NATIONAL E-HEALTH STRATEGY

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FOREWORD

It is becoming increasingly clear that many developing countries, including Ghana, will find it difficult to achieve all the targets of the Millennium Development Goals by the year 2015. The challenges are well documented. Weak health systems exacerbated by continuing challenges in developing and retaining the requisite human resource for health have contributed to the current level of performance of the health sector in many developing countries. To overcome these challenges, the need for a faster and effective way to generate knowledge, share knowledge and translate knowledge into effective and affordable interventions and strategies that make health care accessible to the most needy and vulnerable people in our societies is urgently needed.

Ghana is struggling to meet the MDGs not because of the lack of solutions to our health problems, but because we lack the resources to apply the tested and well rehearsed interventions where it is needed and in a sustained manner. In almost all instances our inability to acquire and deploy the needed technology remains a formidable barrier.

The development of our health infrastructure has lagged behind as a result of continuing poor investments in the health sector. Our inability to invest more in the health sector stems out of many factors which unfortunately have been aggravated by the global economic recession. This has resulted in many communities having to go without basic health services and this contributes significantly to our overall ability to meet the MDGs.

We need to apply technology to generate the information required for the formulation of precise health policies to enable us meet our needs. Policies that will help meet our financing needs and provide us the opportunity to seek and provide basic services for those who are not being captured by the health system in its present state. We need to apply technology to boost coverage of our public health interventions and to empower our populations to seek treatment and make healthier lifestyle choices. We need to leverage technology in our search for solutions in the management of diseases of poverty such as buruli ulcer and filariasis.

E-health holds a lot of promise for making the big strides urgently needed for improving the health of our communities, especially those living in rural areas. This strategy provides a framework for the design and roll out of e-health in the health sector. It addresses the issues of standards and inter-operability and mechanisms for coordination that will help to minimise the frequent failures usually encountered in the adoption of e-health solutions. With the clear direction that it provides, we should be able to accord e-health a high priority in future plans of the health sector.

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1.0 BACKGROUND

Information and Communication Technology presents several opportunities for improving the performance of health systems in developing countries. This has been demonstrated in several pilot projects across the developing world. The availability of affordable and easy to use systems and equipment has also contributed to the several initiatives aimed at improving the effectiveness of health care providers, the efficiency of health system managers and new opportunities for health care consumers. Within the last three decades, the demand to intensify the use of Information and Communication Technology has increased. This demand has arisen partly as a result of new insights into the extent to which such applications can influence the health of the population and also as a response to the need to accelerate progress towards the attainment of the Millennium Development Targets.

In the last ten years, the call to developing countries to apply technology to their efforts at meeting the MDGs has been made in several quarters. At the Annual Ministerial Review of the United Nations Economic and Social Council held in Accra in June 2009, African countries were called upon to develop comprehensive policies and strategies to guide the uptake of Information and Communication Technology in the health sector. The increasing need to bring technology to bear on health sector performance is shown in other global heath strategies.

The World Health Organization defines e-health as 'the combined use of electronic information and communication technology in the health sector.' In practical terms, health care delivery should begin to take advantage of the opportunities that technology has made available to other sectors, such as commerce and education, to propel the world towards health for all. These opportunities include improvements in technical and management processes that will lead to more efficient and effective health services in the face of ever growing resource constraints. It also means that health managers and providers will have a better control over resources and ensure optimal health outcomes.

The development of a national e-health strategy constitutes the first stage of a long term undertaking aimed at raising the levels of performance of the health sector in all areas of service delivery. It constitutes a framework for engaging consumers of health services and ensuring that they contribute effectively towards raising the overall health status of the population. It is a tool that is placed in the hands of health care providers to enable them overcome existing barriers, and to access quality care for the majority of consumers who live in places far removed from the centre. It is a means by which health care managers improve the potential of the service in resource mobilization through effective control of resources and demonstration of efficiency and accountability.

1.1 The Case for E-Health Solutions in Ghana

The health system in Ghana has a fundamental aim of maintaining or improving the health outcomes of people living in Ghana. Presently the system is straining to deal with increasing cost of service and to respond to increasing pressure to expand services to enable the inequity gap that exists between urban and rural areas, the northern and the southern sectors of the country and between the rich and the poor to be closed.

This demand also comes in the face of persistent deficit in health manpower across board. Over the last few years, the Ministry of Health has begun exploring new ways of delivering service in the face of these realities, to improve the outcome of investments being made in the health sector. This has resulted in policies such as the close-to-client policy, free maternal care, review of the premium payment systems to remove existing financial barriers, and the introduction of incentive packages to entice staff to work in deprived areas. Although these policies are yielding some results, these are not enough to guarantee the achievements of the MDGs come 2015. While processes for delivering service remain inefficient and unreliable in many respects, management processes are fraught with redundant systems which add no value to transactions and performance continue to be based on data which is not completely reliable. Consumer interactions with the health system continue to be driven by the need to seek treatment for ailments and not for making lifestyle choices. This has resulted in an apparent stagnation of performance in the last two decades.

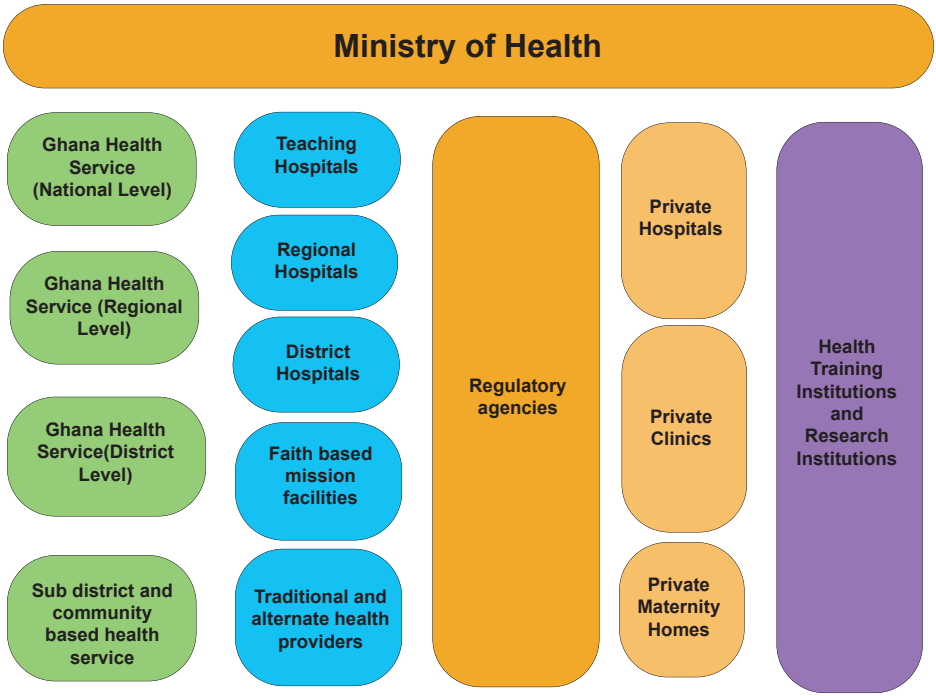
The adoption of e-health solutions presents new opportunities for making progress in the sector performance. It creates the impetus for far reaching changes in the way service is provided. Such change will require a fundamental shift in the way information is accessed and shared across the health system. It also requires a new approach to patient management and the expanded use of the existing knowledge base in the sector to manage health challenges across geographical boundaries.

Several review reports have indicated the need for innovation to push performance levels. The continuing human resource challenges, the large wage bill which leaves little resources for actual delivery of service, the stagnation in coverage of key public health services, the continuing and probably worsening of nutritional indicators, the dismal performance in supervised delivery despite high antenatal care coverage, the difficulty in

achieving behavioural change targets in sexual and reproductive health despite high levels of awareness are some of the many reasons why the sector must be more innovative in approaching health care delivery and this makes a strong case for serious consideration of e-health solutions.

1.2 Overview of Current Demands for E-Health Solutions

The health sector in Ghana is characterized by a large number of different management units working and generating large amount of information which are held in separate silos. This creates difficulties in sharing information and has been a key factor in the inability of the sector to effectively demonstrate its performance. The several management components need a common platform for sharing information and the only way that can be achieved is through electronic means.



The disease profile of the country is experiencing some changes. Presently there is an increasing incidence of chronic diseases which is resulting in the need for long term management of chronic diseases. This will lead to a situation where increasing care and treatment maintenance will be delivered in at the community level. There will be the need to support health care providers at that level with the tools they need to access and share relevant health information.

There is a persistent challenge of ensuring equitable distribution of health care resources across the country. This has manifested in performance disparities among regions, districts and between rural and urban settings. In many of the deprived areas of the country, there has not been any sustainable strategy to move services to them. Human resource situations are precarious leaving communities to continually take up low level services. The deployment of e-health under such circumstances can have a huge impact on how treatment decisions are made and the outcome of individual encounter with health facilities.

The rate at which technology is changing is enormous. Complex and expensive diagnostic equipment now come with information and communication component. Taking advantage of such new capabilities can lead to significant savings and improved quality of care for patients. It also offers opportunities for research and knowledge management for health care professionals. E-health has the potential to integrate the advanced technology effectively into patient care thus making the health system more efficient.

The general poor communication has been implicated in many instances of inefficiencies in the health sector. Many manifestations of poor quality

care and systems breakdown in patient management can be linked directly or indirectly to the lack of communication. Sometimes even well rehearsed procedures to combact emergencies and epidemics are called in too late simple for lack of a well functioning communication system. All these can effectively be minimized through e-health solutions.

The demand for e-health solution is amply demonstrated by the number of initiatives being undertaken in several areas of health care delivery. The challenge is that these initiatives are not coordinated, they are not based on existing standards and are tailored for sector wide improvements required to deliver sector goals and targets. Almost all are focused on small components of system-wide challenges and are therefore of little benefit in the long run.

1.3 Repositioning E-Health To Meet Health Sector Goals

The National Health Policy states that Ghana is currently pursuing three broad health sector objectives. These are:

a) To ensure that people live long, healthy and productive lives and reproduce without an increased risk of death

b) To reduce the excessive risk and burden of morbidity, mortality and disability, especially in the poor and marginalized groups

c) To reduce inequalities in access to health, reproduction and nutrition services and

Meeting these objectives require a change in the way health business is run. It requires that while the health sector becomes more efficient and effective in handling new and endemic health challenges it must begin to transform itself from an organization that treats diseases to one that

guarantees health and provides opportunities for making healthier lifestyle choices. This means that the health sector must find ways of improving health outcomes using the best available knowledge for everyone no matter where they are or their financial position. It also means that the health sector must find new and innovative ways of reaching more people with information and resources to help them take informed decisions. This can effectively be done by using Information and Communication Technology.

