as shown in Appendix (iv).

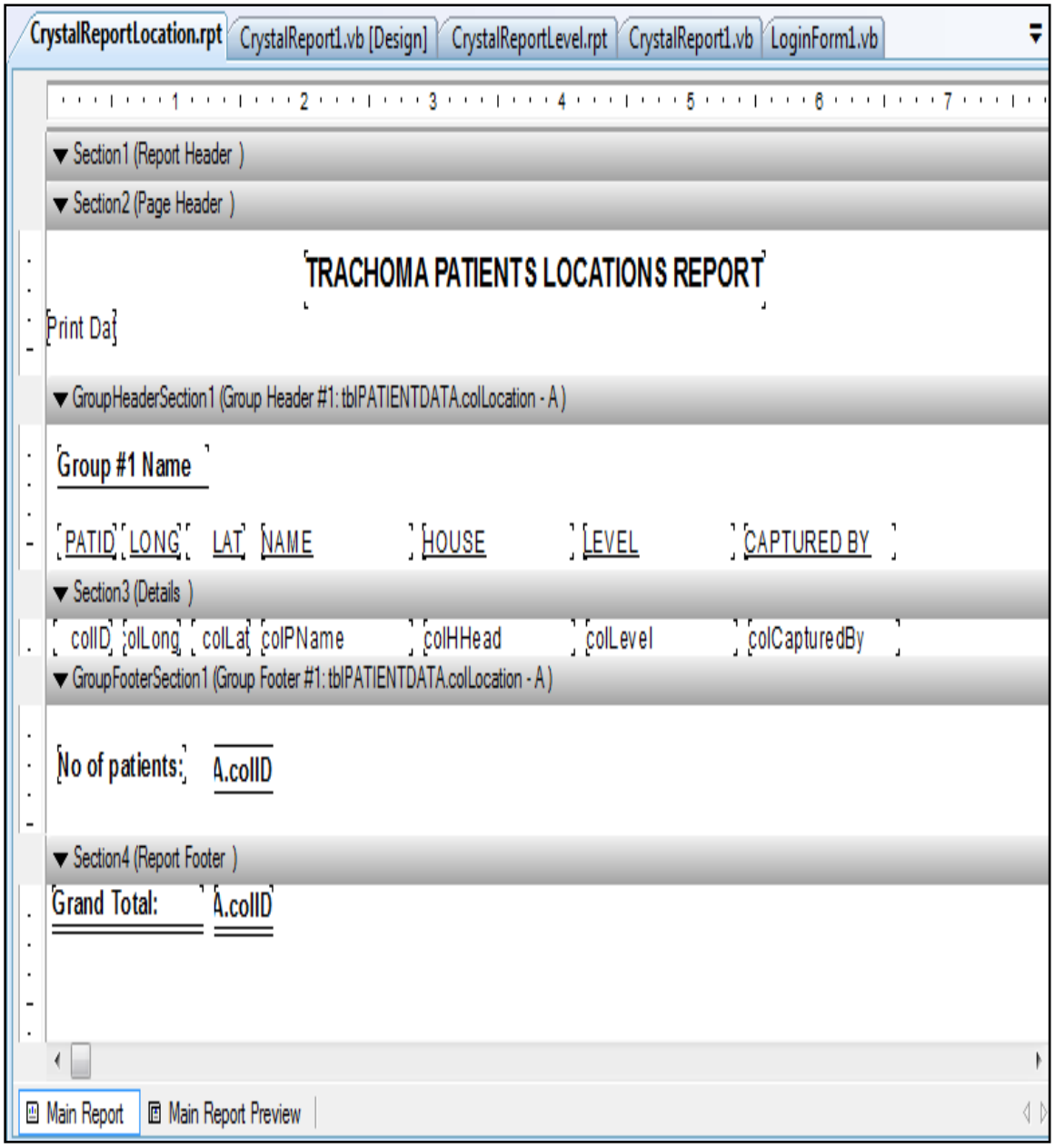


Figure 3.08(A): Design Screen For Patients Location Report

Fig 3.08(b) enables the Trachoma patients report to be displayed as per the location in a pie chart graph as shown in appendix (iv).

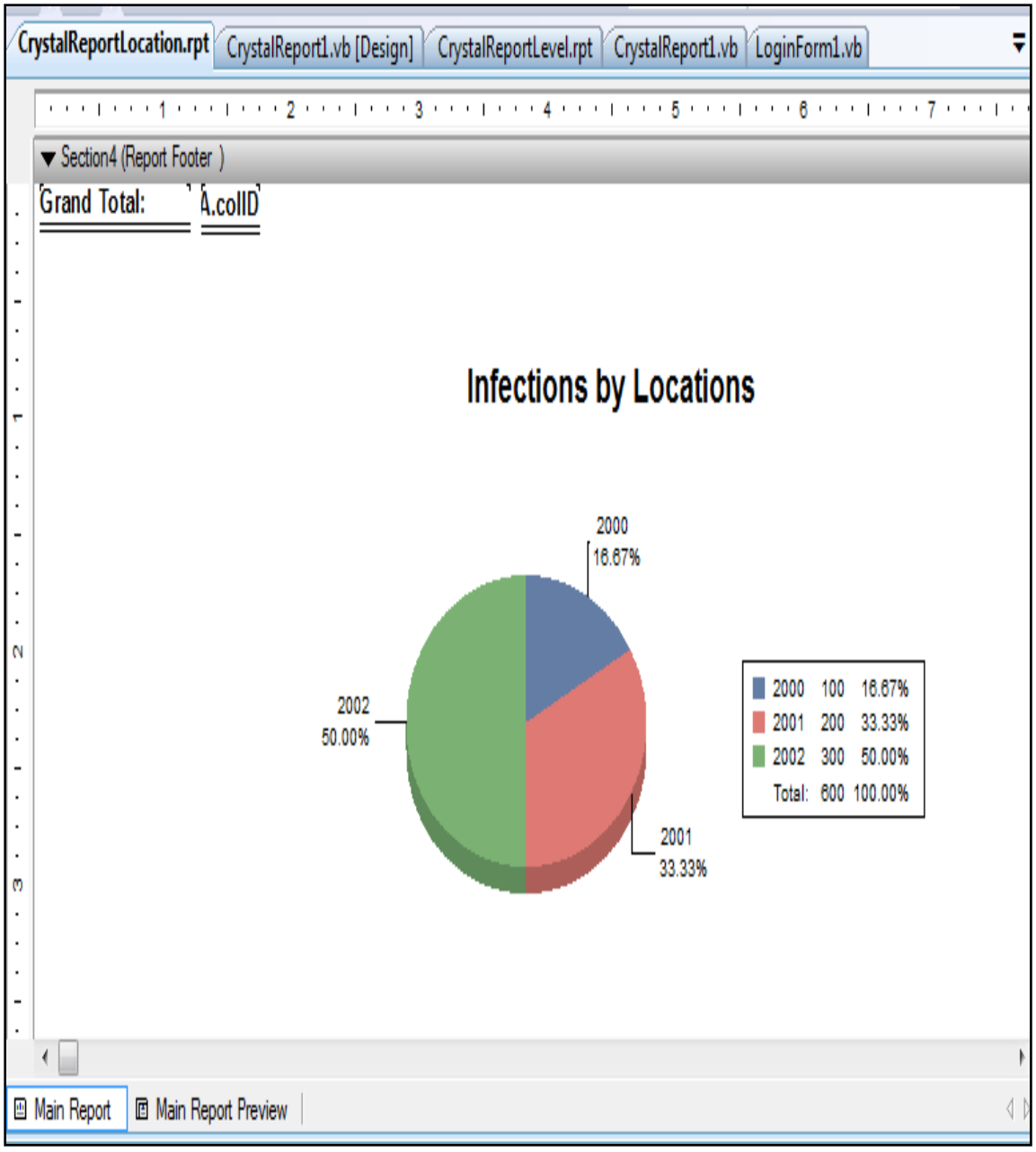


Figure 3.08(B): Design Screen For Patients Location Pie Chart Report

Fig 3.09(a) enables the Trachoma patients report to be displayed as per the level of Trachoma as shown in Appendix (v).

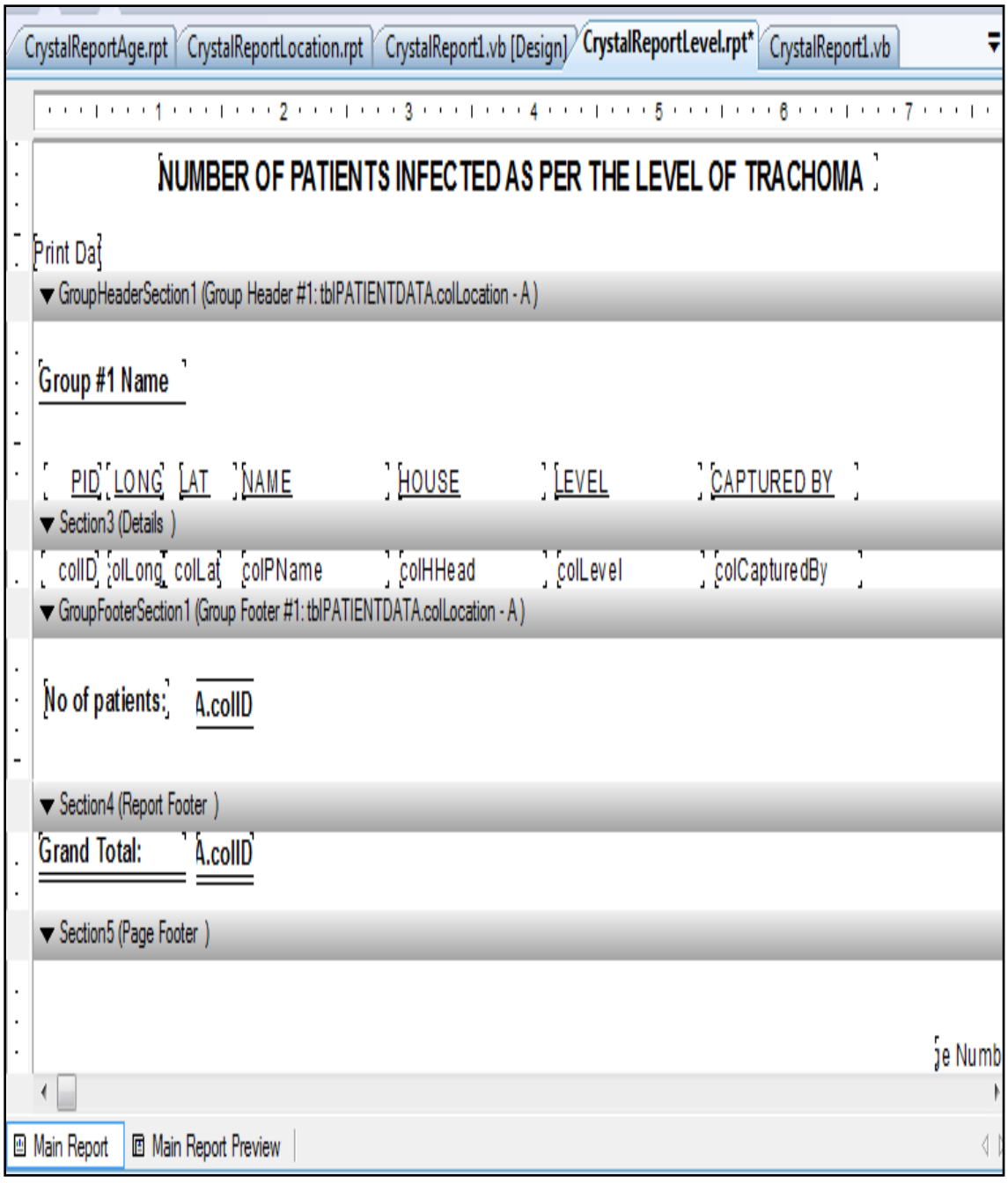


Figure 3.09(A): Design Screen For Patients Level Report

Fig 3.09(b) enables the Trachoma patients to be displayed as per the level of Trachoma in a graph as shown in appendix (v).

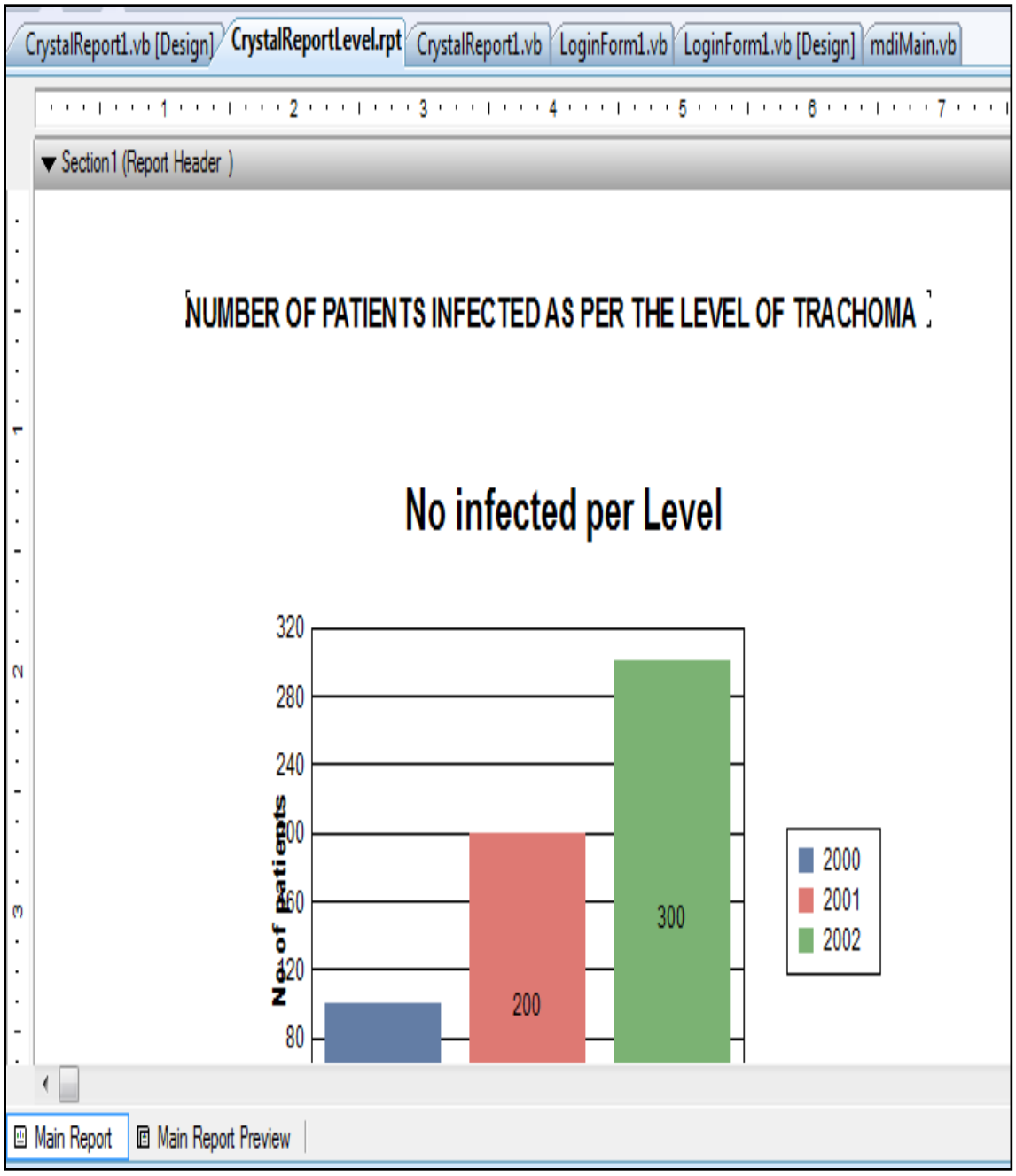


Figure 3.09(B): Design Screen For Patients Level Bar Chart Report

PATIENT LOCATION IDENTIFICATION REPORT

Fig 3.10 displays the location of a patient making it easy for the medical practitioners to locate the patient.

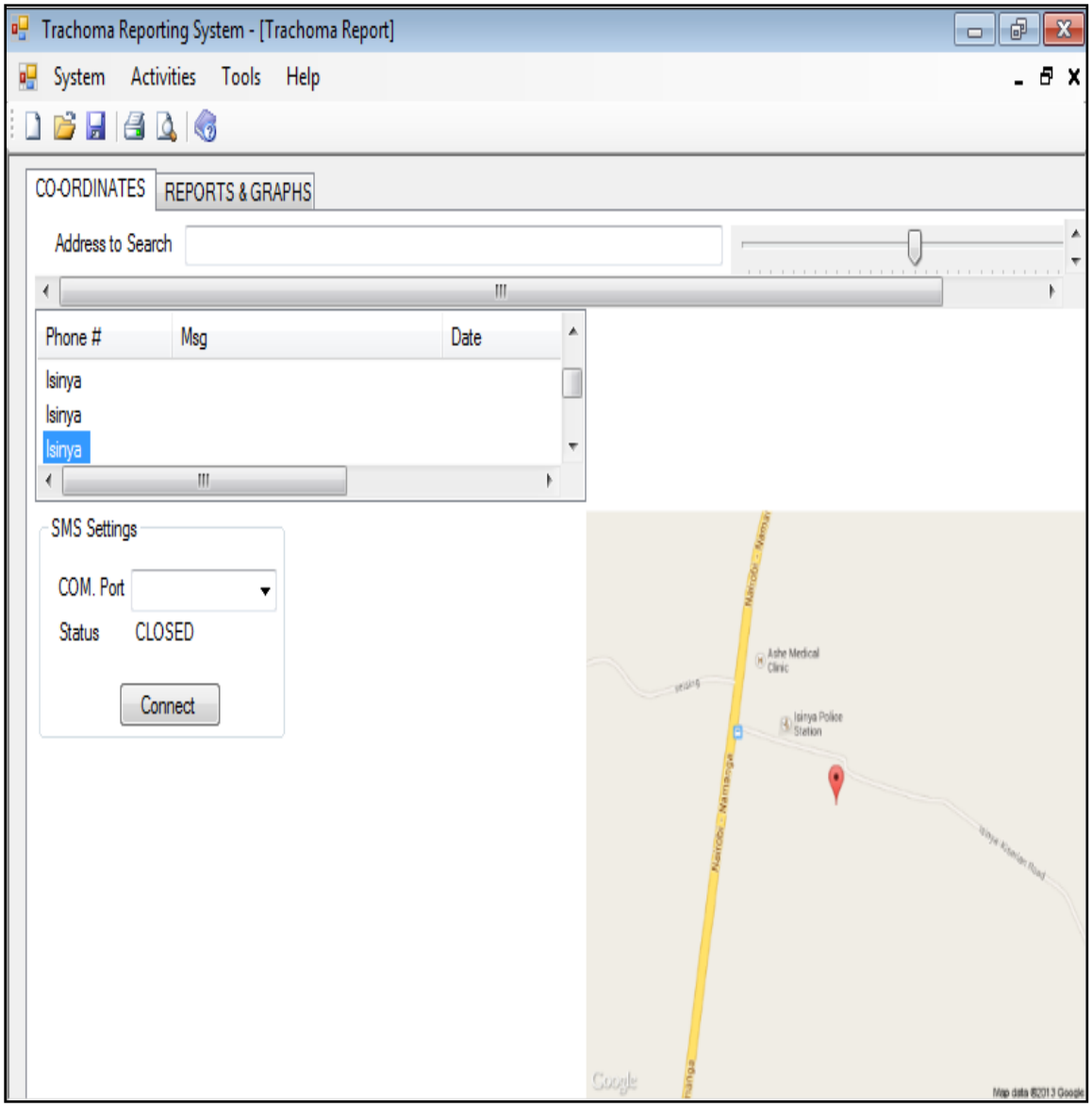


Figure 3.10: Patient Identification Report

Fig 3.11 shows the design for the general report for Trachoma patients

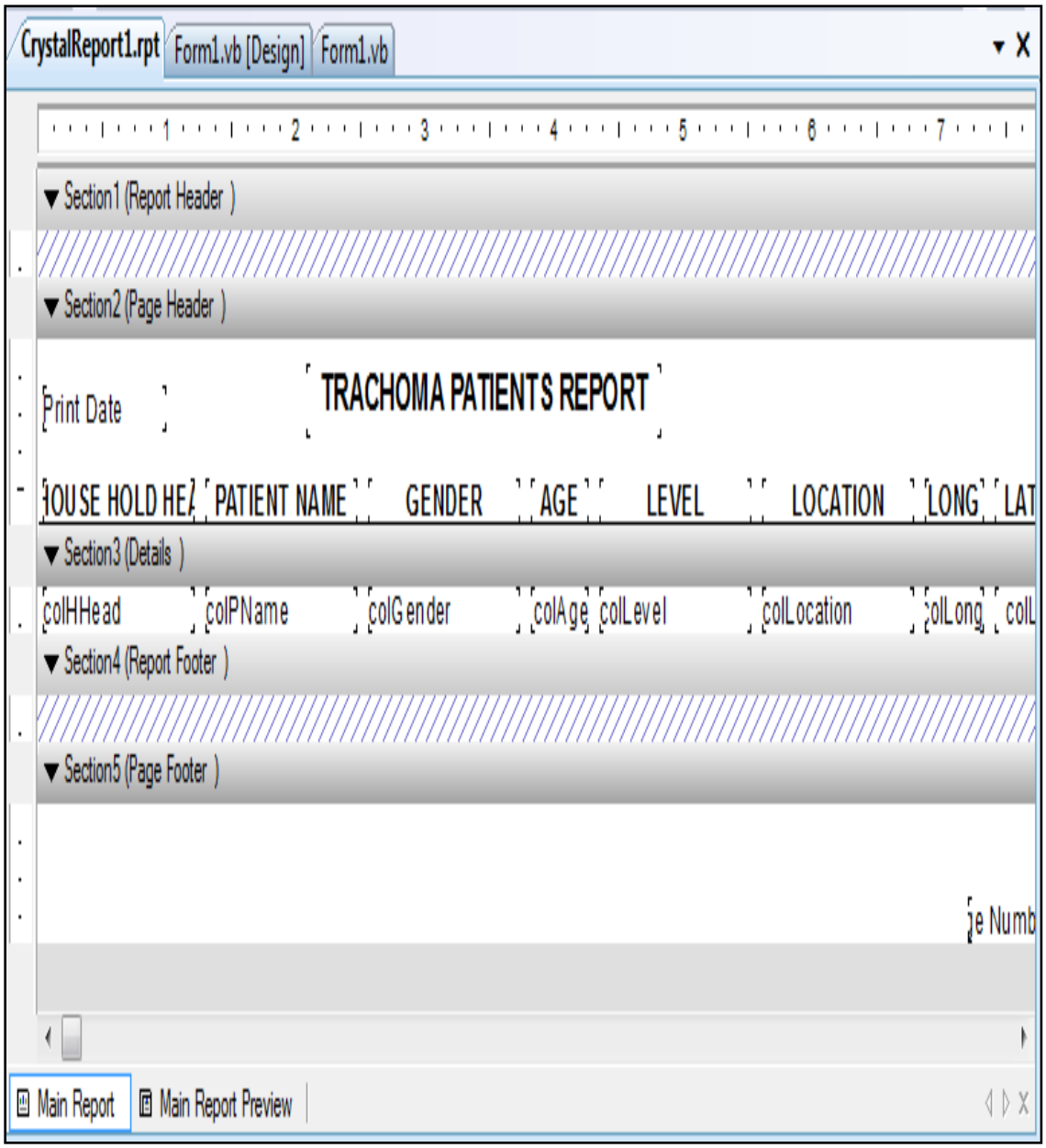


Figure 3.11: General Report For Trachoma Patients

CHAPTER FOUR

SYSTEM DEVELOPMENT AND TESTING

4.0 INTRODUCTION

This chapter highlights the system development, system test plan, test walkthrough and test data.

4.1 SYSTEM DEVELOPMENT

The Trachoma system was developed as per the requirement specifications highlighted in Chapter three. The codes are shown in Appendix (x).

