MINISTRY OF HEALTH

National Community Health Digitization Strategy 2020-2025

DIVISION OF COMMUNITY HEALTH SERVICES
"AFYA YETU, JUKUMU LETU"

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A government CHV in Kisii County uses a smartphone to collect data and conduct an assessment of a sick child. Digital m-Health tools in the hand of CHVs go a long way in ensuring standardized and higher quality of care for pregnant mothers and under fives.

Contents

List Of Tables

List Of Figures

List of Abbreviations

ACHPR	African Commission on Human and Peoples' Rights
API	Application Programming Interface
CCHFP	County Community Health Focal Person
CHA	Community Health Assistant
CHFP	Community Health Focal Person
CHIS	Community Health Information System
CHRIO	County Health Records and Information Officer
CHT	Community Health Toolkit
CHV	Community Health Volunteer
COG	Council of Governors
CPU	Central Processing Unit
DCH	Division of Community Health
DDSR	Division of Disease Surveillance and Response
DHIS	District Health Information System
DHP	Digital Health Platform
EHR	Electronic Health Record
EMR	Electronic Medical Record
GEA	Government Enterprise Architecture
HIS	Health Information System
HRIO	Health Records and Information Officer
ICESC	International Covenant on Economic, Social and Cultural Rights
ICT	Information and Communications Technology
IP	Intellectual Property
KEPH	Kenya Essential Package for Health
KHIS	Kenya Health Information System
KHRO	Kenya Health and Research Observatory
KNBS	Kenya National Bureau of Statistics
LIS	Laboratory Information Systems

KHSSP	Kenya Health Sector Strategic Plan
LMIS	Logistics Management Information Systems
MCHUL	Master Community Health Unit List
MOH	Ministry of Health
NIIMS	National Integrated Identity Management Service
NOFBI	National Fiber Optic Backbone Infrastructure
PIMS	Pharmacy Information Management System
RAM	Random Access Memory
RBAC	Role Based Access Control
SCCHFP	Sub County Community Health Focal Person
SCHRIO	Sub County Health Records and Information Officer
SDG	Sustainable Development Goal
SHR	Shared Health Record
SLA	Service Level Agreement
SMS	Short Message Service
SNOMED-CT	Systematized Nomenclature of Medicine - Clinical Terms
SSD	Solid State Drive
TLS	Transport Layer Security
TPSA	Third Party Self-Assessment
TWG	Technical Working Group
UAT	User Acceptance Testing
UHC	Universal Health Coverage
USSD	Unstructured Supplementary Service Data

Executive Summary

The Government of Kenya recognizes its citizens' right to health as enshrined in the constitution and other international treaties and covenants to which Kenya is a signatory. To deliver on this promise, the government is obligated to create the necessary laws, policies, and standards to achieve equitable and affordable healthcare for all. Cognizant that community health is a fundamental component of Universal Health Coverage, Kenya's Ministry of Health developed the Strategy for Community Health, a blueprint for the delivery of community health services to households across the country. The overarching goal of community health is to enhance access to healthcare, thereby improving productivity, reducing poverty, and combating hunger and preventable death and disease.

Despite its importance, the delivery of community health continues to suffer from weak data collection and reporting tools. This hinders the optimal use of community-level data to inform public health response and resource allocation. The Ministry of Health recognizes the critical role played by information systems in measuring the performance of the healthcare delivery system and generating the necessary data to support program monitoring and evaluation. Consequently, the ministry has identified Information and Communication Technology as a key enabler towards the realization of Universal Health Coverage. Indeed, significant investments have been made in this regard, including in Electronic Medical Records systems, Laboratory Information Systems, the Kenya Health Information System, the Kenya Health and Research Observatory, among others.

Despite these investments, the use of ICT for community health service delivery and data management continues to be limited. The process of reporting community health data from the field to the national level through the KHIS is paper-based, which compromises the accuracy and timeliness of reports. Where digital information systems are available, they are siloed, poorly coordinated, partner-supported implementations with limited functionality and integration with the KHIS. The National Strategy for Community Health Digitization, therefore, seeks to address this gap by providing a framework to guide the development, deployment, and sustainability of digital interventions for community health in Kenya. The strategy was developed through a collaborative, multi-stakeholder process spearheaded by the MOH with the support of Living

Goods and other development partners. It is strongly anchored on the stipulations contained in the Constitution of Kenya (2010), the Data Protection Act (2019), the Kenya Information and Communication Act (2012), the Health Information System Policy, and the Community Health Policy, among other relevant laws and policies.

Further, the strategy is informed in part by a comprehensive landscape assessment conducted to establish the type and nature of existing digital interventions for community health. Among its key findings include the fact that many existing information systems for community health are partner-supported and implemented to address a subset of the full scope of features necessary to fully digitize community health. The assessment also revealed increasing demand for information systems in the counties, with some counties already taking the initiative to implement their own digital interventions to support community health service delivery and data management. In this regard, the National Digitization Strategy for Community Health is a timely blueprint for providing the necessary guidance to streamline a nascent but rapidly growing digital community health ecosystem.

The strategy envisages the development of a national electronic Community Health Information System (eCHIS) to respond to the gaps identified in community health service delivery and data management through the eCHIS Landscape Assessment and intensive stakeholder engagement. The eCHIS will become part of the wider Digital Health Platform under development by the MOH. The broad areas of functionality to be covered by the eCHIS include household enrollment, service delivery, client referral, supply chain management, community-based disease surveillance and client messaging. The eCHIS is expected to interface with the National Integrated Identity Management Service for client identity resolution; the Shared Health Record system for case-based data collection; the Master Community Health Unit List for community unit management; and the Kenya Health and Information System for service statistics reporting. The eCHIS will also integrate with health facility based Electronic Medical Record systems for client referral coordination and defaulter tracing activities. A centralized infrastructure for the eCHIS is proposed to manage cost and complexity. However, logical partitions within the shared server resources will be created to serve the needs of individual counties independently.

This strategy also details the wraparound services needed to ensure the success of the eCHIS. These include help desk and technical support, communication infrastructure, change management, asset management, service level agreements with vendors, capacity building, monitoring, evaluation, and governance. Also included in the strategy is a detailed costed implementation plan of KES 5.2 billion.

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Foreword

The Ministry of Health recognizes the critical role played by community health towards promoting primary healthcare and achieving universal health coverage for all citizens. Unfortunately, while the Ministry of Health has made major strides towards the use of technology for collecting, managing and analysing program data for national-level reporting, the delivery of community health services continues to be hampered by limited use of digital interventions for program monitoring.

The National Community Health Digitization strategy, therefore, seeks to remedy this anomaly by offering a comprehensive roadmap for the achievement of an electronic Community Health Information System (eCHIS). This roadmap will also include the associated cost estimates for the development, deployment and capacity building needs of the eCHIS. It is strongly anchored on the stipulations contained in the Constitution of Kenya (2010), the Data Protection Act (2019), the Kenya Information and Communication Act (2012), the Health Information System Policy, and the Community Health Policy, among other relevant laws and policies.

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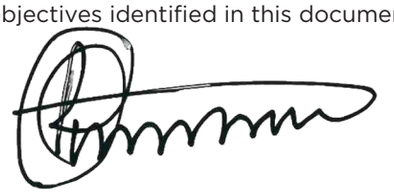
The MoH will leverage existing investments, form partnership to mobilize resources at national and county levels for the realization of the strategic objectives identified in this document.



Dr. Pacifica Onyancha
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Acknowledgment

The Costed National Community Health Digitization Strategy 2020-2025 has been developed through a consultative and participatory process with stakeholders drawn from various organizations especially those in the digital community health information system space. The Ministry acknowledges the contributions of the eCHIS technical working groups and the commitment to finalization of this strategy.

I wish to acknowledge the overall leadership by Dr. Joseph Sitienei and Dr. Maureen Kimani for their strategic leadership, and John Wanyungu for providing technical leadership to this process. I appreciate officers in the Divisions of Community Health Services, Health Informatics and Information Communication Technology among others for their invaluable contribution in the various eCHIS Technical Working Groups.

The development of this document was financed by Johnson & Johnson through AMREF and Living Goods Kenya. We also wish to acknowledge technical contributions from different organizations which included; UNICEF, JICA, World Vision, WHO, PATH, UNICEF, USAID, Red Cross, Save the Children Kenya, Population Council, AMREF, Living Goods, LVCT Health, In-supply Health, Intrahealth, Health IT, Medic Mobile among others. An additional list of contributors is annexed.

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Head, Department of Primary Health Care

1. Chapter One: Introduction

1.1. Background

Health is a basic human right enshrined in the Constitution of Kenya. Article 43 (1) and (2) of the Constitution provides that every person has the right to the highest attainable standard of health, which includes the right to healthcare services, reproductive health, and emergency medical treatment. Kenya has ratified the Sustainable Development Goals (SDGs); the International Covenant on Economic, Social and Cultural Rights (ICESC); the African Commission on Human and Peoples' Rights (ACHPR); as well as other treaties and covenants which contain similar provisions on every citizen's right to health.

To meet these national and international commitments, the Government of Kenya is obligated to create the necessary laws, policies, and standards to achieve quality, equitable and affordable healthcare for its citizens. In line with these obligations and the country's Vision 2030, the Kenya Health Policy 2014 - 2030 1provides direction to guide the improvement of the overall status of health in Kenya. It embodies the health sector's commitment to ensuring that Kenya attains the highest possible standard of health in a manner responsive to the needs of the population. Further, the Government of Kenya has adopted Universal Health Coverage (UHC) as one of the components of the President's Big Four Agenda. Characterized by accessibility, quality and affordability, the overarching aspiration of UHC is that by 2022, all Kenyan citizens will be able to access and use the essential services they need for their health and wellbeing through a unified benefit package without the risk of financial ruination.

The Ministry of Health (MOH) recognizes the critical role played by community health services in achieving UHC for its citizens. The Strategy for Community Health envisages building the capacity of households to not only demand services from all providers, but also to know and progressively realize their rights to equitable and quality healthcare. The strategy draws on the provisions and policy guidelines stipulated in the Constitution of Kenya; Vision 2030; the Kenya Health Policy Framework (2014 - 2030); and the National Health Strategic and Investment Plan (2014 - 20182).

Overall, the goal of community health services is to enhance community access to healthcare to improve productivity and thus reduce poverty, hunger, maternal and child deaths, as well as to improve educational performance across all stages of life. To achieve this goal, the National Health Sector Strategic Plan II (2005 - 2010) introduced the Kenya Essential Package for Health (KEPH). Among its key innovations was the introduction of Level One services, which aimed to empower Kenyan households and communities to take charge of improving their own primary healthcare. In addition, by shifting emphasis from the burden of disease to the promotion of individual and community health, the MOH adopted a community health strategy designed to improve health indicators by implementing critical interventions at the community level.

1.2. Rationale

The Government of Kenya recognizes the vital role played by information systems in measuring the performance of the healthcare delivery system and generating data to support program monitoring and evaluation. As a result, Information and Communications Technology (ICT), has been identified as a key enabler towards the achievement of UHC. Indeed, significant investments have been made in the use of technology to improve the access and quality of healthcare delivery to citizens. Such investments are manifest in the various Health Information Systems (HIS) deployed across the country, including Electronic Medical Record (EMR) Systems; Laboratory Information Systems (LIS); Logistics Management Information Systems (LMIS); the Kenya Health Information System (KHIS); the Kenya Health and Research Observatory (KHRO); among others.

Despite these investments, the use of ICT at the lowest level of healthcare service delivery continues to be limited. Healthcare provision in Kenya begins at the community level, spearheaded by Community Health Volunteers (CHVs) who offer services directly to individual households. The data generated at this level is crucial for decision making, planning, and monitoring progress towards UHC. Unfortunately, the process of documenting community health services provided by CHVs is largely paper-based and, therefore, not only inefficient, but also prone to transcription errors and other data quality issues. In addition, the process of reporting community health data from the field to the national level through the KHIS is also largely paper based. This compromises both the accuracy of data and timeliness of reporting, a problem that is further compounded by strained human resources.

The case for the digitization of community health is also strengthened by the findings of a 2013 review of the community health strategy. In 2005, the National Health Sector Strategic Plan II (2005 - 2010) operationalized community involvement in the community health strategy through the document "Taking the Kenya Essential Package for Health to the Community: A Strategy for the Delivery of Level One Services", developed in 2006. The implementation of this strategy led to observable changes in health indicators, as evidenced by the "Evaluation Report of the Community Health Strategy Implementation in Kenya (2010)". Despite these gains, a 2013 review of the 2006 strategy revealed several weaknesses. Key among them was the lack of clear monitoring and evaluation mechanisms. Although it found several electronic platforms used for community health reporting, it also discovered that most of them were siloed at micro levels and independently managed by development partners, leading to the lack of a coherent digital strategy.

Against the backdrop of these gaps, the MOH, in partnership with other stakeholders, seeks to develop a National Community Health Digitization Strategy. This effort aligns perfectly with the objectives of the Strategy for Community Health; the weaknesses identified upon review of the 2006 strategic document; the guiding principles for the implementation of community health; and the building blocks of the healthcare model in Kenya. The digitization of community health services is expected to lead to improvements in data quality as well as reporting timeliness and efficiency. It will also complement the Kenya National Digital Health Platform (DHP), a system envisaged by the MOH as a robust and sustainable EHR following global best practice and supporting the current and future needs of the ministry. Together, these digital interventions will result in improved healthcare services, cost efficiencies and ultimately better health outcomes for the Kenyan citizens in the form of reduced morbidity and mortality.

1.3. Purpose of the eCHIS Digitization Strategy

This strategy document provides a digitization blueprint that will support a comprehensive approach to community health service delivery. This strategy will support quality community health service delivery through a digital solution that provides specialized functionality in client management, decision support, disease surveillance, commodity management and performance monitoring through automated data management processes and tools. The platform will also provide eLearning capability to enhance capacity building. The strategy articulates an investment case, anticipates governance structures and proposes a performance measurement framework for the digitization process.

1.4. Strategy Development Process

This strategy was developed through a collaborative, multi-stakeholder process spearheaded by the Ministry of Health (MOH) and supported by its partners. The MOH provided overall stewardship on the exercise, closely supported by health sector partners. The collaborative approach adopted included direct involvement of key stakeholders under the auspices of a high-level steering committee led by senior officers from the MOH Divisions of Community Health Services (DCH) and the Department of Health Informatics. The steering committee headed by MOH convened and chaired all technical forums including Technical Working Groups (TWGs).

A desk review of the current situation and a field landscape assessment guided the proposed system requirements, implementation strategies and governance. Multiplicity of systems in an environment that is not well coordinated guided the need to provide specific recommendations of minimum functional requirements and ongoing monitoring.

1.5. Supportive Legislation, Policies and Guidelines

Current Government efforts to achieve end-to-end digitization in health are supported by an enabling environment provided by political commitment, legislative and policy frameworks and operational efforts that have been instituted to ensure successful implementation. The strategy has been advised by a robust and enabling legislative and policy environment anchored in the constitution's aspiration of quality health for all. The environment currently supports and facilitates digitization within the health sector, emphasizes performance management and envisions an interconnected and integrated digital ecosystem within the health sector. These include the following documents:132456

Table 1: National Laws and Policies that inform eCHIS.