The global challenge of meeting the targets of the MDGs also creates the need for Information and Communication Technology support in the health sector. It has become obvious that as a country, Ghana is struggling to make the level of progress that will lead to the achievement of the MDGs. Child survival interventions and efforts at reducing maternal mortality are lagging behind. Fortunately the challenges are well documented. Weak health systems exacerbated by continuing challenges in developing and retaining the requisite human resource for health, lack of access to basic proven interventions and the large burden of endemic diseases coupled with challenges of malnutrition conspire to reverse some of the fragile gains made within the last few years. These are challenges that can be successfully dealt with by taking a radical view of the use of technology in the health sector. To reposition the health sector towards meeting the MDGs, the current and future penetration of Information and Communication Technology must be seen as complementary to existing strategies.

Technology holds a lot of promise for making the big strides urgently needed for improving the health of communities, especially those living in rural areas. There is therefore the need to develop policies and legal frameworks for its roll out in the health sector and to minimize the frequent failures usually encountered in the adoption of new technology in the health sector.

2.0 THE HEALTH SECTOR IN GHANA

2.1 The Health Status of Ghanaians

In Ghana, the disease pattern has changed very little over the last two decades. Like other countries in early phases of health transition, the pattern of disease in Ghana demonstrates a preponderance of communicable diseases, under-nutrition, and poor reproductive health. Epidemics of cerebrospinal meningitis, yellow fever and cholera remain a significant threat. Emerging and re-emerging diseases of increasing magnitude and threat include HIV/AIDS, tuberculosis, buruli ulcer and filariasis. Non-communicable diseases such as cardiovascular disorders, neoplasms and diabetes are emerging threats, whilst trauma and other injuries are the fifth most common outpatient condition.

The six main causes of morbidity and mortality among children have persisted as the main threat to their health over the years. However these have largely been brought under control through the Expanded Programme on Immunization. Malaria is still the number one killer among children and acute respiratory infections, including pneumonia; diarrhoea, malnutrition including anaemia; and neonatal causes continue to be major health problems. These five health problems account for about 50% of all childhood admissions and 30% of childhood deaths.

The overall morbidity and mortality pattern highlights the linkage between poverty, inequalities and health. Most of this burden results from diseases, such as malaria, diarrhoea and pneumonia whose occurrence could be dramatically reduced by low-cost and effective preventive and curative interventions. In other terms, the marginal social and economic returns from investments in health are highest in avoiding these premature deaths. Since communicable diseases in childhood are, in general, more amenable to broad-based primary prevention efforts than are non-communicable diseases, their heavy burden reflects, among other, the difficult living conditions and the inadequacy of the primary health care system.

The current mortality pattern has wide policy implications. First, it highlights the persistent burden of childhood communicable diseases, for which preventive measures (such as sanitation and health education) and simple curative measures (such as malaria treatment and oral rehydration) can be delivered efficiently through community-based care and outreach services. Therefore, better outcomes and greater savings are possible through the use of community-based care supported by the referral network. This is the basis for the development of the CHPS (Community-based Health Planning and Services) in Ghana. However, the growing burden related to high-cost of chronic and degenerative conditions, such as hypertension, other cardiovascular diseases and diabetes, must be taken into account for planning purposes.

A double burden of disease is already emerging at the early stage of the epidemiologic transition, with a mix of persistent, new and re-emerging infectious diseases and increasing chronic conditions and injuries. This will lead to fundamental changes in the volume and composition of demand for health care, with a more complex case mix and a more costly service utilization patterns.

2.2 Organization of Health Services in Ghana

The health services in Ghana include government health services, private, traditional and nongovernmental providers, civil society, and community groups. It also includes collaboration and partnership with other ministries, departments, and agencies whose policies and services have a major impact on health outcomes.

The health services are organized in several tiers ranging from the sub-district to national level. The sub-district level comprises health centres, health posts and clinics. As part of the effort to improve access to health services, the Community-Based Health Planning and Services has been designated as another level of health care delivery which combines public health and basic clinical care activities at the community level. The activities of the sub-districts are coordinated at the district level which would normally have a hospital designated as the first referral point. The district health service also includes the activities of private providers of both clinical and public health services. Each of the ten regions has a Regional Health Administration and a regional hospital which provides secondary level and referral services in support of the districts. National level referral facilities include two teaching hospitals, three psychiatric hospitals and a large military and police hospitals.

Government is by no means the only provider of health services in

Ghana. Other providers include the mission sector, employers, private medical practitioners and an informal sector, comprising traditional practitioners of various kinds as well as pharmacies and chemical sellers of indeterminate size. Mission Health Services have a long and distinguished history in Ghana. This sector operates nearly 20% of hospitals and clinics in Ghana. Public health and preventive services are commonly offered by mission institutions, often in the form of outreach services or satellite clinics. The private for profit sector comprises a variety of providers ranging from the formal hospitals, clinics and diagnostic facilities to the informal drug peddlers. Traditional practitioners are also prevalent and span a multitude of provider types and treatment regimens ranging from traditional birth attendants, herbalists and bone setters to homeopaths and spiritual healers.

The Ghana Ambulance Service aims at providing accessible 24-hour ambulance service nationwide through its own ambulance service and by collaborating with other service providers such as the Fire Service and other hospital-based ambulances. The service also provides improved pre-hospital care in accidents, emergencies and disasters. To facilitate such activities, the service generates timely, complete and accurate information for the efficient operations of the service and ensures the provision of rapid response for persons involved in accidents, emergencies and disasters. As part of its mandate, the Ghana Ambulance Service promotes first aid training to the public and collaborates with other emergency services in national disaster planning.

Within the health sector, there are several regulatory functions. The Food and Drugs Board controls the manufacture, importation, exportation, distribution, use and advertisement of all food, drugs, cosmetics, medical devices and household chemical substances in the country. Among its specific duties are the registration of products and manufacturing facilities and the control of importation and exportation of such

commodities. The Board also undertakes safety monitoring, post market surveillance and product promotion including allocations of narcotics and psychotropic substances.

The Pharmacy Council is charged with the primary responsibility of ensuring the highest standards in the practice of pharmacy in Ghana. This is done by assuring competence of service providers through licensing of personnel and prescribing standards of practice for them. The council also ensures a reliable medicine supply and distribution system and promotes rational use of drugs. Such responsibilities are also executed through licensing of premises, inspections and enforcement of standards through monitoring.

The Nurses and Midwives Council focuses on the training of nursing and midwifery personnel for health care delivery. Their key objective is to ensure that there are enough competent nursing and midwifery human resource at every level of the healthcare delivery system, delivering safe and efficient care. The Council also ensures that these nurses practice in appropriate environment. To meet these requirements, the council has oversight responsibility for the training of nurses and midwives and prescribes conditions of registration of nurses and midwives. Other responsibilities include verification of registration/licensure, orientation of foreign-trained nurses and midwives, and supervising nurses and midwives at both public and private health facilities.

The Medical and Dental Council ensures the highest level of training of Medical and Dental Practitioners and prescribes and enforces the highest standards of professional conduct. The council also determines the adequacy and quality of service facilities, promotes continuing medical education and protects the rights of the patients and clients. Among the key activities of the council is the registration of medical and dental practitioners both locally and foreign trained, and those on short programmes in the country and the inspection and accreditation

of Medical and Dental Schools and Institutions for Housemanship Training.

The Private Hospitals and Maternity Homes Board deals with issues of registration and monitors service delivery within the private health facilities. These include hospitals, health centres, clinics and maternity homes. While other agencies deal with the human resource, the board ensures that these facilities are manned and function according to standards. The board thus registers and renews the registration of these facilities.

The Traditional and Alternate Medicines Council aims at making traditional medicine an integral part of health care delivery in Ghana. The council is responsible for the implementation of the Traditional Medicines Council Law which guides the registration and regulation of practitioners and the sale of traditional medicine products.

The Centre for Research into Plant Medicine is a WHO collaborating Centre for Research and Development of Traditional Medicine. Its main business is to conduct and promote scientific research in herbal medicine through its own research activities and by providing technical support to institutions and individual herbalists. Among the key responsibilities of the centre are the collation of information on indigenous knowledge on herbal remedies and the establishment of arboreta across the country. The Centre also provides outpatient services using herbal medicines.

2.3 The Health Sector Reform Objectives

In the late 1990s the Health Sector embarked on an extensive reform in response to the slow improvements in health status. It was noted that over 40 years after independence, disease patterns had changed very

little, the use of services was low and other determinants of health status were poorly provided. Immunization coverage was under 50% and outpatient attendance was under 0.35 per capita. Close to 80% of disease that affected the population were still preventable and epidemics were still occurring on annual basis. Faced with these challenges the health sector had begun to observe a silent epidemic of non-communicable diseases coupled with extensive problems in nutrition. To meet these challenges the health sector reform sought to:

- Improve access to services
- Improve quality of the service
- Improve efficiency in the use of resources and avoiding waste
- Improve adequate collaboration with other partners
- Improve adequate funding for the delivery of health services

Programmes and interventions designed to achieve these objectives included the prioritization of specific interventions, development of the human resource for health care delivery and to improve financial management. A Sector-Wide Approach to planning and programming and resource mobilization and disbursement was adopted leading to a dramatic change in the way aid was coordinated. Other steps taken included the strengthening of Primary Health Services at the district level, re-orienting and strengthening secondary and tertiary services in support of the district level and providing national level support through training and management development, policy analysis, development of central support system, promoting private sector involvement and promoting inter-sectoral collaboration.

2.4 Key Health Systems Challenges

The factors leading to the poor health status outlined are well documented. The poorly kept and unhygienic environment is implicated in most of the commonly occurring diseases that afflict us as a country. The source of most infections and infestations can be traced to the environment and as slums continue to develop particularly in the peri-urban areas. The silent epidemic of non communicable diseases can also be linked directly to the changing life styles of the average Ghanaian which is characterized by poor eating habits and lack of exercise and recreation. The major challenge is to support the drive for life style changes and the adoption of healthier habits by individuals, families and communities.