The system was developed in the following platform;

ANDROID OPERATING SYSTEM

Android is an operating system with a user interface and based on Linux kernel. The Community Health Worker uses a mobile phone with touchscreen technology for data collection. This is designed for direct manipulation and responds to real-world actions. Android was also chosen to develop the Trachoma system because it has the Android Debug Bridge which is a toolkit included in the Android development package and it consists of both client and server-side programs that communicate with one another.

JAVA PROGRAMMING

Trachoma System is developed to operate on Android Operating System platform, Java programming language was used for developing the back end module interface because of its compatibility with the Android Software Development Kit. Java was used to

develop stable and responsive applications that communicate with one another using well-defined protocols.

VISUAL BASIC .NET

This programming language was used to develop the codes and generate the various reports required for decision making by the AMREF coordinators. It was seen as adequate for the development because of the features in it. This includes the use of graphs which represent data in a more understandable way and has web application features that can further be used to advance the Trachoma Monitoring system .

GOOGLE APIS CLIENT LIBRARY FOR JAVA

Google APIS client library for java, is an easy to use and efficient library. Java Client Library for accessing Google APIS offers a variety of services on top of the Android platform which is required to enable the Trachoma system operate efficiently. The Google APIS enables addition of powerful Google features like maps which is used to identify the exact location of a patient.

The system has the following codes; Splash screen, Login, Data capturing, Database connectivity, various reports, backup and restoring system code.

Splash Screen Code (splashscreen1.vb)

Trachoma reporting system Splash screen is an introduction page of the program. It was developed using Visual Studio.Net built-in splash screen template and personalized with several additional short lines of Visual Basic code.

Login Window Code(loginform1.vb)

The login form is used to verify username and password of the users.

Form Manager Code.(mdiform1.vb)

It provides a link to different forms on the screen.

Database Connectivity Code(Database.vb)

It enables connection of the database to the respective forms for the sake of data capturing.

Backup Code(frmbackup.vb)

It provides a code for performing the backup of the Trachoma Monitoring System.

Restoration Code(frmrestoe.vb)

It provides a code for performing the restoration of the Trachoma Monitoring System.

Report Codes. These codes are used to generate the various reports of the Trachoma Monitoring system. (crystalreport1, cystalreportage, crystalreportgender, cystaleportlevel, crystalreportlocation)

Trachoma.apk. code. It is the client side software to be installed in the mobile phone.

4.2 SYSTEM TESTING

4.2.1 Test Plan

Before implementing the GIS Trachoma Tracking system, a test plan was developed and tested on a given set of test data as shown on Appendix (vii). The output of the test data matched the expected results. The following platforms were tested:

- **Network connectivity**

The GIS Trachoma Monitoring system which was with the community health worker remained online for connectivity to the database server at the AMREF. The Safaricom Modem was tested to ensure that the messages from the CHW in the fields were transmitted to the database server successfully.

The Orange Modem was tested to ensure that the longitudes and the latitudes captured were used to locate the exact position of a patient on a map.

- **Database**

The database was tested to ensure that the data send by the CHW was captured and saved for report generation by the Medical practitioners and the AMREF Coordinators.

- **GIS Tracking and monitoring system**

The developed system was tested to ensure that it met the system requirement specifications. Unit testing was done on the client module and the server module. The system test was finally done to ensure that both modules worked as a component.

(i) The data was tested to determine whether the system could locate the geographical area of the patient using the longitudes and latitudes on a map. The results are shown in Fig 3.10 which showed the location of a patient within Isinya region.

(ii) The data was tested to determine if the system could provide a report on the congregate groups to be targeted for Trachoma prevention. The results are shown in Appendix (iii).Report showed that those between 10 and 18 years were to be targeted for preventive treatment which is facial (F) and Antibiotics (A) treatment.

(iii) The system was tested to determine if it can provide information on the location of Trachoma as per the region, age etc. The result are shown in Appendix (iv). In this case, Mile 46 has the highest number of Trachoma infected patients while Kitengela and Isinya have the least infected.

4.2.2 Test Walkthrough

The stakeholders were involved in the test walkthrough. This ensured that confidence among them was enhanced as per the system operation. Each stakeholder contributed towards the operation of the system.

(i) Community Health Workers

They tested the mobile system to ensure that data could be collected and sent to the database server.

(ii) Medical practitioners

They tested the system to ensure that the system received the data sent by Community Health Workers from the field.

(iii) AMREF coordinators

They tested whether the system could generate reports from the captured data sent to the database.

4.3 TEST DATA

The test data was used to test whether the system responded as required. Appendix (vii) shows the test data used in testing the Trachoma monitoring system.

Result conclusion: The test data used matched the expected output of the system as shown in the reports generated.

CHAPTER FIVE

SYSTEM IMPLEMENTATION AND EVALUATION

5.0 IMPLEMENTATION OF TRACHOMA TRACKING SYSTEM

System implementation is the development, installation and testing of system components and delivery of that system into production (Bentley *et. al.*, 2007).

The implementation technique that was used was Phased changeover. Trachoma patients needed continuous monitoring hence, the old system was kept running for some time to enable the Community Health Workers to continue providing the information to the Medical practitioners and the AMREF coordinators. In this study, the old and new systems would be used concurrently until the entire system is installed. This minimizes the risk of failure. Fig 5.01 shows the changeover procedure for the new system.

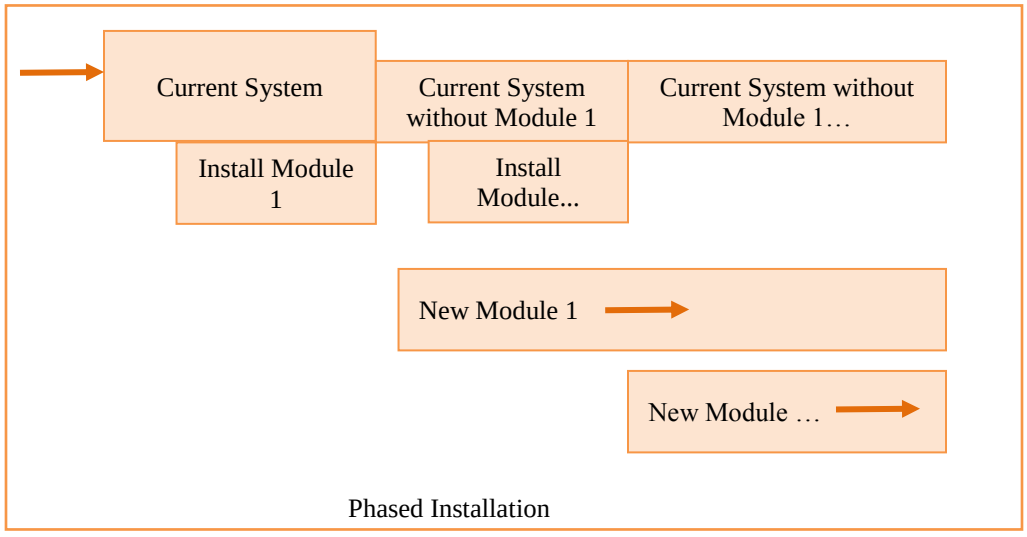


Figure 5.01: Phased Installation

During implementation of the system, it was important to define the stakeholders' roles and responsibilities. This enabled the stakeholders who were working towards the system to understand their individual roles during implementation. The requirements specification of the system was stated to the stakeholders in order to enlighten them on the implications in case any of them was omitted. An example is when a Community Health Worker does not submit the data of an infected patient; Trachoma may spread without the knowledge of the Medical practitioners and the AMREF coordinators.

During implementation the following were considered;

(i) Hardware and software resources.

The necessary and relevant resources were provided. The Community Health Workers were provided with mobile phones which were installed with the GIS software to enable them to locate the latitudes and longitudes of particular positions /household where the patients were situated.

(ii) Training of the Stakeholders

The Community Health Workers were trained on the use of mobile phones and how to send the data to the server.

The Medical practitioners and the AMREF coordinators were taught how to view the reports concerning the patients.

(iii) Consistent support for the system from the AMREF coordinators.

The AMREF coordinators reviewed the system status on regular basis, responding quickly to mitigate barriers like failure of Mobile Phones for a Community Health Worker which would be replaced immediately to avoid delay in data transmission.

(iv) Reward stakeholders (Medical practitioners and Community Health Workers)

Most of the Masaai people prefer traditional methods of treatment as opposed to the modern services offered by hospitals. Physical search of Trachoma Patients was not an easy job. During the survey in Mile 46 it was seen that the Masaai people stay in Manyattas and the distance from one Manyatta to the next was 25 Km. This was a long distance for one to walk as there was no means of transport. Therefore the AMREF Coordinators needed to consider such factors during implementation.

According to Solei, a Community Health Worker, they are never rewarded for their work. He says, "This discourages most of his colleagues from working leading them to drop out hence the spread of Trachoma."

5.1 SYSTEM I NSTALLATION

CLIENT SIDE INSTALLATION

1. Set Security privileges to enable installation of a new software to the mobile phone.
2. Connect the mobile phone to the computer system.
3. From the computer or cd ,Copy the Trachoma.apk system to the mobile phone.
4. From the file manager on the form
5. Click Trachoma Monitor
6. Click on install process.

SERVER SIDE INSTALLATION

INSTALLATION PROCEDURE

1. Open the system folder to locate the folder named **Trachoma Reporting System**
2. Double click on **Trachoma Reporting System** to open.
3. Double click on the **Debug** folder to open.
4. Run the **setup** to install the software plus the required **prerequisite programs** (Just follow . the instructions on the screen to install your software)
5. After installation is complete DON'T RUN THE SYSTEM configure your system database connection (DSN) by following this screen shots.
6. SETTING UP YOUR DATA SOURCE NAME (PATH TO YOUR SYSTEM DB)
7. Start Control panel
8. If using windows 7 change the view of control panel from category view to Large Icons view
9. On the window that appears click on Administrative Tools
10. Double click on Data source (ODBC) icon to open
11. Click on User DSN tab and then click Add to add a new DSN
12. Select a driver for which you want to setup a data source (DSN)
13. On the dialogue box that appears enter the Data Source Name as per what you coded in your system (for this case the DSN is "TRACHOMA") and then click on select button to locate the database you are linking to (i.e It is in the installation folder in a folder called db)

14. Path: C:/Program Files/Trachoma Reporting System/ Trachoma Reporting System/db/trachoma.accdb
15. Locate your database in the Installation folder as indicated and click OK then OK then OK to finish your procedure.
16. You can now run your system by locating it from the Start menu or by double clicking on its Icon from the desktop. (Trachoma Reporting System)

Note : For the system to work, it must be installed in a dot. net environment.

5.2 USER DOCUMENTATION

5.2.1 Client Side Documentation

The CHW collects data from the field. Fig 5.02 was a screen used for collecting data.

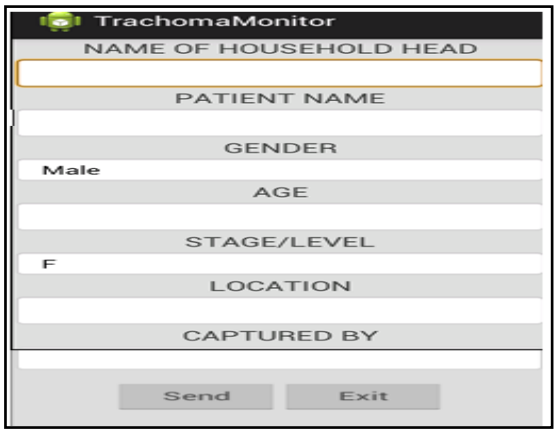


Figure 5.02: User Interface

The data was entered as stated on the fields and sent to the server. Note that the fields for longitude and latitude were not placed because they are captured automatically to the database, depending on the position/location where the CHW is based. Enter the data as per the fields indicated.

5.2.2 Server Side Documentation

The server side documentation provides a guideline on how the reports are generated from the server. To run the system, click on Run command from Visual Basic 2008 environment. The following screen will appear:

SPLASH FORM

Fig 5.03 is a main form that provided connection to the rest of the forms.

Figure 5.03: Splash Screen

LOGIN WINDOW

The AMREF coordinators and the Medical practitioners logged into the system through the login window in Fig 5.04. Any unauthorized users would not be allowed to access the system because they do not have the password and access rights to the system. The following was the login window.

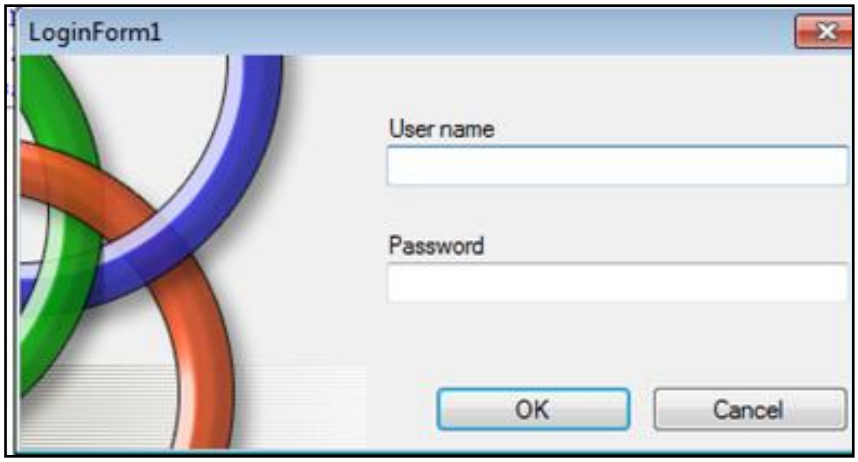


Figure 5.04: Login Window

MDI FORM MANAGER WINDOW

MDI Form Manager this was the main window, which contained the links to perform different operations on the forms. The operations included finding the location of a patient within the map using the coordinates menu and displaying the general textual reports and graphs using the report window.

When the form manager window was selected, the following window appeared.

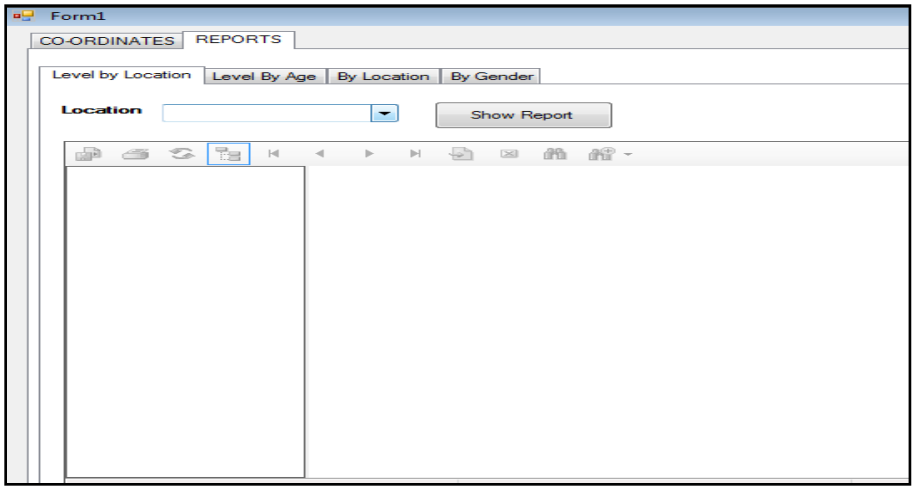


Figure 5.05: Reports Window

The reports were both inform of graphs and text. This was to provide flexibility to the AMREF and Medical practitioners. The different types of reports generated were:

(i) Report showing level by location

This enabled the Medical practitioners to be able to view Trachoma patients in each stage: those in the first level who needed antibiotics (A); those in the second level who needed facial cleaning (F) and those in the third level who needed surgery (S).

(ii) Report showing level by Age

When the user selected level by age option, the age of the patients' were entered in the text boxes provided in the report and the report was displayed according to the age and the stage of the patient. The report showed the children who were between 0-9 years were most infected hence the antibiotics treatment. Those between 10-50 years were most infected and needed facial cleaning while those above 60 years needed surgery.

(iii) Report showing location

When by location option is selected, the patients report is displayed according to the different localities, which includes Mile 46, Bissil, Isinya and Kitengela.

(iv) Report showing Gender

When the user selected the gender option, the Gender report was displayed which showed how many people were infected based on the gender and the age.

BACK UP

The system has a provision for a backup procedure. The backup was taken at the end of the day for recovery purposes in case of any failure.

For the backup procedure, the Activities menu is selected as shown in Fig 5.05. When Backup was selected the following window appeared.

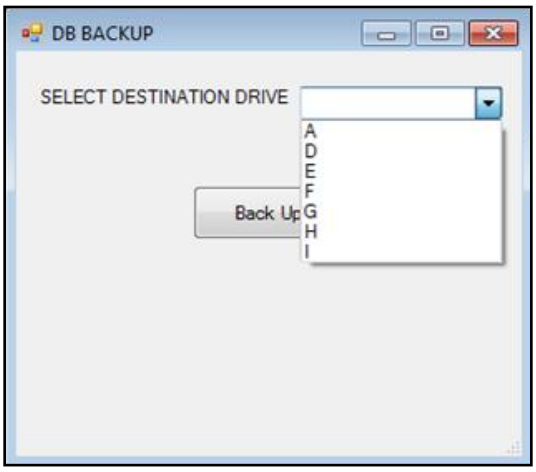
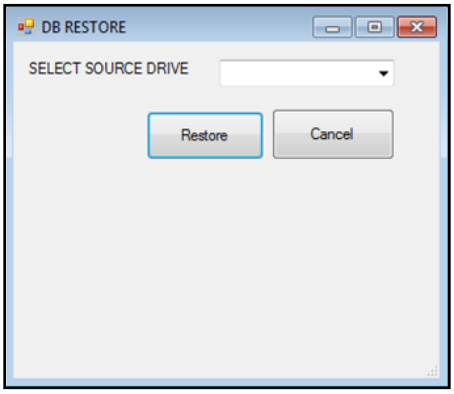


Figure 5.06: Backup Window

The user selects the destination drive where the data is to be backed up and then clicks on backup.

RESTORING OF DATA

In case of data lose, data can be restored. The following window shows how it can be restored.



The user selects the drive which ranges from Drive A to I to restore the data then clicks on Restore and this enables the data to be automatically restored.

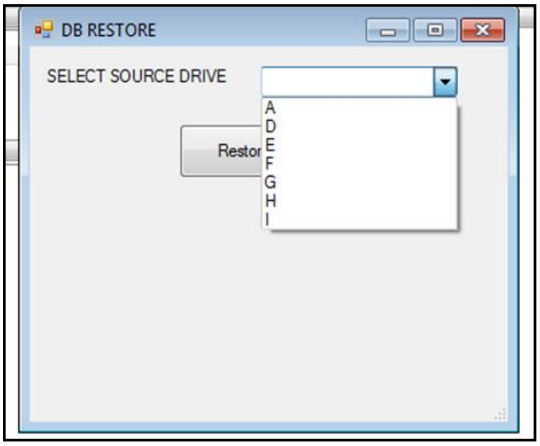


Figure 5.07: Data Restoration Window

5.3 EVALUATION OF THE SYSTEM

During the evaluation of Trachoma GIS system the following were noted:

Efficiency

It was evident that using the Mobile Phone, Patients data collected by Community Health Worker was sent to the database immediately. The Medical practitioners and the AMREF Coordinators were able to receive the data and trace the patient for medication.

Easy to use

The system was easy to use. The interface for capturing data was made simple. The Samsung mobile phone was used which provided a client side platform. The server side platform was used to generate the reports. Most of the Community Health Workers had used mobile phones before; no much training was required to use the interface.

Appropriateness

The study aimed at designing and developing a GIS system that would track and monitor Trachoma patients. The system was appropriate as it was able to; identify the location of the patient on a Google map, generate various reports concerning the patient.

5.4 TECHNIQUES USED TO EVALUATE THE GIS TRACHOMA MONITORING SYSTEM

During evaluation cross case analysis was used to compare the results from different areas of study. The requirement specifications were considered as follows;

(i) To improve the collection and reporting of aggregated health data of Trachoma patients through mobile phone.

This Requirement specification was achieved since data was collected using the Samsung mobile and forwarded to the database for further analysis as shown in Appendix (vii) Trachoma Data.

(ii) Identify specific locations vulnerable to Trachoma disease.

This Requirement specification was achieved because the system was able to accept data collected by different Community Health Workers from different regions and the information was represented in form of graphs as shown in Appendix (iv).

(iii) To identify which age group is targeted for preventive measures of Trachoma disease.

The Requirement specification was achieved since the system was able to provide the target population vulnerable for prevention. This was evident in Appendix

(iii), which shows children who are between 0-9 years been the once targeted for preventive measures whereby the antibiotics and facial cleaning was provided.

(iv) To create maps to help AMREF organizations establish areas where the Trachoma patients are located for field clinics and allocation of medical supplies.The system was developed and was able to provide maps to track the patients by showing the location of the patient in a map as shown in Fig 3.10.

CHAPTER SIX

SUMMARY, FINDINGS, CONCLUSION AND RECOMMENDATION

6.0 INTRODUCTION

The following chapter consists of the summary, findings, conclusion and recommendations.

6.1 SUMMARY

This thesis focused on the use of GIS mobile technologies to improve data collection and reporting process of Trachoma patients. The system has been developed and tested to see the applicability and usability of the available mobile technologies in improving the reporting process. The Evaluation phase showed that the GIS system is very efficient as compared to the manual data collection method that was used to report those infected with Trachoma within Kajiado County. However, there is a need for further evaluation of the system in actual environment to model the functionalities that meet the requirements.

Current practice of collecting Trachoma patients' data is through paper based method where physical books are filled with data and collected manually. The transcription of data for analysis is difficult and compromise integrity of data especially when the data volume is large. Furthermore, the supervision of data collection from multiple locations is difficult and leads to large time lag for data to be available for usage by the AMREF coordinators.

With the developed Trachoma system data transcription has been simplified as data is fed directly to the system by using mobile phones; therefore human data transcription errors are minimized and there is increase in data accuracy. The use of mobile phone for data collection has set uniformity of data formats and increased coordination and reporting of Trachoma patients.

6.2 FINDINGS

The findings of the study were as follows;

(i) Reporting of Trachoma Patients using the mobile phones would led to reduction of the spread of Trachoma since it improved the data collection method enabling patients to receive instant medication.

(ii) The use of maps enabled the medical practitioners and the AMREF coordinators to quickly identify the location/household of Trachoma Prevalence.

(iii) The use of the system provided accurate information concerning Trachoma patients which led to fast policy and decision making by the AMREF coordinators.

CONCLUSIONS

Mobile data collection method has proved to be more efficient in capturing data than using paper forms which is error prone and extremely inefficient. The mobile data collection method has proved to; save time and avoid re-keying of patient data. It has enabled analyzing of the data as soon as the data is transferred from the handheld device,

no delays or extra form filling is required; It has provided consistent input of data from all the CHW mobiles which means that data is collated easily and value summarized reports produced to help in decision making of trachoma patients; it has eliminated the need for skilled staff to fill in forms and re-key patient data.

The locations vulnerable to Trachoma were signaled out and prevention and medication provided immediately according to the level of trachoma. The developed Trachoma Monitoring system is therefore a solution for reporting patients infected with Trachoma or diagnosed with Trachoma symptoms. Experience during the study revealed that Mobile based phone which is GIS enabled provided faster, standardized and shareable data for critical decision making, therefore the system should be adapted to replace the current manual paper based way of reporting patients infected with Trachoma by CHW.

6.3 RECOMMENDATION

Based on the results of this research, it is recommended that the system be upgraded to show relationships between the patterns and trends of Trachoma in form of maps. This will enable the policy makers see at a glance the depth of Trachoma infection categorically in a particular location. The study recommends developing of a GIS Cloud Mobile Data Collection system for web and mobile devices which would allow collection of data in real time mode, with designed forms, working in offline mode.

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APPENDIX I: INTERVIEW GUIDE FOR COMMUNITY HEALTH WORKERS

NAME: …… (OPTIONAL)

LOCATION:……..