NATIONAL LAWS AND POLICIES

	Year/Period	Description	Implications for CHIS
Constitution	**2010**	Article 31: Every individual has the right to not have the information relating to their family and private affairs unnecessarily revealed. Article 35. Every citizen has the right to access information held by the State and held by another person and required for the exercise or protection of another right. Article 43 (1) (a) of the Constitution provides that every person has the right to the highest attainable standard of health, which includes the right to health care services.	In efforts to support attainment of highest standards of health, the digitization strategy must adhere to provisions of privacy while balancing right to information. It also implies that functionality should include the ability to request information stored by a government, in this case, the eCHIS.
Data Protection Act	**2019**	Sections 25, 31, and 46 of the Act regulates collection, processing, storage, and retention of sensitive personal data and protects privacy of data subjects in line with the constitution. Regulates collection, processing, storage, and retention of sensitive personal data while defining principles and obligation of personal data protection.	Counties are required to assign roles and responsibilities appropriately within the CHS. It is anticipated that the MOH will develop internal guidelines to define data management roles in compliance with the data Protection Act. Counties will be expected to adopt these guidelines and define roles in a manner that conform with the data Protection Act. Nonfunctional requirements on Security and interoperability have been informed by the data protection act. Similarly, the need to have data for public health provides a framework for interoperability while assigning duty of care to data processors and controllers.
Kenya Information and Communication Act	**2012**	The main aim of the Act in regulating electronic data as legal data. It ensures retention of electronic records and information in original form Electronic records. Section 83 G Defines Electronic records as legal records. Section 83 H provides for period Retention of electronic Records. Section 83 I Requires retention of information in original form	Act guides how data collected on eCHIS platform will be stored and archived. Specifically, the provisions that guide database architecture that ensures availability of data as collected.
Computer Misuse and cybercrime ACT	**2018**	The Act aims at protection of confidentiality, integrity and availability of computer systems, programs, and data. It also requires information sharing and auditing of information infrastructure.	This guides the specifications on the measures confidentiality, integrity and availability of computer systems and data. Guides the auditing of information infrastructure- to check for compliance Information sharing for unauthorized persons

	Year/Period	Description	Implications for CHIS
GoK ICT Standards	**2019**	The GoK ICT Standards consist of the Government Enterprise Architecture (GEA) framework and ICT Standards. The Government Enterprise Architecture (GEA) Framework defines the minimum components of an ICT Plan and provides the ICT Standards as guidelines on how to implement it in Government. These are minimum standards for Cloud Computing, Data Centre, Electronic Records Management, End-User Equipment, ICT Human Capital and Workforce Development, Information Security, IT Governance, Network, Systems & Applications.	eCHIS Architecture component to be tailored to the GOK ICT Standards Government-wide integration of eCHIS with other GoK systems and interoperability of the eCHIS will be required.
Health information system policy	**2014/2030**	This document guides on the priority areas the information system should focus on. It also outlines the roles and responsibilities of different stakeholders and gives direction on resource mobilization.	The policy has a fundamental principle that demands statistical data and health information be made liberal and readily accessible as a "Public good" and in a timely manner and promotes use of existing data. The policy recognition of the utility of compulsory and comprehensive reporting of health care performance in the public sector, private sector, FBO/NGO, community, and any other service provider. The policy also ensures Integration of the various sub-systems of the HIS by linking health information, management, and community information systems. Ensure Tools for community units are developed and mechanisms put in place to facilitate partnership with community units
Community Health Policy	**2020-2030**	This policy envisions a community based National system that will collect data based on the activities of CHVs, CHAs / CHOs and CHCs as well as general information on community development issues, socio-economic, demographic indices of households, community resources, diseases etc. CHVs and CHAs / CHOs are responsible for the quality of data collected.	Nationally accredited e-health applications may be deployed to ensure quality of community health data collection and reporting.
Kenya Primary Health Care Strategic Framework	**2019-2024**	Describes the how primary health care reporting should be handled. Gives a Description of Primary Health Care Networks for	• Primary health care facilities data should reflect the health of the catchment population not just those seeking. Minimum functional requirements for service delivery and reporting are based on this framework.
Community Health Strategy	**2020-2025**	This strategy gives priority areas of focus in community health including information for the period 2020/2025	Provision for social accountability and how this information will be collected using the community score card which can be digitized It also points out what is envisioned in terms of community health information system

	Year/Period	Description	Implications for CHIS
Standards and Guidelines for electronic records systems		Coordination of development, deployment, implementation, and maintenance of these Systems	This document will provide guidance on the approach to be adopted in development, deployment, implementation, and the maintenance of the eCHIS -
The Kenya National ICT Masterplan	**2014-2017**	The theme of the masterplan is ''Towards a smart Kenya'' and whose foundations are ICT human capital and workforce development, Integrated ICT infrastructure and Integrated information infrastructure and the pillars to deliver the masterplan are E-Government Services to enhance digital presence, ICT as a Driver of Industry and Developing ICT Businesses. There is an increased demand for high-end ICT professionals, transformation and innovation and an ICT literate population and in response the Plan seeks to improve and increase ICT human capacity. -One objective for the provision of e-government services is to offer consistent, integrated e-government citizen centric services.	Provides a foundation for governance of the eCHIS and public service delivery, sharing of data for improved transparency and accountability It guides the competency framework to create digitally enabled eCHIS human capacity.
Kenya Standards for eHealth interoperability	**2020 (TBC)**	Provides guidance on integration of systems	This framework will provide guidance on how to link eCHIS to other HIS platforms within MOH
Kenya Health Sector Data Quality Assurance Protocol	**2014**	Data Quality improvement strategies	Defines procedures for DQA during implementation of eCHIS
National Integrated data analytics		Data analysis towards tracking indicators and informing policy	Sets a framework for the establishment of data visualization and analytic tools
Kenya Standards and Guidelines for mHealth systems	**2017**	Design and development	Outlines the development of the various domains, mHealth applications that support and exchange data for Community Health Information System (CHIS). Cover the legal and ethical concerns in the mHealth application development and implementation including the liability of the community health volunteer in the data transmitted from the mobile device, involve the sharing of client data, shared confidentiality, transmission of the data over wireless connections, and data encryption considerations

	Year/Period	Description	Implications for CHIS
HIV Control Act Privacy Guidelines	**2020**	AN Act of Parliament to provide measures for the prevention, management, and control of HIV and AIDS: Provides for the protection and promotion of public health and for the appropriate treatment, counselling, support, and care of persons infected or at risk.	The provisions of this act will contribute to the development of the eCHIS policy by addressing. Confidentiality: This includes use of codes instead of names, considerations for storage, access, transmission, and disclosure of statistical of other information that could lead to the identification of whom it relates Consent (oral or written) prior to service provision. Service provision: it also highlights that no person shall be denied health services in any health institution in Kenya because of their health status; this should also apply to community health service provision
Public health and welfare- **Science, Technology, and Innovation Act 2012**	**2012**	Right to privacy of data This ST&I Policy underscored the importance of mainstreaming science, technology, and innovation in all sectors of the economy to ensure that Kenyans benefit from the acquisition and utilization of available ST&I capacities and capabilities to improve their quality of life.	There is an enabling policy environment. From an intellectual property (IP) perspective, it is important to note who will have the rights to the innovations developed or patents ever issued.
CHS bill (national and county)		Entrench CHS in the formal health system by law Provides for compilation and analysis of data from the community health unit for incorporation into the health information system; keep and maintain a register of members in all households assigned to the worker;	Formalizes the community health service delivery hierarchy.
Kenya Health Sector Strategic Plan KHSSP	**2019-2022**		Procurement of eCHIS technologies Research Monitoring and evaluation- tracking progress To build and strengthen partnerships and sector coordination mechanisms. Policy 2016–2030 (Ministry of Health 2016c) has five focus areas: telemedicine, health information systems, information for citizens; mobile health and e-learning.
ICT policy	**2019**	Provides an enabling environment for the use and implementation of ICT infrastructure	
Kenya Guidelines on Continuity of Community Health Services in the Context of COVID 19	**2020**	Allows for the training and protection of community health volunteers/CHAs using technology.	Kenyan laws allow and recognize the need to embrace technology for training. Important especially during disease outbreaks.

2. Chapter Two: Situation Analysis

2.1. Current Situation

Community health provides initiatives to help citizens maintain and improve their health, prevent the spread of infectious diseases, and prepare for natural disasters. Studies on community health prove that working at the community level promotes healthy living, helps prevent chronic diseases, and brings the most significant health benefits to the greatest number of people. In Kenya, rural areas are highly affected because they largely lack an adequate number of health care workers and sufficient funding to provide the services needed by community members. Implementing community-based programs and strategies failed because of improper allocation of funds from the government and related bodies. The integration of the community-based approach enables members of the community to participate actively in health-related issues.7

There is proof that developing nations, such as Kenya, have the most significant burden of illness on the planet, the lowest quantities of health experts and the least expenditure on wellbeing. There is a need for a change in policies and strategies that will tackle health issues.

2.2. Access to Healthcare

Access to primary healthcare is crucial for the delivery of Kenya's Universal Health Coverage policy and is widely acknowledged as key to reducing the global burden of morbidity and mortality. However, healthcare disparities have proven to be the biggest challenge to primary healthcare implementation in poor urban resource settings.

In 2006, the Ministry of Health adopted the Community Health Strategy to enable communities to engage actively in bettering their health. By enhancing service delivery at the community level, the strategy targets Level 1 intervention. The strategy's general objective is to upgrade community admittance to healthcare to improve efficiency and abate neediness, hunger, and premature deaths, as well as improve training execution over all the phases of the life cycle. The government has accomplished a 7% inclusion to date. 8

2.3. Community-based programs and the role of health workers

The objective of community health programs was to increase admittance to health services to improve profitability, and along these lines diminish destitution, hunger, premature deaths, and enhance general well-being. Studies show that increased child immunization, malaria prevention and control, improved maternal health, access to clean drinking water and better hygiene all enhance public health. Increasing the number of community health workers in rural areas will lead to better service delivery. Health workers oversee care for vulnerable populaces and help in educating community members on health matters. Better incentives and working conditions highly motivate 9the health workers in playing their roles. The health workers also gather essential information, which policymakers apply in the development of policies that involve every community member.

2.4. Digital Solutions in Community Health

The demand for digital solutions for community health continues to grow, as evidenced by the results of the eCHIS Landscape Assessment annexed to this strategy. Primarily responded to by Community Health Focal Persons at the county and sub-county levels, the eCHIS Landscape Assessment covered a total of 40 counties and 65 sub counties. The quantitative data obtained from the eCHIS Landscape Assessment questionnaire was further augmented with and validated against qualitative data collected through Focus Group Discussions (FGDs) with County Health Records and Information Officers (CHRIOs) and Key Informant Interviews (KIIs) with selected system implementers. A total of 28 distinct information systems used for community health were identified during the exercise. More than half of the systems identified were implemented within the last 3 to 4 years, demonstrating rapid growth in the subsector. Among the most widely reported digital interventions for community health include the Community Health Toolkit (CHT), MJali, Kobo Collect and AMREF LEAP. Others are DHIS2 Tracker, Empower Health, Toto Health, CStock, mDharura, among others. A large majority (76%) of the respondents who participated in the eCHIS Landscape Assessment reported being aware of at least one digital health system in use in their area. Despite these recent advances, there lacks a coordinated approach to the development, deployment, support, maintenance, and sustainability of these solutions. The MOH, therefore, would do well to step in and provide the appropriate policies and standards to guide digitization activities in community health.

Together, existing electronic solutions cover, to varying degrees, all the broad areas of functionality essential to the digitization of community health. These include household enrollment, service delivery (maternal and child health, adolescent health, adult health, NCDs etc.), commodity supply chain management, client referral, messaging and community-based disease surveillance. However, there is not one system that singly covers all these areas. As such, there is a need to invest in a more comprehensive information system for community health that unifies all these critical areas of functionality.

Majority of the existing digital community health systems are partner-supported both in terms of technical capacity and funding. This exposes the counties to potential sustainability problems due to the transient nature of partner support and their susceptibility to volatile funding cycles. For this reason, a gradual transition to direct county support is an important step in ensuring greater sustainability for digital interventions for community health.

Implementations of digital solutions for community health are faced with multiple challenges. The main ones among these relate to users' training and capacity building, as well as complications associated with the systems themselves and the infrastructure that supports them. Increased investment in post-implementation planning, ongoing mentorship, on-the-job training for users, regular system maintenance and technical support as well as comprehensive hardware repair and replacement plans will ameliorate many of these challenges.

Existing digital solutions for community health are predominantly focused on addressing the data collection gaps faced by CHVs using paper-based systems. Many of them also offer support for both case-based and aggregate reports for middle and higher-level health managers. However, there is a dearth of client-centered digital solutions that address the information and service delivery needs of the consumers of community health services. It is therefore imperative that system developers and implementers be encouraged to include specific features to address the needs of clients and create efficiencies in service delivery workflows that go beyond data collection.

Most community health digital systems collect and manage personally identifiable client data. The MOH will be compelled to provide the necessary guidance and standards to ensure that this data is protected and managed according to the stipulations of the Data Protection Act (2019) and the Constitution of Kenya (2010). Such guidance should cover both technical features as well as security best practices for observance by system users and data processors and custodians.

3. Chapter Three: Goals, Objectives and Strategies

3.1. The Aim of eCHIS Strategy

This strategy provides a digitization blueprint that will support a comprehensive approach of community health service delivery, enhancing quality community health service delivery through a digital solution that offers client management decision support, disease surveillance, commodity management, performance management support and an e-learning capability through automated data management processes and tools.

3.2. Specific Objectives

To strengthen eCHIS governance and leadership for enhanced coordination and implementation of Community Health Services

To enhance data use for informing policy- and evidence-based planning for community health services

To provide standardized quality of service delivery occasioned by defined workflows, standard platform for data collection and reporting for community health services by 2023.

To improve the capacity of the community health workforce to generate and use quality data that sustains the Community Health Services

To improve the quality of community health services through monitoring and evaluation of key performance indicators

3.3. Strategic Focus Areas

The Kenya eCHIS will focus the following areas:

1. Leadership and Governance
2. Service Delivery
3. Technology
4. Capacity Building
5. Quality Management and M&E

3.3.1. Leadership and Governance

To ensure the eCHIS is a success, the MOH, in collaboration with health sector stakeholders, will work under the Health Information System ICC who will provide leadership in ensuring seamless implementation. There will be eCHIS technical Working Group (TWG) who will provide technical guidance on all deliberations of the strategy. The focus will be on leadership, governance, policies, procedures, and guidelines ensuring coherence with existing frameworks, costing and resource mobilization.

Strategic Objective: To strengthen eCHIS governance and leadership for enhanced coordination and implementation of Community Health Services

Strategic Interventions

- Establish and institutionalize a coordination mechanism for eCHIS implementation at national and county levels.
- Monitor implementation process and overall performance against health sector strategic objectives.
- Provide supportive supervision and risk management of eCHIS implementation.
- Resource mobilization and advocacy for inclusion of eCHIS implementation requirements in MOH budget

Key Results:

1. Coordinated governance structure for eCHIS.
2. Integration of eCHIS into national MOH Digital Health Platform
3. Improved and coordinated funding for eCHIS.

3.3.2. Service Delivery

The focus will support community-level service delivery, decision support and client monitoring with defined workflows and a standard platform for data collection and reporting for community health service delivery guidelines and protocols.

Strategic Objective: To provide standardized quality of service delivery occasioned by defined workflows, standard platform for data collection and reporting for community health services by 2023.

Strategic Intervention

Support technology-enabled community health workforce.

Guide development of technology and capacity development towards service quality and accountability

Key Results:

1. Standardized minimum requirements for a digital platform to support community health service delivery.
2. Framework for minimum functionalities developed to guide enhancement of digital platforms.

3.3.3. Technology

The development of this strategy will create a workflow that implements best practice business processes of community health services. It will also implement business information management tools to ensure quality service delivery and availability of quality data for decision making at all levels of CHS. It is expected to automate the work of community health services. This strategy will deliver a digital platform that is aligned to the requirements of the community health service delivery guidelines and its commensurate ICT infrastructure.

Strategic Objective: To Improve MOH capacity to support development and implementation of an integrated eCHIS developed as part of the DHP.

Strategic Interventions:

- Support the development and implementation of an eCHIS that supports service delivery at community level and integrates with other systems in the health sector in accordance with the current standards.
- Support ICT infrastructure including centralized servers and monitoring infrastructure.
- Support ICT equipment and facilitation for community health workers.
- Support the information security enforcement and adherence to the data protection laws and guidelines.
- Support the integration the eCHIS data on the existing MOH databases.
- Develop a lesson learnt framework for standardizing reporting documentation of the eCHIS design, implementation, and maintenance aspects.
- Develop a data dictionary for the eCHIS - backend and background.

Key Results:

1. Complete and comprehensive end-to-end digital solution that that meets standards and guidelines.
2. Point of service implementation of digital data management for all community units.
3. Community health indicators dashboard, information products for policy formulation
4. Strong supporting environment for financial, technological, and human resource interventions

3.3.4. Capacity Building

In addition to enhancing community health worker skills, this will equip the community health workforce, enabling workers to support the implementation of eCHIS and improved service delivery. It will also focus on training and capacity building to enable quality service delivery, and curricula for eCHIS ensuring availability of trainers and end user manuals and a training plan.

Strategic Objective: To improve the capacity of the community health workforce to generate and use quality data that sustains the Community Health Services.

Strategic Interventions:

- Conduct training needs assessment.
- Develop ECHIS training package.
- Train National ToTs and Content Management in the MOH Virtual Academy
- Train technical team on development and maintenance of the system
- Train Community Health Volunteers
- Sensitization of Community Health Committees Members

Key Results:

1. Standard eCHIS training package
2. Community health practitioners training, and refresher content included in the National Digital learning Academy.
3. 100% of providers involved in community service delivery access capacity building content through blended approaches.

3.3.5. Quality Management, Monitoring and Evaluation Environment

The focus on monitoring, evaluation, research, learning and quality control. Implementation of eCHIS will aim at accounting for results of community health services including service coverage, service quality, timely and accurate reporting morbidity, and mortality at community level -- related to the scope of work of the CHVs.

Strategic Objective: To improve the quality of community health services through monitoring and evaluation of key performance indicators at all levels.

Strategic Interventions:

- Review and improve existing indicators to take full advantage of digital tools and emerging needs.
- Formulate and implement success matrices for judging the maturity level of the technology for the purposes of national scale up.
- Develop and implement Service and Data Quality Assurance (DQA) strategies
- Develop and implement M&E framework
- Manage performance evaluation including mid- and end-term evaluation.
- Strengthen eCHIS supporting environment for service delivery, technology and resource management

Key Results:

1. Service standards for community health services assessed each year.
2. Developed community health indicator dashboards and information products for policy formulation
3. Progressive improvement in data quality and timelines in reporting achieved from continuous learning.
4. Mid- and end-term evaluations completed.

