KISUMU COUNTY DIGITAL HEALTH TRANSFORMATION ROADMAP

2023 - 2028

Transform Health
KENYA

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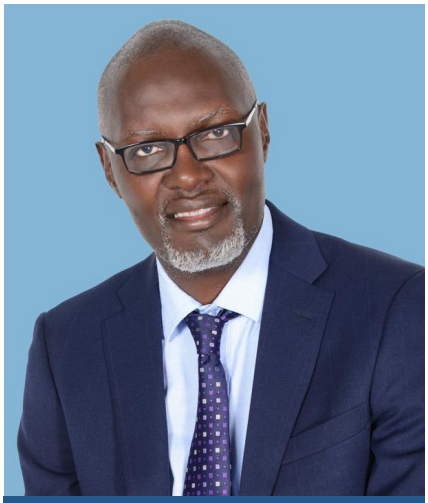
List of Abbreviations

CHP	-	Community Health Promoters
CIDP	-	County Integrated Development Plan
CoK	-	Constitution of Kenya, 2010
CSO	-	Civil Society Organizations
eCHIS	-	Electronic Community Health Information Systems
EMR	-	Electronic Medical Records
HMIS	-	Health Management Information Systems
HIV	-	Human Immunodeficiency Virus
KELIN	-	Kenya Legal and Ethical Issues Network on HIV & AIDS
KEMSA	-	Kenya Medical Supplies Agency
KHIS	-	Kenya Health Information System
NHDC	-	National Health Data Centre
NHIF	-	National Health Insurance Fund
PHC	-	Primary Health Care
PCN	-	Primary Care Networks
TIBU	-	TB Information from Basic Unit
UHC	-	Universal Health Care
WHO	-	World Health Organization

Foreword



Dr. Gregory Ganda

CECM Medical Services, Public Health and Sanitation,
County Government of Kisumu.

The County Department of Health Kisumu (CDH) is mandated to provide quality health services, promote equity in healthcare access, ensure financial risk protection, and oversee governance and stewardship in the health sector. These functions rely heavily on accurate data collected by health facilities and aggregated reports submitted through county structures to the national office. However, manual data collection has proven prone to errors, susceptible to tampering, and demands significant physical storage space.

The shift to electronic data collection offers a promising alternative by ensuring data quality and completeness, reducing storage needs, and incorporating clinical decision support tools that facilitate secure data sharing and validation.

Kenya's healthcare sector has embraced information technology (IT) as a strategic opportunity to enhance service delivery. Unfortunately, the uncoordinated adoption of various IT solutions has led to fragmented systems, where patient data is siloed and unable to support comprehensive reporting or clinical care. To address these challenges, Kisumu County, in collaboration with partners, has developed this Digital Health Transformation Roadmap. The roadmap outlines functional requirements for health systems, covering areas such as Primary Health Care, Laboratory Services, and Pharmacy Management.

Vendors and implementers of digital health solutions will find this roadmap invaluable for improving data quality, reducing paperwork, minimizing errors, and facilitating real-time data accessibility for better decision-making. As technology evolves, the County Division of Digital Health will ensure that this roadmap and its guidelines are reviewed regularly to keep pace with emerging trends and clinical guidelines.

We express our deep gratitude to everyone who contributed to the development of this document. We look forward to continued collaboration to enhance healthcare provision across Kisumu County.

Preface

Digital health solutions have transformed the provision of health care at both the national and county levels. They have contributed tremendously to the realization of positive health outcomes to citizens seeking care at different health facilities in the country. One of the strongest gains has been the identification of patients using a centrally generated unique patient identifier. They ensure that patients are uniquely identified whenever they present at any level of health care provision. They implement clinical decision support based on defined guidelines to ensure that health care provision is consistent. Digital health solutions exist at the community, at different clinics at health facilities, and within institutions providing the commodities required for health care provision.

Digital health solutions are required to be FHIR compliant, being able to take in and output correct formatting of data for exchange with other systems in the Kenya digital health ecosystem. They maintain audit trails that log all transactions conducted in the individual systems, and support the definition of user accounts with appropriate permission for the tasks they are required to undertake.

Results for tests requested for patients should be linked back to the right patients. The quality of the tools used for running tests should be enforced through defined thresholds and should be reviewed at regular intervals. Systems dispensing medication should flag prescribed drugs that are interactive or that have components that a patient is allergic to. Pharmacists should easily determine when they need to restock as well as know in advance when medicines are due for expiry.

Digital health tools should support reporting and data visualization for timely decision-making. They should support patient-level summaries that indicate the response to health care. Support for national aggregate reporting is paramount to meet the monthly obligations of the decision-makers. Further, the systems should provide trend analysis through derived patterns in the health care data for the population seeking health care.

The integrity of data collected, maintained, and exchanged with other digital health solutions should be preserved while in storage or in transmission. Further, the systems should facilitate the maintenance of services and their tariffs to guide billing and payment for the services. All expenses incurred by patients seeking care should be reconciled and charged to the defined financing options

Acknowledgement

Mr. James Odiga

Head-Division of Digital Health,
Department of Medical Services, Public Health and Sanitation, Kisumu County.

This digital health transformation roadmap for Kisumu County was developed through a consultative process that involved several Kisumu County stakeholders responsible for implementing health services in the sector. Representatives from non-state actors particularly the implementing partners participated in the development process. There were two validation workshops including the one held on 30th November 2023 where the document was endorsed by players as a fair document for implementation. However, there was felt need to have another level of consultation to review the document. This led to convening of another four (4) day workshop from 10th – 13th September 2024 attended by the sector participants with leadership provided by the County Health Management (CHMT) team to conduct further review in line with the fast-changing developments in the sector.

Special acknowledgement goes to the Kisumu County leadership led by the CECM Health, Dr Gregory Ganda for providing overall leadership throughout the roadmap development. The contributions by the Kisumu County partners the CHMT and senior health leaders were key in ensuring an inclusive process and county ownership (state and non-state actors).

The development of the transformation roadmap was made possible through financial and technical support from Transform Health Kenya Coalition.

The transformation roadmap has been greatly enriched by insights from the Kisumu County Health Information Exchange and County Data Repository Blueprint. Developed by IntelliSOFT Consulting Limited, these documents reflect your valuable contributions, which we sincerely acknowledge and appreciate.

Successful implementation of this transformation roadmap will require the coordinated efforts and action of all county actors, and the participation of all stakeholders in the sector including the national government.

This transformation roadmap will contribute to the process of partnership planning, sector coordination, partnerships, and monitoring. Full implementation of the transformation roadmap forms the basis for accelerating attainment of universal health coverage and improving the quality of life for the people of Kisumu County.

Prologue: Navigating the Future of Digital Health

Dr Khizra Syed
Digital Health Insurance Systems,
Kisumu County.

In an age defined by rapid technological advancement and an ever-evolving healthcare landscape, the integration of digital health solutions stands as a beacon of hope and innovation. The convergence of technology and medicine promises to transform how we approach health and wellness, empowering individuals, enhancing patient experiences, and optimizing clinical outcomes.

This roadmap is not just a document; it is a vision for a future where digital health is seamlessly woven into the fabric of our healthcare systems. It serves as a guide for stakeholders across the spectrum—providers, payers, technologists, policymakers, and patients—aimed at fostering collaboration, advancing technology, and prioritizing patient-centered care.

Our vision as a department is to provide responsive, sustainable, technologically-driven, evidence based and client centered health services. This involves creating a future where digital health technologies are seamlessly integrated into every aspect of our healthcare system, ultimately enabling better health outcomes, improved patient experiences, and more efficient care delivery

As we embark on this journey, we acknowledge the complexities and challenges inherent in digital health adoption. From ensuring equitable access to safeguarding patient privacy, we must navigate a landscape rife with both opportunities and obstacles. Our commitment is to create an ecosystem where technology enhances human connection, promotes health equity, and drives meaningful outcomes.

Together, let us envision a future where digital health is not just an enhancement of traditional care but a transformative force that redefines the patient experience and reimagines what is possible in health and wellness. Welcome to the roadmap—a pathway to innovation, collaboration, and a healthier tomorrow.

1.0 INTRODUCTION

The government of Kenya has prioritized the rollout of Universal Health Coverage (UHC) by 2030 as a means of attaining Sustainable Development Goal 3 (Good Health and Well-being) and meeting the constitutional requirements of ensuring every Kenyan the right to the highest attainable standard of health, which includes the right to health care services. This aspiration will be realized through strengthening Primary Health Care (PHC).

PHC is defined by the WHO as "essential health care based on practical, scientifically sound, and socially acceptable methods and technology made universally accessible to individuals and families in the community through their full participation and at a cost that the community and country can afford." The aspirations of PHC will be realized through harnessing digital technology and the use of health data to make informed decisions. In Kenya, UHC will be achieved by strengthening the community health system through the empowerment of Community Health Promoters (CHP), implementing Primary Care Networks (PCN), and establishing Multi-Disciplinary Teams.

The government has put in place relevant policy documents such as the Kenya Health Policy, 2014–2030, Health Sector Unique Identification Framework, National Health Data Dictionary (Terminology Services), Health Data Governance Framework, and most recently, the Digital Health Act, 2023. The Health Act, 2017 directs the Cabinet Secretary for Health to develop an integrated, comprehensive health information system. The Act calls for the recognition and incorporation of e-Health as a mode of health delivery. However, digital health implementations raise questions regarding fundamental rights related to personal autonomy, the use of private data, and the disclosure of personal information. To operationalize the Data Protection, Act effectively, it is essential to implement a functional data governance framework. This framework should encompass policies, procedures, and standards that ensure the integrity, confidentiality, and availability of health data. Key components of the data governance framework include:

1. **Data Stewardship:** Assigning roles and responsibilities for data management to ensure accountability and proper handling of health data.
2. **Data Quality Management:** Establishing processes to maintain the accuracy, completeness, and reliability of health data.
3. **Data Privacy and Security:** Implementing measures to protect health data from unauthorized access, breaches, and misuse.
4. **Compliance Monitoring:** Regularly auditing and monitoring data practices to ensure adherence to the Data Protection Act and other relevant regulations.
5. **Consent Management:** Ensuring that data subjects provide informed consent for the collection, use, and sharing of their health data.
6. **Data Lifecycle Management:** Managing health data from creation to disposal, ensuring that data is retained only as long as necessary and disposed of securely.

By integrating a comprehensive data governance framework, health institutions can better manage sensitive health data, uphold the rights of individuals, and comply with the Data Protection Act, 2019.

To guide the sector in implementing digitization, the government has developed the National Digital Health Ecosystem shown in figure 1.