NAME OF HOUSE HOLD:_____

CO-ORDINATES FOR THE

LATITUDE:_____

LONGITUDE:_____

1. How do you identify the areas infected with Trachoma?.

   _____

2. Incase a patient is diagnosed with Trachoma, what steps do you take?

   _____

3. What are the challenges you get when attending to the patients?

   _____

4. What is the rate of infection, in case one person is diagnosed?

   _____

5. Which means do you use to store the patients records for follow up.?

   _____

6. Does the current method of storing records enable you to effectively know how many patients you are to review in a specific day?

   _____

7. Provide details for those treated within the house hold.

Month:_____		
STAGES OF TRACHOMA	AGES	NUMBER OF PATIENTS ATTENDED TO
SURGERY	BELOW 9 YEARS BETWEEN 10-18 YEARS ABOVE 19 YEARS	☐ ☐ ☐
ANTIBIOTICS	BELOW 9 YEARS BETWEEN 10-18 YEARS ABOVE 19 YEARS	☐ ☐ ☐
FACIAL CLEANING	BELOW 9 YEARS BETWEEN 10-18 YEARS ABOVE 19 YEARS	☐ ☐ ☐
ENVIRONMENTAL RESOURCES PROVIDED	WATER SOURCES LATRINES	☐ ☐

8. How many patients in total do you attend to that are re-infected with Trachoma in a month.

_____

9. How many of them get cured without re-infection.

_____

10. How many health centers do you have within your allocated area?

_____

APPENDIX II: INTERVIEW GUIDE FOR AMREF COORDINATORS

NAME: …… (OPTIONAL)

LOCATION: ……..

1. What factors do you consider when sending doctors to a particular village for treatment.

   _____

2. How do you locate areas with Trachoma outbreaks?

   _____

3. Do the community based workers provide the patients records in time in case of a visit to the centres?

   _____

4. Are the records accurate enough to enable you provide the services needed to the infected patients?

   _____

5. How do you handle patients who have been on treatment and the records are not available.

   _____

6. Do you maintain backup copies for records for the treatment offered to the Patient's in the SAFE category.

   _____

7. Is it possible for you to know the patients to be reviewed on specific days?

   _____

8. According to your past records, which areas are frequently infected with Trachoma. _____

9. About how many patients are infected with Trachoma within the area?

   _____

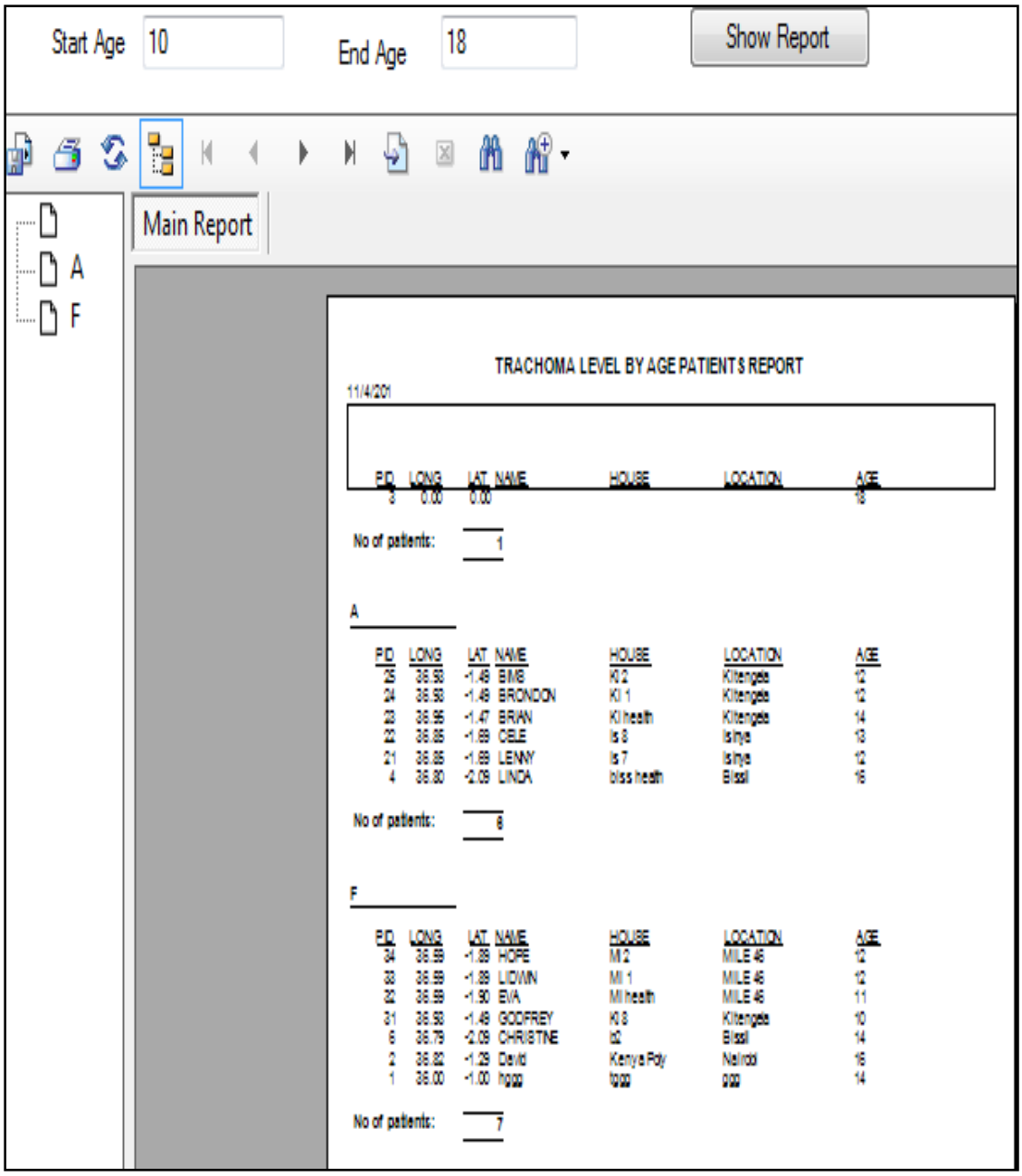
10. Which areas have you dug boreholes and toilets?

    _____

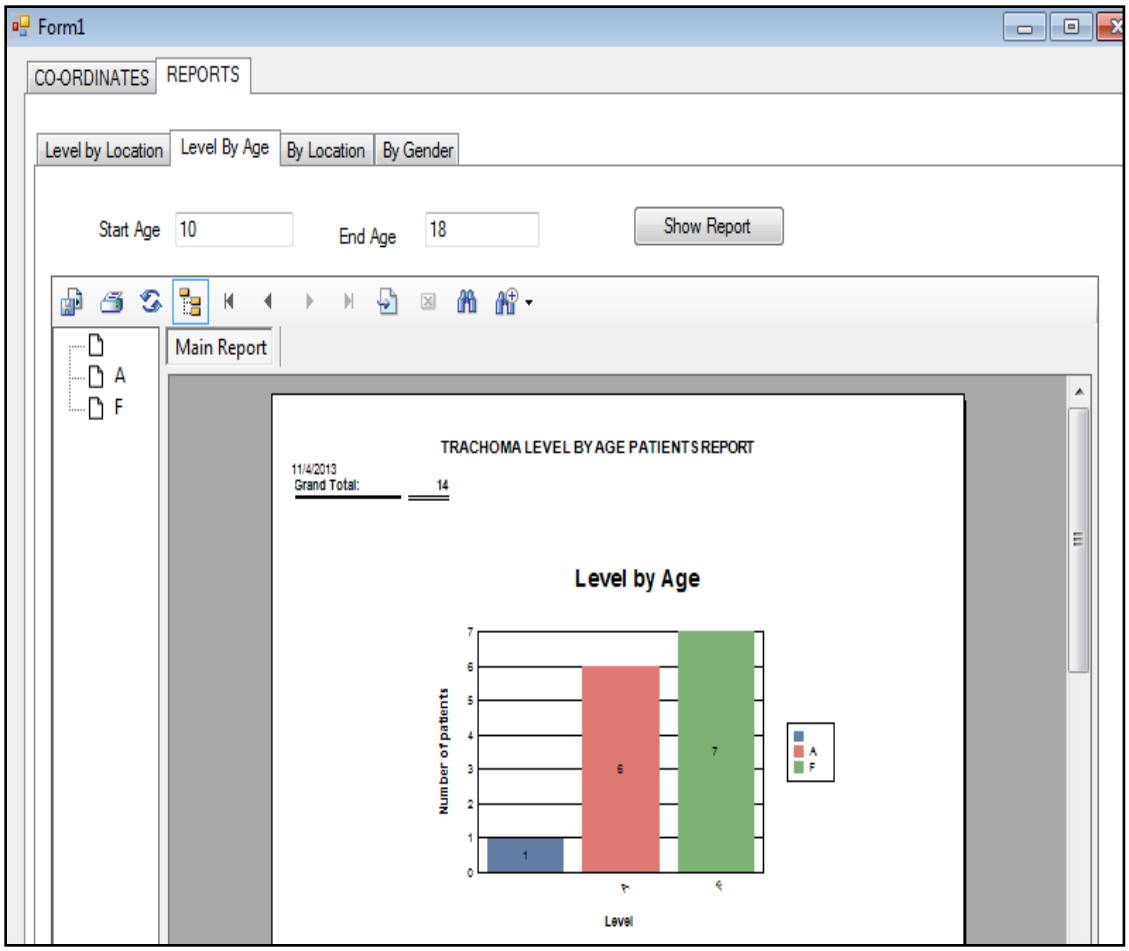
11. If any, has Trachoma infection reduced in the named areas?

    _____

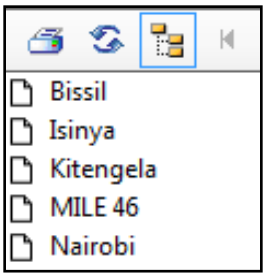
APPENDIX III: SYSTEM TEST REPORT ON TRACHOMA LEVEL BY AGE