Strategic Focus Areas	Interventions	Results
Leadership and Governance	• Coordinate National & County implementation • Mobilize resources for implementation and sustenance of eCHIS mobilization. • Monitor implementation process and overall performance against government strategic objectives. • Provide MOH supervision and Risk Management.	1. Coordinated governance structure for eCHIS. 2. Integration of eCHIS into national MOH Digital Health Platform 3. Improved and coordinated funding for eCHIS.
Service Delivery	• Support technology-enabled community health workforce. • Guide technology and human capacity development towards service quality and accountability • Service Quality Assessment	1. Standard digital platform identified and enhanced to support community health services. 2. Framework for minimum functionalities developed to guide enhancement of digital platforms.
Technology	• Support the development and implementation of an eCHIS that supports service delivery at community level and integrates with other systems in the health sector as per the standards. • Support ICT infrastructure including centralized servers and monitoring infrastructure. • Support ICT equipment and facilitation for community health workers • Support the information security enforcement and adherence to the data protection laws and guidelines. • Support the integration the eCHIS data on the existing MOH databases. • Develop a lesson learnt framework for standardizing reporting documentation of the eCHIS design, implementation, and maintenance. • Develop a data dictionary for the eCHIS - backend and background.	1. Complete and comprehensive end-to-end digital solution that that meets standards and guidelines. 2. Point of service implementation of digital data management for all community units. 3. Community health indicators dashboard, information products for policy formulation 4. Strong supporting environment for financial, technological, and human resource interventions
Quality Management, Monitoring and Evaluation Environment	• Formulate and implement success matrices for judging the maturity level of the technology for the purposes of national scale up. • Develop Data Quality Assurance (DQA) strategies for validating data Integrity. • Develop and implement M&E framework • Manage Performance evaluation including Mid and end-term evaluation.	1. Service standards for community health services assessed each year. 2. Progressive improvement in data quality achieved from continuous learning. 3. Mid and end-term evaluations completed.
Capacity Building	• Conduct training needs assessment. • Develop ECHIS training package. • Train National ToTs and Content Management in the MOH Virtual Academy • Train technical team on development and maintenance of the system • Train Community Health Volunteers • Sensitization of Community Health Committees Members	1. Standard eCHIS training package 2. Community health practitioners training, and refresher content included in the National Digital learning Academy. 3. 100% of providers involved in community service delivery access capacity building content through blended approaches.

4. Chapter Four: eCHIS Development

A robust electronic Health Information System shall be developed to answer to the needs and gaps identified in community health delivery and data management through the eCHIS Landscape Assessment and intensive stakeholder engagement. The eCHIS will become part of the broader Digital Health Platform envisaged by the MOH and will, specifically, digitize the process of delivering community health beginning with household enrollment and continuing through to reporting at subnational and national levels. Ultimately, it is expected that the eCHIS will improve the quality of community health services by increasing efficiency, enhancing performance management, and driving evidence-based decision-making through timely and accurate data. This will in turn result in reduced morbidity and mortality, better education outcomes and a healthier and more productive population.

4.1. Overall Architecture

4.1.1. Software Architecture

The eCHIS will serve as the primary health information system for community health service delivery and data management in Kenya. As such, the application will cover the entire continuum of KEPH Level One services, including household enrollment, service delivery, client referral, supply chain management, community-based surveillance, messaging, and routine reporting at the community, subnational and national levels. The system will also include integration with other digital applications used for health and demographic data management within the country such as the National Integrated Identity Management System (NIIMS), Electronic Health Record (EHR) systems, Stock Management Information Systems, the Master Community Health Unit List (MCHUL), and the District Health Information System (DHIS).

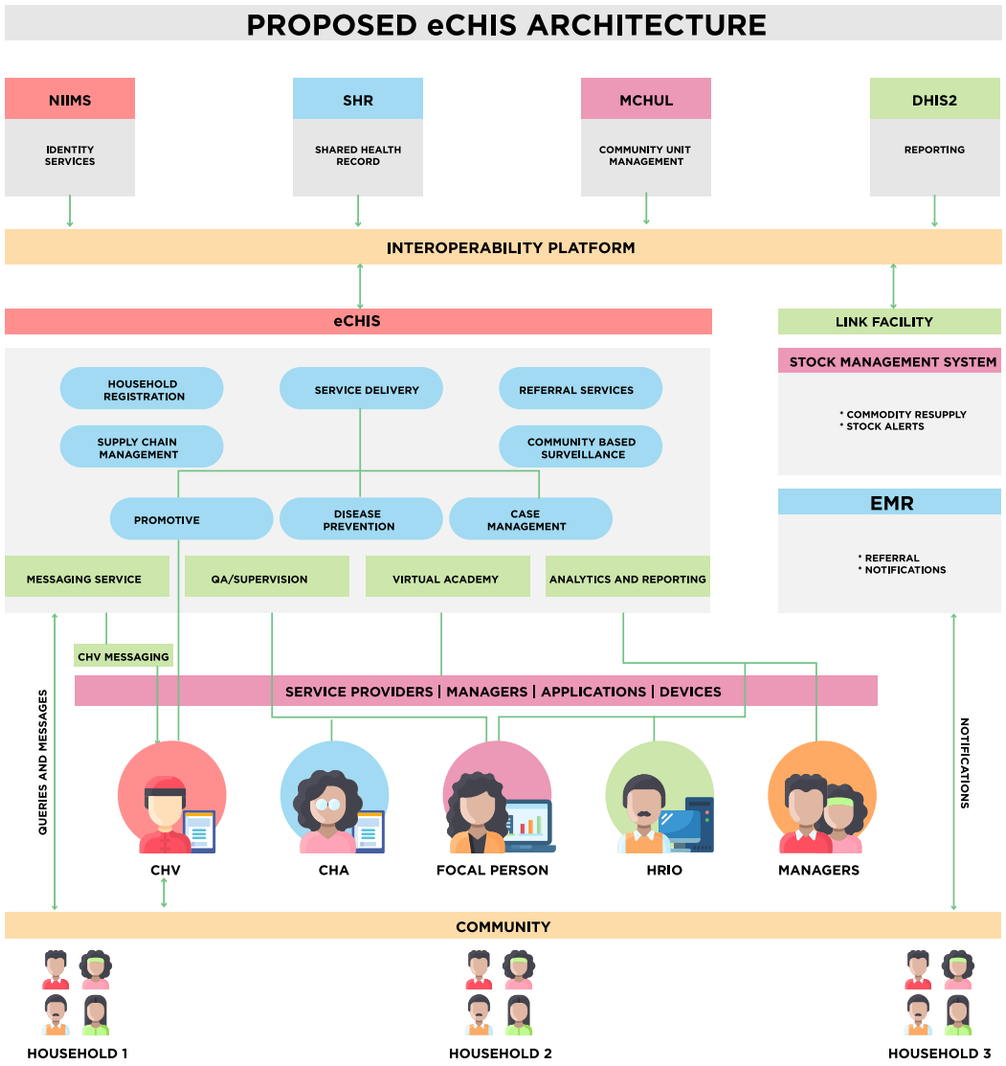


Figure 1: Proposed high level software architecture for the eCHIS.

The diagram above depicts the proposed high-level software architecture for the eCHIS. It shows how the system will function from the community level, through to the county and national levels. It also shows how the eCHIS will fit within the broader Digital Health Platform, including its relationship with other information systems. The sections below provide more details on this architecture.

4.1.1.1. Community Level

At the base of this structure is the community itself, in line with the DHP's principle of building client-centric information systems. The community is organized into individual households, which comprise one or more household members under the leadership of a household head. Other layers within this proposed architecture will be built upon the community as the foundational concept. Above the community and its members will be Community Health Volunteers (CHVs). CHVs serve as the primary agents of community health delivery at the household level. The eCHIS will provide them with the tools they need to enroll households, deliver services, collect data, manage commodities, refer patients, and raise event notifications. Above the CHVs will be the Community Health Assistants (CHAs). CHAs are responsible for supporting the role of the CHVs through supervision, mentorship and facilitating commodity supplies. The eCHIS will provide CHAs with the capabilities to conduct these activities digitally, including near real-time CHV performance monitoring. The eCHIS will also enable clients to engage directly with the community health system through two-way targeted and untargeted messaging.

4.1.1.2. Health Facility Level

The proposed architecture recognizes the role of healthcare providers at health facilities in the success of community health services. Within this proposed architecture, healthcare providers will be responsible for completing the referral loop once client referrals have been made by CHVs at the community level. In order to achieve this, this architecture envisages the need to integrate the eCHIS with the Electronic Health Record (EHR) system running at the link health facility. The goal of this intervention will be to digitize the referral coordination process so that referrals made in the field through the eCHIS are automatically transmitted to the EHR at the relevant health facility for action. Once the client visits the health facility, the healthcare provider will be responsible for raising a notification to the eCHIS to "close the referral loop" and communicate to the CHV that the client has honored his or her referral and need not be followed up on regarding the same issue in the future.

4.1.1.3. Subnational and National Levels

As previously explained, clients, CHVs, CHAs and healthcare providers will all mainly use the eCHIS to conduct their day-to-day activities. In other words, they will use the system on a transactional basis and create new data as they interact with the community health system or perform their daily duties. Health managers at the sub county, county, and national levels, on the other hand, will use the eCHIS for information processing, performance monitoring and decision making. The proposed architecture accommodates these needs through robust data analytics and reporting module. Healthcare managers, regardless of their position within the human resource hierarchy, will be able to connect to the eCHIS and view the reports to which they have been granted access based on their roles. Critically, access to data in the system will be strictly controlled through a Role Based Access Control (RBAC) system, as well as logical database partitions that will only allow users to view and interact with data that is within their purview. For example, sub-county managers will only be able to see data from their sub county, while county managers will be able to see data from their entire county and national managers will be able to interact with data from across the country.

4.1.1.4. Interoperability

The last but equally critical component of the eCHIS architecture will be interoperability with other information systems. The interoperability use cases contemplated in the proposed architecture are based on a careful analysis of the needs discovered during both the eCHIS Landscape Assessment and in-depth discussions with various stakeholders. As part of the DHP, it is proposed that information exchange between the eCHIS and other systems be facilitated through the same Interoperability Platform contemplated in the DHP architecture. The eCHIS is expected to integrate with the National Integrated Identity Management System (NIIMS) for client identity resolution; Electronic Health Record (EHR) systems for client referral coordination; the Shared Health Record (SHR) system for collating deidentified patient level data; the Kenya Health Information System (KHIS) for aggregating service statistics; and the Master Community Health Unit List (MCHUL) for managing data on community health units.

4.1.2. Infrastructure Architecture

The proposed software architecture for the eCHIS will be backed by a simple but robust infrastructure designed to minimize complexity, simplify upgrades and maintenance, manage costs, and promote long term reliability. In particular, this infrastructure plan avoids physical eCHIS servers at health facility and subnational levels. Instead, corresponding logical partitions will be layered on top of a centralized multi-tenant server hosted at the national level. The national server will have the appropriate redundancy built in for resilience, load balancing, data backup and disaster recovery. This is expected to keep the burden of data synchronization across multiple servers at a minimum as well as reduce points of failure and therefore limit system support and maintenance issues. Mobile apps will be provided for clients, CHVs and CHAs, while managers will connect using a common web application through their web browsers.

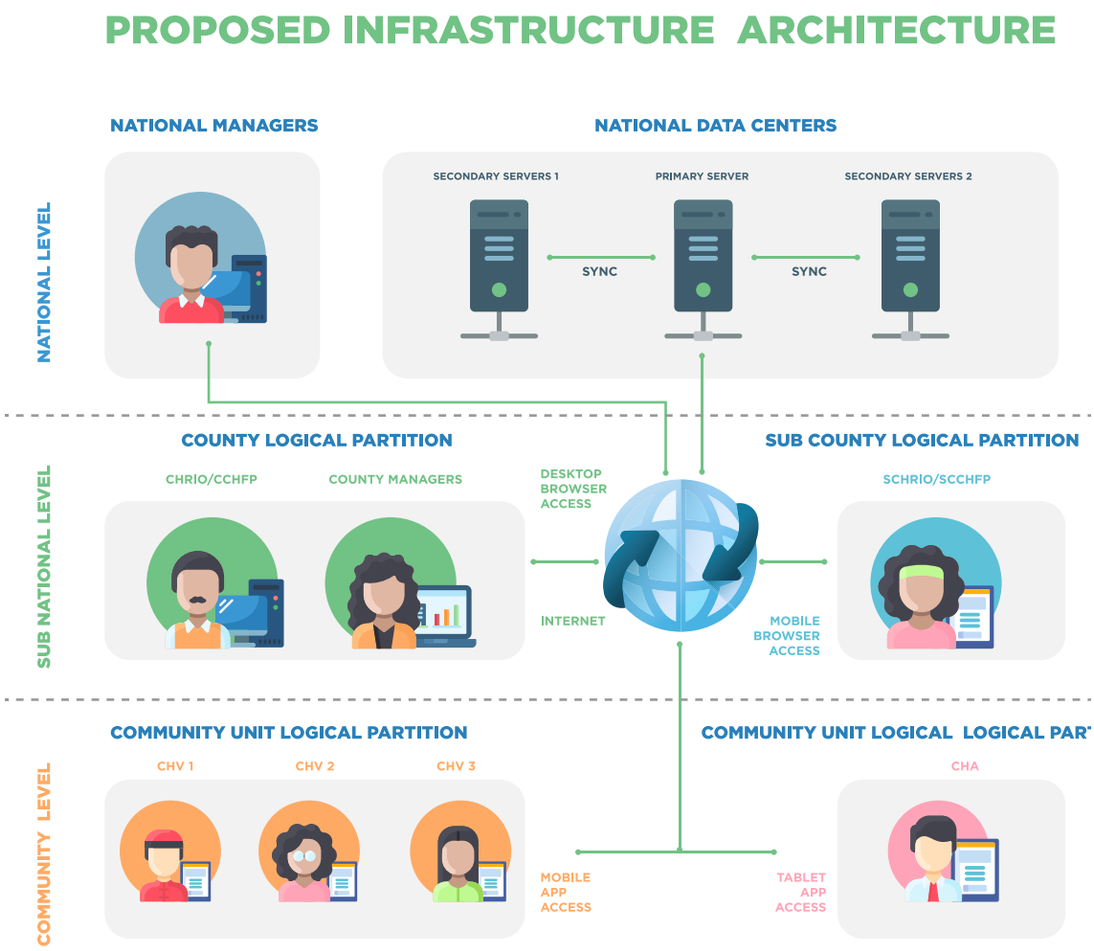


Figure 2: Proposed high-level infrastructure architecture for the eCHIS.

4.1.2.1. Server Hosting

A dedicated or virtual server shall be provisioned at the national data center for hosting the eCHIS. This server shall act as the primary eCHIS host computer and will receive all requests from client interfaces, be they mobile, web or API based. The primary server shall be mirrored to two other physically separate servers for redundancy. The data on all three servers will be maintained in synchrony on a real-time basis through database level replication. Automatic failover will also be implemented to ensure continuity of service in the event that the primary server fails.

The application database shall be designed for multi-tenancy. This means that while individual counties will share the same application instance and hardware, the system will be logically partitioned to allow individual counties to independently manage their data, configuration, and users. This will offer counties the autonomy to operate their eCHIS "virtual instance" without the complexity and cost overheads associated with hosting their own real instances of the system. It will also allow national level managers to readily access data from all the counties subject to lad down information access protocols.

Each of the three eCHIS servers shall have the following minimum specifications:

Table 2: Minimum Server specifications

Specification	Minimum
Random Access Memory (RAM)	64GB
Central Processing Unit (CPU)	2.4GHz (8 cores)
Storage	2TB Solid State Drive (SSD)
Network	1GBps network connection with 10TB of bandwidth.

NB: These are the minimum proposed specifications. They should be expandable to accommodate growing needs in the future.

4.1.2.2. System Access

Users and user agents (i.e., computer programs acting on behalf of users) will access the eCHIS directly on the primary server through one of three possible interfaces namely, mobile, web or Application Programming Interfaces (APIs). Access through these interfaces will be conducted via 256-bit encrypted internet connections. Appropriate mobile applications will be provided to facilitate access for clients, CHVs and CHAs. Health managers at the subnational and national levels will access the system through a regular desktop or mobile web browser. Third party systems wishing to either send or receive data from the eCHIS will do so through the eCHIS APIs. No intermediaries (such as subnational servers) will be required to mediate users' and user agents' access to the eCHIS.

The ideal specifications for CHV and CHA mobile devices shall be as follows, with the main difference being that CHVs will be provided with mobile phones with a minimum of 5-inch screens and CHAs will be provided with tablets with 10-inch screens. Community Health Focal Persons, Health Records and Information Officers, County Health Managers and National Health Managers will all access the eCHIS using ordinary laptop/desktop web browsers and will not require any special hardware.