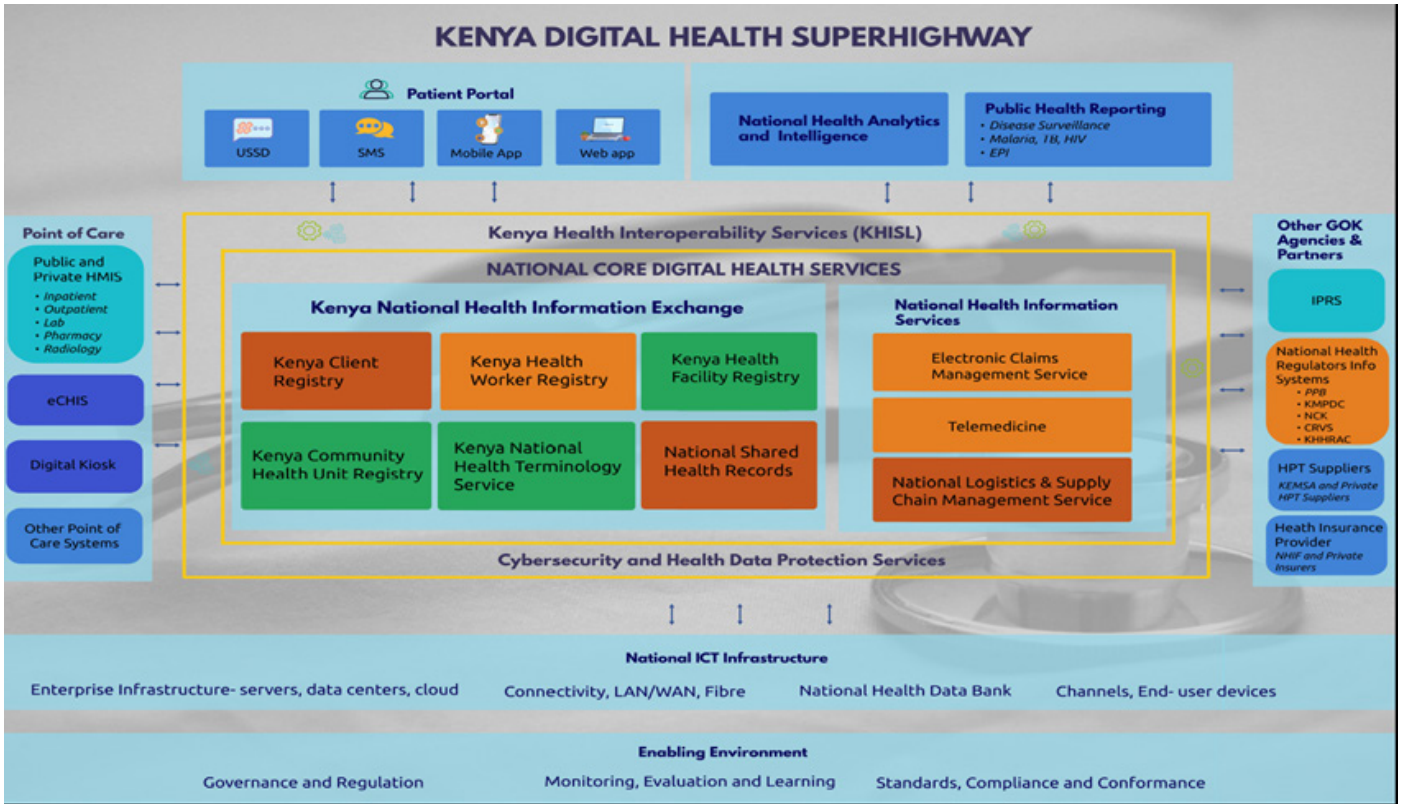


Figure 1 Kenya Health Enterprise Architecture, Health Information Exchange Component

The National Digital Health Ecosystem will fortify the development of a comprehensive, integrated health information system that will meet the demands for a patient centric system and one that can support national and county governments to make informed decisions based on high quality health data collected in real time.

The ecosystem has a service delivery side and the disease surveillance side sharing national resources. It provides for how clinical data collection systems are integrated at the facilities and to health data bases of importance like NHIF and KEMSA. Moreover, it also shows how systems will be integrated to provide real time disease surveillance data for rapid response. Data collected will enable high level matrix analytics and visualization through customization to need.

All digital health systems will be able to use shared resources for national good. These tools include the resources for standardizing terminologies across the country, one national client registry to enable portability of patients' virtual files from one facility to another and across the sector (public and non-public). The shared resources also provide for one health master facility list. The list provides facilities that operate legally and the ones where clients and patients can be referred to, upwards or downwards for services. The health care registry will enable only authorized access to data based on security levels and what one is allowed to view. The registry includes identity management for community health units.

The main objective of national digital ecosystem is to enhance the delivery of health services through:

1. Patient centred services:
- Equitable Access to Healthcare – remote care e.g., telemedicine

2. Standardization of eHealth Solutions
3. Integration into Existing Systems
- Networked Care and Professional Practice
- Secure transfer of health information

4. Equitable Access to Healthcare
5. Promote Research and Innovations
6. Compliance to Legislations and Ethics

Situation Analysis for Digital Health

The national digital architecture is envisaged to provide guidance on the infrastructure that is needed at different levels of data collection and how the data will move from the point of collection at county level to the national health data centre as shown in figure 2.

At the community level and dispensaries (level 1 and 2), smart phones or tablets will be used by CHP and dispensary staff. Data from the community is expected to move to the link facility to enable referral of clients (including operationalization of PCN) and patients in both directions before transfer to the national health data centre.

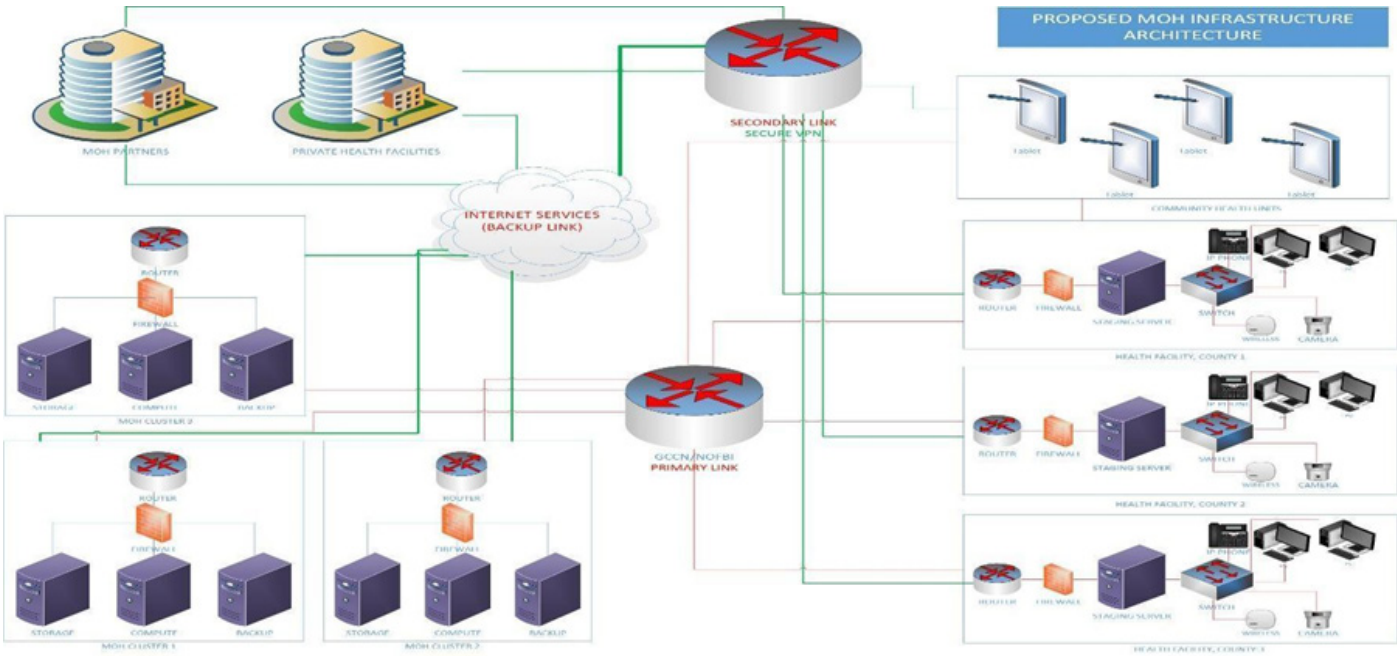


Figure 2: Infrastructure Architecture, MoH

Level 3, 4 and 5 will use additional end user equipment like desktop computers and the data relayed to the NDHC through existing fibre or redundant links. All service providers (state and non-state) are expected to conform to the infrastructure requirements.

Kisumu County Context

Kisumu County is strategically located on the shores of Lake Victoria, Africa's largest freshwater lake. Its administrative capital, Kisumu City, is the third-largest city in Kenya, serving as a vital commercial hub for Western Kenya. According to the 2019 National Census, the county has a population of 1,155,574, which is projected to grow to 1,391,921 by 2028, based on an annual population growth rate of 2.1%.

The county's demographic structure is predominantly youthful, with a wider base and a narrowing middle and apex, as illustrated in Figure 3.

Kisumu's proximity to Lake Victoria has established it as a key center for the region's economy, particularly in fishing, fish processing, sugarcane farming, and rice farming. Administratively, the county is divided into seven Sub-Counties: Nyakach, Muhoroni, Nyando, Kisumu East, Kisumu Central, Kisumu West, and Seme. These are further divided into 35 wards, enabling localized governance and service delivery across the county.

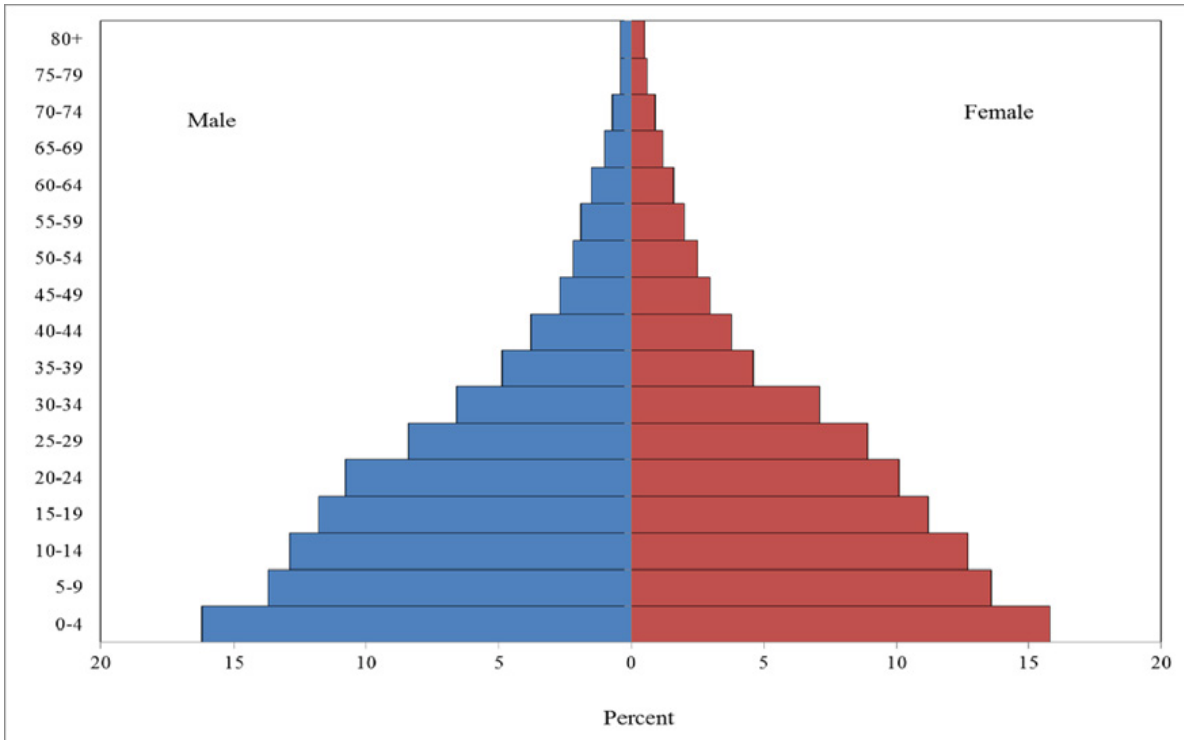


Figure 3: Kisumu County population structure

The County Health Information Exchange

The Kisumu CHIE will constitute the following independent major components;

a. The Kenya Digital Health Superhighway;
b. The Point of Service Solutions and
c. The County Digital Health Shared Services

The CHIE platform will utilize the infrastructural functionalities of these independently developed and managed components to realize the county's envisioned interoperable digital health ecosystem that will seamlessly facilitate health information exchange both at the county and national levels. The Kisumu county CHIE is modelled around the digital public infrastructure (DPI) and specifically the DPI variant contextualized for digital health, the digital public infrastructure for health (DPI-H). Rather than focusing on specific digital health interventions,

The Kisumu County CHIE will focus on an infrastructural investment approach that prioritizes a subset of digital systems and services that act as the foundation for many priority use cases in digital health, both currently and in the future. This will be accomplished through leveraging on existing components both nationally, like the digital health superhighway and point of service solutions, as well as building the DPI-H missing component, the county digital health shared services that will house all KCG's specific digital health shared services like the County Data Repository (CDR), the health insurance scheme dubbed **MARWA** and other county shared digital health components that may be implemented in the future. This infrastructure-focused design approach enables an ecosystem of innovations for point of service solutions, implementers of different digital health interventions for a variety of use cases at both national and county levels, and other stakeholders like research institutions and individual researchers to gain efficiency by leveraging a common set of open, widely scaled, relatively foundational basic digital functions for health systems within the county.