The health sector continues to suffer from severe inequities in access to health services resulting in large disparities in health outcomes across regions. Some diseases are also persistent; particularly those that intensify poverty continue to be a challenge. This may largely be due to the continuing poor environmental sanitation at the community level. There is also the increase burden of non communicable diseases as a result of increasing risk factor emanating from unhealthy life styles. Malaria presents a particular challenge as it has vast economic and social effects on the population. Maternal and Child mortality remains very high. Although efforts have been made to improve EOC in the health sector, the effort has not translated into the desired reduction in maternal deaths.

Weak Referral and poor emergency response systems have been noted as the key areas affecting the implementation of a seamless health service. Improvement in health infrastructure including transport, ICT continues to lag behind the demand for services. With the concept of "close to client" services, the development of CHPS compound has also remained

slow. Expansion of health facilities is limited leaving large areas still without basic health services and peri-urban areas remain particularly deprived.

Human resource production and distribution and the management of the health sector wage bill are still challenges in ensuring equity in health outcomes. While the health worker to population ratio remains small, the distribution of health workers remains skewed towards urban areas. The increasing wage bill is of particular challenge. Personnel cost is on the increase taking over 90% of government recurrent budget.

There are broader issues of a multi sectoral origin that also impinge on health development. Development planning including improved infrastructure such as roads, houses and the provision of key amenities affect the health status in the long run. The lack of enforcement of basic laws including laws on occupational safety and health hazards has led to indiscipline in our society and specifically on our roads which in turn has contributed to numerous occupational and traffic related accidents with high human and economic tolls.

3.0 E-HEALTH AND HEALTH SECTOR DEVELOPMENT

3.1 Current status of e-health in Ghana

Computing equipment, networking devices, multimedia systems, mobile telephony and communication, Imaging devices and internet systems form the basis for ICT infrastructure. Most health facilities in the country have computing equipment, multimedia device, imaging and printing system, communication and Internet system. The existing ICT infrastructure have not been fully integrated and networked in a manner that will support healthcare services locally or across facilities. Apart from a few hospitals with a fully functional local area network (LAN), most of the healthcare providers have restricted their LANs to the front

office and pharmaceutical unit of their facilities. The LANs are mainly used to support the automation of pharmaceutical services and front office operations like patient registration and records keeping.

Multimedia systems are employed for playing back medical and non-medical documentaries and movies at the front desks. Routine planned preventative maintenance is not carried out because of budgetary constraints. Service level agreement is not used to define the nature and quality of ICT services outsourced.

Well-defined e-health architecture is the main pillar for achieving success in any e-health strategy. Protocols on e-health architecture cover healthcare policy and practices in order for inter-operability among systems is addressed and information sharing on clinical practice and other disciplines is promoted. Interoperability means "the ability of information and communication technology (ICT) systems and the business processes they support to exchange data and to enable the sharing of information and knowledge". For systems to be interoperable there has to be a defined architecture that describes the way in which systems "talk to each other" and standards for the data that is supposed to be exchanged.

There is currently no operational e-health architecture in place. The existing systems are not based on any defined data standards with defined data sets. Most of the systems in place are "silos". They run on different operating systems, generate different reporting formats and have different data sets. Data from one system cannot be interfaced with any other.

The conventions with respect to International Classification of Diseases (ICD) are occasionally employed in software development. In other cases, country specific classifications are being used as in the case of the

National Health Insurance Scheme. The existing systems do not take cognizance of standards like HL7, DICOM, and SINOMED. A draft enterprise architecture for the Ghana Health Service and a report on the technological needs of the service has been completed.

The use of health management information system is not widespread. There are currently two main applications used for information management. One version is used for the management of clinical business process whilst the other supports the collection and aggregation of data, and is mainly used for reporting. PDAs have been used for collecting data at the district and community levels on pilot basis. The District Health Information Management System is primarily used to capture data, aggregating and generating management reports. It has been deployed nationwide.

There are five different software used in the management of hospital operations. The software applications are modular in nature and do not support the full processes in the hospitals. The extent to which these processes are supported by information systems varies from hospital to hospital and from activity to activity. The characteristics of the hospital processes include documentation on admission, capturing of treatment regimen and discharge summaries. All are done manually and kept in folders. Key elements of the patient record in hospitals remain exclusively paper-based. Imaging and diagnostic results are not available electronically and are also not accessible from remote locations. Electronic versions of prescription history are not available and there is no electronic logistics and supply chain management system in place for medicines and non-consumables. Most activities are carried out manually. There are no systems for the generation of electronic medical records. This impacts significantly on the arrangements for referrals and patient management.

The Government's health insurance scheme plays a vital role in the financing arrangements for the health care providers. The National Health Insurance Authority (NHIA) has deployed an ICT infrastructure for the automation of health insurance services. All accredited healthcare providers operate a common ICT platform with common protocols for patient's authentication and claims management. There are also plans to deploy an online claims management system. The ICT platform for the national health insurance does not currently support any shared services. It only meets the business processes and needs.

The availability of staff with clinical and non-clinical background and a desirable level of IT literacy are crucial in any e-health project. The MOH does not have adequate staff with skill sets in e-health systems. The few staff who have undergone professional IT training are not involved in mainstream ICT related activities because the existing Human Resource establishment post does not have a structure for ICT professionals. There is no routine or formal training for professionals with clinical and non clinical background in ICT related courses like networking, systems administration, database administration, security, fundamental of computing and web based systems etc.

Several health facilities have diagnostics and imaging equipment. These equipments are used for the conventional laboratory examinations and X-rays. The use of paper based documentation for the diagnostics and films for x-rays are the standard practice. Technicians usually carry out tests whilst physicians or other specialist handle the interpretations of results. Even though some diagnostic and imaging equipment support automation and have the capacity for digital imaging they are hardly used for that purpose.

Telemedicine is the use of information and communications technology to deliver healthcare services, promote healthy lifestyles

and education, where the patients or clients are geographically separated. Telemedicine facilitates clinical consultation including patient assessment, diagnosis and treatment, continuing professional education, health promotion, and healthcare management. There is currently a national coverage for telecommunication via landlines and cell phone. Internet connectivity is accessible nationally. It is available via ADSL, GPRS and VSAT. All the ISPs have internet enable features on their network. The Ministry of Communication is rolling out a programme for optical fiber connectivity for all regional hospital and selected district hospitals. A nation-wide area network (WAN) is also being deployed by the Ministry of Communication for use by the MDAs. There are however challenges with bandwidth and cost. There is clear commitment from the top management to establish a robust and dependable telecommunication infrastructure throughout the country. In spite of the ongoing activities, there is still a large "digital divide" delineated by geography, income, education level, literacy, etc.

E-Learning is practiced on a very small scaled. Even though eLearning is recognized by the MOH as one of the means of carrying out cost effective, efficient and convenient medical education, the medical schools and training centers have been slow in changing their teaching methodologies. No training institution has an eLearning-enabled training curricula with interactive features and online tutor support functionalities. The only eLearning project is the Pan African e-Network Project at the Kwame Nkrumah University of Science and Technology (KNUST). The University as an academic institution and the University's hospital are being used as the project site. Participation and connectivity to the eLearning project is restricted to a few selected sites in Africa and India. Other local hospitals and universities are not allowed to connect to the network.

The MOH and a few of the agencies and regulatory bodies have

developed web sites for the dissemination of information. The content of the portals are skewed towards non-clinical information. They are also not regularly updated. The HMIS systems are also not web based and data can only be accessed on site. The use of PDAs and cell phone for m-health activities is at the pilot stages. The deployment of ICT infrastructure, installation of management information systems and training of ICT professionals are not funded in a structured and coordinated manner. Implementations at the healthcare provider facilities are normally funded from internally generated funds (IGF) and Government of Ghana funds.

Implementation usually spans across several months because of the high investment cost and unpredictability of GOG funds. The development partners sometimes bridge the gaps in the funding sources. E-health Initiatives funded and managed heavily by the development partners stand a great risk of failing because of sustainability issues are not fully addressed. The cost of maintaining ICT infrastructure and remuneration cost of IT experts becomes a challenge especially after the project closure or handing over to local counterparts. The availability of funds impinges on the sustainability of project and it is mostly the primary causes of project failures.

There is currently no policy guideline with respect to electronic data interchanges and patient identifiable information in the health sector. Ownership of electronic data and information is not defined.

3.2 E-Health Opportunities

ICT provides opportunities for individuals, medical professionals and healthcare providers to obtain information, communicate with other healthcare professionals and patients, offer primary healthcare support

and promote preventive healthcare programmes. The emerging and changing technological development has led to a rethinking in the way technology can be used in healthcare delivery. Technology enabled systems allow healthcare providers to deliver better support at lower cost and also contribute to quality health services. These systems collectively drive e-health and provide life saving data and information for clinical and non-clinical use. The key benefits to be achieved through a comprehensive e-Health strategy in Ghana are:

- Improved access and availability of healthcare services in remote or rural areas. Through mobile telephony or telemedicine, health care consumers will reduce the need for travel and referral to a secondary or tertiary health institution.
- Improved quality of care as a result of reduction in wait-times for medical treatment and surgical procedures and enhanced access to data for research. This will in turn improve patient health outcomes.
- Improved logistics and supply chain due to enhanced management information system for medical and non medical supplies.
- Facilitate the adoption of eLearning systems in medical education training and continuing professional development.
- Improved data and information to generate evidence to support timely and informed clinical and non clinical decisions as well as planning.

These benefits will almost certainly lead to improved productivity through increased efficiency, reduced duplication of tests and procedures and use of integrated health information management systems. It will also help to improve financial management by improving accountability and financial accessibility to healthcare services and cost reduction. Medical and health records will also be more secured with increased assurance of privacy and confidentiality.

3.3 Major Challenges and Barriers

E-Health systems, as mentions earlier, offer significant benefits and opportunities. There are however some barriers to its effective implementation. There are different stakeholders in the health sector providing services across wide geographic areas. The presence of such a wide range of autonomous providers from both public and private sectors creates a semblance of a fragmented health service. This is especially so with the diverse ownership of the services, some of which have clearly different ideological basis for their enterprise. This has made it very difficult to effectively coordinate and align information systems in the past and will pose a challenge in the implementation of e-health solutions in the future.