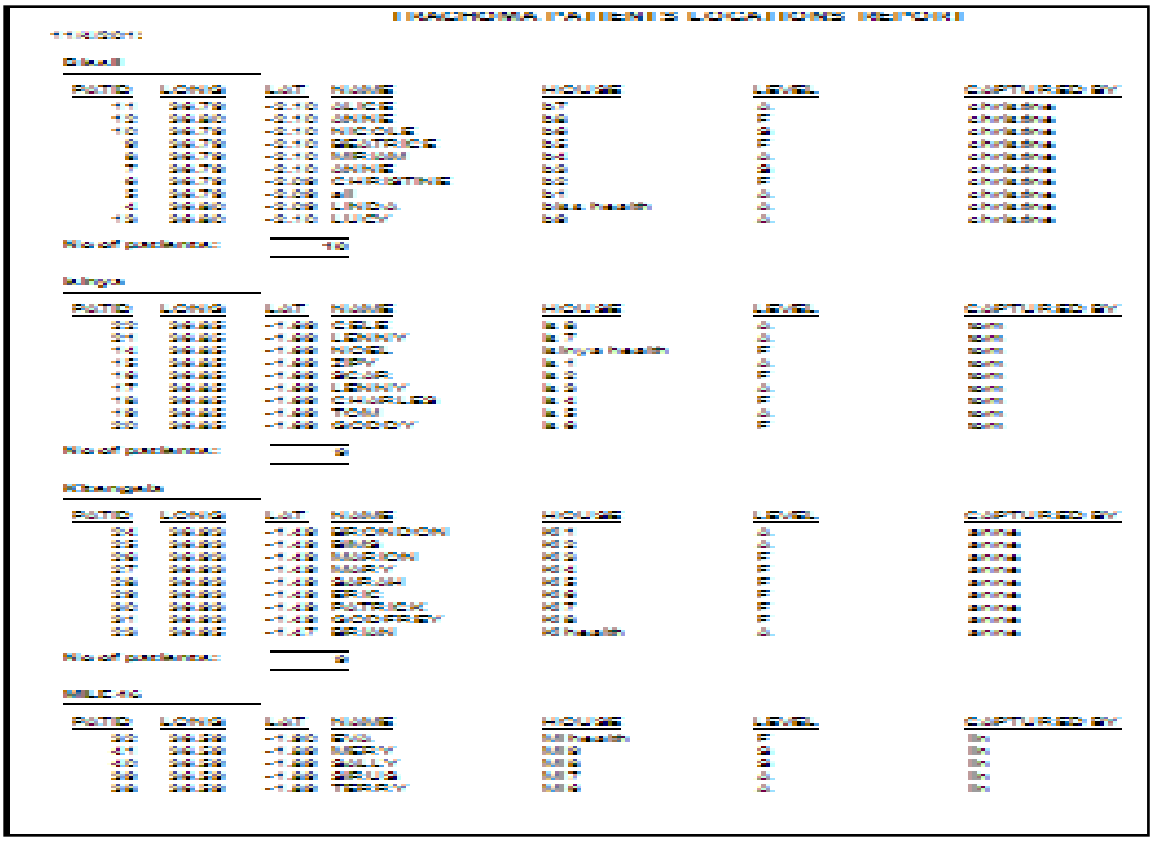


GRAPH FOR TRACHOMA LEVEL BY AGE

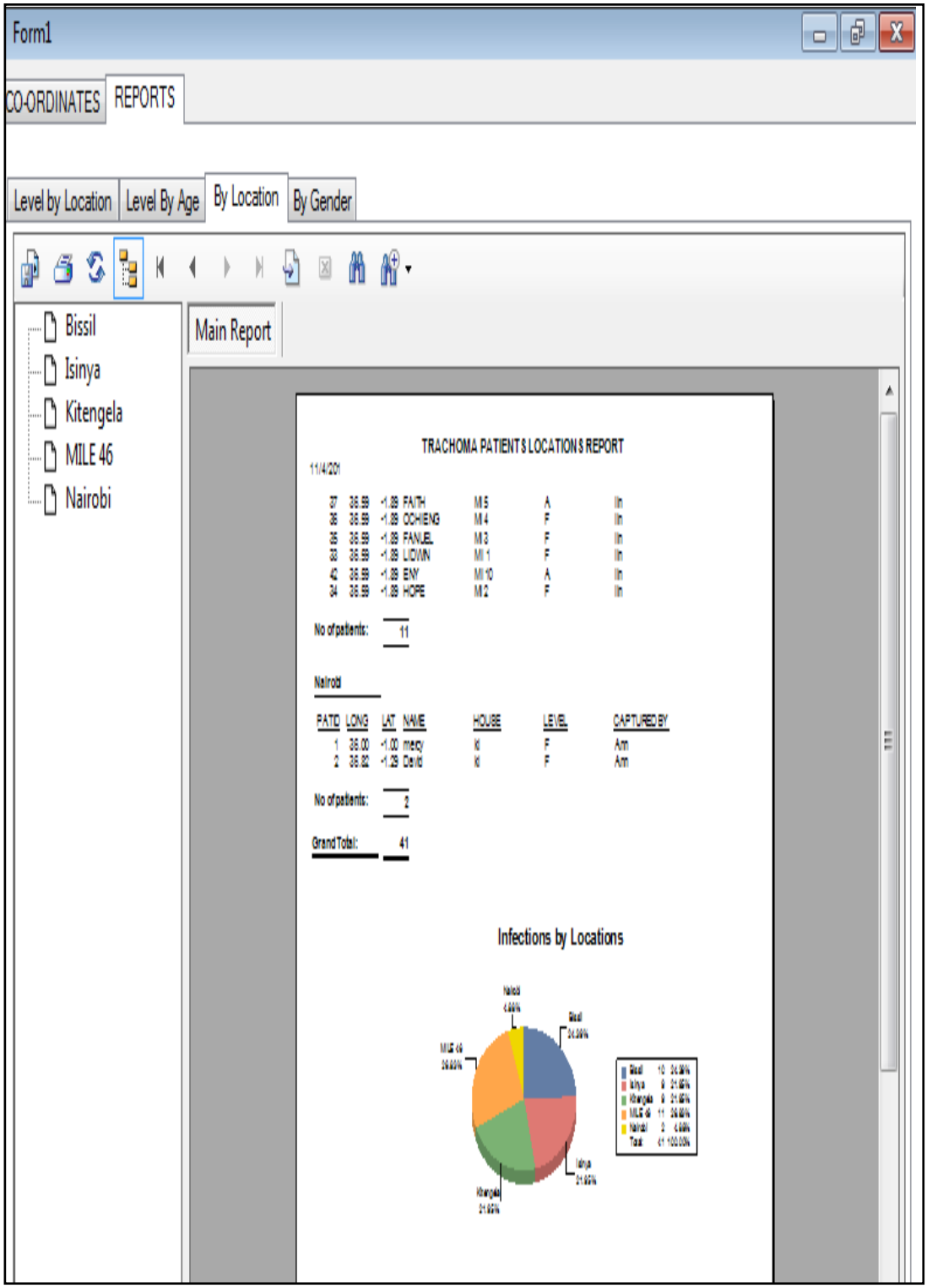


APPENDIX IV: SYSTEM TEST REPORT ON TRACHOMA BY LOCATION

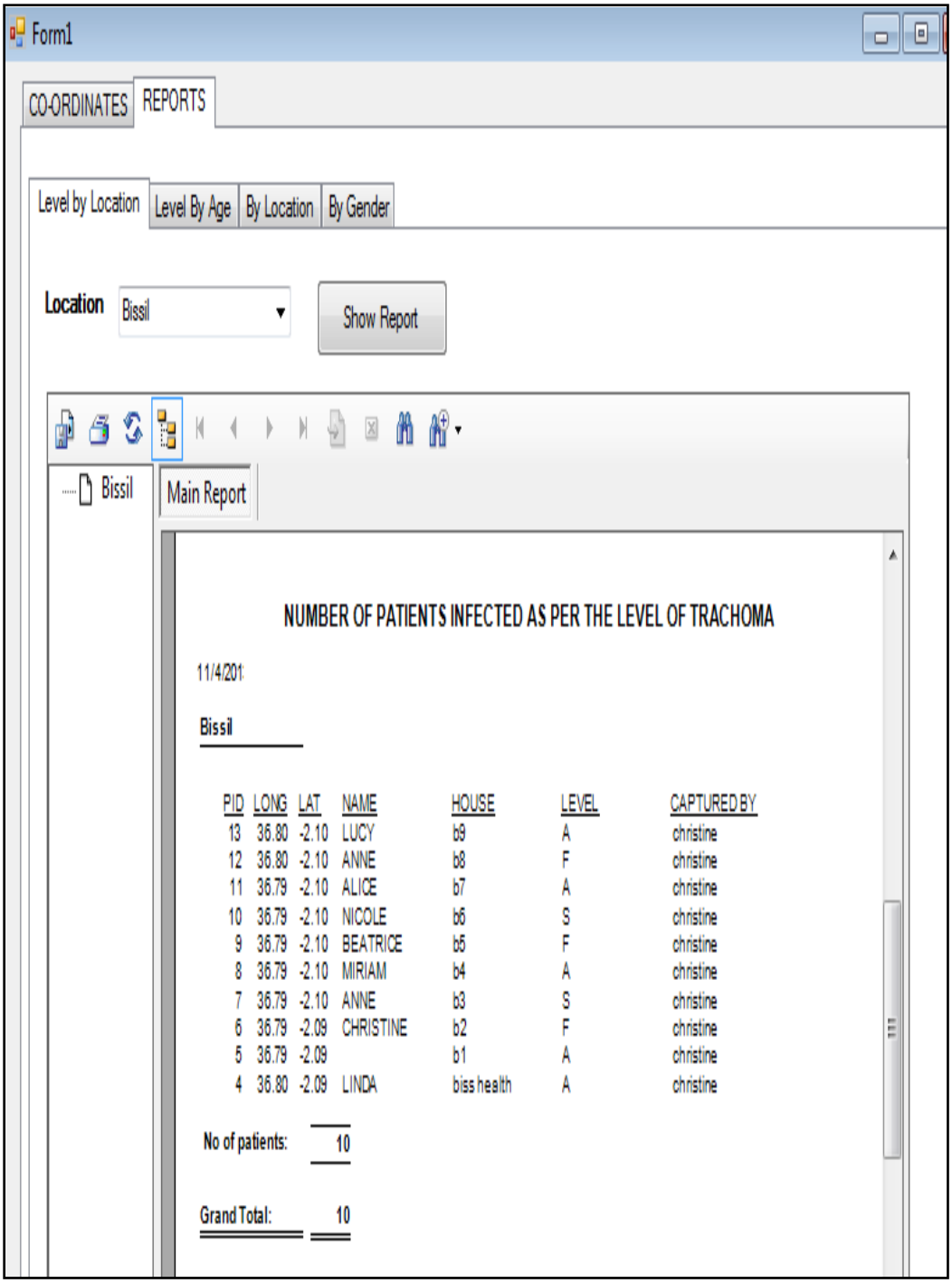




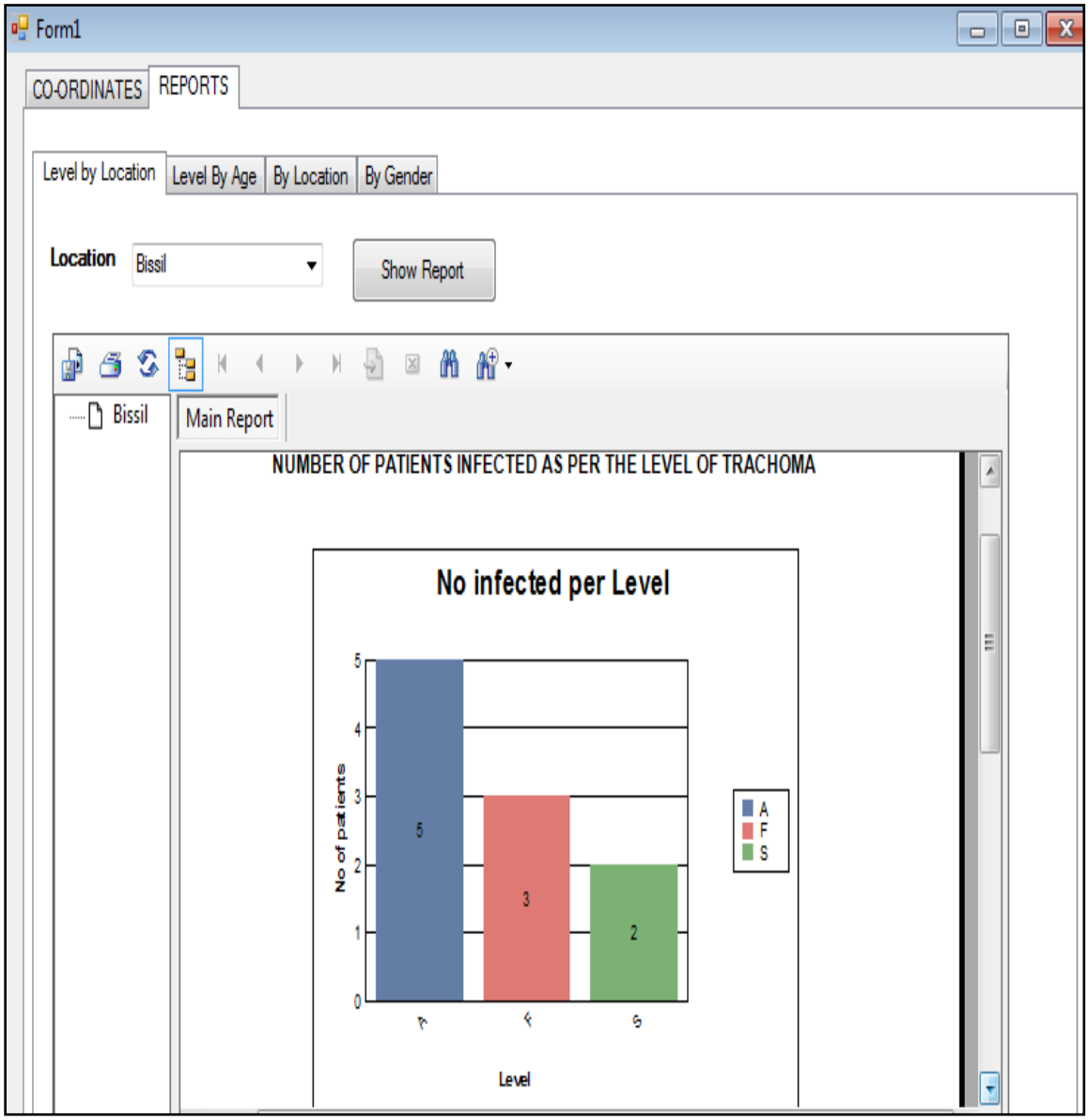
GRAPH FOR TRACHOMA BY LOCATION



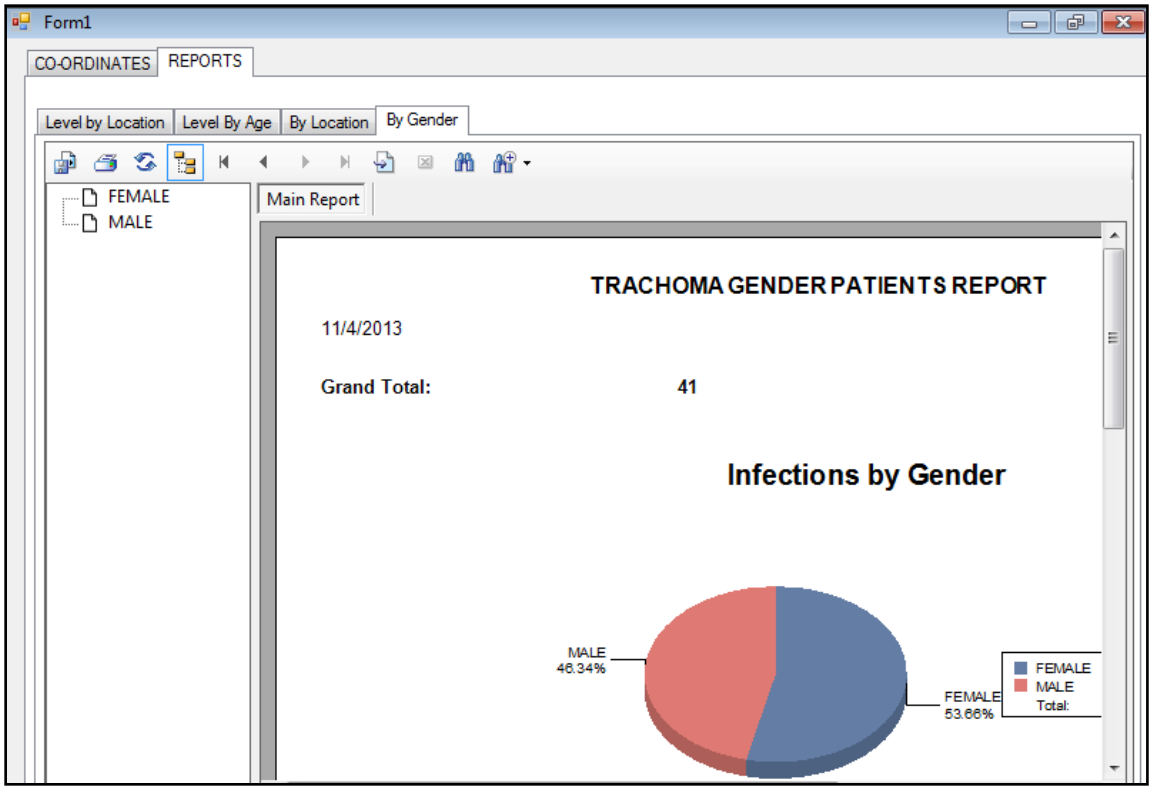
APPENDIX V: SYSTEM TEST REPORT ON TRACHOMA BY LEVEL AND LOCATION



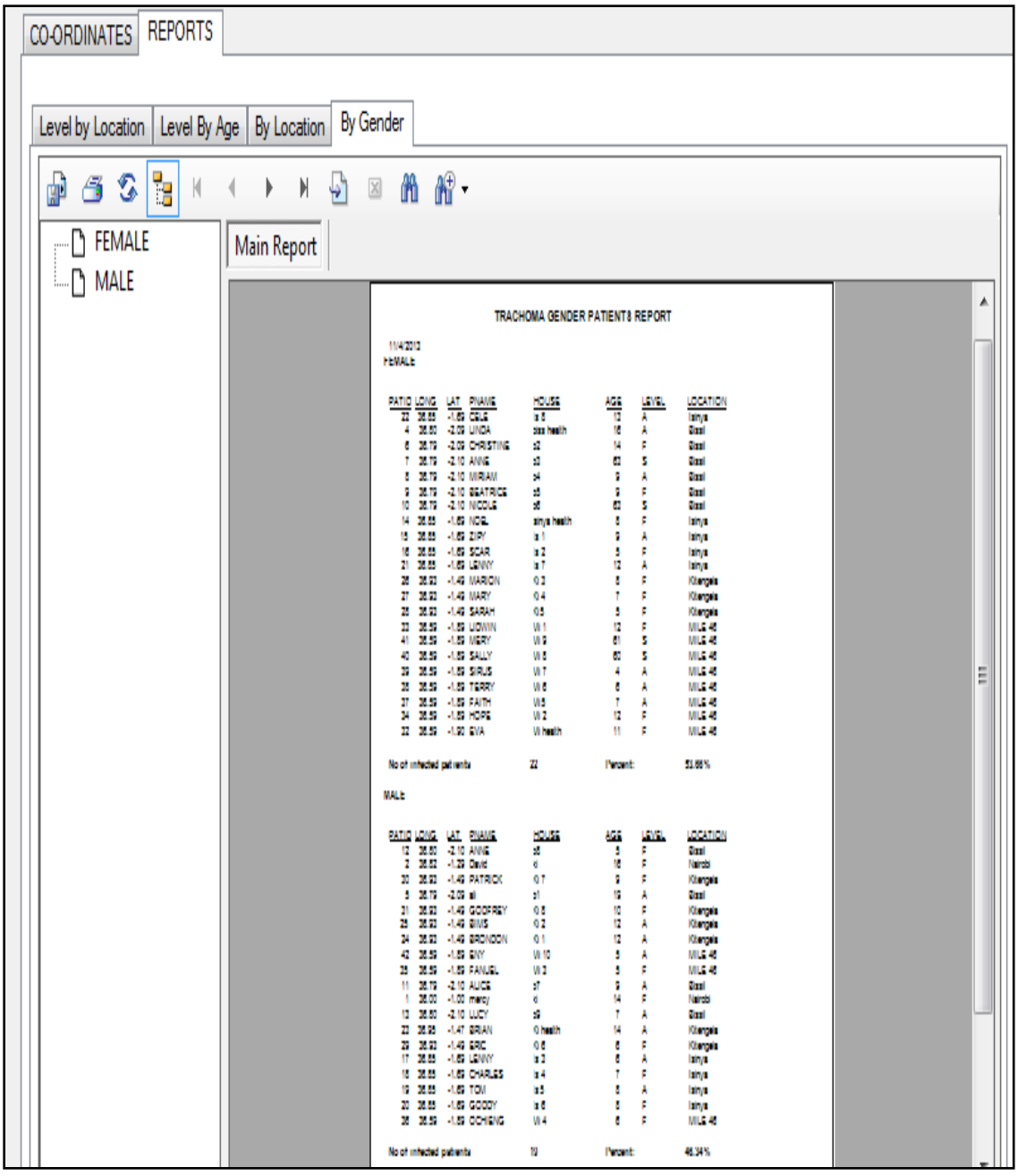
GRAPH FOR TRACHOMA BY LEVEL AND LOCATION



GRAPH FOR TRACHOMA BY GENDER



APPENDIX VI: SYSTEM TEST REPORT ON TRACHOMA BY GENDER



APPENDIX VII: TRACHOMA TEST DATA

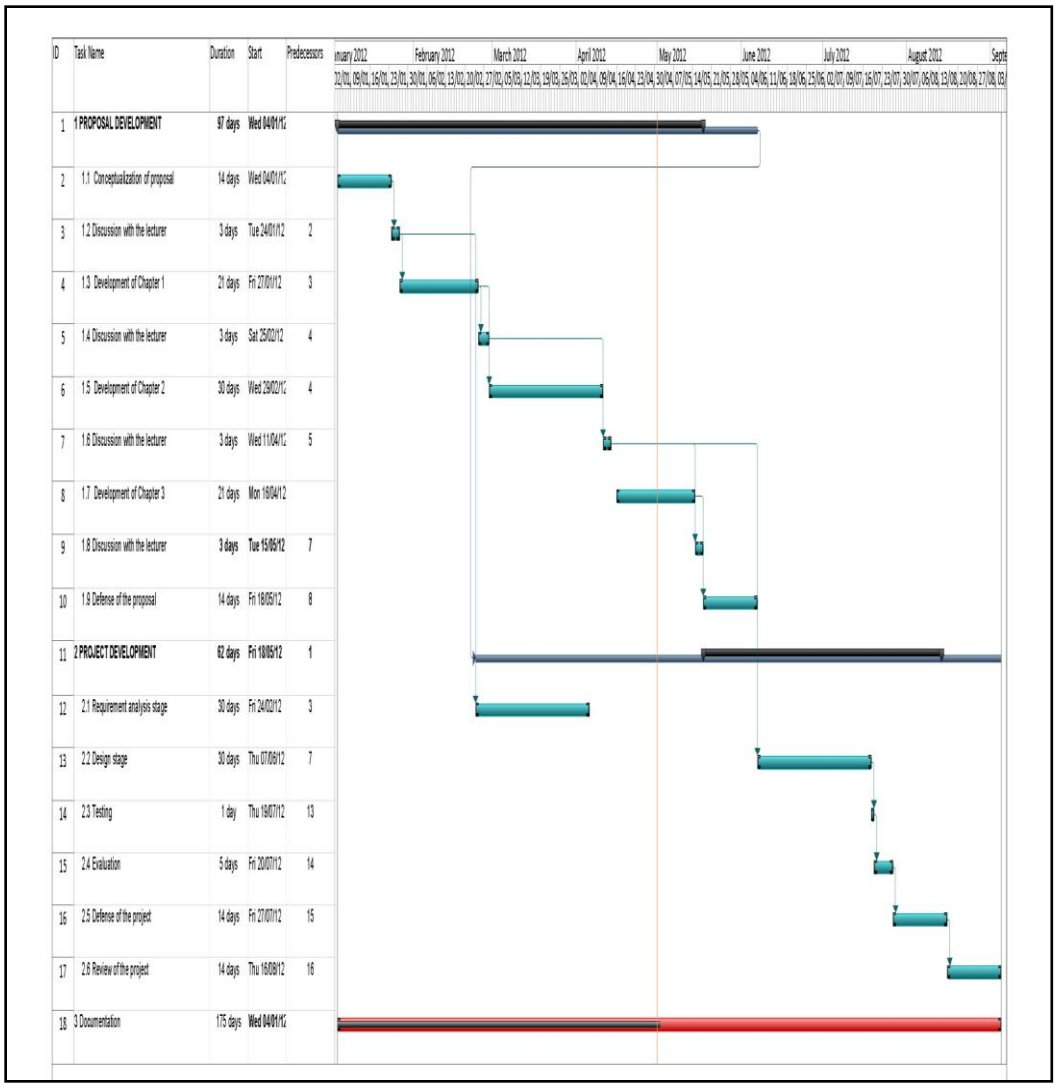
co	colLong	colLat	colHHead	colPName	colGende	colAge	coll	colLocat	colCaptur
4	36.79561	-2.08544	biss health	LINDA	FEMALE	16	A	Bissil	christine
5	36.79295	-2.08766	b1	LAWI	MALE	19	A	Bissil	christine
6	36.79133	-2.09072	b2	CHRISTINE	FEMALE	14	F	Bissil	christine
7	36.78979	-2.09739	b3	ANNE	FEMALE	63	S	Bissil	christine
8	36.78999	-2.09809	b4	MIRIAM	FEMALE	9	A	Bissil	christine
9	36.78962	-2.09836	b5	BEATRICE	FEMALE	9	F	Bissil	christine
10	36.78953	-2.09843	b6	NICOLE	FEMALE	63	S	Bissil	christine
11	36.79015	-2.09808	b7	ALICE	MALE	9	A	Bissil	christine
12	36.79549	-2.09827	b8	ANNE	MALE	5	F	Bissil	christine
13	36.79511	-2.09799	b9	LUCY	MALE	7	A	Bissil	christine
14	36.8474	-1.68793	isinya health	NOEL	FEMALE	8	F	Isinya	tom
15	36.84755	-1.68795	Is 1	ZIPY	FEMALE	9	A	Isinya	tom
16	36.85091	-1.68817	Is 2	SCAR	FEMALE	5	F	Isinya	tom
17	36.8518	-1.68857	Is 3	LENNY	MALE	6	A	Isinya	tom
19	36.85182	-1.69013	Is 5	TOM	MALE	8	A	Isinya	tom
20	36.85208	-1.69047	Is 6	GODDY	MALE	8	F	Isinya	tom
21	36.85221	-1.68954	Is 7	LENNY	FEMALE	12	A	Isinya	tom
22	36.85263	-1.68897	Is 8	CELE	FEMALE	13	A	Isinya	tom
23	36.95422	-1.47066	Ki health	BRIAN	MALE	14	A	Kitengela	anne
24	36.93127	-1.48982	Ki 1	BRONDON	MALE	12	A	Kitengela	anne
25	36.9307	-1.48878	Ki 2	BIMS	MALE	12	A	Kitengela	anne
26	36.93048	-1.48839	Ki 3	MARION	FEMALE	8	F	Kitengela	anne
27	36.92982	-1.48715	Ki 4	MARY	FEMALE	7	F	Kitengela	anne
28	36.9284	-1.48661	Ki 5	SARAH	FEMALE	5	F	Kitengela	anne
29	36.92762	-1.48703	Ki 6	ERIC	MALE	6	F	Kitengela	anne
30	36.92625	-1.48782	Ki 7	PATRICK	MALE	9	F	Kitengela	anne
31	36.92562	-1.4881	Ki 8	GODFREY	MALE	10	F	Kitengela	anne
32	36.58834	-1.89648	Mi health	EVA	FEMALE	11	F	MILE 46	lin
33	36.58688	-1.89476	Mi 1	LIDWIN	FEMALE	12	F	MILE 46	lin
34	36.58665	-1.89474	Mi 2	HOPE	FEMALE	12	F	MILE 46	lin
35	36.58654	-1.89454	Mi 3	FANUEL	MALE	5	F	MILE 46	lin
36	36.58641	-1.89439	Mi 4	OCHIENG	MALE	6	F	MILE 46	lin
37	36.58637	-1.89433	Mi 5	FAITH	FEMALE	7	A	MILE 46	lin
38	36.58617	-1.89419	Mi 6	TERRY	FEMALE	6	A	MILE 46	lin
39	36.58602	-1.89404	Mi 7	SIRUS	FEMALE	4	A	MILE 46	lin
40	36.58605	-1.89392	Mi 8	SALLY	FEMALE	60	S	MILE 46	lin
41	36.58605	-1.89393	Mi 9	MERY	FEMALE	61	S	MILE 46	lin
42	36.58618	-1.89381	Mi 10	ENY	MALE	5	A	MILE 46	lin

APPENDIX VIII: BUDGET FOR THE RESEARCH

Table below provides estimates of the requirements for this research

Item	Ksh
Stationeries e.g. printing papers, toner, pens, writing materials, folders and binding	20,000.00
Transport ,Accommodation and meals and communication	20,000.00
Allowance for the Medical practitioners helping in the research	40,000.00
Reference materials	40, 000.00
Laptop and printer	90,000.00
Miscellaneous	10,000.00
Total	**220,000.00**

APPENDIX IX: PROPOSED PROJECT WORK PLAN GANTT CHART



APPENDIX X: SYSTEM CODE

```
'--------------------------------------
'Programmed by: Eve
'This is a  login in form module
'--------------------------------------
Public Class LoginForm1

    Private Sub Cancel_Click(ByVal senter As System.Object, ByVal e As
System.EventArgs) Handles Cancel.Click
        Me.Close()
    End Sub
    Private Sub PasswordTextBox_Enter(ByVal senter As Object, ByVal e As
System.EventArgs) Handles PasswordTextBox.Enter
        'HLText(PasswordTextBox)
    End Sub

    Private Sub PasswordTextBox_TextChanged(ByVal senter As System.Object, ByVal e
As System.EventArgs) Handles PasswordTextBox.TextChanged
        PasswordTextBox.SelectionStart = Len(PasswordTextBox.Text)
    End Sub

    Private Sub OK_Click(ByVal senter As System.Object, ByVal e As
System.EventArgs) Handles OK.Click
        'validation
        If UsernameTextBox.Text = "" Then UsernameTextBox.Focus() : Exit Sub

        If PasswordTextBox.Text = "" Then PasswordTextBox.Focus() : Exit Sub
        Dim strPass As String
        strPass = Nothing
        Dim pSql As String
        pSql = "SELECT [password] FROM tblUsers WHERE [username] ='" &
UsernameTextBox.Text & "'"
        If Database.getData(pSql) = True Then
            While Database.moddata.Read
                'loop to get password according to username entered
                strPass = Database.moddata("password")

            End While
            'compare found password according to inputed one
            If LCase(PasswordTextBox.Text) = LCase(strPass) Then
                MsgBox("Ok connected, enjoy and God bless you!",
MsgBoxStyle.Information, "Successfully connected...")

                Dim MainForm As New mdiMain
```

```
            MainForm.Show()
        Else
            MsgBox("Sorry failed to connect, please check your connection details..." &
vbCrLf & vbCrLf & "Invalid login details.Please try again!", MsgBoxStyle.Exclamation)
            PasswordTextBox.Focus()
        End If
        'End While
    End If

  End Sub
End Class


'--------------------------------------
'Programmed by:Eve

'mdi parent form contains menus and tool buttons
'--------------------------------------

Imports System.Windows.Forms

Public Class mdiMain
  Private blnActive As Boolean

  Private Function IsOpen(ByVal nameForm As String) As Boolean
    Dim childfrm As Form
    Dim strName As String
    Dim intLastIndex As Integer

    For Each childfrm In Me.MdiChildren
      strName = childfrm.GetType.ToString
      intLastIndex = strName.LastIndexOf(".")
      strName = Mid(strName, intLastIndex + 2, Len(strName) - intLastIndex)
      If LCase(strName) = LCase(nameForm) Then
        childfrm.BringToFront()
        Return True
      End If
    Next
    Return False

    'If nameForm.Visible Then
    '  nameForm.Focus()
    '  Return True
    'End If
    'Return False
```

```
    End Function

    Private Sub ShowNewForm(ByVal senter As Object, ByVal e As EventArgs) Handles
NewToolStripButton.Click
        ' Create a new instance of the child form.
        Dim ChildForm As New System.Windows.Forms.Form
        ' Make it a child of this MDI form before showing it.
        ChildForm.MdiParent = Me

        m_ChildFormNumber += 1
        ChildForm.Text = "Window " & m_ChildFormNumber

        ChildForm.Show()
    End Sub
    'For Tool buttons
    Private Sub ExitToolsStripMenuItem_Click(ByVal senter As Object, ByVal e As
EventArgs) Handles ExitToolStripMenuItem.Click
        MsgBox("Thank you and God bless...", MsgBoxStyle.Information +
MsgBoxStyle.OkOnly, "God bless...")
        End
    End Sub

    Private Sub CutToolStripMenuItem_Click(ByVal senter As Object, ByVal e As
EventArgs)
        ' Use My.Computer.Clipboard to insert the selected text or images into the clipboard
    End Sub

    Private Sub CopyToolStripMenuItem_Click(ByVal senter As Object, ByVal e As
EventArgs)
        ' Use My.Computer.Clipboard to insert the selected text or images into the clipboard
    End Sub

    Private Sub PasteToolStripMenuItem_Click(ByVal senter As Object, ByVal e As
EventArgs)
        'Use My.Computer.Clipboard.GetText() or My.Computer.Clipboard.GetData to
retrieve information from the clipboard.
    End Sub

    Private m_ChildFormNumber As Integer

    'Form Load Event
    Private Sub mdiMain_Load(ByVal senter As System.Object, ByVal e As
System.EventArgs) Handles MyBase.Load
        LoginForm1.Close()

        If blnActive = IsOpen("Form1") Then
```

```
            Dim MainView As New Form1

            MainView.MdiParent = Me
            MainView.StartPosition = FormStartPosition.CenterScreen
            MainView.MaximizeBox = True
            MainView.Show()
            MainView.WindowState = FormWindowState.Maximized


        End If
    End Sub

    'Display main form
    Private Sub HomeToolStripMenuItem_Click(ByVal senter As System.Object, ByVal e
As System.EventArgs) Handles HomeToolStripMenuItem.Click
        If blnActive = IsOpen("form1") Then
            Dim MainView As New Form1

            MainView.MdiParent = Me
            MainView.StartPosition = FormStartPosition.CenterScreen
            MainView.Show()
            MainView.WindowState = FormWindowState.Maximized
        End If
    End Sub
    'Display DB Backup form
    Private Sub BackUpDBToolStripMenuItem_Click(ByVal senter As System.Object,
ByVal e As System.EventArgs) Handles BackUpDBToolStripMenuItem.Click
        Dim bkp As New frmBackup

        'bkp.MdiParent = Me
        bkp.StartPosition = FormStartPosition.CenterScreen
        bkp.ShowDialog()
        bkp.WindowState = FormWindowState.Normal
    End Sub
    'Display DB Restore form
    Private Sub RestoreDBToolStripMenuItem_Click(ByVal senter As System.Object,
ByVal e As System.EventArgs) Handles RestoreDBToolStripMenuItem.Click
        Dim resdb As New frmRestore

        resdb.StartPosition = FormStartPosition.CenterScreen
        resdb.ShowDialog()
        resdb.WindowState = FormWindowState.Normal
    End Sub
    'Display user input form
    Private Sub ToolStripMenuItem1_Click(ByVal senter As System.Object, ByVal e As
System.EventArgs) Handles ToolStripMenuItem1.Click
```

```
        Dim user As New frmUser

        user.StartPosition = FormStartPosition.CenterScreen
        user.ShowDialog()
        user.WindowState = FormWindowState.Normal
    End Sub
End Class


Public NotInheritable Class SplashScreen1

    'TODO: This form can easily be set as the splash screen for the application by going to the "Application" tab
    '  of the Project Designer ("Properties" under the "Project" menu).


    Private Sub SplashScreen1_Load(ByVal senter As Object, ByVal e As System.EventArgs) Handles Me.Load
        'Set up the dialog text at runtime according to the application's assembly information.

        'TODO: Customize the application's assembly information in the "Application" pane of the project
        '  properties dialog (under the "Project" menu).

        'Application title
        If My.Application.Info.Title <> "" Then
            ApplicationTitle.Text = My.Application.Info.Title
        Else
            'If the application title is missing, use the application name, without the extension
            ApplicationTitle.Text = System.IO.Path.GetFileNameWithoutExtension(My.Application.Info.AssemblyName)
        End If

        'Format the version information using the text set into the Version control at design time as the
        '  formatting string.  This allows for effective localization if desired.
        '  Build and revision information could be included by using the following code and changing the
        '  Version control's designtime text to "Version {0}.{1:00}.{2}.{3}" or something similar.  See
        '  String.Format() in Help for more information.
        '
        '    Version.Text = System.String.Format(Version.Text, My.Application.Info.Version.Major, My.Application.Info.Version.Minor, My.Application.Info.Version.Build, My.Application.Info.Version.Revision)
```

```
        Version.Text = System.String.Format(Version.Text,
My.Application.Info.Version.Major, My.Application.Info.Version.Minor)

        'Copyright info
        Copyright.Text = My.Application.Info.Copyright
    End Sub

End Class
```