The following is a brief functional description of each of the independent infrastructural components of the Kisumu County CHIE as shown in figure 4 below.

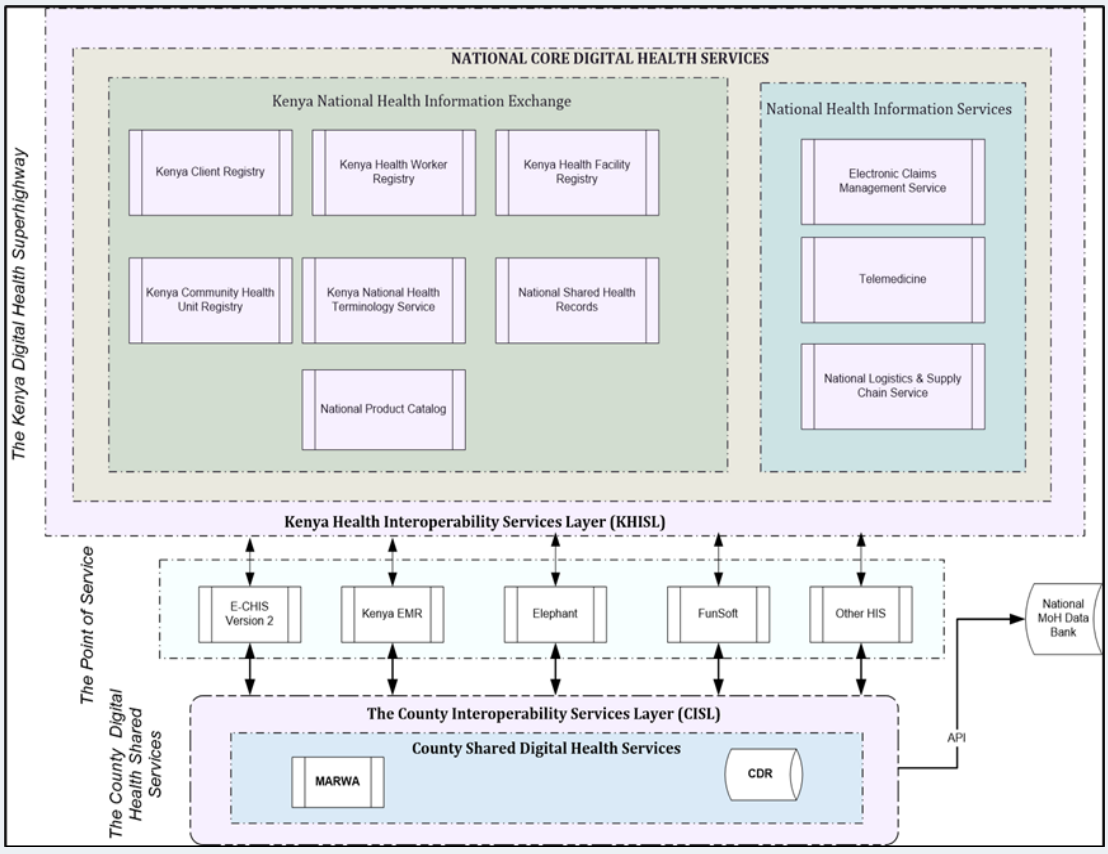


Figure 4:The Kisumu County Health Information Exchange (CHIE)

The National Digital Health Superhighway

Developed, managed and maintained by the National Ministry of Health, the national Digital Health Superhighway provides the horizontal foundation for the digital health platform for the country. This platform will provide all nationally common shared digital health components that will enable health information exchange across the entire country's digital health system. The Kisumu County Health Information Exchange will depend on this national platform for interoperability and health information exchange not only within the county, but across the country's healthcare ecosystem.

The Point of Service Solutions (POS)

The Point of Service solutions represent various EMRs (such as eCHIS, Elephant, KenyaEMR, FunSoft etc) used by the facilities and providers within the county. The POS provides the points of interaction between the patients, providers and the CHIE. These POS solutions will be required to align with the MoH national specification and standards for point of care solutions. Part of MoH requirement will be to ensure the solutions are able to interact with the Kenya digital health superhighway through the Kenya health interoperability services layer (KHISL) and interact with the county shared digital health services component through the CISL. This will facilitate innovation ranging from personal health apps, mhealth, telemedicine among other digital health innovations that might come up in future. The county health information exchange will allow plugging of any new solution that complies with the MoH national specifications and standards onto the County Health Information Exchange platform.

The County Digital Health Shared Services

This component will be developed by the county. The county digital health shared services will be made up of the CISL and other county digital health shared components. This currently includes the CDR and MARWA. The county digital health shared services will host any future county digital health system shared components. Built on OpenHIM mediation principle, the CISL will facilitate secure interoperability and data orchestration between POS components and the county digital health shared services sub-components (currently the CDR and MARWA). The CDR sub-component will store all the county's health data. This will be in compliance with the Digital Health Act 2023 article 26 subsections 2 and 3 about the establishment of county data banks. All points of services solutions within the county will be required to push all patients' encounter data to the CDR through the CISL. The POS solutions will also be required to store certain datasets to the national SHR in the Kenya digital health superhighway through the KHISL. The CDR while laying the foundation for the county's massive digital health data storage for emerging capabilities like predictive analytics and artificial intelligence and enabling the use in these contexts, will also avail health data for other use cases like research, disease surveillance, and social determinants of health among others. The CDR will also optionally provide various data marts to address various county health systems information requirements including information disaggregation for evidence-based decision making in various health programmatic areas.

1.0 Kisumu County Data Center Design

The Data Center (DC) is one of the foundational components of a digital health ecosystem. The DC is home to the computational power, storage and applications necessary to support a CGK digital health system. According to Cisco, a DC at its simplest is a physical facility that organizations use to house their critical applications and data. A data center's design is based on a network of computing and storage resources that enable the delivery of shared applications and data. The key components of a DC design include routers, switches, firewalls, storage systems, servers, and application-delivery controllers. The DC infrastructure is central to the IT architecture that will hold all the county's shared digital health services. The DC will provide the ICT infrastructure components for the CDR and MARWA should the CGK opt for on-premise CDR rather than the cloud option.

Proper provisioning of the DC infrastructure design is critical, and performance, resiliency, and scalability need to be carefully considered. Designing a flexible DC architecture that can support new applications in a short time frame can result in seamless operational efficiency as the DC responds to county government digital health transformation needs. Such a design requires careful initial planning and thoughtful

considerations in the areas of active network device port density, access layer uplink bandwidth redundancy and load balancing, and server capacity agility among other aspects. There are various standards and industry best practices for the proper designing of an on -premise data center. An example of best industry standards is the Uptime four-tiered scale of DC implementation.

The proposed CGK DC design as shown in Figure 5 below is based on a proven layered approach that has been tested and improved over the years in some of the largest data center implementations. The layered approach is the basic foundation of the DC design that seeks to improve scalability, performance, flexibility, resiliency and maintenance. The CGK DC will be a multi-layer model with different layers designed for seamless scalability. The layers will include publicly accessible Web-server(s) clustered in a demilitarized zone (DMZ) for cybersecurity purposes, application servers will be logically separated from the database servers.

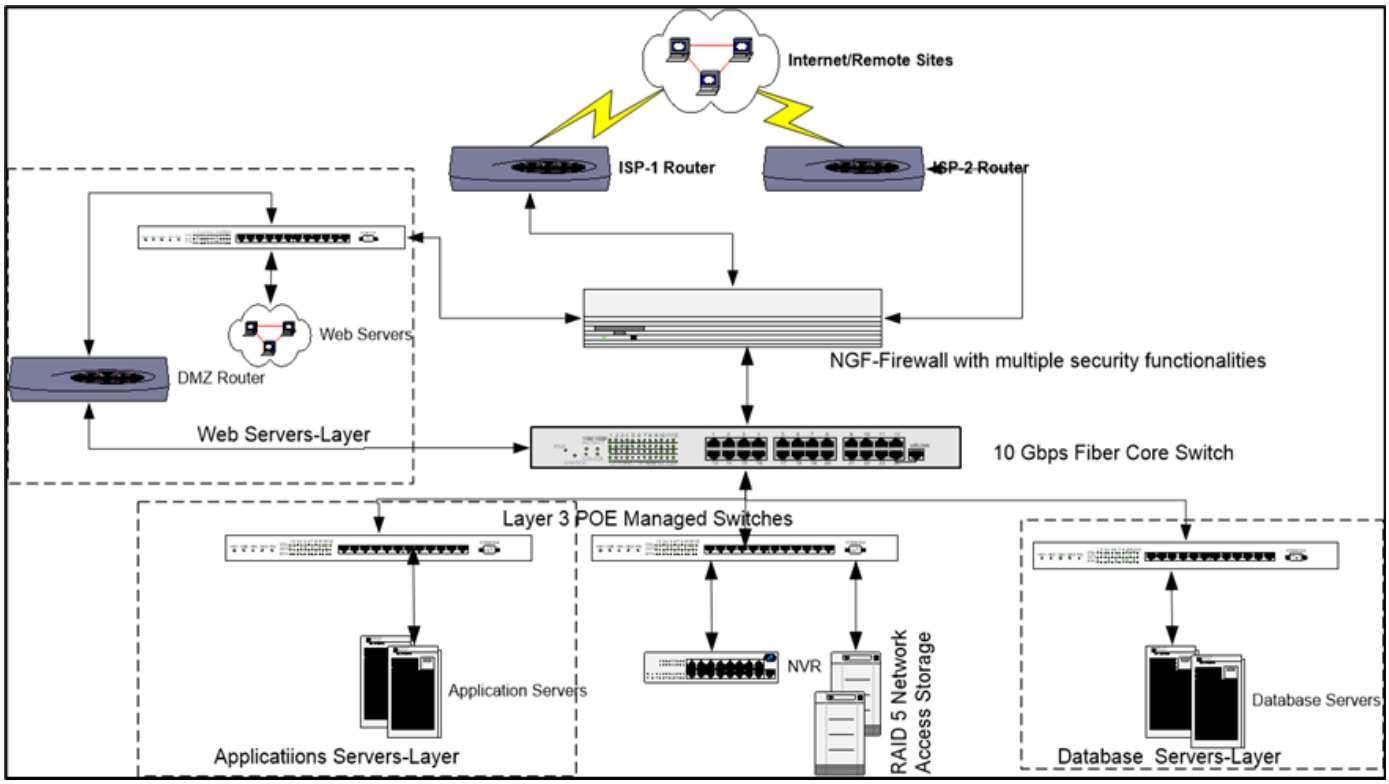


Figure 5 The Kisumu County Data Center Topology

Typically, the following three layers are proposed to provide inherent agility, scalability and cybersecurity:

a. Web-servers' layer: Web portals for accessing the web-based application. This will be in the DMZ for external or publicly accessed systems.
b. Application servers' layer: All application servers will be accessed publicly through the web portal within this layer.
c. Database servers' layer: All database servers will be logically accessed through the application and no direct interaction between the Web Servers and the databases.