Table 3: Minimum tablet/phone specifications

Specification	Minimum
Random Access Memory (RAM)	3GB
Central Processing Unit (CPU)	1.8GHz
Storage	16GB
Battery	5000mAh
Connectivity	4G/Wi-Fi
Screen Size	5/10 inch (Smartphone/Tablet)
Build	Rugged (Optional depending on cost implications)

NB: In addition to these specifications, the eCHIS web application will be tested against commonly used desktop and mobile web browsers.

4.1.2.3. Connectivity

Connectivity to the eCHIS server will occur through a regular internet connection, provided it is secured using 256-bit Transport Layer Security (TLS) encryption. Unstructured Supplementary Service Data (USSD) will also be supported where applicable to provide at least a subset of the functionality to users who may not have internet-enabled devices. The eCHIS will be designed to be agnostic to the underlying connectivity infrastructure. This will allow it to ride on any suitable infrastructure including the National Optic Fibre Backbone Infrastructure (NOFBI) as well as internet services provided by regular internet service providers and telecommunications companies.

4.2. Functional Requirements

In order to satisfy the community health service delivery and data management needs identified through the landscape assessment and stakeholder engagement, the eCHIS shall support a broad range of transactional and reporting capabilities. Transactional functions will facilitate the interaction between community health providers, the community itself and link health facilities and will include the following features:

1. Household enrollment
2. Service delivery
3. Commodity management
4. Client referral
5. Community-based surveillance
6. Messaging

In addition to these functions, the eCHIS will also facilitate the processing of data into information and insights through comprehensive data analytics and reporting module. This will facilitate the performance monitoring, service quality assurance and evidenced-based decision making based on timely and accurate data. The eCHIS will generate two main types of reports, namely.

1. Cohort reports
2. Aggregate reports

These types of reports will either be offered as standard reports or ad hoc reports that will be customized on demand to meet emergent needs. The remainder of this section covers these broad areas of functionality in more detail.

4.2.1. Household Enrollment

Intended for use by the CHV through a mobile app, this function will support the enrollment, updating and management of identity and demographic data on households and their members. CHVs will be able to enroll new households and household members into the community health program for routine service delivery through the digitization of the paper-based MOH 513 form. Household enrollment will be a two-step process involving recording the identity and demographic information of both the household itself and of its individual members.

Each household will be identified uniquely within the system by a unique identifier allocated either by the eCHIS or a central authority such as the Kenya National Bureau of Statistics (KNBS). Similarly, each household member will also be uniquely identified within the system through a unique identifier. Ideally, the individual identifier for clients should be drawn from a centralized identity management system. The National Integrated Identity Management System (NIIMS) is proposed for this purpose. However, a Universally Unique Identifier generated and assigned by the eCHIS may be used as an interim approach should the integration between the eCHIS and the NIIMS not be feasible in the initial stages of the eCHIS project.

During the enrollment process, only immutable household or client attributes may be recorded. Immutable attributes are attributes that are not liable to change on a routine basis. Mutable attributes will be tracked separately as part of updating household data during the initial and subsequent visits. The specific attributes to be collected during the enrollment are as currently documented in the MOH 713 form. These may be expanded or modified as necessary in consultation with a suitably qualified subject matter expert and business analyst. In principle, the attributes to be collected during household enrollment should support easy client identification while protecting their right to not having unnecessary data collected about them.

Besides the ability to enroll new households, the eCHIS will also allow the CHV to update data on existing households, as well as void within the system households that no longer exist or that have voluntarily and explicitly requested to be dropped out of the electronic community health system.

4.2.2. Service Delivery

The service delivery component of the eCHIS is intended for use by the CHV and CHA through a mobile app. In this context, a service is defined as a group of related community health interventions targeted at households or household members and delivered as a single package. The list below covers some of the community health services that are currently defined:

1. Pregnancy, delivery, and the newborn
2. Early childhood
3. Late childhood
4. Adolescent and youth
5. Adults
6. Elderly persons (over 60 Years)

Within the eCHIS, the service delivery functionality will be a more sophisticated digital implementation of the MOH 514 form. Each service defined within the eCHIS will be defined based on the following core characteristics:

1. Target: Who is eligible for the service?
2. Data: What data is collected as part of delivering the service?
3. Workflow: In what order are the constituent parts of the service delivered?
4. Commodities: What commodities are offered as part of delivering the service?
5. Periodicity: How frequently is the service provided?

The eCHIS implementation of service delivery functionality will need to be flexible enough to accommodate not just present but also future unanticipated needs. An example of an unanticipated need could be COVID-19 contact tracing. For this reason, the eCHIS, shall provide a mechanism for defining new and existing services based on the above core characteristics. The system administrator will be responsible for defining, modifying, and managing services within the eCHIS.

The process for defining services will involve creating or updating a service within the system, as well as publishing the service template to enable CHVs to use it for data collection. It is envisaged that the eCHIS will be developed to ensure that services defined within the system and then later updated will be backwards compatible i.e., data sets collected using different versions of the same service template will automatically be collated by the system.

Besides creating, updating, and publishing services, the eCHIS system administrator will also be able to create, update and publish supervision checklists for use by CHAs to conduct routine quality assurance and performance monitoring activities. CHAs will also use these checklists to log information on mentorship sessions conducted with their CHVs.

4.2.3. Commodity Supply Chain Management

The eCHIS will support a basic level of commodity supply chain management at the community level. Specifically, this feature will facilitate the ordering, receipt, issuance, and disposal of commodities by the CHV. It will also provide a basic level of inventory management.

Through a mobile app, the eCHIS will enable the CHV to monitor their stock levels i.e., the number of commodities in their possession based on the quantities previously received and issued or otherwise disposed of. Each commodity in the eCHIS will be configured with a reorder level. The reorder level may be static i.e., always the same regardless of historical consumption data, or dynamic i.e., automatically adjusted to reflect historical consumption data. Based on this reorder level, the system will notify the eCHIS whenever the stock levels for a particular commodity or set of commodities goes below the specified reorder level.

At any point in time and provided that there are one or more commodities that are below the stipulated reorder level, the CHV may raise an order for resupply. The commodity order raised by the CHV via the eCHIS mobile app shall be forwarded through the interoperability platform to the Pharmacy Information Management System (PIMS) at the link health facility for fulfilment. On designated commodity resupply days, a CHA shall invite their CHVs to visit the link health facility and collect the commodities they ordered. During this visit, the PIMS operator at the facility shall process the CHV's order by restocking their commodities. The PIMS shall then update the eCHIS accordingly by sending the appropriate data through the interoperability platform.

Once in the field, the CHV will dispose of the commodities issued to them either by dispensing them to clients or by otherwise recording them as lost due to expiry, damage, misplacement, or other similar reasons. This is important for the system to keep an accurate record of the CHV's stock on hand. For the purposes of accountability, commodity disposal by means other than dispensing shall be annotated with an appropriate comment by the CHV describing the circumstances of the loss.

4.2.4. Client Referral

Client referral within the eCHIS shall aim to digitize the MOH 100 community referral form. This feature will be used by the CHV through a mobile app to link clients to health facilities. Clients may be referred to a health facility whenever they are located by CHVs as part of a defaulter tracing exercise instigated by the health facility, e.g., because they have failed to honor their clinic appointments; or when the CHV finds a client whose condition by its nature necessitates medical attention at a health facility, e.g., for laboratory testing services.

The mechanism for executing a successful client referral shall involve filling out a digital version of the MOH 100 referral form. This will then be transmitted to the link facility through the interoperability platform and raise an appropriate notification within the EHR. When the client eventually visits the facility, the EHR shall indicate to the healthcare provider that the client has an outstanding referral. Upon processing the client through the normal EHR workflow, the EHR shall raise a notification to the eCHIS through the interoperability platform to indicate to the CHV that the client has honored the referral and need not be followed up any further for the same issue. This will form a complete referral loop.

An open referral loop shall occur whenever a client who has been referred to a health facility has not yet visited the facility. Further follow-up by the CHV will be expected in this case and will be documented within the eCHIS in a similar manner as previously described.

4.2.5. Community Disease-Based Surveillance

The eCHIS shall support a mechanism by which a CHV can use their eCHIS mobile app to raise a notification for any event of public health concern. The event may be raised through a smartphone user interface or by sending a designated code via SMS. Any event raised in this manner shall be forwarded for action to the Division of Disease Surveillance and Response (DDSR). Upon receipt of the notification, the DDSR will mobilize its personnel in the affected sub county to verify the event and coordinate the appropriate response.

The area CHA will be responsible for updating the eCHIS to record whether the notified event turned out to be a true or a false positive. The eCHIS will use this data to generate the relevant reports as defined by the program.

4.2.6. Messaging

The eCHIS shall provide a messaging capability to allow two-way communication between clients and the healthcare system. The messaging module will also enable health managers to send mass messages to CHVs to notify them of any critical updates.

Duly authorized eCHIS users will be able to create and send both non-targeted and targeted messages to clients. Non-targeted messages will be broadcasted to all registered clients on the eCHIS for a specific jurisdiction e.g., sub-county, county, or the entire country. Targeted messages, on the other hand, will be sent to a subset of clients based on distinct demographic or health characteristics. The specific channel for sending these messages will be Short Message Service (SMS) to reach the widest possible audience. In a similar manner, the eCHIS will also support the mass messaging of CHVs. This may be handy for sharing regular updates on community health guidelines and so on.

Future versions of the eCHIS will also support the ability for clients themselves to initiate contact with the community health service system. Clients will, for example, be able to raise notifications of events of public health concern, invite CHVs to their households or check appointment information for their meeting with CHVs.

4.2.7. Reporting

The eCHIS shall support a robust data analysis and reporting module capable of producing both cohort or patient level reports and aggregate or service statistics reports. Specifically, the eCHIS shall support the automatic generation of standard MOH reports in both human and machine-readable formats for the purposes of transmission to the DHIS. The eCHIS shall enable duly authorized users to define custom reports to meet ad hoc reporting needs.

4.3. Non-Functional Requirements

Table 4: Nonfunctional requirements

Specification	Definition
Data Security	Data security refers to the assurance that the data transmitted to and from a system as well as the data stored within it has the necessary security measures in place to deter unauthorized access. The eCHIS shall be designed to comply with the latest information security standards to ensure that the sensitive client data processed through it is adequately secured. In particular, the eCHIS shall implement a robust mechanism for user authentication backed by strong hashed and salted passwords, 256-bit TLS encryption for data in transit, role-based access control, inactivity timeouts and audit trailing. In addition to these technological security measures, eCHIS users will be thoroughly oriented on security best practices to minimize the risk of security breaches resulting from human error and ignorance.
Data Integrity	Data integrity focuses on the validity, consistency and accuracy of data that is stored within a system. The eCHIS implementation team shall review and identify all common threats that would compromise data quality and define the necessary mitigation measures to be implemented in the system. Examples of such threats include human error, software bugs, hardware failure, misconfiguration, security errors, data transfer errors and cyber-attacks. Possible mitigation measures include input validation, routine deduplication, data audit trailing, data backup and access control. In addition, database management and security measures will be implemented to reduce the risk of attacks on the data both at rest and in transit.
Usability	The ease in which the users can interact with a system while having their goals effectively fulfilled is referred to as usability. The eCHIS implementation team shall promote optimal usability of the system by developing and running usability tests on prototypes with an appropriate audience before scaling up, referencing successful applications for best practices and usability benchmarks as well as conducting usability comprehensive user requirements gathering and field studies where necessary to understand the proper context within which the system will be used. This will include customizing the system to reflect the user's locale, language, culture, literacy level and other similar considerations.

Performance and Scalability	Performance is an indication of the responsiveness of a system to execute any action within a given time interval. Scalability, on the other hand, refers to the ability of a system either to handle increases in load without impact on performance or for the available resources to be readily increased. The eCHIS will be designed for optimal performance and scalability by defining specific metrics for system throughput and latency. Automated tests will be used to simulate many requests to stress test the system and identify and fix bottlenecks.
Reliability, Maintainability and Availability	Reliability refers to the ability of a system to run without experiencing a failure for any given period under a set of predefined conditions. On the other hand, maintainability refers to the amount of time taken for system maintenance, upgrade, or performance optimization. Lastly availability is the likelihood that a given system will be available to users at any given time. The eCHIS shall promote the achievement of these specifications by defining the normal usage conditions and uptimes and optimizing for them; defining the acceptable maintenance time frame and documenting it in a Service Level Agreement (SLA) and implementing redundancy measures to decrease the likelihood of that the system is not available to users on demand.
Interoperability	Interoperability refers to the ability of computer systems or software to exchange and make use of information. Interoperable health information systems should be able to exchange, interpret and use data in a cohesive and consistent way. The eCHIS is expected to exchange data with other systems including the National Integrated Identity Management System (NIIMS), Electronic Health Record (EHR) systems, the Kenya Health Information System (KHIS), the Shared Health Record (SHR), among others. In order to fulfil this requirement, the eCHIS shall adhere to the stipulations documented in the Kenya Health Information Systems Interoperability Standards and Guidelines and provide secure APIs for information exchange as appropriate. The eCHIS will be designed to support all three levels of interoperability namely, foundational, structural, and semantic interoperability. Support for international information encoding standards used in healthcare such as the Systematized Nomenclature of Medicine - Clinical Terms (SNOMED-CT) will also be integrated, as necessary.
Portability and Compatibility	The eCHIS shall be designed for optimal performance on the ICT infrastructure provided within the MOH Data Center. It shall support commonly available operating systems and web browsers and not conflict with other applications and processes within these operating environments.

4.4. Development Lifecycle

The agile software development methodology will be used for the development of the eCHIS to promote transparency, encourage early delivery and feedback, manage costs and timelines, accommodate emerging needs, and enhance software quality. The project lead will, in consultation with the eCHIS committee, be responsible for dividing the system requirements specified by subject matter experts into individual manageable units which will form the basis of sprints. A sprint is a short, time-limited period when a development team works to complete a set amount of work. Each sprint will generally be processed through the following development lifecycle steps.

4.4.1. Requirements Gathering

Requirements gathering will form the initial step for each atomic piece of work defined by the project lead and designated to last a specified period. It will involve turning high-level functional specifications into detailed user requirements ready for design and prototyping. This process will be facilitated by a suitable business analyst who shall be a subject matter expert in community health. Any stakeholder engagement will also be conducted during this stage. Taking time to go through a comprehensive process of requirements gathering will not only help to optimally manage resources but also to generate the necessary information to inform software testers on what the expectations are once development is completed. The project lead working closely with the business analyst will be responsible for collating, documenting, and signing off on the final requirements document that shall be handed over to software engineers for design and prototyping. They will also jointly track design and development progress on a routine basis against the time allocated for the specific feature or set of features under development.

4.4.2. Design and Prototyping

Design and prototyping will be the responsibility of software engineers and will involve turning user requirements into a minimal but tangible digital product. The purpose of this step is to enable the engineers to explore the strengths and weaknesses of various design approaches, as well as receive feedback from end users on the suitability of their design with respect to meeting the defined specifications. This step is necessary to help arrest any potential misunderstandings or suboptimal implementations in good time, thereby limiting the loss of time and resources. Design and prototyping are an iterative process whose ultimate outcome is an agreed design approach upon which software engineers will scale the feature implementation during the development phase.

4.4.3. Software Development

During the development phase, software engineers will endeavor to develop the feature or defined set of features identified for a particular sprint in full. They will limit themselves to the approach arrived upon during the design and prototyping unless there is sufficient justification to modify it. Software engineers will be expected to adhere to the highest standards of software development including coding standards, source code management, unit, and integration testing, build automation and continuous integration. The outcome of the development phase will be a complete feature or set of features ready for testing and piloting by the testing team.

4.4.4. Testing and Piloting

The testing and piloting phase will be spearheaded by the testing team. Both a software technical expert and end users will be represented in the testing team. The technical expert will be responsible for testing the technical aspects of the digital solution such as performance, stress testing and penetration testing where applicable. End user testers will represent the typical users of the eCHIS and will essentially conduct User Acceptance Testing (UAT) to validate that the delivered digital intervention answers to the defined specifications. Testing will be an iterative process during which any issues identified will be channeled back to the software engineers for resolution.

Once the testing phase is completed, the feature or set of features will be deployed in the real world to a small subset of users. This will constitute the piloting phase and will be aimed at picking out any potential issues missed during the testing stage. As with testing, any issues detected at this stage will be sent back to the engineering team for resolution. The outcome of the testing and piloting phase will be a fully functional feature or set of features ready for scaled-up deployment.

4.4.5. Deployment and Maintenance

The deployment phase will involve officially releasing a copy of the eCHIS containing the newly developed feature or set of features for use by a larger group of users. At this stage, the focus will shift from testing to change management, technical support, and routine maintenance. The goal of this process will be to ensure that the feature or set of features deployed works well for all users with minimal friction in terms of upgrading or day-to-day use. The responsibility for deployment and maintenance will rest on the end users themselves, as well as trainers and help desk staff.

4.4.6 Provisional Timelines

The provisional timelines below are indicative only and intended to provide a rough estimate of how long it might take to develop a fully functional eCHIS based on the high-level requirements covered in this document. Overlaps between tasks are expected, and therefore the total eCHIS development time may be less than the sum of the individual tasks.