The effective use of ICT systems for electronic health records, e-prescribing and bar coding of medical and non medical consumables, point of care decision support tools etc require commitment and clear decisions on investments in technology. In a developing country such as Ghana, the priority in the health sector is to invest in direct services such as procurement of drugs, vaccines and medical supplies to fight communicable diseases. With continuing constraints in budgetary allocation, most of the e-health solutions will have to be funded either through internally generated funds thus making them small uncoordinated projects, or through donor support. E-health programmes typically require large sustained investment over five to ten year periods which will not be a strategically attractive funding candidate for most donors.

The health sector in Ghana suffers a shortage of ICT skills required to deliver large scale e-health programs. Given the complexity of workplace and technological challenges involved in the rollout of e-health solutions

building the human resource capacity to meet the challenge will be an uphill task. The need to nurture such skills and ensure that they are ready for effective implementation of the strategy will create significant delay in the system.

The underlying health information technology infrastructure is weak. This is due to consistent under-investment. In addition the market is crowded with information technology vendors who are only capable of providing basic ICT services. This limits the health sector's ability to adopt new systems and technologies which have been tested and proven successful in developed countries. One of the key risks is therefore the ability of vendors to deliver robust solutions in a timely manner. This limits the health sector in many ways to implement very small basic solutions and pass them on as solutions that must be adopted.

4.0 THE NATIONAL E-HEALTH VISION

Ghana is aspiring to be a middle income country by the year 2015. To achieve this economic status, it is recognized that the country will need the full contribution of its population. Such contribution can only come from a healthy and productive population. With the health sector plagued with persistent challenges which have, for a long time, prevented the attainment of sector goals and objectives, e-health is seen as an additional tool which, when strategically deployed, can help the sector to overcome these challenges and be able to provide people living in Ghana with high quality health services according to the needs of individuals, families and communities.

4.1 The Vision

E-health will enable the delivery of quality, affordable and up-to-date health services in an equitable and timely manner by enhancing communication and the use of information for planning, managing and delivering health services.

When this vision is realized:

Routine reporting from the district and sub-district level will be timely and will be available for decision making in less than 24 hours after data has been captured at source. Updates, reporting and feed back will be regular and data errors will be minimized. Reports on notifiable diseases will be in real time and early warning on impending outbreaks will be facilitated.

Nurses and Health Assistants in remote areas will have easy on-line access to information and the services of experts in other parts of the country when confronted with health challenges in their area of operation. Every patient making a contact with any health facility or service, no matter where it is located, will benefit from available expertise in other parts of the country without necessarily being referred. This will enhance performance and reduce referrals to ones that are absolutely necessary. Referrals will also be better coordinated and documented.

Access to health information to enable the population make informed choices on health will be greatly enhanced. All available means of communication will be used to transmit appropriately packaged public health information to all sections of the population leading to increased awareness and adoption of healthier lifestyles.

Diagnostic services will be provided without the need for movement of files and folders by patients. Such reports will be transmitted electronically to doctors who requested them and this will help cut down the cost of such services drastically.

4.2 Goal and objectives

The goal of the e-health strategy is to harness the potential of Information and Communication Technology to improve the health status of people living in Ghana.

In meeting this goal the strategy will seek to provide options to support decision making by health care providers, health service managers and consumers of health services thereby making the health sector more responsive to the needs of individuals, families and communities. The main objective therefore is to guide the strategic use of information and communication technology to bridge the human resource and infrastructure inequities that exist in the health sector in Ghana.

Specifically, the strategy will:

- Improve access to information in support of safe, efficient and effective health care delivery in a timely manner and at the point of need by:
  - Guiding the deployment of information and communication technology at all levels of the health system
  - Enabling the communication and exchange of information among multi-disciplinary health teams to provide better coordinated and seamless health care
  - Improving the quality and efficiency of decision making in clinical practice through better access to health information, clinical evidence and clinical decision support tools
- Provide access to appropriately packaged information to enable individuals make informed health choices to manage, control and improve personal health outcomes in all parts of the country.

- Improve reporting of data, health activities and health outcome information in a timely and accurate manner and thus facilitate evidence based decision making at all levels.

- Provide standards and outline processes for ensuring interoperability, data safety and information confidentiality in all aspects of electronic data management within the health sector.

- Put in place structures that will improve the governance of investment in e-health solutions in the health sector and to ensure maximum benefits for such investments.

When these objectives are met, the health care provider will be in a better position to make informed decisions at the point of care as a result of better access to accurate and complete consumer health information, the support of relevant decision support systems and tools and access to remote sources of information to help take accurate and prompt treatment decisions. This will help them deliver care more efficiently and be able to share information with other providers. Reporting on diseases of public health importance will be more timely and will facilitate better responses by the public health system.

Consumers will receive safer, better coordinated and more accessible care as a result of the improved accuracy, completeness and accessibility of personal health information. They will also be supported to stay healthy through access to reliable health information, better follow up services and continuing interaction with the health system to ensure that they continue to make better lifestyle choices.

Health Care Managers will have access to a more robust, comprehensive and accurate body of data and information for decision making and planning. This will help them to make more targeted resource allocation and support resource mobilization drives.

5.0 THE NATIONAL E-HEALTH STRATEGY

Increased use of Information and Communication Technology cannot be achieved without basic improvements in information structure, extended technical infrastructure and some changes or improved enforcement of the legal and policy framework for information management. Action in these areas will yield substantial benefits for e-Health solutions but they fall beyond the scope of the health sector. The strategies outlined are therefore based on the following strategic principles:

- Information and Communication Technology is an increasingly important tool for a wide range of health care applications. Its careful deployment is therefore necessary for achieving strategic improvements in health care delivery in general.
- The health sector will depend on the Ministry of Communication to deploy a national infrastructure that will deliver the core elements of the national e-health infrastructure. The roll out of

the e-health plan will depend on the coverage of the national Information and Communication Technology infrastructure.

- The strategy will seek active stakeholder engagement, particularly the private sector, in the design and implementation of e-health solutions.
- The strategy will seek to align all e-health solutions to the standards outlined but will not limit the development of local e-health initiatives.
- There is the need for relevant minimum Information and Communication Technology skill among health care providers to support the delivery of the national e-health strategy. This will however be done systematically in order to help skilled workers appreciate the potential rather than see it as a new demand.

5.1 Strategy Overview

The intent of the e-health strategy is to systematically deploy Information and Communication Technology to improve the health status of people living in Ghana. Although presently the penetration of technology in health care has improved dramatically, its application in many aspects of health care has been limited. Several factors have contributed to this and key among them are the inherent lack of capacity to use available technology in the day to day health care delivery activities. Capacity in this sense is not only about resources, both human and material. It is about the culture, work ethics and the need to make the application of technology an essential demand for accelerated performance in the medium term. This will require work in the area of training, development and implementation of new policies and programmes and incremental improvements in the use of information and communication technology based tools used in health care work and for communication between patients and care service providers. The necessary improvements have been captured under the following strategies.

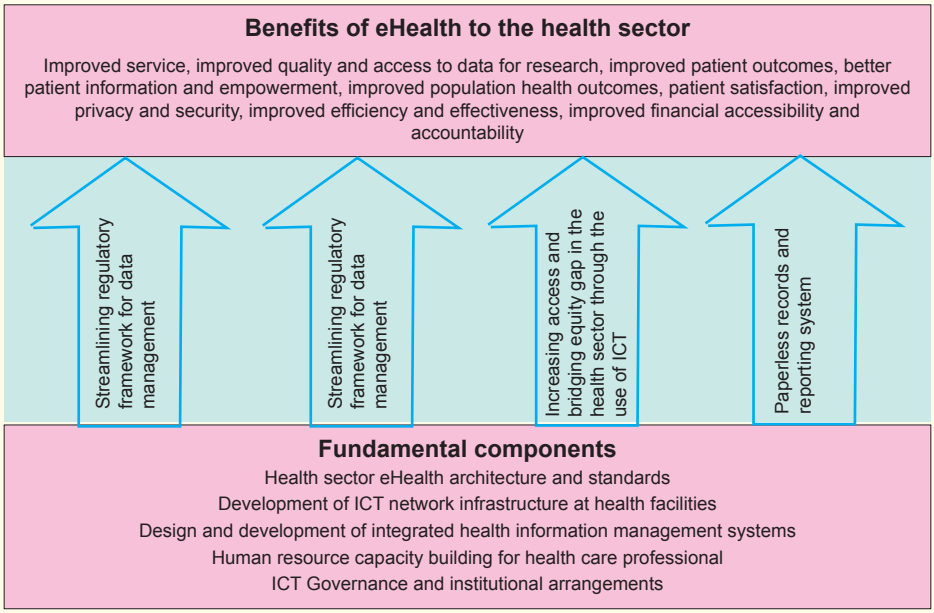
Strategy 1. Streamlining the regulatory framework for health data and information management

Strategy 2. Building sector capacity for wider application of e-health solutions in the health sector

Strategy 3. Increasing access and bridging equity gap in the health sector through the use of Information and Communication Technology

Strategy 4. Towards a paperless records and reporting system

These strategies have been nominated to facilitate the identification and provision of e-health solutions capable of supporting and supplementing existing systems to help meet the overall health sector objectives. Recognizing that there is no universally defined processes and information flows that serve as a basis for initiating and coordinating the deployment of e-health solution; Action in these areas will be pursued in such a manner that they build capacity towards the desired situation where through the application of technology, the health system has become more responsive and yielding better health outcomes. Thus, while action will be taken on all four strategies, more will be done on strategy one in the initial stages so as to build the basis for a sustainable system.



5.2.1 The Challenge

Data safety and privacy has been violated in a number of projects and programmes. This is because security regarding the confidentiality, availability and integrity of data and information has not been defined and backed by an official procedure. The form in which data and information should be transmitted and the encryption methodology is also nonexistent. Procedures regarding responsibility and accountability in the use of passwords and access privileges are not fully implemented. Patient identifiable information could be viewed by third party vendors and the transmission of data and information via the internet or WAN is not regulated by any security protocol. There is a general lack of security policies and protocols regarding confidentiality, availability and integrity of data. Business continuity plans and disaster recovery procedures are non existent. There is no standardized information on the ownership of patient identifiable data. Computing equipment are susceptible to external threats like viruses, worms and hacking of corporate networks. Business continuity plans and disaster recover procedures are also not in place to ensure availability of connectivity.