Multi-layered servers running on separate machines (either on virtual or physical servers) will provide improved resiliency and security. Resiliency is improved because a server can be taken out of service while the same function is still provided by another server belonging to the same application tier, especially if clustering and fault tolerance are fully implemented. Security is improved because an attacker has several layers to break through. For example, the web server can be hacked without the attacker gaining access to the application or database servers. However, the Web and application servers can coexist on a common physical server if resources are limited; the database typically will remain separate.

1.1. Data Center Implementation Options

The data Center can be implemented in either of the following options;

a. **On-premise (On-prem):** The county can decide to invest and set up a data center locally at either the county offices or any secure location within the county. This setup ensures that the county fully owns and operates the DC. However, among other concerns of ensuring adherence to industry standards, best practice and security measures this setup requires, it also demands sizable capital investment to establish the DC physical facility and also requisite technical skills to manage and operate the DC.
b. **Colocation (Colo):** In this setup, rather than the county setting up a DC physical facility, the county can decide to only procure the physical servers and rent space from one of the service providers like Safaricom, Liquid Intelligent Technologies, KENET or Dimension Data within their data center to place the servers. The county is not required to manage the environmental aspects of the data center facility like clean and backup power, cooling systems and physical security. These among other data center environmental and physical issues will be handled by the service provider. However, the management of the server including data backups, cybersecurity and ensuring smooth running of the servers and the applications would be the responsibility of the County Government. A variant of this option is where the CGK opt to buy Virtual Private Servers (VPS) space from the service provider and therefore not need to invest in physical servers.
c. **Cloud:** In this option, the CGK subscribes or purchases data center services from a cloud service provider like Safaricom, Liquid Intelligent Technologies or any other and is billed for services utilized. This is known as infrastructure-as-a-service (IAAS). The complete management of the DC is the responsibility of the cloud service provider (physical, cybersecurity and other logical security-related concerns). However, the County Government owns and manages the data stored as well as logical access (authentication and authorization of data in the DC) control of the data.

The choice among these options depends on factors like security requirements, cost structure and organizational needs and capacity to set up, operate and manage. Each has its advantages and trade-offs, and therefore, the county should evaluate their specific context before deciding which approach best suits its IT infrastructure setup. The Ministry of Health is setting up a national DC and this could also be an option where CGK's CHIE can be hosted at the MoH's national DC. There are various resources available to guide the procurement of enterprise digital health implementations that can be referenced to ensure the informed decision on the appropriate deployment. Some of these resources that the CGK can utilize include the WHO digital implementation investment guide (DIIG), the USAID digital health investment review tool (DHIRT).

The proposed CGK CDR architecture will constitute of the following three tiers as posited by IBM

a. **Bottom tier:** The bottom tier of the CDR will constitute a database server, usually a relational database system, which will collect, cleanse and transform data from multiple data sources including eCHIS, KenyaEMR KHIS, Marwa through extraction, transformation from the current and future CGK digital health systems intervention and load to the CDR database through secure ETL pipeline for continuous access to the heterogeneous datasets from the county digital health applications;
b. **Middle tier:** The middle tier consists of an online analytical processing (OLAP) server which enables fast query speeds from the curated and collated datasets;
c. **Top tier:** The top tier is represented by a front-end user interface or reporting tool, which enables end users to conduct ad-hoc data analysis on their business data.

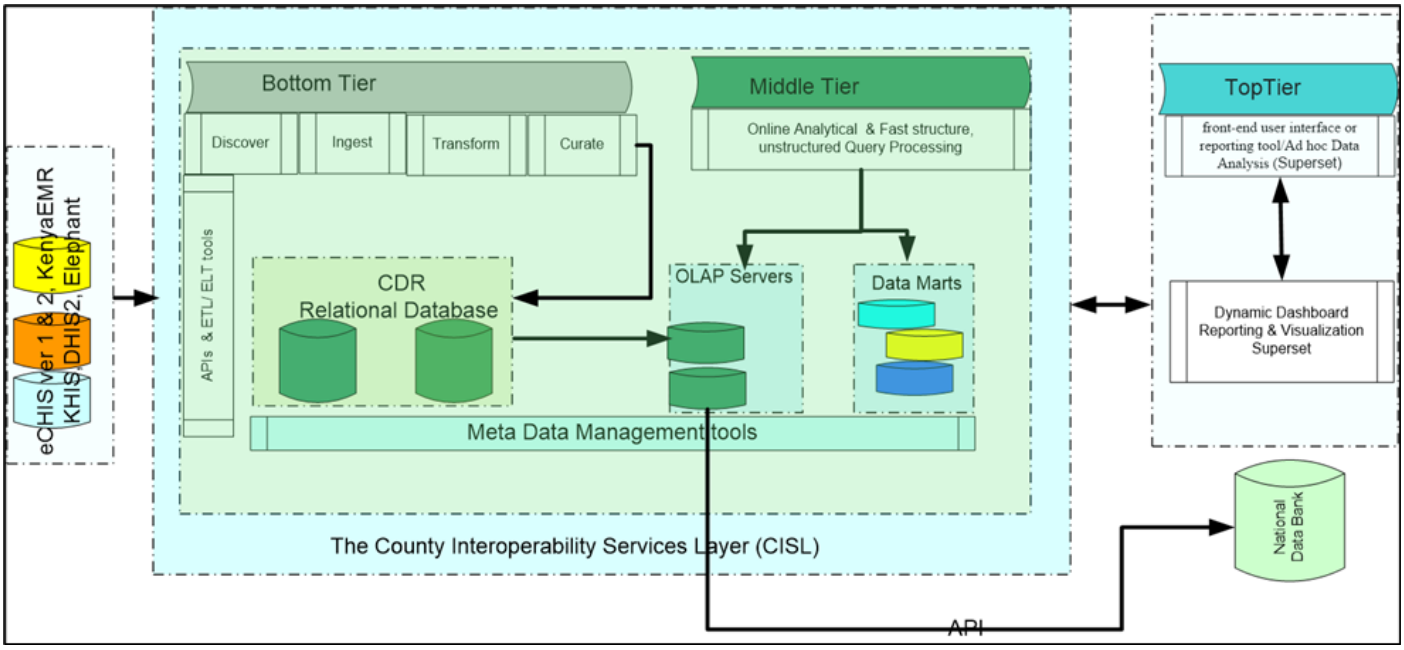


Figure 4:The Kisumu County Data Repository

1.2. County Data Repository Components

a. The CISL to facilitate secure interoperability
b. Central database: Where the collated data from various CGK digital health systems deployed within and in active use will be stored and processed.
c. ETL or ELT pipeline Tools: For extracting from different data sources, transforming, curating at the staging phase and loading the curated data in online analytical processing servers.
d. Metadata management: To track data lineage and characteristics to enable detailed and concise analytics.
e. Access Tools: Enabling analytics and visualization. This will be part of the main dashboard tools to enable CGK healthcare and other partners to consume analytical reports from the data repository.

Situation Analysis for Digital Health in Kisumu County

Kisumu County's health services are provided by a combination of government-owned, faith-based organizations (FBOs), and private institutions. Out of 261 health facilities, 138 (53%) are government-owned. These facilities are distributed across seven sub-counties, and include one teaching and referral hospital, one county referral hospital, six county hospitals, 15 sub-county hospitals, 74 dispensaries, and 18 health centers. Despite this well-established network of facilities, the county faces significant challenges in fully digitizing its health services.

	Public	Private	FBO	Total
Kisumu Central	14	51	3	**68**
Kisumu East	11	19	3	**33**
Kisumu West	23	11	1	**35**
Muhoroni	23	9	2	**34**
Nyakach	23	5	3	**31**
Nyando	22	10	1	**33**
Seme	22	4	1	**27**
Kisumu County	138	109	14	**261**

Table 1: Health facilities distribution by ownership, 2023

Health Services Digitization in Kisumu County

The county's health sector is under continuous pressure from both endemic and emerging diseases such as HIV/AIDS, malaria, and sickle cell disease. These conditions have not only strained healthcare systems but have also highlighted the limitations of traditional, paper-based health information systems. The overreliance on manual data collection methods has contributed to poor forecasting and quantification of medical supplies, further complicated by financial constraints and occasional industrial action from healthcare workers due to delayed salaries.

Efforts to address these challenges have led to a patchwork adoption of various digital health solutions, often implemented with the support of development partners. However, these systems are typically vendor-driven, disease-specific, and fragmented, with limited interoperability. The systems currently in use include Kenya EMR (focusing on HIV services), TIBU, Maisha Med, Elephant, and Funsoft. While these digital systems have improved service delivery in isolated cases, they lack integration and sustainability. This lack of coordination has hindered the county from fully capitalizing on digital health resources available at the national level.

Kisumu County has been at the forefront of national health initiatives, serving as a pilot for the rollout of Universal Health Coverage (UHC) and the Electronic Community Health Information System (eCHIS). However, for the county to fully realize the potential of these initiatives, there is a pressing need for investment in comprehensive digital frameworks. These frameworks must support the scaling up of digital systems to enhance health service delivery, enable efficient data use, and prepare the county for emerging technologies such as artificial intelligence.

Policy and Legal Context

The Kisumu County Digital Health Transformation Roadmap is aligned with national policies, including the Digital Health Act (2023), Data Protection Act (2019), National ICT Policy (2016), and other relevant legal instruments. These policies aim to protect individuals' privacy and data rights while facilitating the digitization of healthcare services. The roadmap emphasizes full compliance with these national guidelines, ensuring the responsible and secure handling of health data.

Community Health Services

Kisumu County has adopted a Primary Health Care (PHC) approach to digitization. Since October 2020, the county has trained 2,998 community health promoters (CHPs), representing 100% of its community health workforce, in preparation for the full rollout of eCHIS. This initiative is critical to integrating health information systems from the community level upward, ensuring that data collected is both accurate and actionable. Table 2 shows CHP coverage and Table 3 shows the distribution of community health services per Sub County.

Training of CHP	Community Health Promoters
Sub County	Trained
Muhoroni	415
Nyakach	430
Nyando	497
K. East	476
K. Central	401
K. West	383
Seme	396
Kisumu County	2,998 (100%)

Table 2: CHP Coverage

Sub-County	CU's	CHP's	CHOs'	Villages	Households
Nyakach	43	430	30	356	40,230
Nyando	48	497	28	338	44,850
Muhoroni	41	415	30	415	34,336
Kisumu Central	35	401	22	92	75,879
Kisumu East	44	476	27	186	53,300
Kisumu West	33	383	33	197	31,655
Seme	36	396	26	261	24,135
Kisumu County	280	2,998	199	1845	307,185

Table 3:Community health services in Kisumu County
Source: Kisumu County, 2023

Digitization of Insurance Services

In its efforts to achieve UHC, Kisumu County has strategically focused on increasing insurance penetration, particularly through the Marwa social health insurance scheme. This initiative targets vulnerable populations and informal sector workers, ensuring timely payments from the county budget and NHIF capitation. Since its launch in 2021, the scheme has provided coverage to 47,973 households (approximately 191,892 individuals) by 2023. The county aims to fully digitize the enrollment process at both the community and facility levels.