Table 5: Proposed System Development Timelines

Task	Timeline
Requirements gathering	3 months
Design and prototyping	4 months
Software development	30 months
Testing and piloting	8 months
Deployment and maintenance	10 months

4.5. Human Resource

Table 6: Human Resource Requirements

Position	Description and Role
Technology Lead	The technology lead will be responsible overall for turning the eCHIS from a concept to the fully functional technology product that will be piloted and scaled up in the field. There shall be 1 staff member holding this position.
Assistant Technology Lead	The assistant technology lead will serve as the principal assistant to the technology lead. Liaison and partnerships. There shall be 1 staff member holding this position.
Business Analyst	The business analyst will serve as the primary subject matter expert in community health attached to the technology team. There shall be 1 staff member holding this position.
Software Engineers	Senior software engineers will lead small teams of software engineers in specific domain areas of the technology development process (front end, application, and database development). There shall be 3 staff members holding this position. Reporting to the senior engineers will be junior software engineers. They will be responsible for the actual development of the technology from requirements through to design, development, and testing. There shall be 9 team members holding this position.
System Auditors	System auditors will be responsible for examining and monitoring the eCHIS to ensure that the accuracy and security of data is safeguarded. They will also review the overall computing environment and validate the reliability of the results and operations of the system. There shall be 2 team members holding this position.

5. Chapter Five: eCHIS Implementation

5.1. Technology Wraparound Services

5.1.1. Help Desk and Incident Management

A suitable system, whose goal will be to ensure easy tracking and resolution of system issues as raised by users, shall be put in place for incident management. This will increase customer satisfaction and ensure quick turnaround time on resolution. Users will be provided with multiple channels through which to raise issues including telephone, SMS, email, and internet chat. The issues raised by users will be converted into support tickets and assigned to the relevant help desk team. An acknowledgement of receipt of the issue will be emailed to the user, along with an indication of the period within which it is expected to be resolved. Issues that cannot be resolved by the help desk officer to whom they have been assigned may be reassigned to a more knowledgeable member of the help desk staff. The help desk system will be anchored within the MOH and managed by a qualified, multiskilled team of technical support experts.

5.1.2. Change Management

The eCHIS is expected to impact the business processes in community health service delivery in ways that necessitate new practices and behavior. Change management provides standardized methods, processes, and procedures for managing change as well as facilitating the efficient and prompt handling of modifications while maintaining a balance between the need for change and the potential detrimental impact of the change. The process offers a more structured approach for managing the planned deployment of alterations.

By definition, a change is an event that is:

1. Approved by policy or guidelines and partly or entirely affects the service delivery and data management business process.
2. Implemented with a minimized and accepted risk to existing IT infrastructure.
3. Results in a new status of one or more systems or items.
4. Provides increased value to the business (avoided cost, or improved service) from the use of the new or enhanced IT systems.
5. Communicated for buy-in and acceptance and internalization.

Changes may affect both software and hardware components of the eCHIS, e.g., in the form of system upgrades, data migration, additional reports, API integration and even interoperability with third party systems.

The process of managing change shall entail:

1. Identifying what will be improved.
2. Developing a change plan with key components of change, timelines, expected results and outcome.
3. Presenting a solid business case to stakeholders.
4. Planning for the change - identifying resources required.
5. Deploying change.
6. Reviewing, revising and continuously improving.
7. Identifying the key change agents and champions.
8. A schedule detailing rollout plan, process, and targeted cascade

NB: As part of stakeholder engagement and management of expectations through the health sector platforms, there will be continuous communication to the stakeholders to inform them on the key changes and successful change implementation. Changes may be instigated by any of the eCHIS stakeholders. However, for accountability purposes, they will be managed centrally by the Technology Lead/Project Manager. The Technology Lead/Project manager will coordinate with the eCHIS committee to ensure that changes are duly authorized and approved before release.

5.1.3. Asset Management

The eCHIS infrastructure shall be managed through existing government assets management policies and guidelines. The national MOH shall ensure provision of specific asset management guidelines, as necessary. Counties will be responsible for tracking all hardware inventory issued to their officers based on existing government equipment inventorying protocols. National MOH, on its part, will be responsible for the eCHIS equipment and infrastructure deployed at the national data center. A system for keeping track of the equipment and inventory vital to the day-to-day operations of the eCHIS will be instituted. This asset management system will help keep real time track of the program's asset status. The asset tracking system will be integrated with the core eCHIS and will aid in the tracking of assets from procurement to decommissioning. The following process is proposed for asset management:

1. Conduct a baseline catalog of assets.
2. Determine who is responsible for each asset.
3. Use asset management software (avoid spreadsheets).
4. Use asset management hardware (ID tags or barcodes).
5. Track assets as they come into the company.
6. Create customized reports that can be consumed by different stakeholders.

The following considerations shall be made before undertaking asset repairs:

1. Ongoing maintenance costs over the remaining life of the equipment.
2. The impact any repair would have on productivity and quality.
3. Costs incurred from the equipment downtime.
4. Health, safety, and environmental implications that come with equipment breakdown.
5. Cost for a new piece of equipment.

Before a decision is made (Repair or Replace), the team will take time to:

1. Consider the age of the asset
2. Consider cost of repair.
3. Consider downtime (e.g., duration that CHVs are not reporting).
4. Consider efficiency in the long run.
5. Electronic waste will be disposed in conformance with the guidelines provided by the National Environment Management Authority.

5.1.4. Vendor Management

A comprehensive process shall be put in place to manage the procurement of goods and services from vendors as well as manage the relationship between the DCH and these vendors in terms of providing ongoing support. The technology team will work alongside the procurement department in order to:

1. Establish business goals.
2. Select appropriate vendors
3. Maintain an up-to-date vendor database.
4. Draft and manage contracts.
5. Review vendors performance
6. Conduct Third Party Self-Assessment (TPSA) to close compliance and risk gaps.

5.1.5. Field Support

Ongoing field support will be provided for the eCHIS to ensure that both the system and the underlying infrastructure are running optimally. A centralized help desk team at the national level will be responsible for this role and will be closely supported by county-based field-based officers who will serve as the first line of support. Typical field support will include:

1. Resolving daily incidents that may or may not require escalation to the next level.
2. Communicating with field staff and aligning with general operations
3. Providing technical support during training at the Community Unit level
4. Preparing and disseminating weekly reports to all relevant stakeholders on areas of focus; accomplished work and blockers.

5.1.6. Application Whitelisting

The DCH will explore the option of whitelisting the eCHIS application with a mobile service provider in order to:

1. Reduce operating costs in application usage.
2. Increase availability of these applications.
3. Increase usage and productivity as there are no airtime/bundle limitations.
4. Increase customer satisfaction.

5.2. Capacity Building

Capacity-building efforts for community services are currently disjointed and based on actual services. Consequently, multiple training sessions are conducted targeting the same participants using didactic approaches.

This strategy proposes a competency-based approach to capacity-building. This includes training people for the roles they perform, with more focus on competency/skill and less emphasis on knowledge. To ensure competency-based training, training needs assessments will be conducted to ensure that the needs align with the eCHIS capacity requirement. The capacity-building strategy has identified a tool (annex...) to assess competencies required for direct service delivery, supervision, and data management across the cascade. A cascade model will train national master trainers, county ToTs and facility-based champions to ensure sustained capacity beyond the initial years. Digital Learning will be integrated in the system to support self-paced learning and dissemination of updates. There will be a review, and reflection and experience sharing of the best practices on the implementation of eCHIS practices.

5.2.1. Capacity Building on eCHIS

The MOH will leverage eCHIS to drive strong performance management and achieve data-driven decision making to transform health delivery and achieve improved health outcomes. Ultimately, to achieve this, there is a need to capacity build all the various community health user classes on the major features that shall be supported by the eCHIS to satisfy their needs and drive greater community health impact.

The features are classified according to two main ways in which the system is expected to be used and the skills required to adequately operate the eCHIS. These features are.

1. Transactional i.e., using the eCHIS to conduct the day-to-day business of community service delivery.
2. Reporting i.e., using the eCHIS to generate and consume information emanating from the transactional data stored in the system.
3. Trouble shooting: Ability to raise issues and fix them.

Empowering the various community health user classes to leverage stronger health data and analytics at the community level will ultimately build the foundation for stronger, more real-time response.

Table 7: Capacity Building for various categories of Health Workers

Cadre	Trainings required to adequately use eCHIS
Community Health Volunteers	Prerequisite training on Basic and Technical modules training as outlined in Community Health Strategy Policy guidelines. Training on use of technology to provide community health services and reporting. Household enrollment Service delivery and client referral Commodity management Community-based surveillance Client messaging. Training on eLearning (MOH Virtual academy)
Community Health Officer/ Assistant	Prerequisite training on CHEW Curriculum and support supervision. Training on use of technology to supervise and report to higher level. Training on Community health data management Training on eLearning (MOH Virtual academy)
Health Facility In-charges	Sensitization on Community Health Strategy Training on use of technology to supervise and report to higher level. Training on Community health data management Training on eLearning (MOH Virtual academy)
Community Health Committee	Prerequisite training on leadership, governance, and resource mobilization as per the CHC training manual. Orientation on Partnerships, collaboration, and advocacy for CHS Orientation on eLearning (MOH Virtual academy)
Sub County Community Health Officers	Prerequisite training on digitally- enabled, field based supportive supervision for level 1. Computer literacy including use of current and emerging technologies to provide training, collect and analyze data for decision making. Training on eLearning (MOH Virtual academy)
Sub County Health Records Information officer	Prerequisite TOT training on supporting the CHVs to collect and analyze data appropriately. Training on community health indicators translation and use Use of all appropriate technology to collate, analyze and data use (eLearning - MOH Virtual academy) Troubleshooting of software used in data collection. Training on how to manage, forecast and quantify commodities provided to CHWs, manage CHAs and community units

Cadre	Trainings required to adequately use eCHIS
County Community Health Officers	Prerequisite training on leadership, management, advocacy, Data management, Reporting, Mentorship, Coaching and support supervision. Performance management Use appropriate technology and software (eLearning - MOH Virtual academy)
County Health Records Information officer	Prerequisite TOT training on supporting the sub counties on eCHIS (data collection, analysis, and reporting) Training on Community Health Indicators translation and use Use appropriate technology and software (eLearning - MOH Virtual academy)
Technical/ICT Team	Orientation on community health strategy to support counties on eCHIS Help Desk. Required training on the system functionality, deployment, and issue resolution. Required core system improvement competency.
National level -Heads of Directorates, Departments and Divisions, Programs, and projects Officers	Orientation on community health strategy to support counties on eCHIS (data collection, analysis, and reporting) Orientation on eLearning - MOH Virtual academy

The top-to-bottom approach: This will start at the policy and advocacy level (national level) and be disseminated through the counties, sub-counties, facilities and community units.

Orientation of the policymakers on e-digitization in relation to CHIS to provide guidance to its implementation at county level.

1. Conduct a capacity building needs assessment at all levels and develop a training tracker to document all the training by cadres.
2. Conduct trainings on eCHIS at county level for ownership and actual coordination of the trainings and translation of theory to practice.
3. Conduct trainings on eCHIS at sub-county level to supervise and offer coaching for actual use of the platform.
4. Conduct trainings on eCHIS at community unit level
5. Document and finalize a training report.
6. Disseminate the report to the wider audience for cascade.

Figure 3: Capacity Building Cascade

Conduct a capacity building needs assessment at all levels and develop a training tracker to document all the training by cadres

Orientation of the policy makers on e-digitization in relation to CHIS to provide guidance to its implementation at county level

Conduct trainings on eCHIS at County level for ownership and actual coordination of the trainings and translation of theory to practice

Conduct trainings on eCHIS at Sub County level to super vise and offer coaching for actual use of the platform

Conduct trainings on eCHIS at community level

5.3. e-CHIS Capacity Building Plan

Each required competency will be achieved during a specific, designated period. Using the cascade approach, the training materials will be developed centrally for quality control purposes after a complete training needs assessment. The table below shows the logical flow of the capacity building plan, the target audience, the time required for the training to take place, and the performance indicators.

Table 8: Capacity Building Plan

Plan	Activity Detailed Description	Target Audience	Number of Days	Performance Indicators
Training needs assessment	Develop TNA tools and methodology	CHS, DHI, Programs and Counties	5	TNA tools developed
	Conduct Training Needs Assessment	CHS, DHI and Programs	14	TNA field work report
	Develop training needs assessment report	CHS, DHI, Programs and Counties	5	TNA assessment report
Classroom based Training	Developing eCHIS training manuals	CHS, DHI and Programs	10	eCHIS Training curriculum developed
	Validation of eCHIS training manuals	Stakeholders	5	eCHIS Training curriculum validated
	Printing of eCHIS training manuals	CHS, Partners	1	141 ECHIS Training Manuals Printed
	Orientation of County Leadership on eCHIS capacity building Strategy for buy-in and ownership	CEC, COH, CDH, CHRIO, CCHFP	1	735 County leaders oriented on eCHIS
	Design of training protocols and competency framework	CHS, DHI and programs	2	Training protocols and competency framework developed
	Training of National ToTs		5	30 TOTs trained at the National Level

Plan	Activity Detailed Description	Target Audience	Number of Days	Performance Indicators
	Training of County ToTs	CCHFPs, CHRIOs and CNOs	5	141 ToTs trained at the county Level
	Training of sub county ToTs	SCCHFPs, SCHRIOs and SCNOs	5	900 ToTs trained at the sub-county level
	Training of Community Health Assistants	Community Health Assistants	3	4,000 CHAs trained
	Training of facility teams	Facility In-charges	3	7,000 ToTs trained at the facility level
	Training of Community Health Volunteers	Community Health Volunteers	3	100,000 CHVs Trained
	Training of Community Health Committees	Community Health Committee	2	50,000 CHCs members trained
E-Learning Based Training	Content management on the MOH Virtual Academy	CHS, DHI and Programs	5	Categories and courses translated into e-learning
	Content uploaded in the MOH Virtual Academy	CHS, DHI and Programs	5	Courses and categories uploaded in the MOH virtual academy
	Training of ToTs on eCHIS via MOH Virtual Academy	CHS, DHI and Programs	5	30 ToTs Trained on eCHIS via MOH Virtual Academy at the national Level
	Training of Counties on eCHIS via MOH Virtual Academy	Counties	5	141 ToTs Trained on eCHIS via MOH Virtual academy at the county Level
	Training of Sub-Counties on eCHIS via MOH Virtual Academy	Sub-counties	5	900 ToTs Trained on eCHIS via MOH Virtual academy at the sub-county Level
	Training of CHAs on eCHIS via MOH Virtual Academy	CHAs	5	4,000 CHAs Trained on eCHIS via MOH Virtual academy at the community Level
Technical Support	County Level	CCHFPs, CHRIOs and CNOs		141 County officers supported at the County level
	Sub-County Level	SCCHFPs, SCHRIOs and SCNOs		900 sub-county officers supported at sub county level

5.4 eCHIS Governance

5.4.1 The eCHIS Implementation and Coordination

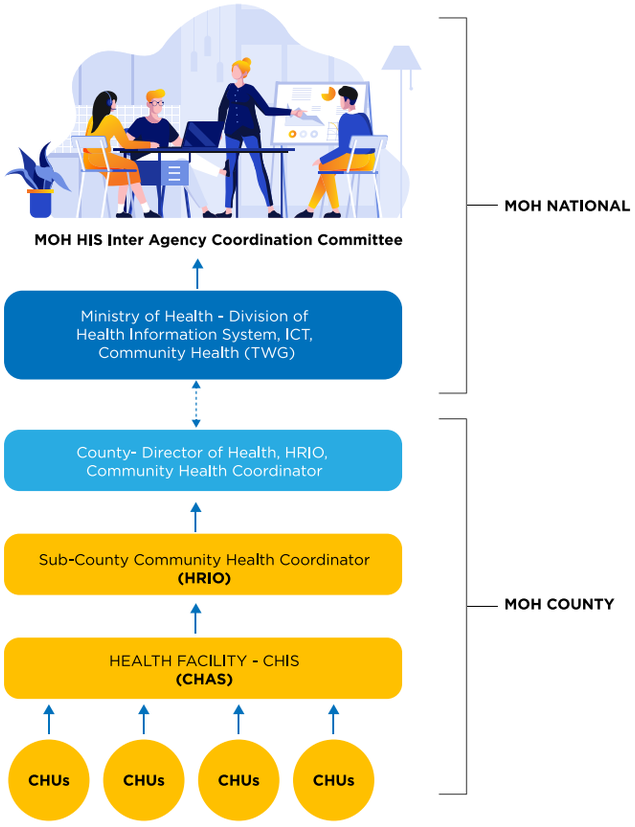
Implementation of this strategy will be coordinated and governed by the Health Sector Partnership and Coordination Framework, the National Ministry of Health HIS-ITT, the inter-governmental relations, and the Interagency Coordination Committee (ICC). County Governments will collaborate with the government ministries to ensure compliance with the implementation guidelines, contextualizing requirements to local needs and sustainability. The ICC will be main forum for decision making with the HIS-ITT TWG drawing from implementing partners in the health sector. The table below shows the ICC membership, composition, and roles.