Splash Screen Program

```
Public NotInheritable Class SplashScreen1

    'TODO: This form can easily be set as the splash screen for the application by going to
the "Application" tab
    '  of the Project Designer ("Properties" under the "Project" menu).


    Private Sub SplashScreen1_Load(ByVal senter As Object, ByVal e As
System.EventArgs) Handles Me.Load
        'Set up the dialog text at runtime according to the application's assembly
information.

        'TODO: Customize the application's assembly information in the "Application" pane
of the project
        '  properties dialog (under the "Project" menu).

        'Application title
        If My.Application.Info.Title <> "" Then
            ApplicationTitle.Text = My.Application.Info.Title
        Else
            'If the application title is missing, use the application name, without the extension
            ApplicationTitle.Text =
System.IO.Path.GetFileNameWithoutExtension(My.Application.Info.AssemblyName)
        End If

        'Format the version information using the text set into the Version control at design
time as the
        '  formatting string.  This allows for effective localization if desired.
        '  Build and revision information could be included by using the following code and
changing the
        '  Version control's designtime text to "Version {0}.{1:00}.{2}.{3}" or something
similar.  See
        '  String.Format() in Help for more information.
        '
```

```
        '    Version.Text = System.String.Format(Version.Text,
My.Application.Info.Version.Major, My.Application.Info.Version.Minor,
My.Application.Info.Version.Build, My.Application.Info.Version.Revision)

        Version.Text = System.String.Format(Version.Text,
My.Application.Info.Version.Major, My.Application.Info.Version.Minor)

        'Copyright info
        Copyright.Text = My.Application.Info.Copyright
    End Sub

End Class

‘Program showing the main form
<Global.Microsoft.VisualBasic.CompilerServices.DesignerGenerated()> _
Partial Class Form1
    Inherits System.Windows.Forms.Form

    'Form overrides dispose to clean up the component list.
    <System.Diagnostics.DebuggerNonUserCode()> _
    Protected Overrides Sub Dispose(ByVal disposing As Boolean)
        Try
            If disposing AndAlso components IsNot Nothing Then
                components.Dispose()
            End If
        Finally
            MyBase.Dispose(disposing)
        End Try
    End Sub

    'Required by the Windows Form Designer
    Private components As System.ComponentModel.IContainer

    'NOTE: The following procedure is required by the Windows Form Designer
    'It can be modified using the Windows Form Designer.
    'Do not modify it using the code editor.
    <System.Diagnostics.DebuggerStepThrough()> _
    Private Sub InitializeComponent()
        Me.CrystalReport11 = New TrachomaReport.CrystalReport1
        Me.TabPage1 = New System.Windows.Forms.TabPage
        Me.Panel3 = New System.Windows.Forms.Panel
        Me.ehImageHost = New System.Windows.Forms.Integration.ElementHost
        Me.Panel2 = New System.Windows.Forms.Panel
        Me.GroupBox2 = New System.Windows.Forms.GroupBox
        Me.lblStatus = New System.Windows.Forms.Label
        Me.Label2 = New System.Windows.Forms.Label
```

```
        Me.btnConnect = New System.Windows.Forms.Button
        Me.Label3 = New System.Windows.Forms.Label
        Me.cbbCOMPorts = New System.Windows.Forms.ComboBox
        Me.lvAddressDetails = New System.Windows.Forms.ListView
        Me.MainAddress = New System.Windows.Forms.ColumnHeader
        Me.Msg = New System.Windows.Forms.ColumnHeader
        Me.hDate = New System.Windows.Forms.ColumnHeader
        Me.Latitude = New System.Windows.Forms.ColumnHeader
        Me.Longitude = New System.Windows.Forms.ColumnHeader
        Me.Panel1 = New System.Windows.Forms.Panel
        Me.btnSearch = New System.Windows.Forms.Button
        Me.tbZoom = New System.Windows.Forms.TrackBar
        Me.txtSearch = New System.Windows.Forms.TextBox
        Me.Label1 = New System.Windows.Forms.Label
        Me.TabControl1 = New System.Windows.Forms.TabControl
        Me.TabPage4 = New System.Windows.Forms.TabPage
        Me.TabControl2 = New System.Windows.Forms.TabControl
        Me.TabPage5 = New System.Windows.Forms.TabPage
        Me.ComboBox2 = New System.Windows.Forms.ComboBox
        Me.Label6 = New System.Windows.Forms.Label
        Me.Button2 = New System.Windows.Forms.Button
        Me.TabPage6 = New System.Windows.Forms.TabPage
        Me.TabPage7 = New System.Windows.Forms.TabPage
        Me.CrystalReportViewer22 = New
CrystalDecisions.Windows.Forms.CrystalReportViewer
        Me.CrystalReportLocation1 = New TrachomaReport.CrystalReportLocation
        Me.TabPage8 = New System.Windows.Forms.TabPage
        Me.CrystalReportViewer3 = New
CrystalDecisions.Windows.Forms.CrystalReportViewer
        Me.CrystalReportGender1 = New TrachomaReport.CrystalReportGender
        Me.CrystalReportViewer2 = New
CrystalDecisions.Windows.Forms.CrystalReportViewer
        Me.Label7 = New System.Windows.Forms.Label
        Me.Label8 = New System.Windows.Forms.Label
        Me.Button3 = New System.Windows.Forms.Button
        Me.TextBox1 = New System.Windows.Forms.TextBox
        Me.TextBox2 = New System.Windows.Forms.TextBox
        Me.CrystalReportViewer4 = New
CrystalDecisions.Windows.Forms.CrystalReportViewer
        Me.TabPage1.SuspendLayout()
        Me.Panel3.SuspendLayout()
        Me.Panel2.SuspendLayout()
        Me.GroupBox2.SuspendLayout()
        Me.Panel1.SuspendLayout()
        CType(Me.tbZoom, System.ComponentModel.ISupportInitialize).BeginInit()
        Me.TabControl1.SuspendLayout()
```

```
Me.TabPage4.SuspendLayout()
Me.TabControl2.SuspendLayout()
Me.TabPage5.SuspendLayout()
Me.TabPage6.SuspendLayout()
Me.TabPage7.SuspendLayout()
Me.TabPage8.SuspendLayout()
Me.SuspendLayout()
'
'TabPage1
'
Me.TabPage1.Controls.Add(Me.Panel3)
Me.TabPage1.Controls.Add(Me.Panel2)
Me.TabPage1.Controls.Add(Me.Panel1)
Me.TabPage1.Location = New System.Drawing.Point(4, 22)
Me.TabPage1.Name = "TabPage1"
Me.TabPage1.Padding = New System.Windows.Forms.Padding(3)
Me.TabPage1.Size = New System.Drawing.Size(784, 538)
Me.TabPage1.TabIndex = 0
Me.TabPage1.Text = "CO-ORDINATES"
Me.TabPage1.UseVisualStyleBackColor = True
'
'Panel3
'
Me.Panel3.Controls.Add(Me.ehImageHost)
Me.Panel3.Dock = System.Windows.Forms.DockStyle.Fill
Me.Panel3.Location = New System.Drawing.Point(411, 47)
Me.Panel3.Name = "Panel3"
Me.Panel3.Size = New System.Drawing.Size(370, 488)
Me.Panel3.TabIndex = 5
'
'ehImageHost
'
Me.ehImageHost.Dock = System.Windows.Forms.DockStyle.Fill
Me.ehImageHost.Location = New System.Drawing.Point(0, 0)
Me.ehImageHost.Name = "ehImageHost"
Me.ehImageHost.Size = New System.Drawing.Size(370, 488)
Me.ehImageHost.TabIndex = 0
Me.ehImageHost.Text = "ElementHost1"
Me.ehImageHost.Child = Nothing
'
'Panel2
'
Me.Panel2.Controls.Add(Me.GroupBox2)
Me.Panel2.Controls.Add(Me.lvAddressDetails)
Me.Panel2.Dock = System.Windows.Forms.DockStyle.Left
Me.Panel2.Location = New System.Drawing.Point(3, 47)
```

```
Me.Panel2.Name = "Panel2"
Me.Panel2.Size = New System.Drawing.Size(408, 488)
Me.Panel2.TabIndex = 4
'
'GroupBox2
'
Me.GroupBox2.Controls.Add(Me.lblStatus)
Me.GroupBox2.Controls.Add(Me.Label2)
Me.GroupBox2.Controls.Add(Me.btnConnect)
Me.GroupBox2.Controls.Add(Me.Label3)
Me.GroupBox2.Controls.Add(Me.cbbCOMPorts)
Me.GroupBox2.Location = New System.Drawing.Point(3, 101)
Me.GroupBox2.Name = "GroupBox2"
Me.GroupBox2.Size = New System.Drawing.Size(182, 111)
Me.GroupBox2.TabIndex = 2
Me.GroupBox2.TabStop = False
Me.GroupBox2.Text = "SMS Settings"
'
'lblStatus
'
Me.lblStatus.Location = New System.Drawing.Point(69, 51)
Me.lblStatus.Name = "lblStatus"
Me.lblStatus.Size = New System.Drawing.Size(106, 13)
Me.lblStatus.TabIndex = 4
'
'Label2
'
Me.Label2.AutoSize = True
Me.Label2.Location = New System.Drawing.Point(12, 51)
Me.Label2.Name = "Label2"
Me.Label2.Size = New System.Drawing.Size(37, 13)
Me.Label2.TabIndex = 3
Me.Label2.Text = "Status"
'
'btnConnect
'
Me.btnConnect.Location = New System.Drawing.Point(59, 82)
Me.btnConnect.Name = "btnConnect"
Me.btnConnect.Size = New System.Drawing.Size(76, 23)
Me.btnConnect.TabIndex = 2
Me.btnConnect.Text = "Connect"
Me.btnConnect.UseVisualStyleBackColor = True
'
'Label3
'
Me.Label3.AutoSize = True
```

```
        Me.Label3.Location = New System.Drawing.Point(12, 29)
        Me.Label3.Name = "Label3"
        Me.Label3.Size = New System.Drawing.Size(56, 13)
        Me.Label3.TabIndex = 1
        Me.Label3.Text = "COM. Port"
        '
        'cbbCOMPorts
        '
        Me.cbbCOMPorts.FormattingEnabled = True
        Me.cbbCOMPorts.Location = New System.Drawing.Point(68, 27)
        Me.cbbCOMPorts.Name = "cbbCOMPorts"
        Me.cbbCOMPorts.Size = New System.Drawing.Size(108, 21)
        Me.cbbCOMPorts.TabIndex = 0
        '
        'lvAddressDetails
        '
        Me.lvAddressDetails.Columns.AddRange(New
System.Windows.Forms.ColumnHeader() {Me.MainAddress, Me.Msg, Me.hDate,
Me.Latitude, Me.Longitude})
        Me.lvAddressDetails.Location = New System.Drawing.Point(0, 0)
        Me.lvAddressDetails.Name = "lvAddressDetails"
        Me.lvAddressDetails.Size = New System.Drawing.Size(408, 95)
        Me.lvAddressDetails.TabIndex = 0
        Me.lvAddressDetails.UseCompatibleStateImageBehavior = False
        Me.lvAddressDetails.View = System.Windows.Forms.View.Details
        '
        'MainAddress
        '
        Me.MainAddress.Text = "Phone #"
        Me.MainAddress.Width = 100
        '
        'Msg
        '
        Me.Msg.Text = "Msg"
        Me.Msg.Width = 200
        '
        'hDate
        '
        Me.hDate.Text = "Date"
        Me.hDate.Width = 100
        '
        'Latitude
        '
        Me.Latitude.Text = "LAT"
        Me.Latitude.Width = 120
        '
```

```
'Longitude
'
Me.Longitude.Text = "Long"
Me.Longitude.Width = 120
'
'Panel1
'
Me.Panel1.AutoScroll = True
Me.Panel1.Controls.Add(Me.btnSearch)
Me.Panel1.Controls.Add(Me.tbZoom)
Me.Panel1.Controls.Add(Me.txtSearch)
Me.Panel1.Controls.Add(Me.Label1)
Me.Panel1.Dock = System.Windows.Forms.DockStyle.Top
Me.Panel1.Location = New System.Drawing.Point(3, 3)
Me.Panel1.Name = "Panel1"
Me.Panel1.Size = New System.Drawing.Size(778, 44)
Me.Panel1.TabIndex = 3
'
'btnSearch
'
Me.btnSearch.Location = New System.Drawing.Point(785, 3)
Me.btnSearch.Name = "btnSearch"
Me.btnSearch.Size = New System.Drawing.Size(59, 27)
Me.btnSearch.TabIndex = 3
Me.btnSearch.Text = "Search"
Me.btnSearch.UseVisualStyleBackColor = True
'
'tbZoom
'
Me.tbZoom.LargeChange = 2
Me.tbZoom.Location = New System.Drawing.Point(515, 3)
Me.tbZoom.Maximum = 29
Me.tbZoom.Name = "tbZoom"
Me.tbZoom.Size = New System.Drawing.Size(264, 45)
Me.tbZoom.TabIndex = 2
Me.tbZoom.Value = 15
'
'txtSearch
'
Me.txtSearch.Location = New System.Drawing.Point(111, 3)
Me.txtSearch.Name = "txtSearch"
Me.txtSearch.Size = New System.Drawing.Size(398, 20)
Me.txtSearch.TabIndex = 1
'
'Label1
'
```

```
Me.Label1.AutoSize = True
Me.Label1.Location = New System.Drawing.Point(12, 5)
Me.Label1.Name = "Label1"
Me.Label1.Size = New System.Drawing.Size(94, 13)
Me.Label1.TabIndex = 0
Me.Label1.Text = "Address to Search"
'
'TabControl1
'
Me.TabControl1.Controls.Add(Me.TabPage1)
Me.TabControl1.Controls.Add(Me.TabPage4)
Me.TabControl1.Location = New System.Drawing.Point(12, 6)
Me.TabControl1.Name = "TabControl1"
Me.TabControl1.SelectedIndex = 0
Me.TabControl1.Size = New System.Drawing.Size(792, 564)
Me.TabControl1.TabIndex = 0
'
'TabPage4
'
Me.TabPage4.Controls.Add(Me.TabControl2)
Me.TabPage4.Location = New System.Drawing.Point(4, 22)
Me.TabPage4.Name = "TabPage4"
Me.TabPage4.Padding = New System.Windows.Forms.Padding(3)
Me.TabPage4.Size = New System.Drawing.Size(784, 538)
Me.TabPage4.TabIndex = 3
Me.TabPage4.Text = "REPORTS & GRAPHS"
Me.TabPage4.UseVisualStyleBackColor = True
'
'TabControl2
'
Me.TabControl2.Controls.Add(Me.TabPage5)
Me.TabControl2.Controls.Add(Me.TabPage6)
Me.TabControl2.Controls.Add(Me.TabPage7)
Me.TabControl2.Controls.Add(Me.TabPage8)
Me.TabControl2.Location = New System.Drawing.Point(11, 19)
Me.TabControl2.Name = "TabControl2"
Me.TabControl2.SelectedIndex = 0
Me.TabControl2.Size = New System.Drawing.Size(725, 491)
Me.TabControl2.TabIndex = 0
'
'TabPage5
'
Me.TabPage5.Controls.Add(Me.CrystalReportViewer2)
Me.TabPage5.Controls.Add(Me.ComboBox2)
Me.TabPage5.Controls.Add(Me.Label6)
Me.TabPage5.Controls.Add(Me.Button2)
```

```
Me.TabPage5.Location = New System.Drawing.Point(4, 22)
Me.TabPage5.Name = "TabPage5"
Me.TabPage5.Padding = New System.Windows.Forms.Padding(3)
Me.TabPage5.Size = New System.Drawing.Size(717, 465)
Me.TabPage5.TabIndex = 0
Me.TabPage5.Text = "Level By Location "
Me.TabPage5.UseVisualStyleBackColor = True
'
'ComboBox2
'
Me.ComboBox2.FormattingEnabled = True
Me.ComboBox2.Location = New System.Drawing.Point(141, 22)
Me.ComboBox2.Name = "ComboBox2"
Me.ComboBox2.Size = New System.Drawing.Size(138, 21)
Me.ComboBox2.TabIndex = 2
'
'Label6
'
Me.Label6.AutoSize = True
Me.Label6.Location = New System.Drawing.Point(12, 18)
Me.Label6.Name = "Label6"
Me.Label6.Size = New System.Drawing.Size(81, 13)
Me.Label6.TabIndex = 1
Me.Label6.Text = "Select Location"
'
'Button2
'
Me.Button2.Location = New System.Drawing.Point(296, 15)
Me.Button2.Name = "Button2"
Me.Button2.Size = New System.Drawing.Size(113, 33)
Me.Button2.TabIndex = 0
Me.Button2.Text = "Show Report"
Me.Button2.UseVisualStyleBackColor = True
'
'TabPage6
'
Me.TabPage6.Controls.Add(Me.CrystalReportViewer4)
Me.TabPage6.Controls.Add(Me.TextBox2)
Me.TabPage6.Controls.Add(Me.TextBox1)
Me.TabPage6.Controls.Add(Me.Button3)
Me.TabPage6.Controls.Add(Me.Label8)
Me.TabPage6.Controls.Add(Me.Label7)
Me.TabPage6.Location = New System.Drawing.Point(4, 22)
Me.TabPage6.Name = "TabPage6"
Me.TabPage6.Padding = New System.Windows.Forms.Padding(3)
Me.TabPage6.Size = New System.Drawing.Size(717, 465)
```

```
        Me.TabPage6.TabIndex = 1
        Me.TabPage6.Text = "Level By Age"
        Me.TabPage6.UseVisualStyleBackColor = True
        '
        'TabPage7
        '
        Me.TabPage7.Controls.Add(Me.CrystalReportViewer22)
        Me.TabPage7.Location = New System.Drawing.Point(4, 22)
        Me.TabPage7.Name = "TabPage7"
        Me.TabPage7.Size = New System.Drawing.Size(717, 465)
        Me.TabPage7.TabIndex = 2
        Me.TabPage7.Text = "By Location"
        Me.TabPage7.UseVisualStyleBackColor = True
        '
        'CrystalReportViewer22
        '
        Me.CrystalReportViewer22.ActiveViewIndex = 0
        Me.CrystalReportViewer22.BorderStyle =
System.Windows.Forms.BorderStyle.FixedSingle
        Me.CrystalReportViewer22.Dock = System.Windows.Forms.DockStyle.Fill
        Me.CrystalReportViewer22.Location = New System.Drawing.Point(0, 0)
        Me.CrystalReportViewer22.Name = "CrystalReportViewer22"
        Me.CrystalReportViewer22.ReportSource = Me.CrystalReportLocation1
        Me.CrystalReportViewer22.Size = New System.Drawing.Size(717, 465)
        Me.CrystalReportViewer22.TabIndex = 0
        '
        'TabPage8
        '
        Me.TabPage8.Controls.Add(Me.CrystalReportViewer3)
        Me.TabPage8.Location = New System.Drawing.Point(4, 22)
        Me.TabPage8.Name = "TabPage8"
        Me.TabPage8.Size = New System.Drawing.Size(717, 465)
        Me.TabPage8.TabIndex = 3
        Me.TabPage8.Text = "By Gender"
        Me.TabPage8.UseVisualStyleBackColor = True
        '
        'CrystalReportViewer3
        '
        Me.CrystalReportViewer3.ActiveViewIndex = 0
        Me.CrystalReportViewer3.BorderStyle =
System.Windows.Forms.BorderStyle.FixedSingle
        Me.CrystalReportViewer3.Dock = System.Windows.Forms.DockStyle.Fill
        Me.CrystalReportViewer3.Location = New System.Drawing.Point(0, 0)
        Me.CrystalReportViewer3.Name = "CrystalReportViewer3"
        Me.CrystalReportViewer3.ReportSource = Me.CrystalReportGender1
        Me.CrystalReportViewer3.Size = New System.Drawing.Size(717, 465)
```

```
        Me.CrystalReportViewer3.TabIndex = 0
        '
        'CrystalReportViewer2
        '
        Me.CrystalReportViewer2.ActiveViewIndex = -1
        Me.CrystalReportViewer2.BorderStyle =
System.Windows.Forms.BorderStyle.FixedSingle
        Me.CrystalReportViewer2.Location = New System.Drawing.Point(6, 72)
        Me.CrystalReportViewer2.Name = "CrystalReportViewer2"
        Me.CrystalReportViewer2.SelectionFormula = ""
        Me.CrystalReportViewer2.Size = New System.Drawing.Size(705, 387)
        Me.CrystalReportViewer2.TabIndex = 3
        Me.CrystalReportViewer2.ViewTimeSelectionFormula = ""
        '
        'Label7
        '
        Me.Label7.AutoSize = True
        Me.Label7.Location = New System.Drawing.Point(6, 29)
        Me.Label7.Name = "Label7"
        Me.Label7.Size = New System.Drawing.Size(51, 13)
        Me.Label7.TabIndex = 0
        Me.Label7.Text = "Start Age"
        '
        'Label8
        '
        Me.Label8.AutoSize = True
        Me.Label8.Location = New System.Drawing.Point(193, 29)
        Me.Label8.Name = "Label8"
        Me.Label8.Size = New System.Drawing.Size(48, 13)
        Me.Label8.TabIndex = 1
        Me.Label8.Text = "End Age"
        '
        'Button3
        '
        Me.Button3.Location = New System.Drawing.Point(358, 18)
        Me.Button3.Name = "Button3"
        Me.Button3.Size = New System.Drawing.Size(97, 35)
        Me.Button3.TabIndex = 2
        Me.Button3.Text = "Show Report"
        Me.Button3.UseVisualStyleBackColor = True
        '
        'TextBox1
        '
        Me.TextBox1.Location = New System.Drawing.Point(85, 26)
        Me.TextBox1.Name = "TextBox1"
        Me.TextBox1.Size = New System.Drawing.Size(86, 20)
```

```
        Me.TextBox1.TabIndex = 3
        '
        'TextBox2
        '
        Me.TextBox2.Location = New System.Drawing.Point(259, 29)
        Me.TextBox2.Name = "TextBox2"
        Me.TextBox2.Size = New System.Drawing.Size(82, 20)
        Me.TextBox2.TabIndex = 4
        '
        'CrystalReportViewer4
        '
        Me.CrystalReportViewer4.ActiveViewIndex = -1
        Me.CrystalReportViewer4.BorderStyle =
System.Windows.Forms.BorderStyle.FixedSingle
        Me.CrystalReportViewer4.Location = New System.Drawing.Point(7, 78)
        Me.CrystalReportViewer4.Name = "CrystalReportViewer4"
        Me.CrystalReportViewer4.SelectionFormula = ""
        Me.CrystalReportViewer4.Size = New System.Drawing.Size(704, 359)
        Me.CrystalReportViewer4.TabIndex = 5
        Me.CrystalReportViewer4.ViewTimeSelectionFormula = ""
        '
        'Form1
        '
        Me.AutoScaleDimensions = New System.Drawing.SizeF(6.0!, 13.0!)
        Me.AutoScaleMode = System.Windows.Forms.AutoScaleMode.Font
        Me.ClientSize = New System.Drawing.Size(804, 582)
        Me.Controls.Add(Me.TabControl1)
        Me.Name = "Form1"
        Me.Text = "Trachoma Report"
        Me.WindowState = System.Windows.Forms.FormWindowState.Maximized
        Me.TabPage1.ResumeLayout(False)
        Me.Panel3.ResumeLayout(False)
        Me.Panel2.ResumeLayout(False)
        Me.GroupBox2.ResumeLayout(False)
        Me.GroupBox2.PerformLayout()
        Me.Panel1.ResumeLayout(False)
        Me.Panel1.PerformLayout()
        CType(Me.tbZoom, System.ComponentModel.ISupportInitialize).EndInit()
        Me.TabControl1.ResumeLayout(False)
        Me.TabPage4.ResumeLayout(False)
        Me.TabControl2.ResumeLayout(False)
        Me.TabPage5.ResumeLayout(False)
        Me.TabPage5.PerformLayout()
        Me.TabPage6.ResumeLayout(False)
        Me.TabPage6.PerformLayout()
        Me.TabPage7.ResumeLayout(False)
```

```
        Me.TabPage8.ResumeLayout(False)
        Me.ResumeLayout(False)

    End Sub
    Friend WithEvents TabPage1 As System.Windows.Forms.TabPage
    Friend WithEvents Panel3 As System.Windows.Forms.Panel
    Friend WithEvents ehImageHost As System.Windows.Forms.Integration.ElementHost
    Friend WithEvents Panel2 As System.Windows.Forms.Panel
    Friend WithEvents GroupBox2 As System.Windows.Forms.GroupBox
    Friend WithEvents lblStatus As System.Windows.Forms.Label
    Friend WithEvents Label2 As System.Windows.Forms.Label
    Friend WithEvents btnConnect As System.Windows.Forms.Button
    Friend WithEvents Label3 As System.Windows.Forms.Label
    Friend WithEvents cbbCOMPorts As System.Windows.Forms.ComboBox
    Friend WithEvents lvAddressDetails As System.Windows.Forms.ListView
    Friend WithEvents MainAddress As System.Windows.Forms.ColumnHeader
    Friend WithEvents Msg As System.Windows.Forms.ColumnHeader
    Friend WithEvents hDate As System.Windows.Forms.ColumnHeader
    Friend WithEvents Latitude As System.Windows.Forms.ColumnHeader
    Friend WithEvents Longitude As System.Windows.Forms.ColumnHeader
    Friend WithEvents Panel1 As System.Windows.Forms.Panel
    Friend WithEvents btnSearch As System.Windows.Forms.Button
    Friend WithEvents tbZoom As System.Windows.Forms.TrackBar
    Friend WithEvents txtSearch As System.Windows.Forms.TextBox
    Friend WithEvents Label1 As System.Windows.Forms.Label
    Friend WithEvents TabControl1 As System.Windows.Forms.TabControl
    Friend WithEvents CrystalReport11 As TrachomaReport.CrystalReport1
    Friend WithEvents TabPage4 As System.Windows.Forms.TabPage
    Friend WithEvents TabControl2 As System.Windows.Forms.TabControl
    Friend WithEvents TabPage5 As System.Windows.Forms.TabPage
    Friend WithEvents TabPage6 As System.Windows.Forms.TabPage
    Friend WithEvents TabPage7 As System.Windows.Forms.TabPage
    Friend WithEvents ComboBox2 As System.Windows.Forms.ComboBox
    Friend WithEvents Label6 As System.Windows.Forms.Label
    Friend WithEvents Button2 As System.Windows.Forms.Button
    Friend WithEvents TabPage8 As System.Windows.Forms.TabPage
    Friend WithEvents CrystalReportViewer22 As
CrystalDecisions.Windows.Forms.CrystalReportViewer
    Friend WithEvents CrystalReportLocation1 As
TrachomaReport.CrystalReportLocation
    Friend WithEvents CrystalReportViewer3 As
CrystalDecisions.Windows.Forms.CrystalReportViewer
    Friend WithEvents CrystalReportGender1 As TrachomaReport.CrystalReportGender
    Friend WithEvents CrystalReportViewer2 As
CrystalDecisions.Windows.Forms.CrystalReportViewer
    Friend WithEvents TextBox2 As System.Windows.Forms.TextBox
```

```
    Friend WithEvents TextBox1 As System.Windows.Forms.TextBox
    Friend WithEvents Button3 As System.Windows.Forms.Button
    Friend WithEvents Label8 As System.Windows.Forms.Label
    Friend WithEvents Label7 As System.Windows.Forms.Label
    Friend WithEvents CrystalReportViewer4 As
CrystalDecisions.Windows.Forms.CrystalReportViewer

End Class



‘Report in graph and text by age.
------------------------------------------------------------------------------
' <auto-generated>
'     This code was generated by a tool.
'     Runtime Version:2.0.50727.4963
'
'     Changes to this file may cause incorrect behavior and will be lost if
'     the code is regenerated.
' </auto-generated>
'------------------------------------------------------------------------------

Option Strict Off
Option Explicit On

Imports CrystalDecisions.CrystalReports.Engine
Imports CrystalDecisions.ReportSource
Imports CrystalDecisions.Shared
Imports System
Imports System.ComponentModel


Public Class CrystalReportAge
    Inherits ReportClass

    Public Sub New()
        MyBase.New
    End Sub

    Public Overrides Property ResourceName() As String
        Get
            Return "CrystalReportAge.rpt"
        End Get
        Set
            'Do nothing
        End Set
```

```
    End Property

    Public Overrides Property NewGenerator() As Boolean
        Get
            Return true
        End Get
        Set
            'Do nothing
        End Set
    End Property

    Public Overrides Property FullResourceName() As String
        Get
            Return "TrachomaReport.CrystalReportAge.rpt"
        End Get
        Set
            'Do nothing
        End Set
    End Property

    <Browsable(false), _

DesignerSerializationVisibilityAttribute(System.ComponentModel.DesignerSerialization
Visibility.Hidden)> _
    Public ReadOnly Property Section1() As
CrystalDecisions.CrystalReports.Engine.Section
        Get
            Return Me.ReportDefinition.Sections(0)
        End Get
    End Property

    <Browsable(false), _

DesignerSerializationVisibilityAttribute(System.ComponentModel.DesignerSerialization
Visibility.Hidden)> _
    Public ReadOnly Property Section2() As
CrystalDecisions.CrystalReports.Engine.Section
        Get
            Return Me.ReportDefinition.Sections(1)
        End Get
    End Property

    <Browsable(false), _

DesignerSerializationVisibilityAttribute(System.ComponentModel.DesignerSerialization
Visibility.Hidden)> _
```

```
    Public ReadOnly Property GroupHeaderSection1() As
CrystalDecisions.CrystalReports.Engine.Section
        Get
            Return Me.ReportDefinition.Sections(2)
        End Get
    End Property

    <Browsable(false), _

DesignerSerializationVisibilityAttribute(System.ComponentModel.DesignerSerialization
Visibility.Hidden)> _
    Public ReadOnly Property Section3() As
CrystalDecisions.CrystalReports.Engine.Section
        Get
            Return Me.ReportDefinition.Sections(3)
        End Get
    End Property

    <Browsable(false), _

DesignerSerializationVisibilityAttribute(System.ComponentModel.DesignerSerialization
Visibility.Hidden)> _
    Public ReadOnly Property GroupFooterSection1() As
CrystalDecisions.CrystalReports.Engine.Section
        Get
            Return Me.ReportDefinition.Sections(4)
        End Get
    End Property

    <Browsable(false), _

DesignerSerializationVisibilityAttribute(System.ComponentModel.DesignerSerialization
Visibility.Hidden)> _
    Public ReadOnly Property Section4() As
CrystalDecisions.CrystalReports.Engine.Section
        Get
            Return Me.ReportDefinition.Sections(5)
        End Get
    End Property

    <Browsable(false), _

DesignerSerializationVisibilityAttribute(System.ComponentModel.DesignerSerialization
Visibility.Hidden)> _
    Public ReadOnly Property Section5() As
CrystalDecisions.CrystalReports.Engine.Section
```

```
        Get
            Return Me.ReportDefinition.Sections(6)
        End Get
    End Property

    <Browsable(false), _

DesignerSerializationVisibilityAttribute(System.ComponentModel.DesignerSerialization
Visibility.Hidden)> _
    Public ReadOnly Property Parameter_startage() As
CrystalDecisions.[Shared].IParameterField
        Get
            Return Me.DataDefinition.ParameterFields(0)
        End Get
    End Property

    <Browsable(false), _

DesignerSerializationVisibilityAttribute(System.ComponentModel.DesignerSerialization
Visibility.Hidden)> _
    Public ReadOnly Property Parameter_endage() As
CrystalDecisions.[Shared].IParameterField
        Get
            Return Me.DataDefinition.ParameterFields(1)
        End Get
    End Property
End Class

<System.Drawing.ToolboxBitmapAttribute(GetType(CrystalDecisions.[Shared].ExportO
ptions), "report.bmp")> _
Public Class CachedCrystalReportAge
    Inherits Component
    Implements ICachedReport

    Public Sub New()
        MyBase.New
    End Sub

    <Browsable(false), _

DesignerSerializationVisibilityAttribute(System.ComponentModel.DesignerSerialization
Visibility.Hidden)> _
    Public Overridable Property IsCacheable() As Boolean Implements
CrystalDecisions.ReportSource.ICachedReport.IsCacheable
        Get
            Return true
```

```
        End Get
        Set
            '
        End Set
    End Property

    <Browsable(false), _

DesignerSerializationVisibilityAttribute(System.ComponentModel.DesignerSerialization
Visibility.Hidden)> _
    Public Overridable Property ShareDBLogonInfo() As Boolean Implements
CrystalDecisions.ReportSource.ICachedReport.ShareDBLogonInfo
        Get
            Return false
        End Get
        Set
            '
        End Set
    End Property

    <Browsable(false), _

DesignerSerializationVisibilityAttribute(System.ComponentModel.DesignerSerialization
Visibility.Hidden)> _
    Public Overridable Property CacheTimeOut() As System.TimeSpan Implements
CrystalDecisions.ReportSource.ICachedReport.CacheTimeOut
        Get
            Return CachedReportConstants.DEFAULT_TIMEOUT
        End Get
        Set
            '
        End Set
    End Property

    Public Overridable Function CreateReport() As
CrystalDecisions.CrystalReports.Engine.ReportDocument Implements
CrystalDecisions.ReportSource.ICachedReport.CreateReport
        Dim rpt As CrystalReportAge = New CrystalReportAge
        rpt.Site = Me.Site
        Return rpt
    End Function

    Public Overridable Function GetCustomizedCacheKey(ByVal request As
RequestContext) As String Implements