While public health insurance schemes have made progress, there is a lack of data on the private insurance providers operating in the county. A comprehensive mapping of these providers, along with aggregated data on coverage, is necessary to better understand the scope and services offered by private insurers.

Opportunities for Digital Health Transformation in Kisumu County

a. **Integration of Health Systems**: Kisumu County has the opportunity to integrate the fragmented digital systems currently in place. With the adoption of a comprehensive digital health strategy, the county can move towards creating an interconnected system that supports seamless data exchange across different health facilities and programs. This integration would enhance service delivery, improve patient care, and ensure that data collected is available for national reporting and strategic decision-making.
b. **Development of Comprehensive ICT Infrastructure:** The absence of a fully developed ICT infrastructure presents an opportunity for Kisumu County to invest in high-speed internet connectivity, reliable power sources, and advanced digital tools in health facilities. By addressing these gaps, the county can create a functional foundation that enables real-time data collection, telemedicine services, and efficient resource management, thus improving overall health system efficiency.
c. **Scaling Up of Existing Digital Health Solutions:** Kisumu County has already piloted successful digital health initiatives such as UHC and eCHIS. The county can build on these successes by scaling up digital health solutions, such as expanding the Kenya EMR system to include additional services beyond HIV care. The use of digital platforms in other health areas—such as community health, medicines management, and financial reporting—can improve health outcomes across the county.
d. **Leveraging National Digital Health Resources,** the national government's commitment to digital health provides Kisumu County with an opportunity to align its efforts with national initiatives. By leveraging shared national resources, including patient registries and data governance frameworks, the county can ensure efficient use of digital tools and enhance data portability, security, and accessibility across health facilities.
e. **Strengthening Data Security and Ownership**: The development of a fully functional County Data Centre provides Kisumu with a chance to strengthen data security protocols and ensure greater control over health data. By implementing advanced data management practices, the county can minimize the risk of data loss and vendor lock-in while ensuring that sensitive health data is securely stored, accessed, and utilized in compliance with the Data Protection Act (2019).
f. **Human Resource Development in Digital Health**: Kisumu County has the opportunity to build a specialized workforce capable of supporting its digital health transformation. Through targeted recruitment and capacity-building initiatives, the county can enhance its digital health workforce, training staff in areas such as health informatics, cybersecurity, data analysis, and system interoperability. This investment in human resources will ensure that digital health systems are effectively managed and maintained.
g. **Investment in Digital Health Innovations:** The county's focus on digital transformation creates an ideal environment for the adoption of cutting-edge health technologies, such as artificial intelligence (AI), telemedicine, and mobile health (mHealth) solutions. These innovations could improve diagnostics, enhance patient monitoring, and expand access to healthcare services, particularly in remote and underserved areas of Kisumu County.
h. **Enhancing Community Health Services through Digital Platforms**: With the successful training of 2,998 community health promoters (CHPs), Kisumu County is well-positioned to expand the use of digital platforms like eCHIS to strengthen community health services. This will improve the collection and use of real-time health data at the community level, enhance disease surveillance, and facilitate timely referrals between community units and health facilities.
i. **Digitization of Health Insurance Enrollment:** The county's efforts to increase health insurance coverage through the Marwa social health insurance scheme present an opportunity to fully digitize the enrollment process. By utilizing digital tools at both the community and facility levels, Kisumu can ensure more efficient and

transparent insurance enrollment, which will improve service delivery, streamline payment processes, and boost overall health coverage in the county.

j. **Building Partnerships for Digital Health Implementation**: Kisumu County can harness the support of development partners, private health providers, and civil society organizations to foster collaboration in digital health implementation. Establishing a County Digital Health Enabler Forum will create a platform for stakeholders to share best practices, coordinate efforts, and collectively invest in sustainable digital health solution

Roadmap Development Process

The development of the Kisumu County Digital Health Transformation Roadmap followed a structured, consultative, and participatory approach. The process was driven by Kisumu County leadership and supported by several key partners, including Transform Health Kenya. The primary aim was to create a comprehensive strategy that would guide the county in digitizing its health systems.

The process began with a thorough assessment of the county's digital health landscape, facilitated through two major workshops held in 2023 and 2024. These workshops brought together stakeholders from various sectors, including government officials, healthcare professionals, development partners, and technical experts. Their collective knowledge and insights helped identify existing challenges, opportunities, and priority areas for digital health transformation.

Key steps in the roadmap development process included:

a. Initial Workshop (September 2023):

- The first workshop was designed to understand the current state of health digitization in Kisumu County.
- Participants analyzed barriers to full digitization, such as inadequate infrastructure, fragmented systems, and the lack of skilled personnel.
- A key outcome of this workshop was the identification of critical gaps and the initial drafting of a costed roadmap for the county's digital health implementation.

b. Partner Presentations:

- Various partners presented the digital systems they had implemented in the county, highlighting their scope, capabilities, and future expansion plans.
- These presentations provided valuable insights into the range of existing solutions and helped shape recommendations for system integration and scaling.

c. Group Discussions and Recommendations:

- Stakeholders were divided into working groups to brainstorm actionable solutions to the identified barriers.
- These groups developed a set of recommendations for the roadmap, including strategic initiatives, potential investments, and policies needed to ensure successful digitization.

d. First Draft Review

- A draft of the roadmap was developed based on the workshop outcomes and was submitted to the County Executive Committee Member (CECM) for Health for review.
- The CECM provided feedback on areas that required further refinement, including legal compliance and alignment with the newly enacted Digital Health Act (2023).

e. Second Workshop (September 2024):

- A second workshop was convened to refine the roadmap and incorporate feedback from the CECM.
- The workshop focused on aligning the roadmap with national digital health policies, ensuring adherence to the Digital Health Act (2023), and addressing any gaps from the initial draft.
- Participants also outlined the costs associated with implementing the roadmap and identified key strategic priorities for the next five years.

f. Finalization and Approval:

- After incorporating feedback from the second workshop, a final version of the roadmap was produced.
- The document was subsequently endorsed

by key county stakeholders, ensuring it was comprehensive, actionable, and in line with Kisumu County's health goals.

g. Ongoing Review and Updates:

- The roadmap includes provisions for periodic reviews to ensure it remains relevant and responsive to emerging technologies and healthcare needs.
- The Kisumu County leadership, with support from the Division of Digital Health, will review and update the roadmap every three years to maintain alignment with national strategies and technological advancements.

Alignment with Global, Regional, and National Strategies

The *Kisumu County Digital Health Roadmap* aligns with key global, regional, and national frameworks, ensuring coherence with broader health system objectives. It integrates global best practices, regional collaborations, and national policies to establish a comprehensive, scalable, and sustainable digital health ecosystem for the county.

Global Alignment

The *Digital Health Roadmap* aligns with the *Global Strategy on Digital Health 2020–2025*, endorsed by the 73rd World Health Assembly through decision WHA73(28) in 2020. This global strategy aims to enhance healthcare access by accelerating the development and adoption of appropriate, scalable, and sustainable person-centric digital health solutions. It supports the realization of Sustainable Development Goals (SDGs) 3 and 9, which focus on ensuring healthy lives, promoting well-being for all ages, and fostering innovation through resilient healthcare infrastructure. The roadmap positions Kisumu County to benefit from international standards in digital health, promoting sustainable, high-impact solutions that improve healthcare delivery and outcomes.

Regional Alignment

At the regional level, the *Digital Health Roadmap* is aligned with the *African Union (AU)* Digital Transformation Strategy, which encourages member states to develop and implement clear, visionary digital health strategies. Additionally, the roadmap aligns with the *East African Community (EAC) Digital Health Policy Framework* and the *Digital Regional East African Community Health (Digital REACH) Initiative*, both of which promote interoperability of health systems across the region. By adhering to these regional frameworks, Kisumu County strengthens its ability to engage in cross-border health data exchange and regional healthcare collaborations, driving improved health outcomes across East Africa.

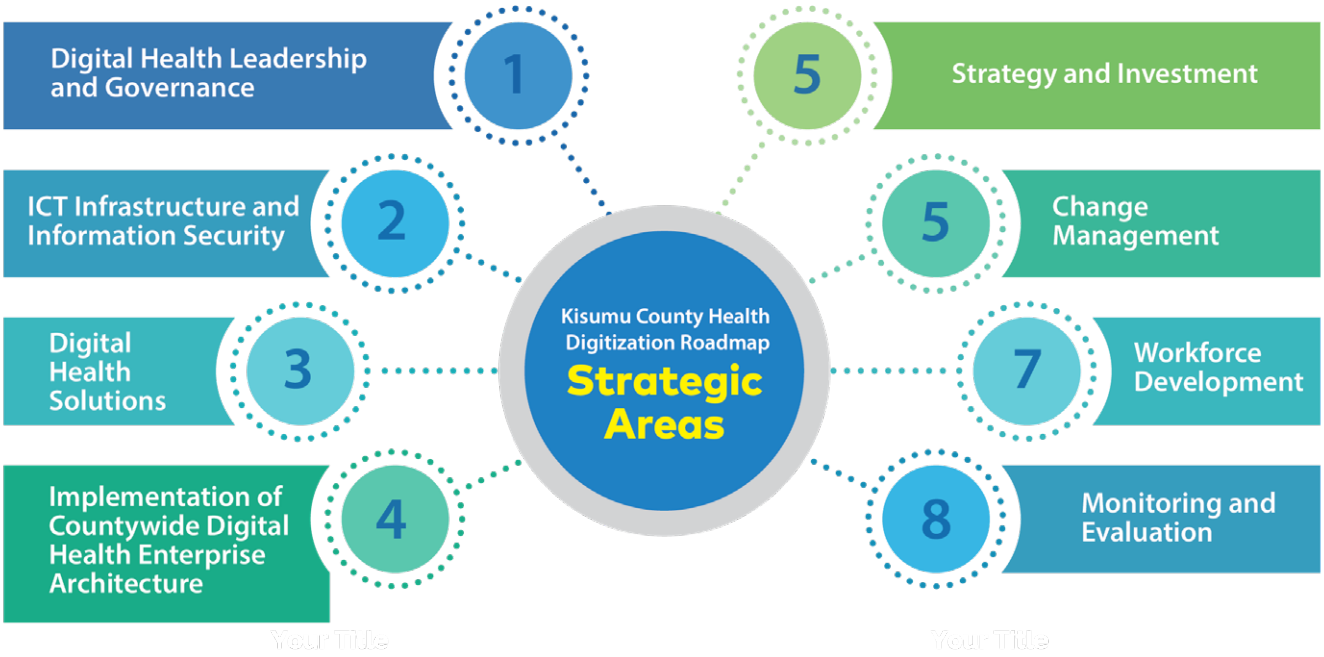
National Alignment

The *Digital Health Roadmap* supports Kenya's *Vision 2030*, which aims to transform the country into a globally competitive and prosperous nation with a high quality of life. It is also aligned with the *Kenya Health Policy 2014-2030*, which underscores the role of digital technologies in enhancing health outcomes and achieving universal health coverage (UHC). Additionally, the roadmap adheres to the objectives outlined in the *Health Sector Strategic Plan (July 2018–June 2023)*, which emphasizes the need to leverage digital platforms to optimize health service delivery and strengthen the health system. By aligning with these national policies, Kisumu County contributes to Kenya's broader digital health transformation goals, ensuring improved access to quality healthcare and enhanced health outcomes.