Table 9: ICC Membership and Role in the implementation of the eCHIS Strategy

Membership	**The State Actors:** • MOH Heads of Departments/ Divisions, and programs; County Government's representatives from counterpart Health Sector Intergovernmental Forum (HSIGF Technical Working Groups). • External Actors: • Technical representatives from Development Partners and UN Technical Agencies • Non-State Actors: • Health NGO Network (HENNET) representing NGOs and CSOs. • Faith-Based Organizations: Christian Health Association of Kenya (CHAK); Kenya Conference of Catholic Bishops (KCCB) and Supreme Council for Kenya (SUPKEM), • Private commercial sector partners represented by Kenya Healthcare Federation (KHF
Functions	• Bring all key sub-sector partners together for joint planning, oversight, and decision-making. • Enable partners to become jointly responsible for planning, monitoring, and reviews and reporting. • Hold all sector partners jointly accountable for achieving results. • Reduce the number of separate meetings with individual partners. • Enable harmonization of inputs and better coordination of investments in the sector partnership for more effective use of all available resources - reduce duplication of efforts and critical gaps. • Provide easy access to coordinated technical assistance and support for priority actions such as development and implementation of the eCHIS Strategy
Responsibilities on eCHIS	
National level DCH/HIS/ ICT	• National MOH will assume overall custodian and coordination of the implementation of the eCHIS Strategy • Planning and oversight the implementation of the eCHIS Strategy • Coordination evaluation and periodic review of the eCHIS Strategy • Capacity Building will provide technical support and build the capacity of county governments on eCHIS • Provide guidelines and formulate policies • Provide technical support and ensure adherence to standards tools and data management procedures • eCHIS Systems management e.g., Maintain and update the eCHIS, Host the data, System quality improvement. • Quality Assurance (DQA) & Data Quality Improvement (DQI) • Define the indicators and data sets to be collected • Document lessons learnt • Provide technical assistance to counties on eCHIS • Evaluate the progress and performance on eCHIS Strategy • Ensure coordination mechanisms for the health-sector working groups including partners supporting MOH at the national level • Ensure that all stakeholders implement eCHIS Strategy at all levels. • Ensure adequate consultations and participation of both levels of government in the eCHIS implementation process • Ensure sufficient resources are available to ensure implementation of the eCHIS Strategy • Oversight and risk management • Partnerships • Public participation • Operation Research • Performance management: End term and mid-term review of the strategy implementation • Change management

County level	• Provide electronic tools for data collection • Provide routine technical support to sub county and community units • Perform data quality checks • Upload the data to KHIS • Train sub-county teams on the data tools • Supervise • Co-create of the reporting system giving the user requirements • Document lessons learnt in the implementation • Participate in the eCHIS Strategy implementation processes. Specifically, they will contribute to define implementation guidelines and cost estimation. • Support the implementation of this eCHIS Strategy within their jurisdictions • Mobilize and allocate resources for the implementation and monitoring of the eCHIS Strategy at health facility level. • Building capacity at the county level • Joint monitoring of compliance of eCHIS Strategy • Periodic review of eCHIS Strategy compliance at the county level • Enforce facility-level adherence to eCHIS implementation process
Sub-county level	• Train the community health personnel and the CHVs • Provide technical support • Upload data to KHIS • Build capacity at the sub-county level • Monitor compliance of eCHIS Strategy at the sub-county level • Periodically review eCHIS Strategy compliance at the sub-county level
Health Facility	• Maintain data on referrals • Review and submit the CHU data
Community Units/ CHVs/CHA	• Collect data from the household • Submit the data to the supervisor • Adhere to the eCHIS Strategy at the community level • Ensure client enrolment at the community level • Maintain eCHIS at the community level • Build capacity at the facility level • Monitor compliance of eCHIS Strategy at the community level • Periodically review eCHIS Strategy compliance at the community level

Figure 4: Inter-Agency Coordination Committee Structure



5.4.2. Partnership and Collaboration

In the implementation of the eCHIS strategy, the MOH and counties recognize the important role played and contribution made by the health sector stakeholders. This will not only require close coordination for the realization of improved results but will also require leveraging of resources. To this end, a concerted effort will be made by the key sector stakeholders to forge close collaboration under the leadership of the national MOH and the counties. The MOH and counties shall provide leadership and coordination of various stakeholders and players in the process, including but not limited to taking lead role in review progress, initiating modification, sustaining the implementation efforts and general administration in ensuring adherence with all other aspects of the strategy.

Table 10: eCHIS Stakeholders Implementation Roles

Stakeholder	Current role	Role related to digitization of community health
MOH – Community Health	Technical lead in community health strategy, guidelines, reporting	Ensure implementation at community levels. Share feedback with the TWG for reviews. Set national level guidelines and framework to enable roll out including capacity building plans, integrated curricula
MOH – HIS	Technical lead in digitization and data management policies adoption, eHealth policy implementation	Provide oversight and general guidelines on the implementation of eCHIS
MOH – ICT	Technical lead on ICT infrastructure definition and implementation, system development and implementation technical components	Ensure technology soundness by providing required infrastructure

Council of Governors	County policies, operationalization	Consolidate county experiences for sharing and community of practice. Operationalize the use of eCHIS in service delivery through health committee
County HMT	Lead the eCHIS implementation in the county	Implementation guidance in the County and sub county levels
WHO	Strategic technical support for HIS including guidelines and human resources; Design and pilot funding $4 million	Partnership support including resources
Development Partners	Strategic technical support and funder of Palladium and Health IT	Partnership support including resources
UNICEF	Implementer, developed the ICHIS	Partnership support including resources
AMREF Health Africa	Implementer, developed Leap, GF principal recipient for Malaria, TB and USAID funded, Coordinating J & J funding $3M	Partnership support including resources
Kenya Red Cross Society	Implementer, GF principal recipient for HIV CSO grant, Coordinator of funding for 34k CHV training	Partnership support including resources
Living Goods	Technical advisor, Implementer, 7 counties	Partnership support including resources
Financing Alliance	CHS, Financing and costing support to the MOH	Partnership collaboration support including resources
Local Universities	Pre-service training	Spearhead action research, innovation, and review for improvement

5.5. The eCHIS M&E Framework

The purpose of this M&E framework is to enable stakeholders to measure the achievements of eCHIS implementation. It provides guidance in reviewing the eCHIS implementation process and required modification. This is a living tool which will move the strategy to the achievement of intended goals and objectives. It looks at the high-level measurement that will allow for periodic review.

Table 11: Strategy M&E Framework

Objective Statements

Goal: Robust national electronic community health information system with improved access and quality community health services that attain the highest possible standard of health.

Strategic Objective 1: Strengthened governance and leadership for enhanced coordination and implementation of community health services	Number of ICC/TWG meetings held	Minutes/Reports	**2**	**4**	**4**	**4**	**4**
Strategic Objective 2: Standardized quality of service delivery occasioned by defined workflows, standard platform for data collection and reporting for community health services by 2023.	Functional Requirements Available to guide system improvement	Minutes and reports Documented guidelines, data tools and advisories	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Strategic Objective 3: Improved MOH capacity to support development and implementation of an integrated eCHIS developed as part of the DHP	Cumulative Proportion Community Units and National Data centre Infrastructure running optimized system	Implementation Reports and Service desk reports	**10%**	**50%**	**100%**	**100%**	**100%**
Strategic Objective 4: Improved capacity of the community health workforce to generate and use quality data that sustains the Community Health Services	Cumulative Proportion of targeted providers and managers receiving relevant training by Cadre	Meeting and Training records	**10%**	**50%**	**100%**	**100%**	**100**
Strategic Objective 5: Improved quality of community health services through monitoring and evaluation of key performance indicators at all levels	Incidences of Data Use in policy formulation and decision making	Data quality Assessments, Service Delivery Assessments, Mid-term, and end-term evaluation	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**

6. Chapter Six: Costed Implementation Plan

6.1 Costing Approach

This strategy will adopt Activity-Based Costing. Under this approach costs will be driven by activities and quantities required to achieve the strategic objectives. Costs were based on standard MOH mid-points for respective prices and have not been adjusted for inflation. These costs as represented by interventions will provide annual investment requirements and facilitate resource mobilization.

Costing will be done for the following components.

Infrastructure – the cost of setting up and running.

Software technical capacity –HR software engineers etc.

Training of users (national, county, sub-county, facility, CHU, CHAs, CHVs)

Network connectivity (network black spots)

Operational logistics (airtime and device management-loss, repairs, replacing)

Management

6.2. Costing Assumptions

Costs have been allocated assuming price stability, governance-based on devolved units, centralized development and distributed deployment, availability of DHA infrastructure and political and policy goodwill to implement the strategy.

6.3. Resource Mapping for eCHIS

Pooling of resources is key to the implementation of this initiative. The MOH and other line ministries including the sector stakeholders will leverage resources, directing them to thematic areas for implementation of the strategy. These resources are both technical and materials including system development, network installation, human resources, and tools for delivering, network connectivity and personnel cost.

6.3.1 Costed implementation plan by strategic objectives

Implementing all the five strategic objectives over the 5 years' period will attract a cost of KSH. 5,221,215,600, distributed as follows: The first year KSH. 1,756,483,320, second year KSH. 1,940,766,920, third year KSH. 2,599,008,770 fourth year KSH. 167,422,320, fifth year KSH. 113,141 ,520

Table 12: Costed Strategy Implementation Plan

Intervention	Budget Estimate 2020/2021	Budget Estimate 2021/2022	Budget Estimate 2022/2023	Budget Estimate 2023/2024	Budget Estimate 2024/2025	Total
Strategic Objective 1: Strengthened governance and leadership for enhanced coordination and implementation of community health services						
1. Establish and institutionalize a coordination mechanism for eCHIS implementation at national and county levels	69,753,400	1,160,000	1,160,000	1,160,000	1,160,000	**82,153,400**
2. Resource mobilization and advocacy for inclusion of eCHIS implementation requirements in MOH budget	1,080,000	-	-	-	-	**1,080,000**
3. Monitor implementation process and overall performance against health sector strategic objectives	432,400	462,400	4,428,000	4,422,800	4,428,000	**14,173,600**
4. Provide supportive supervision and risk management of eCHIS implementation.	411,000	481,000	411,000	411,000	411,000	**2,125,000**
	71,676,800	2,103,400	5,999,000	5,993,800	5,999,000	**99,532,000**
Strategic Objective 2: Improved quality of community health services through monitoring and evaluation of key performance indicators at all levels						
Review and improve existing indicators to take full advantage of digital tools and emerging needs	4887500	0	0	0	0	**1957500**
Develop criteria for selecting community units for testing and piloting technology.	13709800	0	0	0	0	**13709800**
Formulate and implement success matrices for judging the maturity level of the technology for the purposes of national scale up	0	811000	0	0	0	**811000**
Implement routine supervision and quality assurance of the eCHIS including Service Quality Assessment	13,163,120	8,813,120	8,813,120	8,813,120	8,813,120	**48,415,600**

Intervention	Budget Estimate 2020/2021	Budget Estimate 2021/2022	Budget Estimate 2022/2023	Budget Estimate 2023/2024	Budget Estimate 2024/2025	Total
Develop and implement Data Quality Assurance (DQA) strategies for validating the integrity of reports post eCHIS deployment	0	81538400	73113400	73113400	73113400	**300878600**
	31,760,420	**91,162,520**	**81,926,520**	**81,926,520**	**81,926,520**	**365,772,500**

Strategic Objective 3: Improved MOH capacity to support development and implementation of an integrated eCHIS developed as part of the DHP						
Support ICT equipment and facilitation for community health workers	76,762,500.00	594,900,000.00	815,587,500.00	52,250,000.00	-	**1,539,500,000.00**
Support ICT infrastructure including centralized servers and monitoring infrastructure	7,580,000	-	-	-	-	**7,580,000**
Support the development and implementation of an eCHIS that support service delivery at community level and integrates with other systems in the health sector as per the standards	37,476,000	43,902,000	43,902,000	15,960,000	15,960,000	**157,200,000**
	121,818,500	638,802,000	859,489,500	68,210,000	15,960,000	**1,704,280,000**

Strategic Objective 5: Improved capacity of the community health workforce to generate and use quality data that sustains the Community Health Services						
Conduct a training needs assessment	3,381,000					**3,381,000**
Develop and revise eCHIS training package	4,410,000		4,410,000			**8,820,000**
Validation of ECHIS training manuals	4,823,900					**4,823,900**
Orientation of County Leadership on eCHIS capacity building Strategy for buy-in and ownership	10,897,500	8,718,000	11,987,250			**21,795,000**
Training of National ToTs, Technical team, and Content Management in the MOH Virtual Academy	2,970,000					**2,970,000**

Intervention	Budget Estimate 2020/2021	Budget Estimate 2021/2022	Budget Estimate 2022/2023	Budget Estimate 2023/2024	Budget Estimate 2024/2025	Total
MOH Virtual Academy Dry run		1,740,000				**1,740,000**
Training of Sub-counties	12,939,000	10,351,200	14,232,900			**25,878,000**
Training of Community Health Assistants	138,216,000	110,572,800	152,037,600			**276,432,000**
Orientation of Facility Teams	51,300,000	41,040,000	56,430,000			**102,600,000**
Training of Community Health Volunteers	1,148,750,000	919,000,000	1,263,625,000			**2,297,500,000**
Orientation of Community Health Committees Members	152,750,000	122,200,000	168,025,000			**305,500,000**
	1,530,437,400	**1,213,622,000**	**1,670,747,750**	**-**	**-**	**3,051,439,900**
TOTALS	**1,755,693,120**	**1,945,689,920**	**2,618,162,770**	**156,130,320**	**103,885,520**	**5,221,024,400**

Table 13: Resource Mapping

Category	Required Resources	Total(ksh)
Infrastructure setting up and running costs -budget	Servers (virtual or physical)	**4,500,000**
	Phones for CHVs	**1,140,000,000**
	Solar chargers (areas with no electricity – 10%)	**128,250,000**
	Laptops for national developers	**3,080,000**
	Tablets for CHAs	**142,500,000**
	Hosting costs (virtual servers)	**1,500,000**
	Devise replacement (obsolete after 3 years)	**5,833,000**
		1,425,663,000
Software technical capacity – HR-software engineers	Software Design and development Technical services	**39,000,000**
	Staff costs (software engineers)	**118,200,000**
		157,200,000
Capacity Building	Training curricula development	**17,024,900**
	Training of master Trainers and ToTs	**2,970,000**
	Virtual Academy	**1,740,000**
	Community Health Committee	**305,500,000**

Category	Required Resources	Total(ksh)
	County supervisor trainings	**21,795,000**
	Sub-County supervisor trainings	**25,878,000**
	Facility trainings	**102,600,000**
	CHAs training	**276,432,000**
	CHVs trainings	**2,297,500,000**
		3,051,439,900
Network Connectivity –budget	Airtime & data bundles for CHVs	**24,000,000**
	Airtime & data bundles for supervisors:	**21,167,000**
	CHAs	**24,000,000**
		69,167,000
Operational logistics Airtime and infrastructure service	Device (phone/tablet/laptop/server) repairs and maintenance	**52,250,000**
		52,250,000
Management –budget	National cost to support end-to-end system management (data collection, verification, transmission etc.)	**465,304,500**
		465,304,500
Total		**5,221,024,400**

6.4. Resource Mobilization Plan

The Resource Mobilization Plan considers how MOH will be able to deliver the expected funding and other requirements by strengthening coordination with counties, advocacy for internal allocation and external partners., delivered through improved internal capacity. eCHIS costs are designated for three areas: investment expenses, operational/implementation costs, and coordination costs.

Investment Costs

These costs cover input to develop and implement the eCHIS. They include infrastructure, capacity-building and coordination costs required to develop, test, and implement the eCHIS in all the targeted community units. The MOH will identify costs related to system development and human resources, ICT infrastructure and

Implementation Costs

Initial investment costs will need to be sustained by ensuring that wraparound services are optimized towards sustained use of the digital platform. These costs include help-desk services, telecommunication costs, equipment maintenance and continued improvement of the platform and provider capacity.

Coordination Costs

These are costs geared towards governance and sustainable use of the eCHIS. These include governance and TWG costs, quality assessment activities and related policy-level interventions.