The deployment of e-health solutions in the health sector will be aimed at simplifying administrative processes and the reduction in data gathering and processing costs. It will also facilitate the delivery of health related information to remote locations within the sector. This is of paramount importance in order to align the multiple stakeholders towards a common reporting mechanism and objective. It is also to ensure that as much as possible health services are delivered seamlessly. The starting point is therefore to ensure some standardization of the content and processes of information within the sector and to coordinate the application of emerging technology in a way that will help achieve overall sector goals. At the same time there is the urgent need for policies that protect privacy while permitting critical analytic uses of health data

and multipurpose data standards that meet the needs of the diverse groups that record and use health information.

This strategy aims at achieving the following:

- Defining robust system for the use of information technology to capture, store and exchange health information and improve patient care services by providing a continuum of care.

- Put in place a coordinating system for reviewing and aligning new Information and Communication Technology in health care

5.2.2 Current Situation

The Information and Communication Technology for Accelerated Development programme of the Government of Ghana provides a blueprint for the use of information technology in the health sector. Based on this document, the Ministry of Health has developed a sector specific policy on Information and Communication Technology. The National Information Technology Agency, technical arm of the Ministry of Communication is also addressing issues relating legislature covering electronic data interchange, data security and privacy and computer misuse and electronic fraud. The agency has also developed an electronic Government Interoperability Framework. These developments notwithstanding, there is currently no regulatory framework for electronic data interchange in the Health Sector. There are, however, several pilot e-health programmes at various levels but since there are no systems in place to coordinate them, issues relating interoperability and seamless integration of data and other information are not being addressed.

Within the health sector, in addition to the Information and Communication Technology Policy a Medical Records Policy has been developed to guide the content of medical records across board. This has however not been extensively disseminated. Some steps were taken to

review the policy and legal environment for health data and health information reporting but this has not yet resulted in any concrete piece of legislation or policy.

The Government of Ghana has developed an E-Government Interoperability Framework which sets out the government's policy and standards for interoperability across the public sector. Government is also putting in place several regulations to deal with how electronic data will be created and managed to serve the nation in the digital revolution. These include the Electronic Transaction Bill, Data Protection Bill, Electronic Investigations and Inception Regulation, Electronic Payment Mediums Regulation, Electronic Signature (Certifying Agency) Regulation and Electronic Waste (Disposal and Recycling) Regulation.

5.2.3 Key Actions

- An interagency body, to be chaired by the Deputy Minister of Health, will be constituted to coordinate e-health activities in the health sector. The Ministerial Committee on E-Health will review project proposals and ensure, in addition to value for money, that all standards are met and projects are effectively monitored. The committee will also be responsible for advising the Minister of Health on the way forward based on evaluation outcomes. As a first step the committee will initiate a comprehensive technical review of all e-health programmes in the sector.

- The Ministry of health will, in consultation with other relevant agencies, define strict privacy and security rules including liability and sanctions as part of the Medical Records Policy.

- A protocol on data handling in the health sector will be developed and procedures will be put in place to ensure appropriate

disclosure, systems for authorization and consent for all aspects of personal and service data. The protocol will also determine the best way to allow individuals to participate in and consent to electronic health information exchange. Steps for authenticating users of health information, proper access controls will be defined in the protocol to help maintain adequate audit trails for monitoring access to health data.

- The Ministry of Health will set up a Technical Team on Standards to review and recommend for adoption appropriate e-health standards as and when need arises. As a first step the team will define a set of standards based on the e-health standards approved by the WHO for adoption by the Ministerial Committee on E-Health.

- To ensure interoperability and integration the Ministry of Health will work within the e-Government Interoperability Framework for Ghana. The Ministerial Committee on E-Health will ensure that all –health solutions comply with these national technical standards policies and regulations.

- The Ministry of Health will collaborate with agencies to develop unique patient and facility identification systems covering the public and private sectors and deploy a disease coding systems conforming to International standards to facilitate electronic reporting at all levels.

Priority Actions

- Set up interagency e-health committee for the health sector and define terms of reference.
- Develop data handling protocol for the health sector covering all levels of service.

5.3 Strategy 2. Building Sector Capacity for Wider Application of E-Health

5.3.1 The Challenge

One of the biggest challenges to e-health capacity building in Ghana is the shortage of qualified, trained health care professionals and training resources. Consequently the use of Information and Communication Technology in health is limited compared to the overall availability of tools and modern equipment that are capable of providing such services. New diagnostic equipment with electronic data transfer facilities exist in the system but are not utilized for such purposes. The health sector has one of the highest densities of computers in Ghana but almost all of them are used for simple word processing and spreadsheet applications. These challenges are as a result of high numbers of staff who are either not computer literate or have not yet adapted to the current ICT trend. The problem can also be traced to the training institutions where trainees have very little exposure to Information and Communication Technology.

Most persons driving and managing the existing e-Health Infrastructure and initiatives have not had proper professional training. With the few who have had some professional training, the Human resource scheme of service does not recognize such professionals and are most often placed in areas where they do not get involved in mainstream ICT related activities. Biostatisticians and regional information officers double as ICT experts. Most ICT capacity building initiative is directed at user training in the use applications rather than transfer technical skills for the long-term sustainability of the projects. Internal ICT support is very weak at all levels leading to a very weak oversight responsibility for ICT services that are outsourced. From various reports on capacity for ICT in the health sector, it has become increasingly clear that not much priority is placed on ICT in the health sector. This has led to slow adaptability in the area of Information and Communication Technology in the health sector.

This strategy will aim at building institutional capacity for e-health by:

- Building the human resource capacity for e-health
- Improving organization-wide capacity for the deployment of e-health solutions

5.3.2 Current Situation

Facilities for training (e-Learning) in the country are not at an advanced stage presently. Almost all the health training institutions in the country do not run e-learning programmes. The Kwame Nkrumah University of Science and Technology and the Komfo Anokye Teaching Hospital have started an eLearning training session for medical professionals. This is not available for other health professionals. The Rural Health Training School, which runs a diploma programme for middle level health professionals have, for the last decade run a programme for Health Information Officers. This happens to be the only programme in the health sector that focuses on ICT to some degree.

At the agency level, ad hoc programmes are run for Health Information Officers and to some extent programme managers. All these however focus on use of the computer in the management of information. Structured ICT training for staff and medical professionals are not available.

5.3.3 Key Actions

Action will be taken in two broad areas. In the area of building the human resource capacity for e-health, the following will be undertaken:

- The Ministry of Health will take steps to develop and implement a relevant scheme of service that will enable the recruitment and retention of requisite ICT staff to support e-health. To do this the ministry will define a standardized e-health competency framework for health workers and health sector information technology practitioners providing an understanding of required e-health knowledge, skills and attributes for each professional group.

- The Ministry of Health will develop a proposal for all health training institutions to include basic practical ICT skills that will enable graduates to be conversant with tools, equipment and systems that support e-health at their level. Specifically the ministry will determine the education and training course changes required to ensure the development of e-health workforce capabilities and support each institution to set up demonstration sites to support training.

- The Ministry of Health will work with health training and professional bodies to embed e-health into their continuing education curricula so that practicing health professionals can have the knowledge to take on e-health projects, such as implementation of electronic health record, electronic prescribing, and public health information initiatives. Each professional grouping will establish core competencies for e-health and a task force will be put together to develop tools to be used in training.

- The Ministry of Health will ensure access to electronic course materials and to indexed health literature through programs such as HINARI.

To build institutional capacity for the deployment of e-health solutions the following actions will be undertaken:

- The Ministry of Health will outline key areas of investment for e-health at each level of health care delivery to be captured in the annual health sector budget. A means of monitoring will also be established. The Interagency committee on e-health will be tasked to ensure that this is done.

- Agency specific ICT support services will be reviewed and reported on as a way of ensuring that investments made in this area are protected.

- The interagency committee on e-health will mount a resource mobilization programme for e-health.

Priority Actions

- Develop scheme of service for e-health workforce.

- Set up task force to develop e-health training needs for health professionals and Civil Society Organizations in health.

- Ensure that provisions are made within the budget for e-health at all levels

5.4 Strategy 3. Increasing Access and Bridging Equity Gap through Information and Communication Technology

5.4.1 The Challenge

Availability of health services especially in the rural areas is constrained by need to travel long distances to reach health facilities. It is estimated that over 40% of the population live beyond one hour travel time to a health facility and a little over 50% live within 30 minutes travel time from a health facility. In certain areas particularly in the northern sector over 90% of the population do not have access to health services. In most of these areas outreach services are few and far between. To add to this problem, health facilities in these areas are usually only able to provide limited services due to lack of skill. Specialist services to a large extent are limited to the urban areas with over 80% of these services available only in the regional capitals. The underlying causes for this level of access are due to the inadequate service delivery points and a weak referral system, which is further, complicated by the lack of appropriate transport system. The low level of skill among health workers at the periphery, poor physical infrastructure, mal-distribution of staff and the lack of supervision, monitoring, regulation of staff and service delivery contributes to an unacceptable level of quality in many areas. In addition the level of technical competence, the handling of emergencies, frequent shortages of drugs and medical supplies have been identified as major barriers to quality of care. Specialist support to the lower levels is also very limited due to the low numbers of specialists and the lack of facilities at the lower levels.

The strategies adopted to overcome these constraints include the introduction of a close-to-client policy which aims at placing a trained public health nurse within communities to provide basic clinical and

public health services. It also includes the building of new facilities, improving staff skills through in-service training and the introduction of specialist outreach services. These strategies all have large recurrent implications and the mounting costs may affect expansion in the long run. The aim of the strategy is to:

- Use Information and Communication technology to expanding the scope of activities of specialists
- Support the transfer of skills and expertise to health workers in the periphery thereby improving their on-the-job performance
- Support the establishment of a rapid response system to enhance performance in both clinical and public health care
- Empower patients and clients to seek quality care and make the right demands on the health care system

5.4.2 Current Situation

Major developments have taken place over the last few years to build some basis for the objectives of this strategy to be realized. In the area of infrastructure, the expansion of mobile telephony presents the greatest development upon which aspects of the strategy can be further developed. Internet connectivity is available in all Regional Health Administrations via ADSL mode of connectivity. Institutions requiring heavy bandwidth are presently using VSAT. In areas unreachable by telephone landlines, connectivity is achieved by GPRS provided by Internet Service Providers.

As part of the claims management processes, the National Health Insurance Scheme has established connectivity to all major health care provider. Local Area Networks are also widely available in hospitals. Although not at par with that of telephone network, infrastructure to

enable telemedicine can also be developed based on initial investments that have been made through Government of Ghana initiatives. The Komfo Anokye Teaching Hospital for instance has facilities to support telemedicine. The Regenerative Health Programme also has limited use of mobile phones for disseminating public health messages.