County Alignment

At the county level, the *Digital Health Roadmap* outlines a structured approach for its implementation, beginning with leadership consensus-building and stakeholder engagement to ensure broad support and alignment with county priorities. Periodic data-driven evaluations will be conducted to monitor and assess progress. Capacity-building initiatives targeting county health staff will be implemented to ensure effective use and scaling of digital health solutions. Continuous monitoring and evaluation mechanisms will track the implementation's success, with mid-year reviews to assess progress and adjust the roadmap as needed. Technical support will be provided throughout the implementation process to ensure integration with existing systems, fostering a patient-centered and efficient digital health ecosystem.

COUNTY IDENTIFIED KEY PRIORITIES AND STRATEGIC INITIATIVES



Kisumu County Health Digitization Roadmap - Strategic Areas.

Strategic Area 1: Digital Health Leadership and Governance

Objective: Ensure county leadership provides functional support for digital health initiatives.

Key Activities:

- Foster leadership consensus and stakeholder engagement through strategic forums.
- Establish the Kisumu County Digital Health Leadership and Governance Structure.
- Strengthen governance capacity for digital health implementation.
- Develop and implement programs to enhance governance processes related to digital health.
- Operationalize the Kisumu County Digital Health Division/Team.
- Develop and implement quality assurance and compliance checks.
- Activate County Data Banks.
- Develop and roll out a comprehensive Change Management Communication Plan.
- Establish methodologies and strategies for managing organizational change in digital health.
- Collaborate with training institutions and partners to enhance leadership capacity.
- Create a cascading framework for guiding digital health transformation.

Interventions:

- Develop Terms of Reference (TOR) for Digital Health Membership and leadership structure.
- Appoint focal points for data and digital health management, including Primary Health Networks (PCNs).
- Create and implement a communication plan to manage change, ensuring alignment with global best practices.
- Partner with educational institutions to build leadership capacity and roll out governance improvement programs.

Strategic Area 2: ICT Infrastructure and Information Security

Objective: Establish infrastructure to support data interoperability, portability, and security within the county's healthcare system.

Key Activities:

- Develop Standard Operating Procedures (SOPs) for online and offline systems, including hosting solutions, cloud storage, and data centre setup.
- Procure servers for hubs and ward-level health facilities.
- Map stakeholders and conduct engagements to establish a data governance structure, policy, and SOPs.
- Assign data access credentials, and train staff on the Data Protection Act.
- Develop policies for e-waste management and disseminate them.
- Implement the Kenya Health Information Exchange (HIE) Framework for secure data sharing.
- Establish hardware security measures, develop asset allocation forms, and maintain an inventory database.
- Procure necessary ICT devices and ensure proper maintenance.
- Establish reliable power supply and alternative energy sources for health facilities, including solar kits and generators.

Interventions:

- Develop SOPs to optimize data storage and device performance.
- Set up local data centers and implement cloud computing.
- Develop a stakeholder hierarchy and organogram for data governance.
- Train staff on data governance and e-waste management policies.
- Implement data sharing frameworks and secure digital infrastructure.

Strategic Area 3: Digital Health Solutions

Objective: Leverage digital health solutions like telemedicine, AI, and mobile health (mHealth) to improve service delivery.

Key Activities:

- Adopt and implement digital health solutions across various health systems.
- Review and upgrade the digital health infrastructure

Interventions:

- Evaluate Health Information Management Systems (HIMS), including Electronic Health Records (EHR), Electronic Medical Records (EMR), and Electronic Community Health Information Systems (eCHIS).
- Review clinical decision support systems powered by AI.
- Implement telemedicine platforms and customer relationship management systems.
- Monitor the performance and adoption rates of new digital health solutions.

Strategic Area 4: Implementation of Countywide Digital Health Enterprise Architecture

Objective: Implement a comprehensive digital enterprise architecture for the health department, aligned Kenya's Health Sector Enterprise Architecture.

Key Activities:

- Develop and execute a digital health strategy for Kisumu County.
- Plan and design the county's data architecture warehouse, aligning it with the national framework.

Interventions:

- Implement a phased digital health strategy aligned with county and national architectures.
- Engage stakeholders in designing and refining the county's digital enterprise architecture.

Strategic Area 5: Strategy and Investment

Objective: Develop a Digital Health (DH) investment plan that aligns with stakeholder needs and includes a phased implementation strategy.

Key Activities:

- Develop a comprehensive Kisumu County Digital Health Investment Plan.
- Create a Change Management Communication Plan.
- Establish change management strategies and methodologies.
- Collaborate with training institutions and partners.
- Map resources for DH roadmap implementation and advocate for targeted investment.

Interventions:

- Develop an investment case for priority areas in digital health.
- Create and implement a communication plan for managing the transition to digital health.
- Partner with educational institutions to strengthen leadership capacity.
- Establish a phased investment and implementation framework for digital health transformation.

Strategic Area 6: Change Management

Objective: Develop a framework for the adoption and scale-up of digital health initiatives.

Key Activities:

- Conduct stakeholder engagement to understand needs and concerns, ensuring stakeholder buy-in.
- Perform a digital health landscape analysis and develop a corresponding change management plan.
- Build capacity to address identified gaps in digital health support.

Interventions:

- Map and engage digital health stakeholders across the county.
- Develop and disseminate a communication and partnership plan.
- Hold stakeholder inception meetings to introduce the Digital Health Strategy.
- Conduct annual monitoring, evaluation, and learning conferences on digital health.

Strategic Area 7: Workforce Development

Objective: Identify human resource needs and strengthen digital health capabilities in the county.

Key Activities:

- Establish a Digital Health Human Resource Steering Committee.
- Conduct county-level workforce meetings to discuss digital health needs.
- Recruit specialized digital health personnel.
- Build capacity among digital health staff, including community health assistants and promoters.
- Develop a Monitoring and Evaluation (M&E) framework for the digital health workforce.
- Strengthen user capacity for digital health systems.

Interventions:

- Map and appoint members to the Digital Health Human Resource Steering Committee.
- Conduct a comprehensive needs assessment across health system levels.
- Recruit necessary staff and provide advanced training on digital health systems.
- Establish continuous education and certification programs in areas like data management and cybersecurity.
- Develop metrics to evaluate the effectiveness of digital health workforce development.

Strategic Area 8: Monitoring and Evaluation

Objective: Develop a comprehensive plan to monitor and evaluate the performance of digital health implementation.

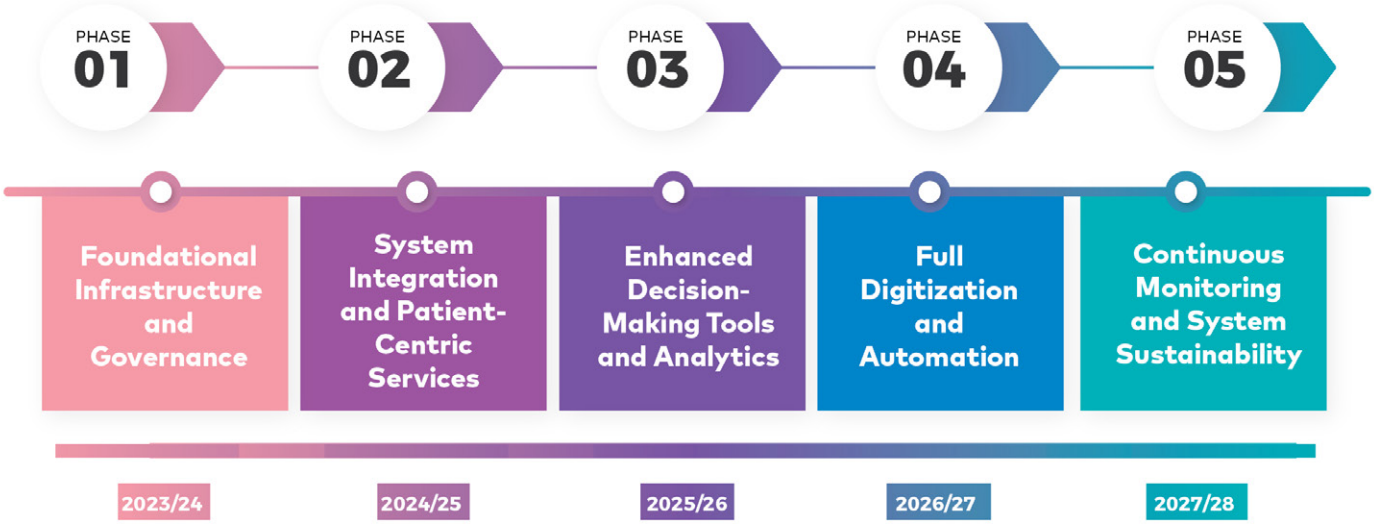
Key Activities:

- Establish a Continuous Monitoring and Evaluation (M&E) framework and system.
- Collect periodic data on the implementation of digital health initiatives.
- Conduct regular reviews against established performance indicators.

Interventions:

- Develop a comprehensive M&E framework to track progress on the implementation of the Digital Health Roadmap.
- Ensure performance is measured against key strategic objectives and adjust implementation strategies as needed.

IMPLEMENTATION ROADMAP FOR KISUMU COUNTY HEALTH SYSTEMS DIGITIZATION



The full digitization of Kisumu County's health system will be implemented in a phased, realistic, and resource-conscious manner. The plan prioritizes the integration of health systems, ensuring compliance with national and county policies while focusing on patient-centered care. The following roadmap outlines the strategic approach for achieving full digitization over the period 2023/24 to 2027/28, utilizing available resources, collaborating with partners, and ensuring system sustainability.

Phase 1: Foundational Infrastructure and Governance (2023/24)

Objectives:

- Build the foundational infrastructure necessary for digitization, focusing on compliance with existing policies and laws.
- Establish governance structures and initiate key leadership and stakeholder engagements to ensure alignment with national and county digital health strategies.

Key Activities:

- Conduct a **comprehensive readiness assessment** of health facilities to determine existing ICT equipment and infrastructure gaps.
- **Procure ICT equipment** (computers, servers, routers, etc.) for priority facilities, focusing on those with minimal existing resources.
- Develop **Standard Operating Procedures (SOPs)** to ensure systems comply with national policies such as the Digital Health Act (2023) and Data Protection Act (2019).
- Operationalize Kisumu **County Digital Health Division** to oversee digitization and ensure continuous alignment with health sector priorities.
- Begin the **operationalization of County Data Banks** to store and manage health data securely.

Expected Outcomes:

- 20% of health facilities are equipped with necessary ICT infrastructure.
- Governance structures and leadership teams established to guide implementation.

Phase 2: System Integration and Patient-Centric Services (2024/25)

Objectives:

- Focus on integrating health systems for interoperability and patient-centered services, including the portability of patient data.
- Ensure that health information systems link public and private facilities and the Kenya Health Information System (KHIS) for reporting.

Key Activities:

- Implement **integrated health information systems (HIS)** across health facilities, ensuring compatibility with KHIS for seamless data exchange and reporting.
- Establish **interoperable systems** linking public and private facilities to enable patient data portability, referrals, and emergency management.
- Deploy **queue management systems** in high-volume facilities to reduce patient waiting times.
- Enhance the **rollout of community data collection** by additional tools, interoperability with facility HMIS training.
- Establish **in-built referral mechanisms** and an emergency management center for effective service delivery.

Expected Outcomes:

- 40% of health facilities are integrated with KHIS and operate with interoperable systems.
- Patient data portability achieved for 30% of facilities.
- Reduced waiting times in key facilities using digital queue management.

Phase 3: Enhanced Decision-Making Tools and Analytics (2025/26)

Objectives:

- Equip health systems with decision-support tools and analytics to enhance data-driven decision-making and improve health service delivery.

Key Activities:

- Implement **health analytics and reporting tools** to provide insights on patient outcomes, service utilization, and operational efficiency.
- Introduce **digital tools for blood tracking and management**, linking them with supply chain management systems.
- **Expand digital solutions** for community health data collection, ensuring data flows from households to higher-level health facilities.