In realizing the resource mobilization plan, the MOH will strategically utilize three elements per the table below.

a) Resource needs

b) Resource providers

c) Funding mechanisms

Table 14: Resource Requirements, and Proposed Sources

eCHIS Resource needs	Experts – skills, competencies
	Cascaded capacity building costs
	ICT Infrastructure : phones, tablets, computers, servers
	Monitoring and evaluation activity costs
	Governance and coordination costs
Mechanisms for resource mobilization	Resource mobilization and advocacy meetings
	Developing private sector investment plan
	County alignment meetings
	Budget advocacy for internal
	Visibility education materials
	Technical assistance and consultancies
	Matching funds with donor thematic areas
Envisaged resource providers	National Ministry of Health and County Health Departments
	Multilaterals
	Bilateral
	Foundations
	Corporates
	Private Sector – Public Private Partnership
	Donations
	In-kind support

Table 15: Mobilization Strategies by Cost component

Resources	Mobilization strategy	Notes
Training curricula and ToTs (curriculum development costs, training costs for master ToTs) Supervision costs for national team (transport, airtime, allowances) Human Resource costs for national team (M&E/quality control unit) Hardware costs for national team (servers and supervisor tablets) - Coordination & communication costs for national team (airtime, data bundles/internet connectivity costs)	Ministry of Health budget	MOH to shoulder national costs while counties will shoulder theirs. However local arrangements can be made with development partners
Supervision costs for entire county teams (transport, airtime, lunches) Human Resource costs (CHV stipends, supervisor salaries, HRIO salaries) HRH training costs (CHV and supervisor allowances, training materials, venues) Hardware costs (CHV phones and supervisor tablets) Communication costs (airtime, data bundles/internet connectivity costs)	County budgets	Counties to shoulder county costs while counties will shoulder theirs. However local arrangements can be made with development partners
Human resources for systems management and maintenance (staff salaries) Hardware (servers – whether housed locally or cloud based) Software (dashboards, software upgrades & updates, security patches, data security) Training costs for staff (allowances, training materials, venues)	Ministry of ICTs budget	
Meeting costs (venue, meals, allowances) Consultant costs to drive the process. Communication costs (airtime and data bundles)	Proposal writing for grant application	
Hardware (phones & tablets) from companies e.g., Samsung, Nokia, Techno, Huawei Solar chargers for areas with no electricity Airtime and data bundle packages from Telcos – Safaricom, Airtel, Telkom, Equitel Communications mast installation in underserved regions – Telcos like Safaricom, Airtel, Telkom, Equitel	Corporates –CSR	These are primarily MOH and County costs. CSR is only plan B, subject to negotiations. MOH to negotiate agreements with corporations willing to support CSR donations (to ensure uniformity across board)
Hardware (phones and tablets for CHVs and supervisors) Solar chargers for areas with no electricity Software development costs (apps and dashboards) HRH training costs (CHV and supervisor allowances, training materials, venues) Communication costs (airtime, data bundles/internet connectivity costs) Supervision costs (transport, airtime, allowances) Training curricula and ToTs (curriculum development costs, training costs for master ToTs)	NGO and CSO contributions	These are primarily MOH and County costs. CSOs are only plan B subject to direct negotiations

6.5 Implementation Phases

The implementation of the strategy will be phased and will encompass three major areas. It is assumed that the first phase, including leadership coordination and formation of the technical working group, will have been undertaken by the MOH. The three major phases will include testing and prototyping the systems, piloting the systems, and based on the results, there will be a review and scale up of the initiative. Detailed implementation steps are included in annex 2.

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Appendix 1: Change Management Plan

Definition: This is a systematic transformation from one state of operation to another. Change management involves a participatory engagement by the stakeholders to execute a set of sequential activities and processes for ease in change uptake and adaptability.

Staged approach: An effective change management process should follow through five stages: change preparedness, change planning, change reinforcement, transition & monitoring.

Framework to use: Formulate a Change Decision Tree to support decision making in understanding the business state and assess whether a change is necessary and the stage in which it can be introduced. Below is the change management framework depending on the business state.

Business State	**Framework** **6-SIGMA**	**Processes**				
Current to eCHIS	**DMAIC** **When improving existing processes** **e.g., where other tools exist**	**Define** 1	**Measure** 2	**Analyze** 3	**Improve** 4	**Control** 5
		Gap analysis Risk planning Stakeholder sensitization Budgeting & resourcing HR mapping; change champions	Perform baseline assessment for future comparison. Review against defined business KPIs	Impact assessment Resistance management	Change prioritization matrix. Product iteration / process modification Capacity building Execution planning Stakeholder communication plan	Phased execution Assess & track. Change control mechanisms. Standardization
Future	**DMADV** **When introducing new processes** **is the only tool**	**Define** 1	**Measure** 2	**Analyze** 3	**Design** 4	**Verify** 5
		Readiness assessment Needs identification. Risk analysis Stakeholder analysis & sensitization Budgeting & resourcing HR mapping; change champions	Conduct a baseline assessment. Performance metrics design; risk, quality, capabilities	Impact assessment Resistance management	Build a re-design plan. Prioritization matrix Benchmark against best practices Stakeholder communication plan Configuration & testing Knowledge transfer Support mechanisms	Phased execution Auditing Learnings documentation Transitioning

Appendix 2: Implementation Plan

The draft implementation plan for phase 2 onwards shall be as outlined below will be executed by the Ministry of Health at National and Sub-National levels with the support of the stakeholders. The mechanism of stakeholder engagement shall be led by MOH.

Phase 2: Test and Prototype		**Responsible**
1. Disseminate Strategy		National
2. Develop detailed system design and specification		National
3. Develop and implement system prototype		National
4. Develop system testing plan		National
5. Digital health tool (s) simulation/testing/ validation		National
		National
6. Change management strategy	6.1: Convene stakeholder meeting and Present draft change management plan	National
	6.2: Incorporate TWG inputs	National
		National
7. Develop training curricula and capacity building plan	7.1: Develop technical Documentation	National
	7.2. Develop ToT manual	National
	7.3. Develop user manual	National
	7.4. Integrate Training material into eLearning content	National
8. Develop M&E plan and end user testing		
	8.1. Finalize eCHIS monitoring toolkit	National
	8.2. Finalize piloting plan	National
Phase 3: Piloting		
1. Pilot in select pilot Counties	1.1: Finalize checklist to guide on select pilot counties	National/Counties
	1.2: Engage the COG and leadership of identified counties for buy-in	National/Counties
	1.3: Convene CHMT buy-in meeting at the select Counties	National/Counties
	1.4: Recurrent Costs	National/Counties
2. Procurement	2.1: Develop and implement checklist to guide procurement of ICT infrastructure	National/Counties
3. Cascaded Trainings	3.1: Conduct trainings of TOTs for Counties, sub-counties, facilities and the CHVs	National/Counties
4. Community sensitization	4.1: Identify community target members for sensitization	National/Counties
	4.2: Conduct community sensitization	National/Counties
5. Review Approaches	5.1: Collect and review pilot data	National/Counties
	5.2: Assess key success criteria and modifications in approach as required	National/Counties
6. Dissemination of Results	6.1: Convene a stakeholder meeting to share the outcome of implementation	National/Counties
	6.2: Incorporate the recommendations	National/Counties
	6.3: Virtual Academy	National/Counties

Phase 4: Scale Up		
1.Scale up strategy/plan:	1.1: Conduct eCHIS implementation review	National
	1.2: Develop eCHIS solution informed by pilot for inform scale-up	National
	1.3: Develop national eCHIS helpdesk system	National
	1.4: Mobilize additional resources and partnerships for sustainability	National
	1.5: Perform regression and user acceptance testing	National
2.Mobilize budget support	2.1: Refine implementation costs based on pilot	National
	2.3: Hold partner resource alignment meetings	National
3.Phased national Implementation (10, 15, 22)	3.1: Procure Equipment	
	3.2: Conduct trainings	National and County
	3.3: Deploy system and equipment	National and County
	3.4: Phased transition from paper systems	National and County
	3.5: Recurrent costs	National and County
	3.6: Service Quality Assessments	National and County

Appendix 3: ECHIS COSTED IMPLEMENTATION PLAN

Purpose and Aim of the eCHIS Digitization Strategy.

The purpose of the strategy document is to provide a framework to guide the digitization of community health services in Kenya, as well as streamline the implementation of existing digital interventions within the sector.

To achieve this the implementation of this strategy focuses on the following costed strategic objectives.

Strategic Objective 1. To strengthen eCHIS governance and leadership for enhanced coordination and implementation of Community Health Services

This will entail dissemination of the strategy to ensure all stakeholders are sensitized to align themselves to the digitization strategy.

Conduct Coordination meetings there will be stakeholders meeting at both levels of government this will be in the form of technical working groups and interagency coordinating committees. These meetings will happen quarterly over the five years' implementation period; in these forums they are expected to communicate and advocate for implementation of the system, plan for the implementation of the strategy, forge partnerships, carry out quality improvement on the system, provide oversight to ensure compliance to the laws and standards, resource mobilization and performance monitoring.

These interventions will be accomplished at a cost of Ksh. 93,336,000 most of the cost drivers will be concentrated in the first year to prepare the ground for implementation of the system.

Strategic Objective 2: Improved data use for policy and evidence-based planning for community health services Conduct and test prototype the eCHIS

The costed interventions under this Strategic Objective focuses on piloting the eCHIS to bring out issues that need to be addressed before implementation at a national scale.

The prototyping will entail piloting the system, the lessons drawn from the pilot will guide in formulating the success matrices for judging the maturity level of the technology to be implemented at a national scale. This will also guide the reviewing of the eCHIS indicators that will be monitored when the system is implemented at scale.

Institute strategies that will ensure the data generated by eCHIS is of good quality data to inform policy. This will be achieved by developing a data quality protocol.

Monitor the quality of services by conducting an assessment.

These interventions will be actualized at a cost of KSH. 373,149,700 most of the cost drivers are toward improving the quality of service and data.

Strategic Objective 3: To provide standard platform for data collection and reporting amongst stakeholders at community level by 2023 and Strategic Objective 4: To provide a digital platform that integrates community health service delivery.

The interventions in these strategic objective focus on providing the infrastructure and human resource that will establish a national electronic community health system. The system will integrate with other national system as well as provide a platform whereby the different systems being implemented at community level can plug in as long as they meet the minimum standards outline in the digitization strategy.

This will require purchasing and setting up the infrastructure that will host and support the running of the system and having in place the prerequisite human resources. This will be actualized at a cost of KSH.1,704,280,000 which will cater for the infrastructure cost (ICT equipment), salaries of the human resource, mobile reporting devices for the CHVs, and recurrent costs of maintain and running the system most of the cost drivers will be concentrated in the first 3 years where mobile devices for the CHVs will be procured in a phased manner.

Strategic Objective 5: To improve the capacity of the community health workforce to generate and use quality data that sustains the Community.

The interventions in this strategic objective focus on equipping the users of the system with the prerequisite knowledge required both at the national and county level.

The training will adopt a mix of approaches incorporating online training through the virtual academy, in class training and on the job training.

The physical training will train national master trainers who will then train county trainers to cascade the training up to the CHV level.

A training needs assessment will be done before developing the training package for the physical training and the virtual academy and conduct the training. This will be undertaken at cost of KSH. 3,050,449,900 over a three years' period. the cost drivers being the trainings.

Total cost

Implementing all the five strategic objectives over the 5 years' period will attract a cost of KSH. 5,221,215,600. Distributed as follows; The first year KSH. 1,756,483,320, second year KSH. 1,940,766,920, third year KSH. 2,599,008,770 fourth year KSH. 167,422,320, fifth year KSH.113,141 ,520

NB: The timeline and costs may potentially be reduced by adopting and improving upon an existing eCHIS platform such as the Community Health Toolkit (CHT) developed by Medic Mobile.

Detailed eCHIS Implementation Costed Plan

Intervention	Tasks	2020/2021	2021/2022	2022/2023	2023/2024	2024/2025	Total
Strategic Objective 1: Strengthened governance and leadership for enhanced coordination and implementation of community health services							
1. Coordination National & County	Dissemination of Strategy	11,808,000					11,808,000
	Hold coordination meetings at National Level-HIS ICC meetings	320,000	320,000	320,000	320,000	320,000	**1,600,000**
	Hold Quarterly TWG meetings at National Level	840,000	840,000	840,000	840,000	840,000	**4,200,000**
	Conduct quarterly TWG and coordination meetings at County Level (this also includes stakeholders)	56,785,400					**56,785,400**
	Develop a Communication and Advocacy plan						**7,760,000**
2. Resource mobilization		-					**-**
	Develop and disseminate Resource Mobilization Strategy at the County Level	1,080,000					**1,080,000**

Intervention	Tasks	2020/2021	2021/2022	2022/2023	2023/2024	2024/2025	Total
3. Performance monitoring	Develop a Checklist document to be used during the supervision rounds		30,000				**30,000**
	Supervision of the Implementation of the eCHIS	432,400.0	432,400				**864,800**
	Conduct a Mid and end term Review of the implementation of the eCHIS strategy at National and County Level			1,684,000		1,684,000	**3,368,000**
	Recognition of best practice				3,714,800		**3,714,800**
5. Oversight and Risk Management	Create a mechanism for auditing compliance		70,000				**70,000**
	Identification and documentation of risks	411,000.0	411,000	411,000	411,000	411,000	**2,055,000**
Total		**71,676,800**	**2,103,400**	**3,255,000**	**5,285,800**	**3,255,000**	**93,336,000**
Strategic Objective 2: Improved data use for policy and evidence-based planning for community health services Conduct and test prototype the eCHIS.							
Review and improve eCHIS indicators							
	Indicators validation	1,957,500					**1,957,500**
	Indicators/ output review during pilot	2,930,000					**2,930,000**
Piloting of eCHIS							
	Protocol Development	3,450,000					**3,450,000**
	Inception meeting	4,810,000					**4,810,000**
	Data Review meeting	3,410,000					**3,410,000**
	QA Activities	-					**-**
	Dissemination	1,810,000					**1,810,000**
Formulate success matrices for judging the maturity level of the technology for the purposes of national scale up.							

Intervention	Tasks	2020/2021	2021/2022	2022/2023	2023/2024	2024/2025	Total
	Orientation on the digital maturity model and tool		166,000				**166,000**
	National Workshop to conduct the digital maturity assessment		645,000				**645,000**
	Dissemination of the digital maturity model tool		827,000				**827,000**
Service Quality Assessment	Tools Development	4,350,000					**4,350,000**
	Data Collection	5,445,120.0	5,445,120	5,445,120	5,445,120	5,445,120	**27,225,600**
	Data analysis	1,270,000.0	1,270,000	1,270,000	1,270,000	1,270,000	**6,350,000**
	Report Writing	2,098,000.0	2,098,000	2,098,000	2,098,000	2,098,000	**10,490,000**
Develop Data Quality Assurance (DQA) strategies for validating the integrity of reports post eCHIS deployment	Develop eCHIS DQA Protocol		4,125,000				**4,125,000**
	Validation of DQA protocol		825,000				**825,000**
	Establishing ToT capacity at national level		4,475,000				**4,475,000**
	Dissemination of the tools at national level		2,850,000				**2,850,000**
	Training on DQA protocol, tools, and checklists		27,062,500	27,062,500	27,062,500	27,062,500	**108,250,000**
	Routine DQA data check at CU level		25,000,000	25,000,000	25,000,000	25,000,000	**100,000,000**
	Field visits for quarterly data checks at the facility and CU levels		12,500,000	12,500,000	12,500,000	12,500,000	**50,000,000**
	Quarterly feedback meetings at county level		8,550,900	8,550,900	8,550,900	8,550,900	**34,203,600**
Total		**31,530,620**	**95,839,520**	**81,926,520**	**81,926,520**	**81,926,520**	**373,149,700**
Strategic Objective 3: To provide standard platform for data collection and reporting amongst stakeholders at community level by 2023							
Strategic Objective 4: To provide a digital platform that integrates community health service delivery							
ICT equipment and facilitation for community health workers	Purchase of tablets for CHAs	7,125,000.00	57,000,000	78,375,000			**142,500,000**

Intervention	Tasks	2020/2021	2021/2022	2022/2023	2023/2024	2024/2025	Total
	Purchase of mobile phones for CHVs	57,000,000.00	456,000,000	627,000,000			**1,140,000,000**
	Data bundles for CHAs' tablets	1,200,000.00	4,800,000	6,000,000	6,000,000	6,000,000	**24,000,000**
	Data bundles for CHVs' mobile phones	1,200,000.00	4,800,000	6,000,000	6,000,000	6,000,000	**24,000,000**
	Solar chargers	7,837,500.00	62,700,000	86,212,500			**156,750,000**
	Repair & Maintenance				52,250,000		**52,250,000**
ICT equipment and facilitation for national eCHIS staff	Purchase of laptops for project managers and software engineers (senior and junior)	1,400,000					**1,400,000**
	Purchase of laptops for business analyst, help desk staff and software testers	1,680,000					**1,680,000**
ICT equipment for eCHIS data center	Purchase of primary and secondary servers to host the eCHIS	1,500,000					**1,500,000**
	Support Service Care Pack	1,500,000					**1,500,000**
	Purchase of auxiliary server equipment including racks, routers, switches, cables etc..	1,500,000					**1,500,000**
Salaries for national eCHIS staff	Remuneration for project manager/ technical lead	4,200,000	4,200,000	4,200,000	4,200,000	4,200,000	**21,000,000**
	Remuneration for assistant project manager/ technical lead	3,060,000	2,970,000	2,970,000			**9,000,000**
	Remuneration for business analyst	3,060,000	2,970,000	2,970,000			**9,000,000**
	Remuneration for lead senior software engineer	3,600,000	3,600,000	3,600,000	3,600,000	3,600,000	**18,000,000**
	Remuneration for senior software engineers	9,180,000	8,910,000	8,910,000			**27,000,000**
	Remuneration for long term junior software engineers	2,160,000	2,160,000	2,160,000	2,160,000	2,160,000	**10,800,000**