The Ministry of Health runs a Medicines Information Resource Centre that provides information on the use of drugs and pharmaceuticals to health care providers across the country. Although this focuses on medicines, it is becoming increasingly relevant that other areas of health care can benefit from the programme. The lessons learnt from this programme will be looked at closely in the expansion of technical support services under this strategy.

5.4.3 Key Actions

The key actions under this strategy will be in three main areas:

- Use of mobile telephony for health services (m-health)
- Use of audio visual support clinical decision making (telemedicine)
- Use of electronic messages to promote public health

5.4.3.1 M-Health

The Ministry of Health will use the significant opportunities offered by the mobile telephone services in the country to improve access to individuals and families and to create a vital link between the service and the general population. This will be done through collaboration with the service providers within the context of their corporate social responsibilities and commitments.

The following will be the main actions.

- The Ministry of Health will engage mobile phone service providers in the country and seek specific services tailored to meet the overall health sector objectives. This engagement will result in agreements on kinds of services, security and ethical requirements, special rates and other details that will allow health services to be assessed through the mobile phones ethically and unimpeded.

- An interagency team will be put together to work with programmes and specialties to determine specific services that can be better managed and improved through the use of mobile telephony for the benefit of patients, health care providers and the general public. This will be reviewed and implemented through the annual programme of work. The areas to be covered will include treatment support and follow up services, medication compliance and help line services.

- Disease surveillance and epidemic tracking system using mobile telephony will be established within the Ghana Health Service and will involve the private sector. This will be liked to a data base to provide real-time information of selected diseases.

5.4.3.2 Telemedicine

Tele medicine infrastructure is the least developed in the country. It is also one that requires significant investment at the peripheral facilities as well as central facilities that will provide service. For these reasons the strategy will at the initial stages adopt a learning approach and work towards building capacity for training and scale up at all levels. Two main approaches will be adopted:

- Networked programs linking Teaching Hospitals and selected Regional Hospitals to outlying clinics and community health centres in rural or sub urban areas. This will be through dedicated high-speed lines or the Internet for telecommunication links between sites.

- Point-to-point connections using high speed networks for hospitals and clinics that deliver specialized services.

The main actions will therefore be:

- The Ministry of Health will seek support to set up pilot programme involving selected districts and a teaching hospital to roll out a planned telemedicine programme to provide information for planning.

- Work with the Kofi Annan Centre and the School of Public Health to establish a center of excellence in telemedicine for the purposes of training and capacity development. This will cover both live interactive video and the use of store and forward transmission of diagnostic images, vital signs and video clips along with patient data.

- The three teaching hospitals will be supported to develop telemedicine centers to link up with training sites at the regional, district and community level.

5.4.3.3 Promoting Public Health

The National Health Policy places a lot of emphasis on behavioral change as a basis for improved health status. Many of the major health problems

currently confronting the health sector can also be effectively mitigated with effective public health interventions. Consequently the promotion of public health has a central place in the health sector programme of work and forms the basis for performance in a number of areas.

A great deal of information on health care is already available electronically on a large number of national, regional and local government supported programmes channeled through the media. The information covers a number of important health care aspects including diseases, symptoms, treatment and prevention methods. There is, however, little information on the organization of the health care services and how to access the services. There is a pressing need to review, coordinate and adapt the information as part of an overall public health drive aimed at behavioural change and providing opportunities for making healthier lifestyle choices. A vital task in this connection is the design of a common gateway, or portal, to a large, comprehensive body of quality-assured health care information.

The following will be the main actions:

- A task team of public health and health education experts will be put together to design health information messages covering access to health services, disease prevention and healthy lifestyle choices to constitute a body of information for use in public health campaigns through electronic media. The task team will eventually be converted into a national health knowledge management group under the interagency ministerial committee to review, validate and coordinate health knowledge sources nationally and make them accessible through the national health portal.

- All teaching and regional hospitals will be equipped with

information units to provide public health information to the general public. A manual based on the work of the task force will be prepared to support these units. The health education unit of the Ghana Health Service will regularly update such information.

- The Ministry of Health will create a common access point (a web portal) through which public health information will be made available to the general public. This will involve a review existing consumer and care provider health knowledge sources and identification of best practices. A Public Health Information Portal will be developed to provide stakeholder groups with a single point of access for coordinated and validated health information.

Priority Actions

- Develop framework for collaboration with mobile phone service providers
- Develop pilot programmes for m-health and telemedicine
- Develop public health information plan for incorporation in annual programme of work

5.5 Strategy 4. Towards A Paperless Records and Reporting System

The health sector has within the last two decades gradually attempted to computerize a number of its operations. However, the only areas that have shown some degree of success in changing management practices have been the effort to computerize some logistics management systems. Computerization of patient information, medical records and patient

management processes in hospital has met with very little success especially in the public sector. A key barrier has been the relatively poor quality of computing infrastructure in many facilities and agencies.

Computing infrastructure is one of the most basic foundations required for collecting, recording and sharing electronic information across the health sector. Unfortunately the health sector has traditionally under invested in computing infrastructure compared with other information intensive industries over the last twenty years. The result is that much of required infrastructure is either not existent or are under developed. To provide the foundation to support e-health, therefore, there will be the need to invest in the establishment and maintenance of an acceptable baseline of computing infrastructure in all health facilities. One of the key aims in the medium term will be to put in place a mechanism by which the health sector can gradually be transformed into an effective data management and information dissemination sector.

Creating a completely paperless records and reporting system may take some time to achieve. This strategy is therefore aimed at achieving some clear improvements in the application of information and communication technology in the collection, storage, transfer and dissemination of health information.

In this direction the strategy will focus on two main areas.

- To improve performance reporting of the health sector by gradually moving towards a real time reporting system from the district level.

- Put in place a functioning patient record system in health facilities and gradually automate patient services in health facilities.

5.5.1 Current Situation

Several local initiatives have taken place in the area of health information management. A comprehensive mapping of data collection points within the sector has been conducted and this has helped in defining a health information management strategy for the sector. This outlines the reporting lines and responsibilities and the content of information to be provided by agencies. A District health Information Management System has also been developed and has currently been rolled out nationally. The system provides aggregate data from health facilities and programmes at the district level which are pooled together at the regional and national level. The DHIMS was developed in response to the need for annual reporting based on selected indicators.

Within health facilities several uncoordinated efforts have been made to put in place computer assisted management systems that will help in managing revenue and patient information. With the introduction of the National Health Insurance scheme, steps are being taken to computerize the claims management system to ensure accountability. In the large hospitals computers are available at almost all service delivery points but these are not networked and do not have standard software to allow transactions to be pooled together at the end of the day.

New diagnostic and laboratory equipment being brought into the system have electronic reporting and data capture capabilities but this is not used due to skill constraints and lack of patient management systems that allow for electronic transfer of reports to consulting rooms.

5.5.2 Key Actions

The key actions under this strategy will be in two main areas.

- To improve and expand the use of the DHIMS to provide real-time report on sector performance
- To develop a comprehensive patient records and service management system in health facilities which will report to the DHIMS

5.5.2.1 Expansion of District health Information System

- Develop a comprehensive Information and Communication Technology requirement for each level of service provider based on the sector ICT policy. This will guide the gradual modernization of the information management systems within facilities and management units. This plan will be incorporated into the medium term capital programme of the health sector.

- Review and upgrade the DHIMS into a web based system to enable real time reporting of performance at all levels. To ensure that programmes are catered for effectively a coordinating committee will be set up to review the performance of the software and ensure maximum coverage at all times. The Centre for Health Information Management will also under go a radical upgrade to serve its purpose as the main centre for compiling service data.

- Set up a national health data repository at the Ministry of Health to collate reports from all agencies electronically and to provide comprehensive analysis and updates on performance of the health sector.

5.5.2.2 Patient Records and Service Management System

The purpose of the Patient Record is to provide a comprehensive documentation of an individual's health information as he or she makes contact with the health care system. It provides information on services and treatment decisions to enable care coordination between care provider teams. The Patient Record is also used as a key information source for longitudinal and aggregated health information, in conjunction with other health sector data sets, to support more informed health care reporting and research.

The deployment of Patient Record and Service Systems require significant process change and huge investments in equipment and training. The strategy will adopt an incremental and distributed approach to the development of Patient Records that will focus initial efforts on enabling the flow of quality and relevant health information across the health care network. It will also support more effective management of Patient Records and the timely delivery of systems capability in those parts of the health sector that are ready to move. This approach is based on the principle of ensuring that health information is made available to the consumer and care provider at the point of care through simple facility networks and at the district level information becomes more summarized and aggregated to provide a consolidated summary of facility performance.

- The first step will be to connect service points within each facility so that they can effectively access and share patient service information. This step requires the implementation of national standards on patient and care provider identifiers, standards, rules and protocols for information exchange and protection, and underlying physical computing and networking infrastructure. This will be captured in the Programme of Work.

- To cut down cost of materials, electronic image management system will be developed, starting with the teaching hospitals and places where appropriate equipment exist. .

- The Ministry of Health will collaborate with communications authorities and service providers to extend the broadband communications infrastructure coverage and capacity to make e-health suitable broadband services available to all care providers.

- The Ministry of Health will negotiate pricing arrangements for care provider broadband services to support the up take and use of broadband services for sharing health information.