Expected Outcomes:

- 60% of health facilities using decision-support and analytics tools.
- Comprehensive digital blood tracking and management system in place.
- Data-driven decision-making becoming the norm for resource allocation and patient care.

Phase 4: Full Digitization and Automation (2026/27)

Objectives:

- Achieve near-full digitization of county health facilities, focusing on automation, data portability, and comprehensive integration with national systems.

Key Activities:

- Complete **digitization of health services** in all remaining county facilities, focusing on data interoperability, patient-centric services, and efficient service delivery.
- **Automate key processes** such as patient referrals, medicine management, and queue systems.
- Finalize integration with **national health systems,** including NHIF, KEMSA, and national referral facilities for seamless care coordination.
- Ensure **real-time reporting** of health data from community health units up to county and national levels.

Expected Outcomes:

- 90% of health facilities fully digitized, with automated systems in place.
- All systems integrated with national health platforms, enabling efficient service delivery and reporting.
- Complete digitization of patient data, referrals, and service tracking.

Phase 5: Continuous Monitoring and System Sustainability (2027/28)

Objectives:

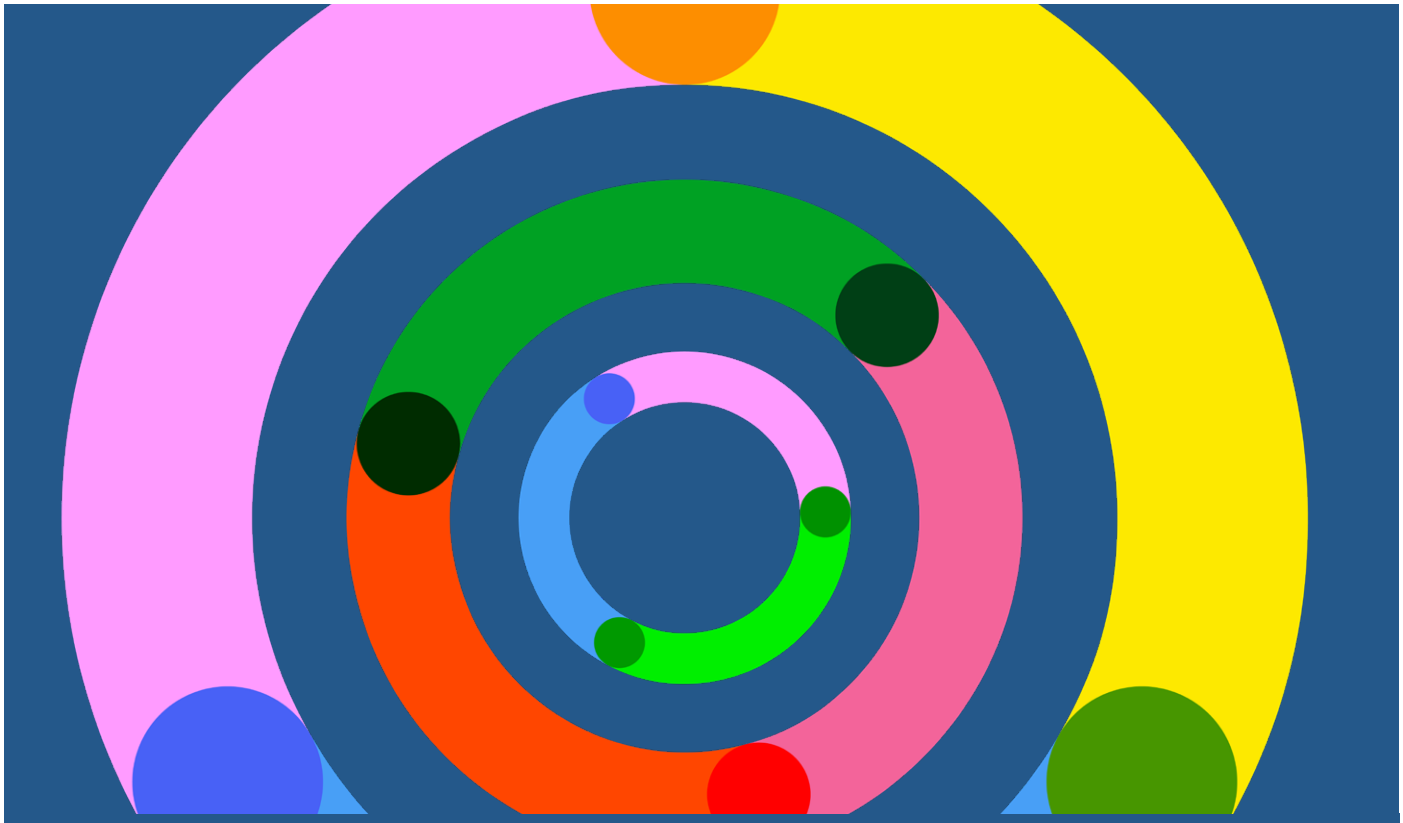
- Ensure sustainability of the digital health ecosystem through continuous monitoring, capacity building, and periodic system reviews.

Key Activities:

- Establish a **continuous monitoring and evaluation (M&E) framework** to assess system performance, identify gaps, and make necessary improvements.
- Conduct **capacity-building programs** to ensure staff are trained on system use, data security, and technology updates.
- Implement a **maintenance and sustainability plan** for ICT infrastructure and digital systems to ensure long-term viability.
- Explore **innovative financing models** through public-private partnerships (PPPs) to maintain and expand digital health systems.

Expected Outcomes:

- Full county-level digitization achieved, with a sustainable digital health ecosystem in place.
- Continuous M&E framework operational, ensuring that systems remain efficient and effective.
- Long-term financial sustainability of digital health systems secured through PPPs and county investments.



MONITORING AND EVALUATION FRAMEWORK FOR KISUMU COUNTY DIGITAL HEALTH ROADMAP

To ensure the successful implementation and sustainability of the Kisumu County Digital Health Roadmap, a functional Monitoring and Evaluation (M&E) framework is necessary. This framework will provide a structured approach for tracking progress, measuring performance, identifying gaps, and ensuring that corrective actions are taken in a timely manner. The framework will focus on key performance indicators (KPIs), timelines, data collection methods, and reporting structures for each phase of the roadmap.

1) M&E Framework Objectives

- **Track Implementation Progress:** Monitor the completion of activities, milestones, and phases of the digital health roadmap.
- **Measure Performance:** Evaluate the effectiveness of the interventions in achieving the stated objectives, such as system integration, data interoperability, and improved health outcomes.
- **Identify Gaps and Risks:** Regularly assess challenges or bottlenecks that could delay the roadmap's implementation and address them proactively.
- **Ensure Accountability:** Promote transparency and accountability by involving stakeholders in the monitoring process and making data-driven decisions.

2) Key Components of the M&E Frameworks

2.1. Monitoring Indicators

The following key performance indicators (KPIs) will be tracked throughout the roadmap's implementation:

Strategic Area	Key Performance Indicators (KPIs)	Baseline	Target	Frequency of Measurement
Digital Health Leadership and Governance	Number of leadership/stakeholder engagements held	0	10	Quarterly
	Kisumu County Digital Health Division operationalized	No	Yes	Annually
	Governance structures established and functioning	No	Yes	Annually
ICT Infrastructure and Information Security	Percentage of health facilities equipped with necessary ICT infrastructure	TBD	100%	Semi-annually
	Number of data governance policies/SOPs developed and implemented	0	3	Annually
	Number of facilities with reliable internet and power backup systems	TBD	100%	Semi-annually
Digital Health Solutions	Percentage of health facilities with integrated/interoperable systems	10%	90%	Semi-annually
	Number of patients with portable digital health records	0	100,000	Annually
Workforce Development	Number of staff trained in digital health systems and data management	0	500	Quarterly
Operationalization of Enterprise Architecture	Enterprise architecture aligned with national health system	No	Yes	Annually
Change Management	Number of change management workshops held	0	5	Annually
Monitoring and Evaluation	Percentage of roadmap milestones achieved on time	0	90%	Quarterly

Table 4: Key performance indicatorsSource: Kisumu County, 2023

3. Data Collection Methods

- **Routine Data Monitoring:** Data will be collected on a regular basis using digital systems installed at healthcare facilities. These systems will track the status of key activities, such as ICT installation, system integration, and service delivery improvements.
- **Field Surveys:** Periodic surveys will be conducted at various health facilities to assess the status of equipment, data security, and infrastructure. These surveys will also gather feedback from healthcare workers and patients on system usability and service improvements.
- **Stakeholder Reports:** Partners involved in implementation will provide quarterly reports detailing their contributions, challenges faced, and progress made. This will be supplemented by interviews with key stakeholders.
- **Health Information System Data:** Integration of health systems with the Kenya Health Information System (KHIS) will enable real-time data sharing, which will be analyzed to measure system performance and patient outcomes.
- **Performance Audits:** Independent audits will be conducted annually to verify that the systems and processes in place are functioning as intended and are compliant with county and national policies.

4. Reporting Structure

- **Monthly Progress Reports:** Each facility implementing the roadmap will submit monthly progress reports to the Kisumu County Digital Health Division, which will compile these reports into county-wide updates.
- **Quarterly M&E Reports**: The Digital Health Division will consolidate data from facilities, partners, and surveys to produce comprehensive quarterly M&E reports. These will include progress against KPIs, financial expenditure, challenges encountered, and corrective actions taken.
- **Annual Reviews:** An annual report will be produced summarizing the year's progress, key achievements, and areas for improvement. This will be shared with county leadership, national health authorities, and external partners.
- **Mid-Year Review Workshops:** Every six months, stakeholders will gather for a review workshop to assess progress, refine implementation strategies, and reallocate resources as needed.

5. M&E Roles and Responsibilities

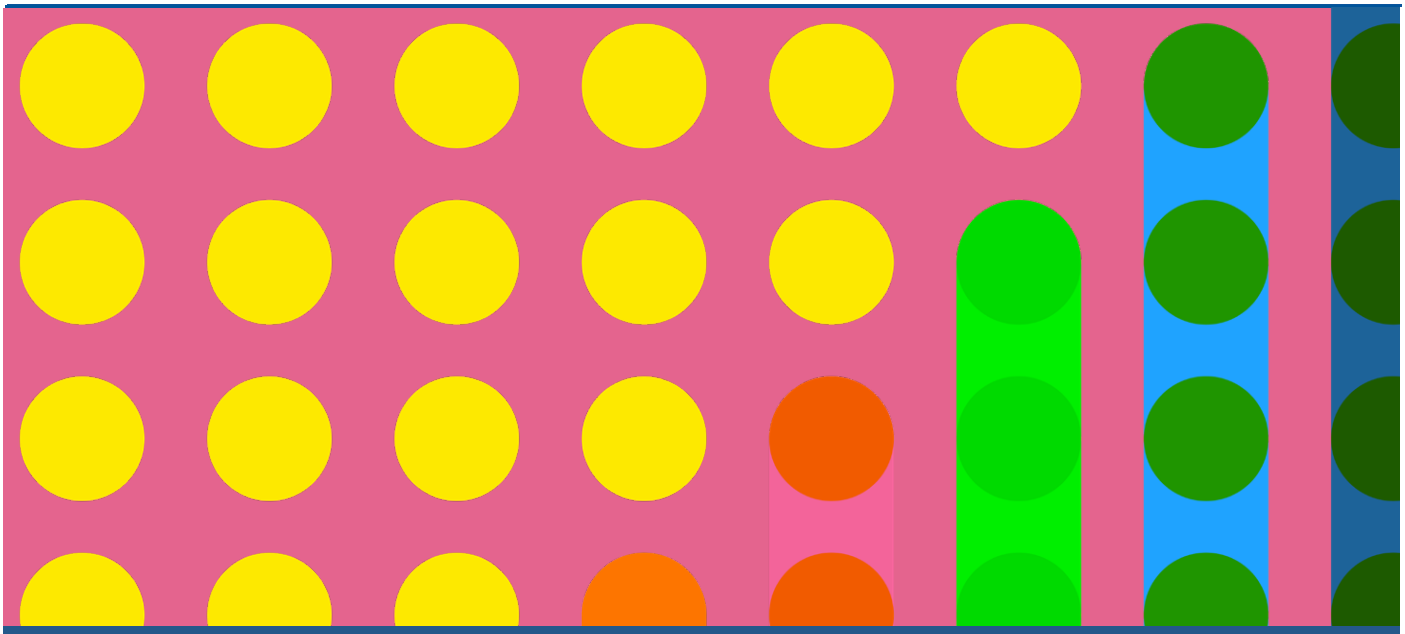
Entity	Roles and Responsibilities
Kisumu County Digital Health Division	Lead the overall monitoring and evaluation process, ensure timely data collection, and generate reports for stakeholders.
Health Facility M&E Teams	Collect and report on facility-specific data related to roadmap activities and outcomes.
External M&E Consultants	Conduct independent performance audits, provide technical guidance, and offer recommendations for system improvement.
Development Partners	Support the M&E process through resource provision and sharing insights from best practices and international experiences.
County Executive Committee Member (CECM) Health	Oversee the overall implementation of the roadmap and ensure alignment with county health priorities.