CrystalDecisions.ReportSource.ICachedReport.GetCustomizedCacheKey
        Dim key As [String] = Nothing
```

```
        '// The following is the code used to generate the default
        '// cache key for caching report jobs in the ASP.NET Cache.
        '// Feel free to modify this code to suit your needs.
        '// Returning key == null causes the default cache key to
        '// be generated.
        '
        'key = RequestContext.BuildCompleteCacheKey(
        '    request,
        '    null,       // sReportFilename
        '    this.GetType(),
        '    this.ShareDBLogonInfo );
        Return key
    End Function
End Class

‘  Report by gender
'------------------------------------------------------------------------------
' <auto-generated>
'     This code was generated by a tool.
'     Runtime Version:2.0.50727.4963
'
'     Changes to this file may cause incorrect behavior and will be lost if
'     the code is regenerated.
' </auto-generated>
'------------------------------------------------------------------------------

Option Strict Off
Option Explicit On

Imports CrystalDecisions.CrystalReports.Engine
Imports CrystalDecisions.ReportSource
Imports CrystalDecisions.Shared
Imports System
Imports System.ComponentModel


Public Class CrystalReportGender
    Inherits ReportClass

    Public Sub New()
        MyBase.New
    End Sub

    Public Overrides Property ResourceName() As String
        Get
            Return "CrystalReportGender.rpt"
```

```
        End Get
        Set
            'Do nothing
        End Set
    End Property

    Public Overrides Property NewGenerator() As Boolean
        Get
            Return true
        End Get
        Set
            'Do nothing
        End Set
    End Property

    Public Overrides Property FullResourceName() As String
        Get
            Return "TrachomaReport.CrystalReportGender.rpt"
        End Get
        Set
            'Do nothing
        End Set
    End Property

    <Browsable(false), _

DesignerSerializationVisibilityAttribute(System.ComponentModel.DesignerSerialization
Visibility.Hidden)> _
    Public ReadOnly Property Section1() As
CrystalDecisions.CrystalReports.Engine.Section
        Get
            Return Me.ReportDefinition.Sections(0)
        End Get
    End Property

    <Browsable(false), _

DesignerSerializationVisibilityAttribute(System.ComponentModel.DesignerSerialization
Visibility.Hidden)> _
    Public ReadOnly Property Section2() As
CrystalDecisions.CrystalReports.Engine.Section
        Get
            Return Me.ReportDefinition.Sections(1)
        End Get
    End Property
```

```
    <Browsable(false), _
DesignerSerializationVisibilityAttribute(System.ComponentModel.DesignerSerialization
Visibility.Hidden)> _
    Public ReadOnly Property GroupHeaderSection1() As
CrystalDecisions.CrystalReports.Engine.Section
        Get
            Return Me.ReportDefinition.Sections(2)
        End Get
    End Property

    <Browsable(false), _
DesignerSerializationVisibilityAttribute(System.ComponentModel.DesignerSerialization
Visibility.Hidden)> _
    Public ReadOnly Property Section3() As
CrystalDecisions.CrystalReports.Engine.Section
        Get
            Return Me.ReportDefinition.Sections(3)
        End Get
    End Property

    <Browsable(false), _
DesignerSerializationVisibilityAttribute(System.ComponentModel.DesignerSerialization
Visibility.Hidden)> _
    Public ReadOnly Property GroupFooterSection1() As
CrystalDecisions.CrystalReports.Engine.Section
        Get
            Return Me.ReportDefinition.Sections(4)
        End Get
    End Property

    <Browsable(false), _
DesignerSerializationVisibilityAttribute(System.ComponentModel.DesignerSerialization
Visibility.Hidden)> _
    Public ReadOnly Property Section4() As
CrystalDecisions.CrystalReports.Engine.Section
        Get
            Return Me.ReportDefinition.Sections(5)
        End Get
    End Property

    <Browsable(false), _
```

```
DesignerSerializationVisibilityAttribute(System.ComponentModel.DesignerSerialization
Visibility.Hidden)> _
   Public ReadOnly Property Section5() As
CrystalDecisions.CrystalReports.Engine.Section
      Get
         Return Me.ReportDefinition.Sections(6)
      End Get
   End Property
End Class

<System.Drawing.ToolboxBitmapAttribute(GetType(CrystalDecisions.[Shared].ExportO
ptions), "report.bmp")> _
Public Class CachedCrystalReportGender
   Inherits Component
   Implements ICachedReport

   Public Sub New()
      MyBase.New
   End Sub

   <Browsable(false), _

DesignerSerializationVisibilityAttribute(System.ComponentModel.DesignerSerialization
Visibility.Hidden)> _
   Public Overridable Property IsCacheable() As Boolean Implements
CrystalDecisions.ReportSource.ICachedReport.IsCacheable
      Get
         Return true
      End Get
      Set
         '
      End Set
   End Property

   <Browsable(false), _

DesignerSerializationVisibilityAttribute(System.ComponentModel.DesignerSerialization
Visibility.Hidden)> _
   Public Overridable Property ShareDBLogonInfo() As Boolean Implements
CrystalDecisions.ReportSource.ICachedReport.ShareDBLogonInfo
      Get
         Return false
      End Get
      Set
         '
```

```
        End Set
    End Property

    <Browsable(false),  _

DesignerSerializationVisibilityAttribute(System.ComponentModel.DesignerSerialization
Visibility.Hidden)>  _
    Public Overridable Property CacheTimeOut() As System.TimeSpan Implements
CrystalDecisions.ReportSource.ICachedReport.CacheTimeOut
        Get
            Return CachedReportConstants.DEFAULT_TIMEOUT
        End Get
        Set
            '
        End Set
    End Property

    Public Overridable Function CreateReport() As
CrystalDecisions.CrystalReports.Engine.ReportDocument Implements
CrystalDecisions.ReportSource.ICachedReport.CreateReport
        Dim rpt As CrystalReportGender = New CrystalReportGender
        rpt.Site = Me.Site
        Return rpt
    End Function

    Public Overridable Function GetCustomizedCacheKey(ByVal request As
RequestContext) As String Implements
CrystalDecisions.ReportSource.ICachedReport.GetCustomizedCacheKey
        Dim key As [String] = Nothing
        '// The following is the code used to generate the default
        '// cache key for caching report jobs in the ASP.NET Cache.
        '// Feel free to modify this code to suit your needs.
        '// Returning key == null causes the default cache key to
        '// be generated.
        '
        'key = RequestContext.BuildCompleteCacheKey(
        '    request,
        '    null,      // sReportFilename
        '    this.GetType(),
        '    this.ShareDBLogonInfo );
        Return key
    End Function
End Class

‘Report by level
'------------------------------------------------------------------------
```

```
' <auto-generated>
'     This code was generated by a tool.
'     Runtime Version:2.0.50727.4963
'
'     Changes to this file may cause incorrect behavior and will be lost if
'     the code is regenerated.
' </auto-generated>
'------------------------------------------------------------------------------

Option Strict Off
Option Explicit On

Imports CrystalDecisions.CrystalReports.Engine
Imports CrystalDecisions.ReportSource
Imports CrystalDecisions.Shared
Imports System
Imports System.ComponentModel


Public Class CrystalReportLevel
    Inherits ReportClass

    Public Sub New()
        MyBase.New
    End Sub

    Public Overrides Property ResourceName() As String
        Get
            Return "CrystalReportLevel.rpt"
        End Get
        Set
            'Do nothing
        End Set
    End Property

    Public Overrides Property NewGenerator() As Boolean
        Get
            Return true
        End Get
        Set
            'Do nothing
        End Set
    End Property

    Public Overrides Property FullResourceName() As String
        Get
```

```
            Return "TrachomaReport.CrystalReportLevel.rpt"
        End Get
        Set
            'Do nothing
        End Set
    End Property

    <Browsable(false), _

DesignerSerializationVisibilityAttribute(System.ComponentModel.DesignerSerialization
Visibility.Hidden)> _
    Public ReadOnly Property Section1() As
CrystalDecisions.CrystalReports.Engine.Section
        Get
            Return Me.ReportDefinition.Sections(0)
        End Get
    End Property

    <Browsable(false), _

DesignerSerializationVisibilityAttribute(System.ComponentModel.DesignerSerialization
Visibility.Hidden)> _
    Public ReadOnly Property Section2() As
CrystalDecisions.CrystalReports.Engine.Section
        Get
            Return Me.ReportDefinition.Sections(1)
        End Get
    End Property

    <Browsable(false), _

DesignerSerializationVisibilityAttribute(System.ComponentModel.DesignerSerialization
Visibility.Hidden)> _
    Public ReadOnly Property GroupHeaderSection1() As
CrystalDecisions.CrystalReports.Engine.Section
        Get
            Return Me.ReportDefinition.Sections(2)
        End Get
    End Property

    <Browsable(false), _

DesignerSerializationVisibilityAttribute(System.ComponentModel.DesignerSerialization
Visibility.Hidden)> _
    Public ReadOnly Property Section3() As
CrystalDecisions.CrystalReports.Engine.Section
```

```
        Get
            Return Me.ReportDefinition.Sections(3)
        End Get
    End Property

    <Browsable(false), _

DesignerSerializationVisibilityAttribute(System.ComponentModel.DesignerSerialization
Visibility.Hidden)> _
    Public ReadOnly Property GroupFooterSection1() As
CrystalDecisions.CrystalReports.Engine.Section
        Get
            Return Me.ReportDefinition.Sections(4)
        End Get
    End Property

    <Browsable(false), _

DesignerSerializationVisibilityAttribute(System.ComponentModel.DesignerSerialization
Visibility.Hidden)> _
    Public ReadOnly Property Section4() As
CrystalDecisions.CrystalReports.Engine.Section
        Get
            Return Me.ReportDefinition.Sections(5)
        End Get
    End Property

    <Browsable(false), _

DesignerSerializationVisibilityAttribute(System.ComponentModel.DesignerSerialization
Visibility.Hidden)> _
    Public ReadOnly Property Section5() As
CrystalDecisions.CrystalReports.Engine.Section
        Get
            Return Me.ReportDefinition.Sections(6)
        End Get
    End Property

    <Browsable(false), _

DesignerSerializationVisibilityAttribute(System.ComponentModel.DesignerSerialization
Visibility.Hidden)> _
    Public ReadOnly Property Parameter_locations() As
CrystalDecisions.[Shared].IParameterField
        Get
            Return Me.DataDefinition.ParameterFields(0)
```

```
        End Get
    End Property
End Class

<System.Drawing.ToolboxBitmapAttribute(GetType(CrystalDecisions.[Shared].ExportO
ptions), "report.bmp")> _
Public Class CachedCrystalReportLevel
    Inherits Component
    Implements ICachedReport

    Public Sub New()
        MyBase.New
    End Sub

    <Browsable(false), _

DesignerSerializationVisibilityAttribute(System.ComponentModel.DesignerSerialization
Visibility.Hidden)> _
    Public Overridable Property IsCacheable() As Boolean Implements
CrystalDecisions.ReportSource.ICachedReport.IsCacheable
        Get
            Return true
        End Get
        Set
            '
        End Set
    End Property

    <Browsable(false), _

DesignerSerializationVisibilityAttribute(System.ComponentModel.DesignerSerialization
Visibility.Hidden)> _
    Public Overridable Property ShareDBLogonInfo() As Boolean Implements
CrystalDecisions.ReportSource.ICachedReport.ShareDBLogonInfo
        Get
            Return false
        End Get
        Set
            '
        End Set
    End Property

    <Browsable(false), _

DesignerSerializationVisibilityAttribute(System.ComponentModel.DesignerSerialization
Visibility.Hidden)> _
```

```
    Public Overridable Property CacheTimeOut() As System.TimeSpan Implements
CrystalDecisions.ReportSource.ICachedReport.CacheTimeOut
        Get
            Return CachedReportConstants.DEFAULT_TIMEOUT
        End Get
        Set
            '
        End Set
    End Property

    Public Overridable Function CreateReport() As
CrystalDecisions.CrystalReports.Engine.ReportDocument Implements
CrystalDecisions.ReportSource.ICachedReport.CreateReport
        Dim rpt As CrystalReportLevel = New CrystalReportLevel
        rpt.Site = Me.Site
        Return rpt
    End Function

    Public Overridable Function GetCustomizedCacheKey(ByVal request As
RequestContext) As String Implements
CrystalDecisions.ReportSource.ICachedReport.GetCustomizedCacheKey
        Dim key As [String] = Nothing
        '// The following is the code used to generate the default
        '// cache key for caching report jobs in the ASP.NET Cache.
        '// Feel free to modify this code to suit your needs.
        '// Returning key == null causes the default cache key to
        '// be generated.
        '
        'key = RequestContext.BuildCompleteCacheKey(
        '    request,
        '    null,       // sReportFilename
        '    this.GetType(),
        '    this.ShareDBLogonInfo );
        Return key
    End Function
End Class


‘Report by location
'------------------------------------------------------------------------------
' <auto-generated>
'     This code was generated by a tool.
'     Runtime Version:2.0.50727.4963
'
'     Changes to this file may cause incorrect behavior and will be lost if
'     the code is regenerated.
```

```
' </auto-generated>
'------------------------------------------------------------------------------

Option Strict Off
Option Explicit On

Imports CrystalDecisions.CrystalReports.Engine
Imports CrystalDecisions.ReportSource
Imports CrystalDecisions.Shared
Imports System
Imports System.ComponentModel


Public Class CrystalReportLocation
    Inherits ReportClass

    Public Sub New()
        MyBase.New
    End Sub

    Public Overrides Property ResourceName() As String
        Get
            Return "CrystalReportLocation.rpt"
        End Get
        Set
            'Do nothing
        End Set
    End Property

    Public Overrides Property NewGenerator() As Boolean
        Get
            Return true
        End Get
        Set
            'Do nothing
        End Set
    End Property

    Public Overrides Property FullResourceName() As String
        Get
            Return "TrachomaReport.CrystalReportLocation.rpt"
        End Get
        Set
            'Do nothing
        End Set
    End Property
```

```
    <Browsable(false), _

DesignerSerializationVisibilityAttribute(System.ComponentModel.DesignerSerialization
Visibility.Hidden)> _
    Public ReadOnly Property Section1() As
CrystalDecisions.CrystalReports.Engine.Section
        Get
            Return Me.ReportDefinition.Sections(0)
        End Get
    End Property

    <Browsable(false), _

DesignerSerializationVisibilityAttribute(System.ComponentModel.DesignerSerialization
Visibility.Hidden)> _
    Public ReadOnly Property Section2() As
CrystalDecisions.CrystalReports.Engine.Section
        Get
            Return Me.ReportDefinition.Sections(1)
        End Get
    End Property

    <Browsable(false), _

DesignerSerializationVisibilityAttribute(System.ComponentModel.DesignerSerialization
Visibility.Hidden)> _
    Public ReadOnly Property GroupHeaderSection1() As
CrystalDecisions.CrystalReports.Engine.Section
        Get
            Return Me.ReportDefinition.Sections(2)
        End Get
    End Property

    <Browsable(false), _

DesignerSerializationVisibilityAttribute(System.ComponentModel.DesignerSerialization
Visibility.Hidden)> _
    Public ReadOnly Property Section3() As
CrystalDecisions.CrystalReports.Engine.Section
        Get
            Return Me.ReportDefinition.Sections(3)
        End Get
    End Property

    <Browsable(false), _
```

```
DesignerSerializationVisibilityAttribute(System.ComponentModel.DesignerSerialization
Visibility.Hidden)> _
    Public ReadOnly Property GroupFooterSection1() As
CrystalDecisions.CrystalReports.Engine.Section
        Get
            Return Me.ReportDefinition.Sections(4)
        End Get
    End Property

    <Browsable(false), _

DesignerSerializationVisibilityAttribute(System.ComponentModel.DesignerSerialization
Visibility.Hidden)> _
    Public ReadOnly Property Section4() As
CrystalDecisions.CrystalReports.Engine.Section
        Get
            Return Me.ReportDefinition.Sections(5)
        End Get
    End Property

    <Browsable(false), _

DesignerSerializationVisibilityAttribute(System.ComponentModel.DesignerSerialization
Visibility.Hidden)> _
    Public ReadOnly Property Section5() As
CrystalDecisions.CrystalReports.Engine.Section
        Get
            Return Me.ReportDefinition.Sections(6)
        End Get
    End Property
End Class

<System.Drawing.ToolboxBitmapAttribute(GetType(CrystalDecisions.[Shared].ExportO
ptions), "report.bmp")> _
Public Class CachedCrystalReportLocation
    Inherits Component
    Implements ICachedReport

    Public Sub New()
        MyBase.New
    End Sub

    <Browsable(false), _
```

```
DesignerSerializationVisibilityAttribute(System.ComponentModel.DesignerSerialization
Visibility.Hidden)> _
    Public Overridable Property IsCacheable() As Boolean Implements
CrystalDecisions.ReportSource.ICachedReport.IsCacheable
        Get
            Return true
        End Get
        Set
            '
        End Set
    End Property

    <Browsable(false), _

DesignerSerializationVisibilityAttribute(System.ComponentModel.DesignerSerialization
Visibility.Hidden)> _
    Public Overridable Property ShareDBLogonInfo() As Boolean Implements
CrystalDecisions.ReportSource.ICachedReport.ShareDBLogonInfo
        Get
            Return false
        End Get
        Set
            '
        End Set
    End Property

    <Browsable(false), _

DesignerSerializationVisibilityAttribute(System.ComponentModel.DesignerSerialization
Visibility.Hidden)> _
    Public Overridable Property CacheTimeOut() As System.TimeSpan Implements
CrystalDecisions.ReportSource.ICachedReport.CacheTimeOut
        Get
            Return CachedReportConstants.DEFAULT_TIMEOUT
        End Get
        Set
            '
        End Set
    End Property

    Public Overridable Function CreateReport() As
CrystalDecisions.CrystalReports.Engine.ReportDocument Implements
CrystalDecisions.ReportSource.ICachedReport.CreateReport
        Dim rpt As CrystalReportLocation = New CrystalReportLocation
        rpt.Site = Me.Site
```

```
        Return rpt
    End Function

    Public Overridable Function GetCustomizedCacheKey(ByVal request As
RequestContext) As String Implements
CrystalDecisions.ReportSource.ICachedReport.GetCustomizedCacheKey
        Dim key As [String] = Nothing
        '// The following is the code used to generate the default
        '// cache key for caching report jobs in the ASP.NET Cache.
        '// Feel free to modify this code to suit your needs.
        '// Returning key == null causes the default cache key to
        '// be generated.
        '
        'key = RequestContext.BuildCompleteCacheKey(
        '    request,
        '    null,       // sReportFilename
        '    this.GetType(),
        '    this.ShareDBLogonInfo );
        Return key
    End Function
End Class



'--------------------------------------
'Programmed by: Eve
'Main form module of the system
'This form module contains a collection of procedures/functions that carry out main
functional activities of the system
'i.e GIS for tracking locations, viewing and displaying reports
'--------------------------------------
'Libraries for GIS functionality
Imports Google.Api.Maps.Service.Geocoding 'GeoCoding functionalities
Imports Google.Api.Maps.Service.StaticMaps 'Map methods
Imports System.Windows.Media.Imaging 'Added reference to PresentationCore for WPF
image capabilities

'Libaries For crystal report view
Imports CrystalDecisions.CrystalReports.Engine
Imports CrystalDecisions.Shared
Public Class Form1
    Public WithEvents objSMS As New mCore.SMS

    'Code for handling response to GIS geographical info requests
    Private Enum ServiceResponse
        Unknown 'Unknown response
```

```
        Ok ' Everything is fine
        InvalidRequest 'Address requested was improperly formatted
        ZeroResults 'No results to return, possibly a non-existant address
        OverQueryLimit 'Too many request on a given day
        RequestDenied 'Request denied
    End Enum
    Private ehImage As System.Windows.Controls.Image = New
System.Windows.Controls.Image() 'Added Element Host from WPF section in toolbox

    'Code for populating the list view for locations that are to be searched by GIS
    Sub displayAll()
        Dim pSql As String

        pSql = "SELECT * FROM tblPATIENTDATA"
        If Database.getData(pSql) = True Then
            While Database.moddata.Read
                Dim lvi As New ListViewItem
                ' First Column can be the listview item's Text
                lvi.Text = Database.moddata("colLocation").ToString

                ' Second Column is the first sub item
                lvi.SubItems.Add("")
                lvi.SubItems.Add("")
                lvi.SubItems.Add(Database.moddata("colLat").ToString())

                ' Third Column is the second sub item
                lvi.SubItems.Add(Database.moddata("colLong").ToString())

                lvAddressDetails.Items.Add(lvi)
            End While
        End If
        Database.moddata.Close()
    End Sub

    'Form Load event
    Private Sub Form1_Load(ByVal senter As Object, ByVal e As System.EventArgs)
Handles Me.Load
        System.Windows.Forms.Control.CheckForIllegalCrossThreadCalls = False
        '---display all the serial port names on the local computer---
        For i As Integer = 0 To My.Computer.Ports.SerialPortNames.Count - 1
            cbbCOMPorts.Items.Add( _
            My.Computer.Ports.SerialPortNames(i))
        Next
        Dim pSql As String
        pSql = "SELECT DISTINCT colLocation FROM tblPATIENTDATA"
        If Database.getData(pSql) = True Then
```

```
            While Database.moddata.Read
                'Populate combobox for locations from db
                ComboBox2.Items.Add(Database.moddata("colLocation"))
            End While
        End If
        Database.moddata.Close()
        displayAll()
    End Sub
    'Code to insert patients data into db
    Sub savedata(ByVal colPhoneNo As String, ByVal colLong As Decimal, ByVal
colLat As Decimal, ByVal colMsg As String, ByVal colHHead As String, _
                 ByVal colPName As String, ByVal colGender As String, ByVal colAge As
Long, ByVal colLevel As String, ByVal colLocation As String, ByVal colCapturedBy As
String)
        Dim pSQL As String
        pSQL = "INSERT INTO tblPATIENTDATA(colPhoneNo,
colLong,colLat,colMsg,colHHead,colPName,colGender,colAge,colLevel,colLocation,col
CapturedBy) VALUES ('" _
                                        & "')"
        Database.saveData(pSQL)
    End Sub
    'New Message Event Handling
    Private Sub objSMS_NewMessageReceived(ByVal senter As Object, _
            ByVal e As mCore.NewMessageReceivedEventArgs) _
            Handles objSMS.NewMessageReceived


        Try
            Dim mMsg As String = e.TextMessage
            Dim mLat As Decimal
            Dim mLang As Decimal
            Dim mHName As String
            Dim mPName As String
            Dim mGender As String
            Dim mAge As Long
            Dim mLevel As String
            Dim mLocation As String
            Dim mCapturedBy As String

            If mMsg.IndexOf("#") > 0 Then
                mLat = Math.Round(CDec(mMsg.Substring(0, InStr(1, mMsg, "#",
CompareMethod.Text) - 1)), 7)
                mMsg = mMsg.Substring(InStr(1, mMsg, "#", CompareMethod.Text))
                mLang = Math.Round(CDec(mMsg.Substring(0, InStr(1, mMsg, "#",
CompareMethod.Text) - 1)), 7)
                mMsg = mMsg.Substring(InStr(1, mMsg, "#", CompareMethod.Text))
```

```
            mHName = mMsg.Substring(0, InStr(1, mMsg, "#", CompareMethod.Text) -
1).Trim
            mMsg = mMsg.Substring(InStr(1, mMsg, "#", CompareMethod.Text))
            mPName = mMsg.Substring(0, InStr(1, mMsg, "#", CompareMethod.Text) -
1).Trim
            mMsg = mMsg.Substring(InStr(1, mMsg, "#", CompareMethod.Text))
            mGender = mMsg.Substring(0, InStr(1, mMsg, "#", CompareMethod.Text) -
1).Trim
            mMsg = mMsg.Substring(InStr(1, mMsg, "#", CompareMethod.Text))
            mAge = CInt(mMsg.Substring(0, InStr(1, mMsg, "#", CompareMethod.Text) -
1).Trim)
            mMsg = mMsg.Substring(InStr(1, mMsg, "#", CompareMethod.Text))
            mLevel = mMsg.Substring(0, InStr(1, mMsg, "#", CompareMethod.Text) -
1).Trim
            mMsg = mMsg.Substring(InStr(1, mMsg, "#", CompareMethod.Text))
            mLocation = mMsg.Substring(0, InStr(1, mMsg, "#", CompareMethod.Text) -
1).Trim
            mMsg = mMsg.Substring(InStr(1, mMsg, "#", CompareMethod.Text))
            mCapturedBy = mMsg
            'MsgBox("Lat = " & mLat & " Long = " & mLang)
            'MsgBox("H/Name = " & mHName & " P/Name = " & mPName)
            'MsgBox("Location = " & mLocation & " CapturedBy = " & mCapturedBy)
            savedata(e.Phone, mLang, mLat, e.TextMessage, mHName, mPName,
mGender, mAge, mLevel, mLocation, mCapturedBy)
            lvAddressDetails.Items.Add(e.Phone) 'Main address
            lvAddressDetails.Items(0).SubItems.Add(mMsg)
            lvAddressDetails.Items(0).SubItems.Add(e.TimeStampRFC)
            lvAddressDetails.Items(0).SubItems.Add(mLat) 'Latitude
            lvAddressDetails.Items(0).SubItems.Add(mLang) 'Longitude
        End If
    Catch ex As System.InvalidOperationException
        MsgBox(ex.Message.ToString)
        'MessageBox.Show("Please enter Town / Suburb / City with Street Address")
'Improper address
    End Try

  End Sub
  'To establish GIS connection for  location maps

  Private Sub btnConnect_Click_1(ByVal senter As System.Object, ByVal e As
System.EventArgs) Handles btnConnect.Click
    Try
        objSMS.Port = cbbCOMPorts.Text
        objSMS.BaudRate = 9600
        objSMS.DataBits = 8
        'objSMS.SMSC = "+254722500029"
```

```
            'objSMS.MessageMemory = mCore.SMS.EnumMessageMemory.SM
            objSMS.PIN = "6131"
            objSMS.StopBits = 1 ' mCore.StopBits.One
            objSMS.Parity = IO.Ports.Parity.None
            'objSMS.FlowControl = mCore.FlowControl.RTS_CTS
            objSMS.NewMessageIndication = True
            objSMS.NewMessageConcatenate = True
            lblStatus.Text = "OPEN"
        Catch ex As mCore.GeneralException
            MsgBox(ex.Message)
            lblStatus.Text = "CLOSED"
        Catch ex As Exception
        End Try
    End Sub

    'Procedure for Requesting geographical info
    Private Sub btnSearch_Click(ByVal senter As Object, ByVal e As System.EventArgs)
Handles btnSearch.Click
        Try
            Dim fmqRequest = New GeocodingRequest() 'Request geographical info
            fmqRequest.Address = txtSearch.Text 'Address that needs to be converted to
geographic coordinates
            fmqRequest.Sensor = "false" 'No built in location sensor
            Dim fmqResponse = GeocodingService.GetResponse(fmqRequest) 'Get response
from request
            If fmqResponse.Status = ServiceResponse.Ok Then 'Everything OK, add to
Listview
                Dim lvi As New ListViewItem
                ' First Column can be the listview item's Text
                lvi.Text = fmqResponse.Results.Single().FormattedAddress.ToString

                ' Second Column is the first sub item
                lvi.SubItems.Add("")
                lvi.SubItems.Add("")
                lvi.SubItems.Add(fmqResponse.Results.Single().Geometry.Location.Latitude)

                ' Third Column is the second sub item

lvi.SubItems.Add(fmqResponse.Results.Single().Geometry.Location.Longitude)


                lvAddressDetails.Items.Add(lvi)
            End If
        Catch ex As System.InvalidOperationException
            MsgBox(ex.Message.ToString)
```

```
            'MessageBox.Show("Please enter Town / Suburb / City with Street Address")
'Improper address
        End Try
    End Sub

    'Code to show the geographical scene depeding on the location highlighted by Lat and
Long
    Private Sub lvAddressDetails_DoubleClick(ByVal senter As Object, ByVal e As
System.EventArgs) Handles lvAddressDetails.DoubleClick
        If lvAddressDetails.SelectedItems.Count <= 0 Then 'Nothing selected
            Return
        End If
        Dim fmqLocation As New GeoPos 'Latitude and Longitude Values
        fmqLocation.Latitude = lvAddressDetails.SelectedItems(0).SubItems(3).Text 'Set
Latitude property
        fmqLocation.Longitude = lvAddressDetails.SelectedItems(0).SubItems(4).Text 'Set