Priority Actions

- Develop framework for modernizing ICT infrastructure
- Revamp the Center for Health Information Management
- Set up National data repository
- Pilot Patient record and service management system

6.0 NATIONAL E-HEALTH ARCHITECTURE

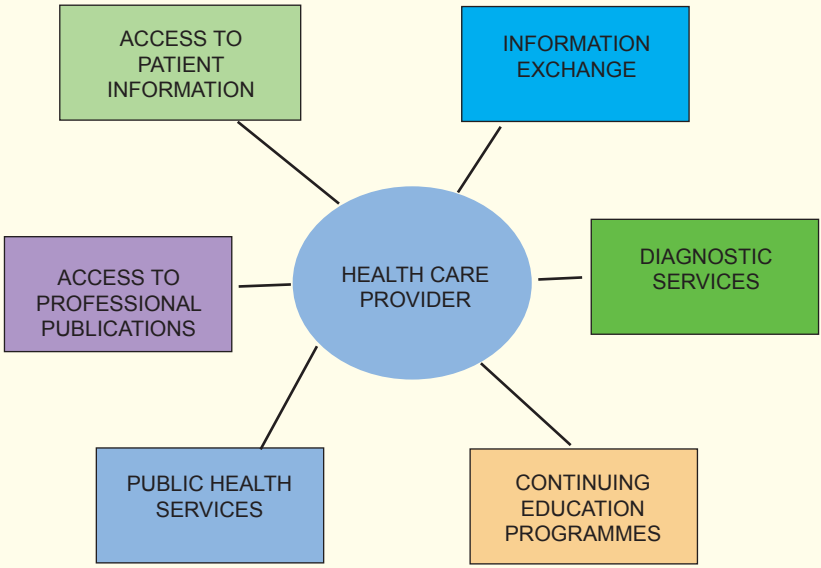
The national e-health vision envisages a fundamental shift in the way the business of health care delivery is done. It sees health care delivery in Ghana as an enterprise that provides a seamless service with a near complete geographical coverage of the whole country. The vision also sees three groups of beneficiaries, namely health care providers, consumers of health services and those who manage services that support health care delivery. These groups of stakeholders will need to understand and translate the any e-health solution into a business solution to guide their interaction with the health system. The e-health architecture is a representation of how health care business actions are carried by e-health solutions. The purpose is to identify all the components that are required to deliver a solution and to clarify their relationships and interdependencies.

The National e-health architecture will also address the information and communications technology requirements for the deployment of systems to support the delivery of healthcare. This will be based on the Government of Ghana National Enterprise Architecture, Ghana Health Service Enterprise Architecture, the ICT4 Accelerated Development Strategy, the Health Sector ICT Policy and Strategy among others. The e-health architecture will encompass a Service Oriented Architecture (SOA) that will promote the adaptability of e-health solutions to respond to changing clinical service requirements and emerging technologies.

6.1 Stakeholder relationships

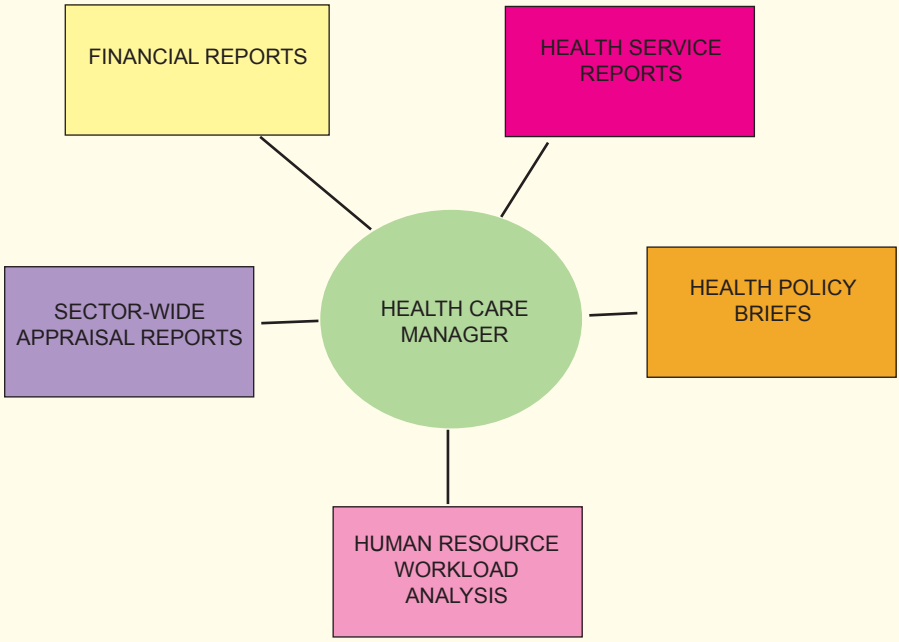
- Health care providers

Health care providers will be key beneficiaries of e-health in the health sector. It is expected that their work will be enhanced and they will use e-health solutions to access information for other service related actions. The diagram below shows how health care providers will be supported.



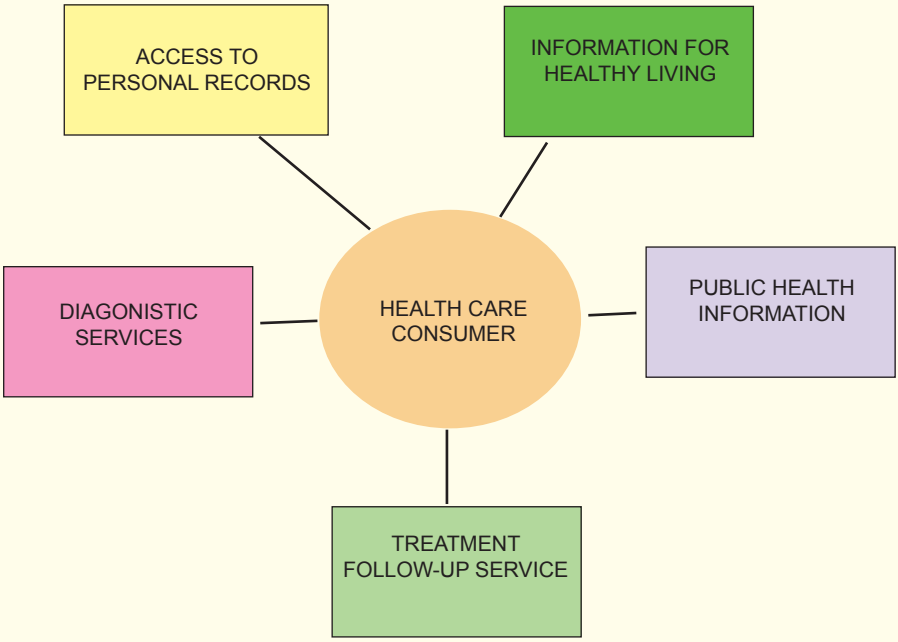
- Health care manager

The processes for policy and management decisions need to be supported by information from various sources. Health care managers will need to have access to such information in forms that will allow for easy decision making. Such information includes routine reports, research reports, performance appraisals, financial reports and other reports that are generated outside the health sector. The diagram below show how managers will be supported.



- The health care consumer

He consumer lies at the heart of e-health activities. The consumer's relationship with the health system will also be largely facilitated by the adoption of e-health solutions. I will be an additional public health tool that will help in modifying behavior and ensuring the adoption of healthier lifestyles. Such information will need to be provided constantly and targeted to ensure maximum effect. The diagram below shows how this will be achieved.



6.2 The Ghana E-Health Architecture

To deliver the e-health vision and to create the stakeholder relationships defined above, the strategy must be developed on two key components. These are the e-health infrastructure and the e-health solutions. The infrastructure defines the required e-health technology infrastructure to carry e-health solutions. These include computing and networking infrastructure and other information and communication equipment transmitting information securely and storing key data. The e-health solutions describes the systems and tools that will be required to enable the collection, storage and dissemination of electronic information and to support other health care delivery functions. These systems and tools support patient records, clinical and non clinical management decision making and health education. The architecture also shows the policy and regulatory framework that will guide the e-health solutions. The diagram below show the relationships.

Diagram of e-health architecture showing e-health infrastructure, solutions and regulations on one side and how they relate to key deliverable of the strategy – patient records system, management decisions, telemedicine, m-health, reporting systems, public health information etc.

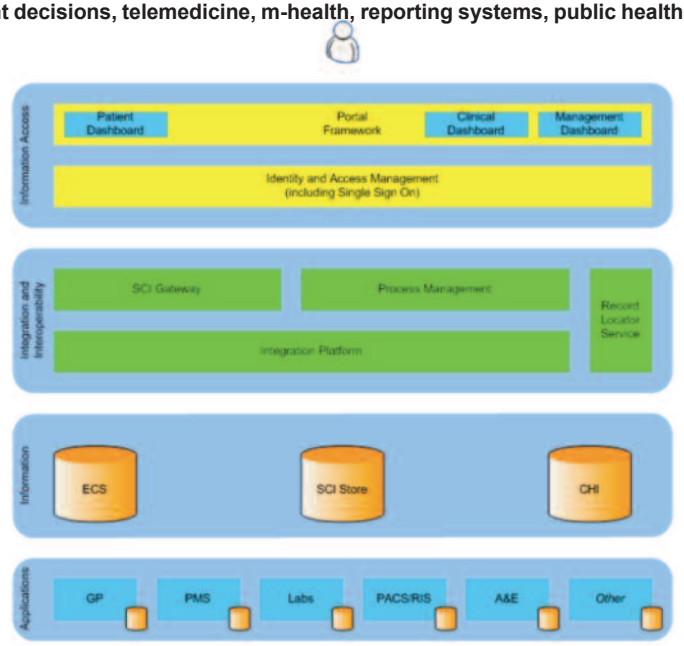


Diagram Showing The Health Information Network

	HEALTH CARE PROVIDER	HEALTH CARE MANAGER	HEALTH CARE CONSUMER
E-HEALTH INFRASTRUCTURE	• Computers • Network capabilities • Broadband connectivity • Computer and Network enabled equipment • Communication network • Handheld devices • Telemedicine equipment	• Computers • Communication equipment • Network capabilities • Information access points	• Mobile telephony • Network access points • Electronic media access • Hotlines and service desks
E-HEALTH SOLUTIONS	• Patient record systems • Web based disease surveillance Image management systems • Electronic prescription system • Referral manage-ment systems • Patient appointment systems • E-consultations and remote service system	• Financial management systems • Performance management systems • Human Resource management • Logistics Management	• Notification systems • Scheduled appointment programmes • Package public health messages • Health information resource network
STANDARDS AND REGULATIONS	• Confidentiality and privacy • Data safety Protocols for managing information sharing	• Standard management rules and regulations such as Financial Management rules and Performance reporting	• Information, confidentiality

- Technical Requirements

The element of the architecture will embody the under listed principles and other technologically appropriate ones agreed on by the Ministerial Committee on E-Health

- E-Health Governance

An e-health governance team will manage arrangements regarding integration with existing architectures, development of standards and architecture principles and e-health solutions lifecycle and ownership of electronic data and information. Change management issues will be addressed.

- Service Oriented Architecture

The SOA will be based on XML web services and other web based systems

- Information Assurance

A mechanism for assuring availability of information, defining access privileges, ensuring data and information are up to date at all times will be put in place. Models for addressing patient consent; security and validation of data quality will be defined.

- Management Information Architecture

Defining and agreeing on an information architecture and optional information sets for clinical and non-clinical information.

- Information Access

Defining a framework for access to the portal with dashboards for patient access, clinicians and management.