6. Evaluation Schedule

- **Mid-Term Evaluation:** Conducted at the end of the third year (2025), this evaluation will assess the roadmap's overall progress, identify any gaps or risks, and recommend adjustments for the final phase of implementation.
- **Final Evaluation:** At the end of the roadmap period (2027/28), a comprehensive evaluation will be conducted to measure the success of the digitization efforts, identify lessons learned, and propose future actions for sustaining and scaling digital health initiatives.

7. Continuous Learning and Adaptation

The M&E framework will incorporate a feedback loop that allows for learning and adaptation. Regular learning sessions will be held to discuss M&E findings, share best practices, and implement corrective measures where necessary. Stakeholder input will be a crucial part of this process to ensure the roadmap remains relevant and responsive to the needs of Kisumu County's healthcare system.



COSTED ROADMAP

Financial Overview

The estimated cost for implementing this roadmap from 2024/25 to 2028/29 is Kshs. 820,528,000. However, this figure is expected to decrease after conducting digital health facility readiness assessments, which will help optimize resource allocation and avoid unnecessary expenditures. The majority of the funds will be allocated towards ICT equipment procurement, system configuration, and facility-level digitization.

This costed roadmap is structured around key strategic areas: governance and leadership, digital infrastructure investment, change management, human resource training, and monitoring and evaluation. Each area is critical to ensuring the sustainability and scalability of the digital health interventions across the county's health system. By addressing these areas progressively, Kisumu County will leverage technology to enhance patient care, optimize resource utilization, and streamline health data management. This amount was costed using the methodology below.

Costing Methodology

The costing methodology employed for this roadmap is activity-based costing, ensuring that every aspect of implementation is covered in a detailed and transparent manner. Key components of the costing process include:

1. **Activity Breakdown:** Each strategic area has been broken down into specific activities and sub-activities, ensuring clarity in what is being costed. For example, "Procurement of ICT equipment" includes sub-activities like purchasing desktops, laptops, routers, and printers for health facilities.
2. **Unit Costs:** Market research and benchmarking were conducted to determine accurate unit costs for equipment, services, and logistics. Unit costs for items such as computers, routers, and software licences reflect prevailing market prices.
3. **Quantity and Frequency:** Quantities are based on the number of facilities or participants required for each activity, while frequency refers to the number of cycles or times an activity is carried out over the roadmap period. For instance, ICT equipment procurement will be done in three cycles across the five-year timeline to ensure all facilities are fully equipped.

4. **Phased Approach:** The implementation is spread over several phases, with critical areas such as governance and leadership being addressed first, followed by infrastructure development, change management, and human resource training. This phased approach allows for optimal resource allocation and minimizes upfront costs.
5. **Stakeholder Engagement:** Costs related to stakeholder engagement, such as workshops, conferences, and dissemination activities, are calculated based on the number of participants and the duration of each engagement, ensuring thorough involvement of all key stakeholders.
6. **Contingencies:** To account for market fluctuations and unforeseen expenses, slight flexibility has been built into cost estimates where necessary.

This structured costing approach ensures that the roadmap is not only financially sustainable but also allows for adjustments based on real-time needs and evolving healthcare challenges. The total estimated cost for full implementation is **Kshs. 820,528,000,** spread across five years, covering infrastructure, training, and change management, among other critical investments.

Kisumu County Digital Health Costed Roadmap

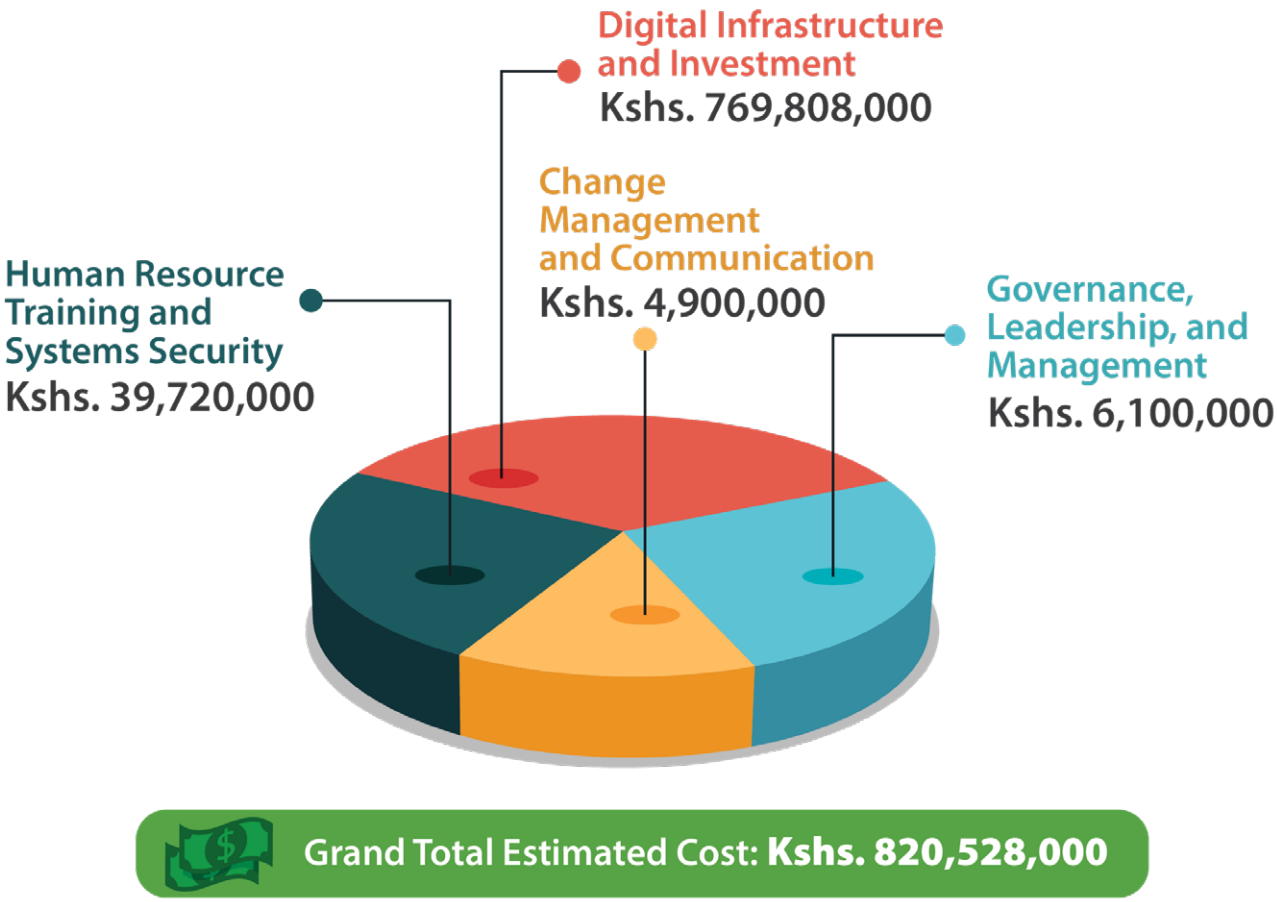


Table 5: Kisumu County Digital Health Costed Roadmap

Topical Area	Key Activities in a phased manner	Sub-Activities	Timeline	Cost Estimate (Kshs.)
Governance, Leadership, and Management	Establish governance structure	- Define leadership structure - Appoint leadership	Q1 2024	0
	Orientation workshop for governance team (20 people)	- Conference package - Transport reimbursement	Q1 2025	200,000
	Strategy validation (5-day workshop, 20 people)	- Conference package - Subsistence allowances - Transport	Q1 2025	1,840,000
	Publication of strategy (online and 100 hard copies)	- Online publication (no cost) - Print 100 hard copies	Q2 2025	100,000
	Dissemination to PCNs (70 people/PCN for 8 PCNs)	- Conference package - Transport reimbursement	Q3 2025	3,960,000
	Total Cost for Governance, Leadership, and Management			6,100,000
Digital Infrastructure and Investment	Procurement of ICT equipment (138 facilities)	- 1,380 desktops/laptops (3 cycles) - 1,380 routers (3 cycles)	2025-2029	496,800,000
		- 1,380 UPS voltage stabilisers (3 cycles) - 138 printers		103,500,000
	Broadband internet subscription for facilities	- Kshs. 3,000/month per facility for 12 months (138 facilities)	2025-2029	4,968,000
	Equipping County Data Center	- Procurement of servers and related hardware - Software licences	2025-2029	50,000,000
	Total Cost for Digital Infrastructure and Investment			769,808,000
Change Management and Communication	Develop change management and communication plan (20 people, 5 days)	- Conference package - Transport reimbursement	Q4 2025	1,440,000
	Dissemination of plan to PCNs (70 people/PCN for 8 PCNs)	- Conference package - Transport reimbursement	Q4 2025	3,360,000
	Publication of plan (100 hard copies)	- Design and printing	Q4 2025	100,000

	Total Cost for Change Management and Communication			4,900,000
Human Resource Training and Systems Security	Hire consultant for systems/platforms interoperability (1 year)	- Consultant hired for 12 months	FY 2025/2026	3,600,000
	Train 14 systems support officers (5-day workshop)	- Conference package - Transport reimbursement	FY 2025/2026	1,120,000
	Install physical security systems for data centres (35 wards)	- Physical barriers (steel, gridlocks, etc.)	FY 2025/2026 - FY 2028/2029	35,000,000
	Total Cost for Human Resource Training and Systems Security			39,720,000
Monitoring and Evaluation (M&E)	Develop M&E framework	- Framework for tracking progress - Training staff on M&E	Ongoing	Included in HR costs
	Conduct quarterly progress reviews	- Meetings with stakeholders - Quarterly reports	2025-2029	Included in governance cost
	Total Cost for M&E			Included
Grand Total Estimated Cost				**820,528,000**

Summary of Costs:

Topical Area	Revised Cost (Kshs.)
Governance, Leadership, and Management	6,100,000
Digital Infrastructure and Investment	769,808,000
Change Management and Communication	4,900,000
Human Resource Training and Security	39,720,000
Total Estimated Cost	**820,528,000**

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