Longitude property
        Dim fmqMap = New StaticMap() 'New map object
        fmqMap.Center = fmqLocation.Latitude.ToString() & "," _
        & Convert.ToString(fmqLocation.Longitude) 'Center-focus the map to your desired
location
        fmqMap.Zoom = tbZoom.Value.ToString("0") 'Zoom percentage
        fmqMap.Size = "800x500" 'Size of map
        fmqMap.Markers = fmqMap.Center
        fmqMap.MapType = "Roadmap" 'Can be Roadmap, Satelite, Terrain, Hybrid
        fmqMap.Sensor = "false" 'No built in location sensor
        Dim mpMap As New BitmapImage() 'added reference to WindowsBase and
System.XAML
        mpMap.BeginInit()
        mpMap.CacheOption = BitmapCacheOption.OnDemand 'Cahce only when needed
        mpMap.UriSource = fmqMap.ToUri() 'Source of map / image
        mpMap.EndInit()

        ehImageHost.Child = ehImage 'Set child control in element host
        ehImage.Source = mpMap 'Set Image source

    End Sub

    'Code for handling the Level of Trachoma by location in the (LEVEL BY LOCATION
REPORT)
    Private Sub Button2_Click(ByVal senter As System.Object, ByVal e As
System.EventArgs) Handles Button2.Click
        Dim cryRpt As New ReportDocument
        'cryRpt.Load(Application.StartupPath & "\CrystalReportLevel.rpt")
        'cryRpt.Load(My.Computer.FileSystem.SpecialDirectories.MyDocuments &
"\CrystalReportLevel.rpt")
```

```
cryRpt.Load("C:\TrachomaReportSystem\TrachomaReportSystem\CrystalReportLevel.rpt")

        Dim crParameterFieldDefinitions As ParameterFieldDefinitions
        Dim crParameterFieldDefinition As ParameterFieldDefinition
        Dim crParameterValues As New ParameterValues
        Dim crParameterDiscreteValue As New ParameterDiscreteValue

        crParameterDiscreteValue.Value = ComboBox2.Text 'selected location
        crParameterFieldDefinitions = cryRpt.DataDefinition.ParameterFields
        crParameterFieldDefinition = crParameterFieldDefinitions.Item("locations")
        crParameterValues = crParameterFieldDefinition.CurrentValues

        crParameterValues.Clear()
        crParameterValues.Add(crParameterDiscreteValue)
        crParameterFieldDefinition.ApplyCurrentValues(crParameterValues)

        CrystalReportViewer2.ReportSource = cryRpt
        CrystalReportViewer2.Refresh()

    End Sub
    'Code for handling the Level of Trachoma by age in the (LEVEL BY AGE REPORT)
    Private Sub Button3_Click(ByVal senter As System.Object, ByVal e As
System.EventArgs) Handles Button3.Click
        Dim cryRpt As New ReportDocument
        'cryRpt.Load(Application.StartupPath & "\CrystalReport5.rpt")

cryRpt.Load("C:\TrachomaReportSystem\TrachomaReportSystem\CrystalReportAge.rpt
")

        'first param var declaration for start age
        Dim crParameterFieldDefinitions As ParameterFieldDefinitions
        Dim crParameterFieldDefinition As ParameterFieldDefinition
        Dim crParameterValues As New ParameterValues
        Dim crParameterDiscreteValue As New ParameterDiscreteValue

        'second param var declaration for end age
        Dim crParameterFieldDefinitions2 As ParameterFieldDefinitions
        Dim crParameterFieldDefinition2 As ParameterFieldDefinition
        Dim crParameterValues2 As New ParameterValues
        Dim crParameterDiscreteValue2 As New ParameterDiscreteValue

        'first param initialization for START AGE
        crParameterDiscreteValue.Value = Convert.ToInt32(TextBox1.Text) 'input start age
        crParameterFieldDefinitions = _
```

```
        cryRpt.DataDefinition.ParameterFields
        crParameterFieldDefinition = _
        crParameterFieldDefinitions.Item("startage")
        crParameterValues = crParameterFieldDefinition.CurrentValues

        'second param initialization for END AGE
        crParameterDiscreteValue2.Value = Convert.ToInt32(TextBox2.Text) 'input end
age
        crParameterFieldDefinitions2 = cryRpt.DataDefinition.ParameterFields
        crParameterFieldDefinition2 = crParameterFieldDefinitions2.Item("endage")
        crParameterValues2 = crParameterFieldDefinition2.CurrentValues

        'first set
        crParameterValues.Clear()
        crParameterValues.Add(crParameterDiscreteValue)
        crParameterFieldDefinition.ApplyCurrentValues(crParameterValues)

        'second set
        crParameterValues2.Clear()
        crParameterValues2.Add(crParameterDiscreteValue2)
        crParameterFieldDefinition2.ApplyCurrentValues(crParameterValues2)


        'link report
        CrystalReportViewer4.ReportSource = cryRpt
        CrystalReportViewer4.Refresh()
    End Sub
End Class



‘To find tha latitudes and longitudes of a patient

Public Class GeoPos
    Private Lng As Decimal 'Longitude Value
    Private Lat As Decimal 'Latitude Value
    Public Property Latitude() As Decimal 'Gets / Sets Latitude
        Get
            Return Lat
        End Get
        Set(ByVal value As Decimal)
            Lat = value
        End Set
    End Property
    Public Property Longitude() As Decimal 'Gets / Sets Longitude
        Get
```

```
            Return Lng
        End Get
        Set(ByVal value As Decimal)
            Lng = value
        End Set
    End Property
End Class


'--------------------------------------
'Programmed by: Eve
'Contains global var data structures
'--------------------------------------

Option Strict Off
Option Explicit On

Imports System.Data.Odbc 'OleDb
Module modGlobal
    'Variable structure for users
    Public Structure USER_INFO
        Dim USER_PK As Integer
        Dim USER_NAME As String
        Dim USER_ISADMIN As Boolean

    End Structure
End Module
'--------------------------------------
'Programmed by: Eve

'This is Database Module
'Contains global functions/procedures that gives access(connectivity) to the db &_
'Data manipulation i.e data retrival, data insertion to the db
'--------------------------------------
Imports System.Data.Odbc
Module Database
    Public myConnectionLoc As OdbcConnection = New OdbcConnection()
    Public myCommand As New OdbcCommand()
    Public myAdapter As New OdbcDataAdapter
    Public moddata As OdbcDataReader
    Public isOpenned As Boolean = False
    Function isServerPresent() As Boolean
        Dim r As Boolean = False
        Try
            If myConnectionLoc.State = ConnectionState.Closed Then
                myConnectionLoc.ConnectionString = "DSN=TRACHOMA;UID=;PWD=;"
```

```
            myConnectionLoc.Open()

        End If
        r = True
        Return r
    Catch ex As Exception
        Return r
    End Try
End Function
Public Function getData(ByVal pSQL As String) As Boolean
    Dim r As Boolean = False
    If isServerPresent() = True Then
        myCommand.Connection = myConnectionLoc
        myCommand.CommandText = pSQL 'start query
        myAdapter.SelectCommand = myCommand
        If isOpenned Then
            Database.moddata.Close()
        End If

        moddata = myCommand.ExecuteReader()
        isOpenned = True
        r = True
    End If
    Return r
End Function
Public Function saveData(ByVal pSQL As String) As Boolean
    Dim r As Boolean = False
    Dim res As Long
    If isServerPresent() = True Then
        myCommand.Connection = myConnectionLoc
        myCommand.CommandText = pSQL 'start query
        myCommand.CommandText = pSQL 'start query
        res = myCommand.ExecuteNonQuery()
        r = True
    End If
    Return r
End Function
End Module
```

```
'Programmed by: Eve
'This a module that contains a collection of global procedures/functions that can be called
from anywhere in the project
```

```
'--------------------------------------

Imports System.Data.Odbc 'OleDb
Module modProcedures
    'Procedure used to highlight text when focus
    Public Sub HLText(ByRef sText As Object)
        On Error Resume Next
        With sText
            .SelStart = 0
            .SelLength = Len(sText.Text)
        End With
    End Sub
    Public Sub backupDB()
        Dim dbase_path As String = System.Windows.Forms.Application.StartupPath & "\"
& "Trachoma.accdb"
        'Dim portfolioPath As String = My.Application.Info.DirectoryPath
        'FileCopy(portfolioPath & "\Information Sources\portfolioDB.mdb", "C:\Program
Files\PortfolioGen2.0\DBBACKUP.mdb")
        FileCopy(dbase_path, selectedDrive & ":\TrachomaDBBACKUP.accdb")
'saveDialog.FileName = Date.Now.ToString("yyyyMMdd") & ".mdb"
        MsgBox("Database Backup was Successful")
    End Sub
    Public Sub restoreDB()
        Dim dbase_path As String = System.Windows.Forms.Application.StartupPath & "\"
& "Trachoma.accdb"
        'Dim portfolioPath As String = My.Application.Info.DirectoryPath
        If MessageBox.Show("Restoring the database will erase any changes you have made
to the DB since you last backup. Are you sure you want to do this?", _
                "Confirm Restore", _
                MessageBoxButtons.OKCancel, _
                MessageBoxIcon.Question, _
                MessageBoxDefaultButton.Button2) = Windows.Forms.DialogResult.OK
Then
            'Restore the database from a backup copy.
            FileCopy(selectedDrive & ":\TrachomaDBBACKUP.accdb", dbase_path)
            MsgBox("Database Restoration Successful")
        End If
    End Sub
End Module




'--------------------------------------
'Programmed by: Eve
```

```
'Module
'Contains global var to be used all over the project
'-------------------------------------
Module modPublicVar
    Public selectedDrive As String 'holds teachers grade as selected from list
    Public tchgrade As String 'holds teachers grade as selected from list
    Public tchNumber As Integer 'holds teacher on as selected from list
    Public CurrUser As USER_INFO 'reffering to a data structure
    'Public CurrBiz As BUSINESS_INFO  'reffering to a data structure
    'Public CurrCust As Customer  'reffering to a data structure

End Module


'Required by the Windows Form Designer
    Private components As System.ComponentModel.IContainer

    'NOTE: The following procedure is required by the Windows Form Designer
    'It can be modified using the Windows Form Designer.
    'Do not modify it using the code editor.
    <System.Diagnostics.DebuggerStepThrough()> _
    Private Sub InitializeComponent()
        Me.Label1 = New System.Windows.Forms.Label
        Me.cboDrive = New System.Windows.Forms.ComboBox
        Me.BtnOk = New System.Windows.Forms.Button
        Me.BtnCancle = New System.Windows.Forms.Button
        Me.SuspendLayout()
        '
        'Label1
        '
        Me.Label1.AutoSize = True
        Me.Label1.Location = New System.Drawing.Point(12, 23)
        Me.Label1.Name = "Label1"
        Me.Label1.Size = New System.Drawing.Size(160, 13)
        Me.Label1.TabIndex = 0
        Me.Label1.Text = "SELECT DESTINATION DRIVE"
        '
        'cboDrive
        '
        Me.cboDrive.FormattingEnabled = True
        Me.cboDrive.Location = New System.Drawing.Point(175, 23)
        Me.cboDrive.Name = "cboDrive"
        Me.cboDrive.Size = New System.Drawing.Size(125, 21)
        Me.cboDrive.TabIndex = 1
        '
```

```
        'BtnOk
        '
        Me.BtnOk.Location = New System.Drawing.Point(109, 87)
        Me.BtnOk.Name = "BtnOk"
        Me.BtnOk.Size = New System.Drawing.Size(96, 35)
        Me.BtnOk.TabIndex = 2
        Me.BtnOk.Text = "&Back Up"
        Me.BtnOk.UseVisualStyleBackColor = True
        '
        'BtnCancle
        '
        Me.BtnCancle.Location = New System.Drawing.Point(211, 87)
        Me.BtnCancle.Name = "BtnCancle"
        Me.BtnCancle.Size = New System.Drawing.Size(89, 35)
        Me.BtnCancle.TabIndex = 3
        Me.BtnCancle.Text = "&Cancel"
        Me.BtnCancle.UseVisualStyleBackColor = True
        '
        'frmBackup
        '
        Me.ClientSize = New System.Drawing.Size(312, 262)
        Me.Controls.Add(Me.BtnCancle)
        Me.Controls.Add(Me.BtnOk)
        Me.Controls.Add(Me.cboDrive)
        Me.Controls.Add(Me.Label1)
        Me.Name = "frmBackup"
        Me.Text = "DB BACKUP"
        Me.ResumeLayout(False)
        Me.PerformLayout()

    End Sub
    Friend WithEvents Label1 As System.Windows.Forms.Label
    Friend WithEvents cboDrive As System.Windows.Forms.ComboBox
    Friend WithEvents BtnOk As System.Windows.Forms.Button
    Friend WithEvents BtnCancle As System.Windows.Forms.Button

End Class

'-------------------------------------
'Programmed by: Eveline...
‘back up program
'-------------------------------------

Public Class frmBackup
```

```
    Private Sub BtnOk_Click(ByVal senter As System.Object, ByVal e As
System.EventArgs) Handles BtnOk.Click
        If Me.cboDrive.Text = "" Then
            MsgBox("Please Select Drive to backup to...", MsgBoxStyle.Information,
"Distination...")
            cboDrive.Focus() 'redirect to search combobox
            Exit Sub
        End If
        selectedDrive = cboDrive.Text
        Call backupDB()
        Me.Close()
    End Sub

    Private Sub BtnCancle_Click(ByVal senter As System.Object, ByVal e As
System.EventArgs) Handles BtnCancle.Click
        Me.Close()
    End Sub

    Private Sub frmBackup_Load_1(ByVal senter As System.Object, ByVal e As
System.EventArgs) Handles MyBase.Load
        With cboDrive
            .Items.Clear()
            .Items.Add("A")
            .Items.Add("D")
            .Items.Add("E")
            .Items.Add("F")
            .Items.Add("G")
            .Items.Add("H")
            .Items.Add("I")
        End With
    End Sub
End Class



    'Required by the Windows Form Designer
    Private components As System.ComponentModel.IContainer
    Friend WithEvents BtnOk As System.Windows.Forms.Button
    Friend WithEvents BtnCancel As System.Windows.Forms.Button
    Friend WithEvents Label1 As System.Windows.Forms.Label
    Friend WithEvents cboDrive As System.Windows.Forms.ComboBox

    'NOTE: The following procedure is required by the Windows Form Designer
    'It can be modified using the Windows Form Designer.
    'Do not modify it using the code editor.
    <System.Diagnostics.DebuggerStepThrough()> _
```

```
Private Sub InitializeComponent()
  Me.BtnOk = New System.Windows.Forms.Button
  Me.BtnCancel = New System.Windows.Forms.Button
  Me.Label1 = New System.Windows.Forms.Label
  Me.cboDrive = New System.Windows.Forms.ComboBox
  Me.SuspendLayout()
  '
  'BtnOk
  '
  Me.BtnOk.Location = New System.Drawing.Point(104, 54)
  Me.BtnOk.Name = "BtnOk"
  Me.BtnOk.Size = New System.Drawing.Size(92, 38)
  Me.BtnOk.TabIndex = 0
  Me.BtnOk.Text = "&Restore"
  Me.BtnOk.UseVisualStyleBackColor = True
  '
  'BtnCancel
  '
  Me.BtnCancel.Location = New System.Drawing.Point(202, 52)
  Me.BtnCancel.Name = "BtnCancel"
  Me.BtnCancel.Size = New System.Drawing.Size(96, 40)
  Me.BtnCancel.TabIndex = 1
  Me.BtnCancel.Text = "C&ancel"
  Me.BtnCancel.UseVisualStyleBackColor = True
  '
  'Label1
  '
  Me.Label1.AutoSize = True
  Me.Label1.Location = New System.Drawing.Point(9, 14)
  Me.Label1.Name = "Label1"
  Me.Label1.Size = New System.Drawing.Size(132, 13)
  Me.Label1.TabIndex = 2
  Me.Label1.Text = "SELECT SOURCE DRIVE"
  '
  'cboDrive
  '
  Me.cboDrive.FormattingEnabled = True
  Me.cboDrive.Location = New System.Drawing.Point(161, 14)
  Me.cboDrive.Name = "cboDrive"
  Me.cboDrive.Size = New System.Drawing.Size(137, 21)
  Me.cboDrive.TabIndex = 3
  '
  'frmRestore
  '
  Me.ClientSize = New System.Drawing.Size(333, 262)
  Me.Controls.Add(Me.cboDrive)
```

```
        Me.Controls.Add(Me.Label1)
        Me.Controls.Add(Me.BtnCancel)
        Me.Controls.Add(Me.BtnOk)
        Me.Name = "frmRestore"
        Me.Text = "DB RESTORE"
        Me.ResumeLayout(False)
        Me.PerformLayout()

    End Sub


End Class



'--------------------------------------
'Programmed by: Eveline...
'Restoration program
'
'--------------------------------------

Public Class frmRestore

    Private Sub frmRestore_Load(ByVal senter As System.Object, ByVal e As
System.EventArgs) Handles MyBase.Load
        With cboDrive
            .Items.Clear()
            .Items.Add("A")
            .Items.Add("D")
            .Items.Add("E")
            .Items.Add("F")
            .Items.Add("G")
            .Items.Add("H")
            .Items.Add("I")
        End With
        'FillCombobox(cboDrive, "SELECT * FROM Users", "Users", "UserID", "PK")
    End Sub

    Private Sub BtnCancel_Click(ByVal senter As System.Object, ByVal e As
System.EventArgs) Handles BtnCancel.Click
        Me.Close()
    End Sub

    Private Sub BtnOk_Click(ByVal senter As System.Object, ByVal e As
System.EventArgs) Handles BtnOk.Click
        If Me.cboDrive.Text = "" Then
```

```
            MsgBox("Please Select Drive to restore from...", MsgBoxStyle.Information,
"Distination...")
            cboDrive.Focus() 'redirect to search combobox
            Exit Sub
        End If
        selectedDrive = cboDrive.Text
        Call restoreDB()
        Me.Close()
    End Sub
End Class



‘Program showing level and location by chart
Public Class frmChartReport
    Function displayData(ByVal pLoc As String) As List(Of GraphData)
        Dim items As New List(Of GraphData)
        Dim pSql As String
        pSql = "SELECT COUNT(*) AS TOT,colLevel FROM tblPATIENTDATA
WHERE colLocation='" & pLoc & "' GROUP BY colLevel"
        If Database.getData(pSql) = True Then
            While Database.moddata.Read
                Dim t As New GraphData
                t.level = Database.moddata("colLevel")
                t.total = Database.moddata("TOT")
                items.Add(t)
            End While
        End If
        Database.moddata.Close()
        Return items
    End Function
    Private Sub Button1_Click(ByVal senter As System.Object, ByVal e As
System.EventArgs) Handles Button1.Click
        'Chart1.DataSource = displayData(ComboBox1.Text)
        Chart1.Series.Clear()
        Dim pSql As String
        pSql = "SELECT COUNT(*) AS TOTAL,colLevel AS TRILEVEL FROM
tblPATIENTDATA WHERE colLocation='" & ComboBox1.Text & "' GROUP BY
colLevel"
        If Database.getData(pSql) = True Then
            'Chart1.DataBindTable(Database.moddata, "TRILEVEL")
            Chart1.DataSource = Database.moddata
        End If
        'Database.moddata.Close()
        Dim levelSeries = Chart1.Series.Add("LEVEL")
        levelSeries.XValueMember = "TRILEVEL"
```

```
        levelSeries.YValueMembers = "TOTAL"
        levelSeries.ChartType =
System.Windows.Forms.DataVisualization.Charting.SeriesChartType.Column
    End Sub

    Private Sub frmChartReport_Load(ByVal senter As System.Object, ByVal e As
System.EventArgs) Handles MyBase.Load
        Dim pSql As String
        pSql = "SELECT DISTINCT colLocation FROM tblPATIENTDATA"
        If Database.getData(pSql) = True Then
            While Database.moddata.Read
                ComboBox1.Items.Add(Database.moddata("colLocation"))
            End While
        End If
        Database.moddata.Close()
    End Sub
End Class
```

```
//Java Code capturing information on the Mobile
public class MainActivity extends Activity {
	EditText mHeadName, mPatientName, mAge, mLocation, mCapturedBy;
	Spinner mGender, mStage;
	TextView error;
	Button ok;
	Button close;
	String mlat;
	String mlong;

	@Override
	protected void onCreate(Bundle savedInstanceState) {
		super.onCreate(savedInstanceState);
		setContentView(R.layout.activity_main);
		mHeadName = (EditText) findViewById(R.id.headname);
		mPatientName = (EditText) findViewById(R.id.p_name);
		mAge = (EditText) findViewById(R.id.p_age);
		mLocation = (EditText) findViewById(R.id.location);
		mCapturedBy = (EditText) findViewById(R.id.captured_by);
		mGender = (Spinner) findViewById(R.id.p_gender);
		mStage = (Spinner) findViewById(R.id.p_stage);

		ok = (Button) findViewById(R.id.btn_login);
		close = (Button) findViewById(R.id.btn_close);
		error = (TextView) findViewById(R.id.tv_error);
		ok.setOnClickListener(new View.OnClickListener() {
			@Override
			public void onClick(View v) {
				if (mHeadName.getText().length() > 0) {

				}

				String mSmstxt = mHeadName.getText() + "#"
						+ mPatientName.getText() + "#"
						+
String.valueOf(mGender.getSelectedItem()) + "#"
						+ mAge.getText() + "#"
						+ String.valueOf(mStage.getSelectedItem())
+ "#"
						+ mLocation.getText() + "#" +
mCapturedBy.getText();

				if (mSmstxt.length() > 0 && mSmstxt.length() < 111) {
					error.setText("Senting Please Wait!");
					GPSTracker p = new GPSTracker(v.getContext());
```

```
                                        mlat = Double.toString(p.getLatitude());
                                        mlong = Double.toString(p.getLongitude());
                                        SmsManager sm = SmsManager.getDefault();
                                        String number = "+254706544678";
                                        sm.sentTextMessage(number, null, mlat + "#" +
mlong + "#"
                                                        + mSmstxt, null, null);
                                        error.setText("Sent Successfully");
                                } else {
                                        error.setText("Not Sent! ");
                                }
                        }

                });
                close.setOnClickListener(new View.OnClickListener() {
                        @Override
                        public void onClick(View v) {
                                finish();
                                System.exit(0);

                        }

                });
        }
}

import android.app.AlertDialog;
import android.app.Service;
import android.content.Context;
import android.content.DialogInterface;
import android.content.Intent;
import android.location.Location;
import android.location.LocationListener;
import android.location.LocationManager;
import android.os.Bundle;
import android.os.IBinder;
import android.provider.Settings;

public class GPSTracker extends Service implements LocationListener {
        private final Context mContext;

        // flag for GPS status
        boolean isGPSEnabled = false;

        // flag for network status
        boolean isNetworkEnabled = false;
```

```
        // flag for GPS status
        boolean canGetLocation = false;

        Location location = null; // location
        double latitude; // latitude
        double longitude; // longitude

        // The minimum distance to change Updates in meters
        private static final long MIN_DISTANCE_CHANGE_FOR_UPDATES = 10; //
10 meters

        // The minimum time between updates in milliseconds
        private static final long MIN_TIME_BW_UPDATES = 1000 * 60 * 1; // 1 minute

        // Declaring a Location Manager
        protected LocationManager locationManager;

        public GPSTracker(Context context) {
                this.mContext = context;
                getLocation();
        }

        public Location getLocation() {
                try {
                        locationManager = (LocationManager) mContext
                                        .getSystemService(LOCATION_SERVICE);

                        // getting GPS status
                        isGPSEnabled = locationManager

        .isProviderEnabled(LocationManager.GPS_PROVIDER);

                        // getting network status
                        isNetworkEnabled = locationManager

        .isProviderEnabled(LocationManager.NETWORK_PROVIDER);

                        if (!isGPSEnabled && !isNetworkEnabled) {
                                // no network provider is enabled
                        } else {
                                this.canGetLocation = true;
                                if (isNetworkEnabled) {
                                        locationManager.requestLocationUpdates(

        LocationManager.NETWORK_PROVIDER,
```

```
                                                MIN_TIME_BW_UPDATES,
        MIN_DISTANCE_CHANGE_FOR_UPDATES, this);
                                        // Log.d("Network", "Network Enabled");
                                        if (locationManager != null) {
                                                location = locationManager
        .getLastKnownLocation(LocationManager.NETWORK_PROVIDER);
                                                if (location != null) {
                                                        latitude = location.getLatitude();
                                                        longitude = location.getLongitude();
                                                }
                                        }
                                }
                                // if GPS Enabled get lat/long using GPS Services
                                if (isGPSEnabled) {
                                        if (location == null) {
                                                locationManager.requestLocationUpdates(
        LocationManager.GPS_PROVIDER,
                                                                MIN_TIME_BW_UPDATES,
        MIN_DISTANCE_CHANGE_FOR_UPDATES, this);
                                                // Log.d("GPS", "GPS Enabled");
                                                if (locationManager != null) {
                                                        location = locationManager
        .getLastKnownLocation(LocationManager.GPS_PROVIDER);
                                                        if (location != null) {
                                                                latitude =
location.getLatitude();
                                                                longitude =
location.getLongitude();
                                                        }
                                                }
                                        }
                                }
                        }

                } catch (Exception e) {
                        e.printStackTrace();
                }

                return location;
        }
```

```
/**
 * Stop using GPS listener Calling this function will stop using GPS in your
 * app
 * */
public void stopUsingGPS() {
	if (locationManager != null) {
		locationManager.removeUpdates(GPSTracker.this);
	}
}

/**
 * Function to get latitude
 * */
public double getLatitude() {
	if (location != null) {
		latitude = location.getLatitude();
	}

	// return latitude
	return latitude;
}

/**
 * Function to get longitude
 * */
public double getLongitude() {
	if (location != null) {
		longitude = location.getLongitude();
	}

	// return longitude
	return longitude;
}

/**
 * Function to check GPS/wifi enabled
 *
 * @return boolean
 * */
public boolean canGetLocation() {
	return this.canGetLocation;
}

/**
 * Function to show settings alert dialog On pressing Settings button will
 * lauch Settings Options
```

```
         * */
        public void showSettingsAlert() {
                AlertDialog.Builder alertDialog = new AlertDialog.Builder(mContext);

                // Setting Dialog Title
                alertDialog.setTitle("GPS is settings");

                // Setting Dialog Message
                alertDialog
                                .setMessage("GPS is not enabled. Do you want to go to
settings menu?");

                // On pressing Settings button
                alertDialog.setPositiveButton("Settings",
                                new DialogInterface.OnClickListener() {
                                        public void onClick(DialogInterface dialog, int
which) {
                                                Intent intent = new Intent(

        Settings.ACTION_LOCATION_SOURCE_SETTINGS);
                                                mContext.startActivity(intent);
                                        }
                                });

                // on pressing cancel button
                alertDialog.setNegativeButton("Cancel",
                                new DialogInterface.OnClickListener() {
                                        public void onClick(DialogInterface dialog, int
which) {
                                                dialog.cancel();
                                        }
                                });

                // Showing Alert Message
                alertDialog.show();
        }

        @Override
        public void onLocationChanged(Location location) {
        }

        @Override
        public void onProviderDisabled(String provider) {
        }

        @Override
```

```
        public void onProviderEnabled(String provider) {
        }

        @Override
        public void onStatusChanged(String provider, int status, Bundle extras) {
        }

        @Override
        public IBinder onBind(Intent arg0) {
                return null;
        }
}
```