Intervention	Tasks	2020/2021	2021/2022	2022/2023	2023/2024	2024/2025	Total
	Remuneration for short term junior software engineers	11,016,000	10,692,000	10,692,000			**32,400,000**
	Remuneration for long term software tester	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	**6,000,000**
	Remuneration for short term software tester		2,400,000	2,400,000			**4,800,000**
	Remuneration for help desk staff		4,800,000	4,800,000	4,800,000	4,800,000	**19,200,000**
Total		**119,418,500**	**629,202,000**	**847,489,500**	**80,210,000**	**27,960,000**	**1,704,280,000**
Strategic Objective 5: To improve the capacity of the community health workforce to generate and use quality data that sustains the Community Health Services							
Conduct a training needs assessment		3,381,000					**3,381,000**
Developing ECHIS training package		8,820,000					**8,820,000**
Validation of ECHIS training manuals		4,823,900					**4,823,900**
Orientation of County Leadership on eCHIS capacity building Strategy for buy-in and ownership		10,897,500	8,718,000	11,987,250			**21,795,000**
Training of National ToTs and Content Management in the MOH Virtual Academy		1,980,000					**1,980,000**
MOH Virtual Academy Dry run			1,740,000				**1,740,000**
Training of Sub-counties		12,939,000	10,351,200	14,232,900			**25,878,000**
Training of Community Health Assistants		138,216,000	110,572,800	152,037,600			**276,432,000**
Training of facility teams		51,300,000	41,040,000	56,430,000			**102,600,000**
Training of Community Health Volunteers		1,148,750,000	919,000,000	1,263,625,000			**2,297,500,000**

Intervention	Tasks	2020/2021	2021/2022	2022/2023	2023/2024	2024/2025	Total
Orientation of Community Health Committees Members		152,750,000	122,200,000	168,025,000			**305,500,000**
Total		**1,533,857,400**	**1,213,622,000**	**1,666,337,750**	**-**	**-**	**-3,050,449,900**
TOTALS		**1,756,483,320**	**1,940,766,920**	**2,599,008,770**	**167,422,320**	**113,141,520**	**5,221,215,600**

Resource Requirements by Level of Implementation National level costs will include national infrastructure, system development and support, development of training package and national coordination costs at an estimated cost of Kshs 1,567,100,900. County costs will include the cost of devices, capacity building at sub counties, facilities, CHU and CHWs. The total cost of eCHJIS implementation allocated to counties will be Kshs. 3,638,161,400 which accounts for 70% of the overall costs. On average it will cost Kshs. 513,866 to train and equip a Community Health Unit and an average of Kshs. 103,866,460 to implement eCHIS per County. These costs include Tablets, mobile phones, solar chargers, trainings of sub county teams up to the community health volunteers.

National Costs

Category	Required Resources	Total(ksh)
a) eCHIS hosting environment		
Infrastructure setting up and running costs -budget	Servers (virtual or physical)	4,500,000
	Phones for CHVs	1,140,000,000
	Solar chargers (areas with no electricity – 10%)	128,250,000
	Laptops for national developers	3,080,000
	Hosting costs (virtual servers)	1,500,000
	Devise replacement (obsolete after 3 years)	5,833,000
Sub Total		**1,283,163,000**
b) eCHIS Tech team		
eCHIS Tech team related cost	Software Design and development Technical services	39,000,000
	Staff costs (software engineers)	118,200,000
	Laptops for national developers	3,080,000
Sub Total		**160,280,000**
c) eCHIS recurring cost national		
Recurring costs	Servers/hosting SLAs and maintenance cost	1,500,000
	Tech team capacity building: Capacity building on eCHIS support areas (field support)	891,000
Sub Total		**2,391,000**
d) Capacity Building – National level	Training curricula development	17,024,900
	Training of master Trainers and ToTs	2,970,000
	Content Management in the MOH Virtual Academy	1,740,000
Management –budget	National cost to support end to end system management (data collection, verification, transmission etc.)	99,532,000
Sub Total		**121,266,900**
National Costs		**1,567,100,900**

County level (all counties)

Category	Required Resources	Total(ksh)
a) ICT infrastructure	Phones for CHVs	1,140,000,000
	Solar chargers (areas with no electricity – 10%)	128,250,000
	Tablets for CHAs	142,500,000
	Device replacement (obsolete after 3 years)	5,833,000
Sub Total		**1,416,583,000**
a) Capacity Building – County level	Community Health Committee	305,500,000
	County supervisor trainings	21,795,000
	Sub-County supervisor trainings	25,878,000
	Facility trainings	102,600,000
	CHAs training	276,432,000
	CHVs trainings	2,297,500,000
Sub Total		**3,051,439,900**
b) Recurring costs		
Internet Connectivity –budget	Airtime & data bundles for CHVs	24,000,000
	Airtime & data bundles for supervisors: county/ national	21,167,000
	CHAs	24,000,000
Sub Total		**69,167,000**
c) Operational logistics Airtime and infrastructure service	Device (phone/tablet/laptop/server) repairs and maintenance	52,250,000
Sub Total		52,250,000
Management –budget	County costs to support end to end system management (data collection, verification, transmission etc.)	341,646,600
Sub Total		**465,304,500**
Total County Costs		**3,638,161,400**
Total		**5,221,024,400**

Average County Cost

Cost Category	Description	Cost Per CHU	Average County Cost
Investment Costs			
Tablets and Devices		154,000	**31,127,660**
Training	Sub-Counties	2,724	**550,596**
	Community Health Assistants	29,098	**5,881,532**
	Facility Teams	10,800	**2,182,979**
	Community Volunteer	241,842	**48,882,979**
	Community Health Committee	32,158	**6,500,000**
Recurrent Costs			**-**
Data and Connectivity		7,281	**1,471,638**
Field Support including DQA		35,963	**7,269,077**
Total		**513,866**	**103,866,460**

Appendix 4: eCHIS Membership Matrix; List of Contributors

Steering Co.

Ag. Director, Medical Service/Preventive and Promotive Health: Dr. Pacifica Onyancha

Head, Department of Health Research, Monitoring & Evaluation and Health Informatics; Dr. Joseph Sitienei
Ag. Head, Directorate of Health Research, Policy, Monitoring & Evaluation and Informatics; Dr. Ayub Manya
Head, Department of Primary Health Care; Dr. Salim Hussein
Head, Division of Community Health; Dr. Maureen Kimani
Head, ICT; Jane Otoko
Head, Division of Health Informatics; Onesmus Kamau
Council of Governors; Benter Owino

Overall Technical Leadership by MoH
Head, Department of Primary Health Care; Dr. Salim Hussein
Assisted by; Division of Community Health: John Wanyungu
And; Division of Health Informatics: Jeremiah Mumo

Secretariat
Division of Community Health: Hillary Chebon
Division of Health Informatics: Diane Kamar
Supported by; Living Goods Lesley Githinji

Short Term Technical Assistants
Health Systems and Community Health Expert; George Owiso
Digital Health Information Systems Expert; Gitahi Ng'ang'a

Working Group (Sub Committees)	Ministry of Health (MoH)	MoH Representative	Partner Name	Partner Representative Name
Policy and Leadership	**Division of Community Health**	John Wanyungu	AMREF	George Oele
	Division of Health Informatics	Pepela Wanjala	UNICEF	Rose Njiriani
	Division of Health Informatics	Onesmus Kamau	LWALA	Danielle Ressler
	Division of Community Health	Beth Gikoyo	REDCROSS	Miriam Mbembe
	Division of Community Health (intern)	Evans Omalla	JICA	Elijah Kinyangi
	Council of Governors	Benter Owino	PATH	John Paul Omollo
	Division of Health Informatics	Dr. Ayub Manya	LVCT Health	Prof Miriam Taegtmeyer
	Head, ICT	Jane Otoko	LVCT	Dr. Lilian Otiso
	Central Planning and Project Monitoring Department	David Njuguna	USAID	Peter Waithaka
			USAID	Mildred Shieshia
			HealthIT	Oliver Munyao
			Living Goods	Howard Akimala
			Living Goods	Georgine Mbeki
			Living Goods	Ruth Ngechu

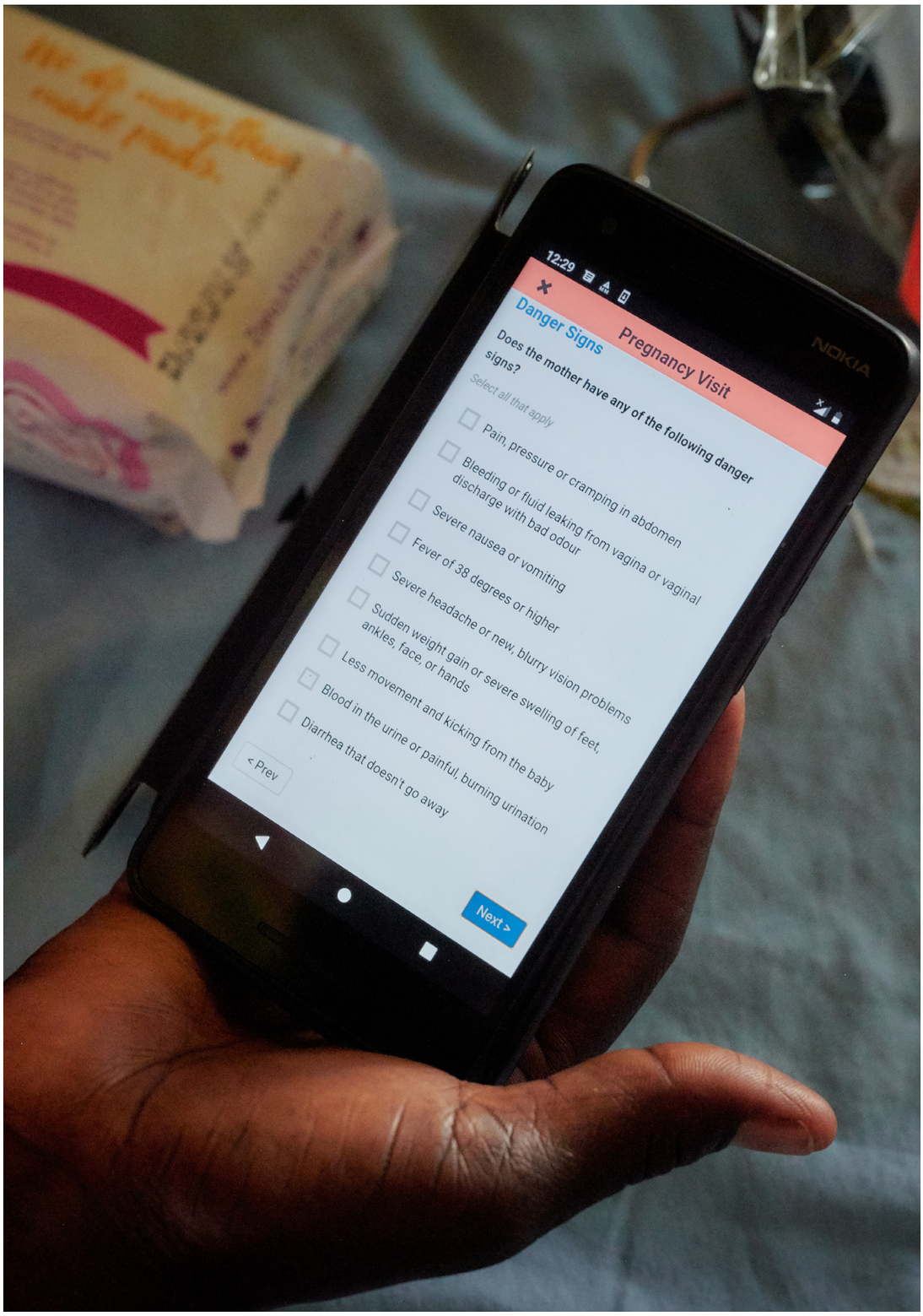
			WHO	Leonard Cosmas Otieno
			Save the Children	Dr. Lynn Kanyuuru
			LVCT Health	Nelly Muturi
			Living Goods	Serah Malaba
			USAID	Duncan Achwoka

Working Groups (Sub Committees)	Ministry of Health (MoH)	MoH Representative	Partner Name	Partner Representative Name
Service delivery and supply chain	**Division of Health Informatics**	Dr. Wesley Oghera	AMREF	George Oele
	Division of Community Health	Jane Koech	UNICEF	Eunice Ndungu
	Division of Community Health	Samuel Kiogora	World Vision	William Omole
	RMNCH - IZ,FP, Nutrition	Bernard Wambu	Save the Children	Linda Misiko
	RMNCH - IZ,FP, Nutrition	Lydia Karimurio	Red Cross	James Osongo
	T B	Simon Ndemo	LVCT	Robinson Karuga
	Malaria	Peter Njiru	Save the Children	Dr. Lynn Kanyuru
	HIV	Rose Ayugi	Living Goods	Michael Kimani
	WASH	Lolem Lokolile	USAID	Andrew Thaiya
	DDSR	Njoroge	USAID	Alex Kinoti
	KEMSA	Abdi Hadun	JSI/InsupplyHealth	Judith Anyona
	Division of Community Health (intern)	Chepkemoi Maureen	JSI/InsupplyHealth	Mercy Lutukai
			LVCT	Linet Okoth
			Living Goods	Serah Malaba

Working Groups (Sub Committees)	Ministry of Health (MoH)	MoH Representative	Partner Name	Partner Representative Name
Capacity building	**Division of Health Informatics**	Nancy Amayo	REDCROSS	James Onsongo
	Division of Community Health	Daniel Kavoo	Jhpiego	Susan Ontiri
	Division of Health Informatics	Sophia Karanja	Save the Children	Linda Misiko
	Division of Health Informatics	Diana Kamar	USAID	Peter Waithaka

	Division of Health Informatics	Paul Malusi	LVCT	Dr. Regeru
	KMTC	Samuel Mwangi	World Vision	Lilian Chebon
	Health Promotion	Dr. Athanasius Ochieng	Intra Health	Sospeter Ndaba
	HRH	Dr. Angela Nyakundi	Living Goods	Austine Odiwour
	Division of Community Health (intern)	Fredrick Oroko	Living Goods	Kenneth Ogendo
			AMREF	Peter Otieno
			Health IT	Charles Mugambi
			LVCT	Linet Okoth
			USAID	Sila Kimanzi
Working Groups (Sub Committees)	**Ministry of Health (MoH)**	**MoH Representative**	**Partner Name**	**Partner Representative Name**
Technology	**Division of Community Health**	Hillary Chebon	Living Goods	Sheila Mutheu
	Division of Health Informatics	Jeremiah Mumo	Health IT	Felix Ongati
	ICT	Rachael Wanjiru	Save the Children	Michael Asiyo
	ICT	Jane Otoko	AMREF	Peter Otieno Kisare
	Division of Health Informatics (intern)	Oscar Odiwour	JSI InSupply Health	Danielson Kennedy
	ICT	Eric Nderitu	Medic Mobile	Simon Mbae
	Division of Health Informatics	Samuel Cheburet	Living Goods	Peter Kamonde
	ICT	Nyokabi Njogu	Medic Mobile	Derick
	Family Health	Timona Ayieko	Medic Mobile	Jane Katanu
	DDSR	Dr. Phillip Ngere	USAID	Brian Onyango
	DDSR	Caroline Maina	Living Goods	Joselyne Chesoli
	DHP	Dickson Kirathie	HealthIT	Oliver Munyao
Working Groups (Sub Committees)	**Ministry of Health (MoH)**	**MoH Representative**	**Partner Name**	**Partner Representative Name**

Quality Management + M&E	**Division of Community Health**	John Wanyungu	Population Council	Dr.Timothy Abuya
	Division of Health Informatics	Gilbert Mboro	Living Goods	Selinah Itale
	Division of Health Informatics	Julius Mutiso	UNICEF	Eunice Ndungu
	Division of Monitoring and Evaluation	Rose Muthee	Palladium Group	Dr. Jacob Odhiambo
	Division of Health Informatics	Diana Kamar	Intra Health	Sospeter Ndaba
	Division of Community Health (intern)	Dorna Khan	Living Goods	Diane Thakura
	Division of Disease Surveillance Response	Jackson Njoroge	Palladium Group	Lilian Mageto
			Save the Children	Geofrey Tanui
			JSI InSupply Health	Danielson Kennedy
			Health IT	Moses Njatha
			USAID	Lydia Odero
			Reuben Momanyi	REDCROSS
			LVCT Health	Linet Okoth



Digitizing and integrating the community heath system with the broader health ecosystem is one of government's key aspirations as part of far reaching health sector reforms to achieve UHC. By leveraging networks of trained, supervised, compensated and digitally enabled CHVs, government can ensure that pregnant mothers and children under age 5 have access to high quality essential health services.

MINISTRY OF HEALTH

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