- Integration and Interoperability

The use of open integration and interoperability standards and plans will be implemented. This will allow for an integration platform to support message based integration, interoperability and SOA

- ICT Infrastructure

Defining minimum standards for computing equipment, networking devices, multimedia equipment etc. This will cover telecommunication infrastructure and bandwidth issues

- Identity and access management

National protocols should be put in place to provide secure access to information and sign on to e-health application.

- Applications

Standards based reference applications architecture, encompassing national application and national technological should be incorporated

- Help Desk and Service Management

Minimum levels of standardization and approaches for help desk and support services for delivery of information, computers and telecommunications to staff in the health sector, standards for IT service management must be based on IT infrastructure Library (ITIL).

7.0 IMPLEMENTATION ARRANGEMENTS

There is significant demand on the health sector to show some tangible e-health within the next five years. This is in response to the assertion that there are some gains to be made in meeting the MDGs with the application of e-health solutions in many areas. Considering the complexity of the environment in which the strategy must be rolled out and the relative weakness of the information system support structure within the health sector, it is important to define clear lines of authority and responsibility for the implementation of the strategies outlined. It is also important to note the degree of integration between system required and the extent to which change must be effected within stakeholder groups to enable unimpeded implementation. This section therefore defines a minimum arrangement for the implementation of the strategy. In doing so it is noted that the Ministry of Communication and the

Ministry of Health will be required to ensure continuing visibility of the targets aimed at in the specific areas of action.

7.1 Implementation Overview

It is expected that at national and agency level, sufficient commitment will be given to the investment in and deployment of e-health solutions as part of the performance arrangement on yearly basis. The implementation arrangement also assumes that formal approval of the strategy will be given by the Ministry of Communication through its technical agencies and allowing the Ministry of Health to present the strategy as reflecting its official framework for guiding the sector-wide deployment of e-health solutions. The implementation of the strategy largely falls under the Ministry of Health and its agencies. Much of the actual demonstration of success will lie with agencies and therefore the need for a buy-in mechanism will be essential.

A number of the action areas serve as pilot stages. Mechanism will be put in place to review such projects and use the lessons for scaling up where necessary. Such projects will therefore have sufficient scope for evaluation and the design of scale up programmes as part of the plan.

7.2 Governance

The governance module that will guide the implementation of the e-health strategy will adopt a system where government and stakeholders play equal and complementary roles in the design and implementation of agreed solutions and jointly own the outcome of such collaborative efforts. Government, through the Ministry of Communication, will define standards, data protection rules and regulations and put in place

mechanisms for enforcement and adherence. Direct supervision will be provided jointly by the Technical units of the Ministry of Communication and the Ministry of Health and its relevant agency. This module will ensure that in places where stakeholders are better placed to drive outcomes sufficient scope is given through consultations to ensure rapid and successful deployment. Key consideration will be given to innovation and the adoption of corporate stances that will enable quick public health outcomes.

The development of specific e-health solutions will be predominantly driven by the Ministry of Health in collaboration with stakeholders and solution vendors. It is expected that such arrangements should enable the development of e-health solutions that meet specific health sector needs. Government, through the Ministry of Health will therefore have overall responsibility for setting national e-health agenda and priorities.

Government will be responsible for directly funding, implementing and operating e-health infrastructure. Government will also stimulate and encourage the market to develop quality e-health solutions that are scalable, standards compliant and aligned with national priorities.

(A chart showing reporting and responsibility relationships)

7.3 Coordinating Mechanisms

The governance module recognizes that the Ministry of Health has ultimate accountability for national health care funding and the delivery of national health care outcomes. An Interagency Ministerial Committee will therefore be put in place and will be responsible for setting overall national e-health direction and priorities. It will also review and approve e-health projects and monitor the progress and outcomes of the e-health strategy and review implementation priorities as and when necessary. The committee will advise the minister of health on e-health investment cases.

A Technical Advisory Committee will also be established to provide support to e-health initiatives and to test the compliance with national standards. This committee will report to the Interagency Ministerial Committee.

The National Information Technology Agency will implement and enforce the national e-health regulatory framework. This will cover regulations on integrity, privacy and security of personal health care information. The Agency will develop and maintain national e-health standards and the delivery of specific national e-health infrastructure foundations including the establishment and implementation of national e-health solution compliance testing and certification.

7.4 Stakeholder Involvement

It is recognized that for a successful implementation of the strategy there will be the need for continuous engagement of a broad range of interests representing public and private sector providers, professional groups, government, e-health solution vendors and community groups.

Stakeholder involvement will be vigorously sought to provide input into the appropriateness and functionality of e-health structures and to prioritize e-health solutions. Stakeholder perspectives on effectiveness of e-health solution will be a critical monitoring and evaluation factor.

As part of the implementation arrangements, the Ministry of Health will establish stakeholder engagement forums with appropriate representation across providers, professionals, government organizations, health care consumers and private sector technology vendors and ensure that their inputs are used to shape direction of the strategy.

A key stakeholder will be the ICT professional groupings. Consultations will be held with them on issues related to the development of e-health human resource and institutional capacity. They will also be involved in defining the changes required for professional education, training and accreditation programs and will play a role in the development of professional practice standards.

7.5 The Roadmap for Implementation

The implementation of the e-health strategy will be phased with the sector medium term planning process. This means that there will be four year intensive implementation of priority components of the strategy depending on availability of funds and sound e-health infrastructure. Each medium tern plan will define planning horizons to guide investments and stakeholder participation in the roll out of the national e-health strategy.

In broad terms, the first four years will be a period of intense efforts and putting in place such building blocks as standards and regulatory framework, establishment of pilot programmes and creating sufficient

scope for learning and development of both human resource and institutional capacity. The second four years will be a period of modest national scale up of tested and well rehearsed e-health solutions. It will also be a period for galvanizing stakeholder involvement and ensuring that sustainability issues are dealt with comprehensively. The third four years will be used to consolidate e-health as a tool for improved performance of the health sector and for ensuring effective coverage.

7.6 Implementation Land Marks

It is essential to ensure that slippage in the implementation of the strategy is reduced as much as possible. Although most of the actions defined under the four strategies will require significant change within the sector, it is expected that with the coordinating mechanisms in place resource availability and commitment will be maintained at a high level. The following landmarks have therefore been identified to help keep the implementation on track.

- Establishment of e-health coordinating structures to be in place and functional within the first 18 months.
- Regulatory framework to be adopted within the first 18 months
- M-health pilot established within first 2 years
- Broadband connectivity at all levels within the first 3 years
- E-health human resource capacity development programme in place by the 3rd year
- Telemedicine pilot established and functional within the first 3

years

- Public interaction with health sector electronically initiated by the 4th year

- Electronic patient records system piloted in selected health facilities by the 4th year

- Web based District Health Information System rolled out in the 4th year

These landmarks are limited to the first four year since they constitute critical building blocks for the success of the e-health programme. It is expected that this will be reviewed at the end of each medium term period.

7.7 Monitoring And Evaluation

Based on the principle that e-health adoption is towards improved and accelerated achievement of sector targets, the overall monitoring and evaluation arrangement will be part of the agreed sector framework for monitoring and evaluation. Consequently, priority action will be taken as part of the annual programme of work so as to lend themselves to the annual review exercises.

The annual review of the health sector is done by an independent team put together by the Ministry of Health in collaboration with development partners in the health sector. Programmes outlined in this strategy will therefore form part of the areas of assessment and will be reported on at the summit. Key priority actions being undertaken will be captured in the sector aide memoire and will be tracked along side other policy and service indicators.

Day to day monitoring of implementation of e-health solutions will be done by the Interagency Ministerial Committee. Project evaluation will be based on the time lines agreed on in the proposal and as will be defined by the committee based on need and implementation requirements. Each pilot project will however have an inception report, half yearly progress reports and an evaluation after an agreed period so as to feed the lessons into the planning and for the sector to plan scale up activities. The Research, Statistics and Information Management Directorate will coordinate all monitoring and evaluation activities on the implementation of the strategy.

8.0 INDICATIVE COSTS AND RESOURCE MOBILIZATION PLAN

A total of One Hundred and Fifteen Million Dollars ($115,000,000.00) will be required over the next five year to implement the strategy outlined. Table 1 on the next page gives an indication of the resource requirement for the first five years and it includes hardware, software and capacity development components and it does not, however, include nationwide infrastructure development that will enable e-health uptake but services that need to be procured have been factored in.

Table 1

STRATEGY	KEY ACTIONS	ESTIMATED COST FOR FIRST 5 YEARS ($)
Strategy 1. Streamlining the regulatory framework for health data and information management	• Coordinating mechanisms, advocacy and technical oversight	1,000,000.00
	• Security, standards, compliance and electronic health information exchange.	2,000,000.00
	• Framework for electronic reporting at all levels.	4,000,000.00
Strategy 2. Building sector capacity for wider application of e-health solutions in the health sector	• Building the human resource capacity for e-health	5,000,000.00
	• Building institutional capacity for the deployment of e-health solutions	10,000,000.00
Strategy 3. Increasing access and bridging equity gap in the health sector through the use of Information and Communication Technology	• Use of mobile telephony for health services (m-health)	30,000,000.00
	• Use of audio visual support clinical decision making (telemedicine)	20,000,000.00
	• Use of electronic messages to promote public health	20,000,000.00
Strategy 4. Towards a paperless records and reporting system	• District health Information and reporting systems	8,000,000.00
	• Implementing electronic patient records and service management systems	15,000,000.00
TOTAL		**115,000,000.00**

Several methods will be used for mobilizing the required resource. Steps will be taken to ensure that agencies make provisions within their budgets for key actions that relate to their core business. Service renewals involving data safety and security will be considered strongly in the annual budgets. Donor funding will be sought to cover huge one off investments such as the bulk acquisition of hardware and mass training programmes. It will also be used to support the initial steps in the capacity development programmes and activities. Where external technical support is required, this will be sourced through donor funding. Funding for the establishment of services such as the electronic patient record system will be sought through flexible funding arrangements with solution vendors. This will be in such a way as to allow payment to be done from the revenue enhancements that the systems will achieve.

Although tangible benefits from the deployment of e-health will be difficult to demonstrate effectively, it is expected that over time these will show in improved revenue and reduced expenditure on services, training and wastage in logistics management. It will also, over time deliver a higher quality of care, a more equitable distribution of services and an overall responsive health system for Ghana.