SCREEN CODES

```
<ScrollView xmlns:android="http://schemas.android.com/apk/res/android"
        xmlns:tools="http://schemas.android.com/tools"
        android:layout_width="fill_parent"
                android:layout_height="fill_parent"
        android:background="#DDDDDD">
<RelativeLayout
   android:layout_width="match_parent"
   android:layout_height="match_parent"
   tools:context=".MainActivity" >
       <TextView
                        android:id="@+id/textView1"
                        android:layout_width="wrap_content"
                        android:layout_height="wrap_content"
                        android:layout_centerHorizontal="true"
                        android:text="@string/house_hold_name"
                        android:textColor="#444444"
                        android:textSize="8pt" />
                    <EditText
                        android:id="@+id/headname"
                        android:layout_width="match_parent"
                        android:layout_height="wrap_content"
                        android:layout_below="@+id/textView1"
                        android:background="@android:drawable/editbox_background"
                        android:inputType="text"
                        android:textColor="#000000"
                        android:textSize="10pt" >
                        <requestFocus />
                    </EditText>
                    <TextView
                        android:id="@+id/textView2"
                        android:layout_width="wrap_content"
                        android:layout_height="wrap_content"
                        android:layout_below="@+id/headname"
                        android:layout_centerHorizontal="true"
                        android:text="@string/patient_name"
                        android:textColor="#444444"
                        android:textSize="8pt" />
                    <EditText
                        android:id="@+id/p_name"
                        android:layout_width="match_parent"
                        android:layout_height="wrap_content"
                        android:layout_below="@+id/textView2"
                        android:background="@android:drawable/editbox_background"
                        android:inputType="text"
```

```
                android:textColor="#000000"
                android:textSize="10pt" >
            </EditText>
            <TextView
                android:id="@+id/textView3"
                android:layout_width="wrap_content"
                android:layout_height="wrap_content"
                android:layout_below="@+id/p_name"
                android:layout_centerHorizontal="true"
                android:text="@string/gender"
                android:textColor="#444444"
                android:textSize="8pt" />
<Spinner
        android:id="@+id/p_gender"
                android:layout_width="match_parent"
                android:layout_height="wrap_content"
                android:layout_below="@+id/textView3"
                android:background="@android:drawable/editbox_background"
        android:entries="@array/gender_arrays"
        android:prompt="@string/gender_prompt"
        android:textColor="#000000"/>

            <TextView
                android:id="@+id/textView4"
                android:layout_width="wrap_content"
                android:layout_height="wrap_content"
                android:layout_below="@+id/p_gender"
                android:layout_centerHorizontal="true"
                android:text="@string/age"
                android:textColor="#444444"
                android:textSize="8pt" />

            <EditText
                android:id="@+id/p_age"
                android:layout_width="match_parent"
                android:layout_height="wrap_content"
                android:layout_below="@+id/textView4"
                android:background="@android:drawable/editbox_background"
                android:inputType="number"
                android:textColor="#000000"
                android:textSize="10pt" >
            </EditText>
            <TextView
                android:id="@+id/textView5"
                android:layout_width="wrap_content"
                android:layout_height="wrap_content"
```

```
            android:layout_below="@+id/p_age"
            android:layout_centerHorizontal="true"
            android:text="@string/stage"
            android:textColor="#444444"
            android:textSize="8pt" />
        <Spinner
    android:id="@+id/p_stage"
            android:layout_width="match_parent"
            android:layout_height="wrap_content"
            android:layout_below="@+id/textView5"
            android:background="@android:drawable/editbox_background"
    android:entries="@array/stage_arrays"
    android:prompt="@string/stage_prompt"
    android:textColor="#000000"/>

        <TextView
            android:id="@+id/textView6"
            android:layout_width="wrap_content"
            android:layout_height="wrap_content"
            android:layout_below="@+id/p_stage"
            android:layout_centerHorizontal="true"
            android:text="@string/location"
            android:textColor="#444444"
            android:textSize="8pt" />
        <EditText
            android:id="@+id/location"
            android:layout_width="match_parent"
            android:layout_height="wrap_content"
            android:layout_below="@+id/textView6"
            android:background="@android:drawable/editbox_background"
            android:inputType="text"
            android:textColor="#000000"
            android:textSize="10pt" >
        </EditText>
<TextView
            android:id="@+id/textView7"
            android:layout_width="wrap_content"
            android:layout_height="wrap_content"
            android:layout_below="@+id/location"
            android:layout_centerHorizontal="true"
            android:text="@string/captured_by"
            android:textColor="#444444"
            android:textSize="8pt" />
        <EditText
            android:id="@+id/captured_by"
            android:layout_width="match_parent"
```

```
                android:layout_height="wrap_content"
                android:layout_below="@+id/textView7"
                android:background="@android:drawable/editbox_background"
                android:inputType="text"
                android:textColor="#000000"
                android:textSize="10pt" >
            </EditText>

    <Button

        android:id="@+id/btn_login"

        android:layout_width="100dip"

        android:textColor="#444444"

        android:layout_height="wrap_content"

        android:layout_below="@id/captured_by"

        android:layout_alignParentLeft="true"

        android:layout_marginTop="15dip"

        android:layout_marginLeft="60dip"

        android:text="@string/sent" />
    <Button
        android:id="@+id/btn_close"
        android:layout_width="100dip"
        android:layout_height="wrap_content"
        android:layout_alignParentLeft="true"
        android:textColor="#444444"
        android:layout_below="@id/captured_by"
        android:layout_marginTop="15dip"
        android:layout_marginLeft="160dip"
        android:layout_toRightOf="@id/btn_login"
        android:text="@string/exit" />

     <TextView

        android:id="@+id/tv_error"

        android:layout_width="fill_parent"

        android:layout_height="40dip"
```

```
        android:textSize="7pt"

        android:layout_alignParentLeft="true"

        android:layout_below="@id/btn_login"

        android:layout_marginRight="9dip"

        android:layout_marginTop="15dip"

        android:layout_marginLeft="15dip"

        android:textColor="#AA0000"

        android:text=""/>
    </RelativeLayout>
</ScrollView>
```

APPENDIX XI RESEARCH DOCUMENTS