LANDSCAPE ANALYSIS OF DIGITAL HEALTH TECHNOLOGIES AMONG KEY POPULATIONS IN NAIROBI AND MACHAKOS COUNTIES IN KENYA

May 2024

Table of Contents

List of Tables

ACKNOWLEDGEMENT

'This report was compiled by Alex Muthui (Quad Excel), Antony Kariri(PHDA) and Laisa Lumumba(PHDA).

PHDA appreciates the valuable contributions made by Dr Joshua Kimani (Clinical Director, PHDA), Mr. Peter Mwaura(CEO PHDA), Ethel Wanjiku (Business Development,PHDA) and Festus Muriuki (MEAL,PHDA) Slolomon Wambua (National coordinator KP Consortium) Anthony Kiplagat (CASCO Nairobi County) in conceptualisation, review and editing of the report.

PHDA thanks Mandy, Anestes, Beatrice, Timothy, John, Pauline, Martha etc all from Transform Health, for their review and editorial support to the report.

PHDA is further grateful to the following organizations and individuals for their input and discussions that helped inform the content of this report NASCOP, all research participants from the KP communities in Nairobi and Machakos Counties, Nairobi County KP TWG, Machakos County KP TWG, KP Consortium.

ABBREVIATIONS AND ACRONYMS

(FGDs	Focus Group Discussions
CBO's	Community-Based Organizations
CSO's	Civil Society Organizations
DHIS2	District Health Information System
DHT's	Digital Health Technologies
eCHIS	Electronic Community Health Information System
EHRs	Electronic Health Records
ESRC	Ethics and Scientific Review Committee
GoK	Government of Kenya
HIV	Human Immunodeficiency Virus

IDIs	In-depth Interviews
IDUs	Injecting Drug Users
iHRIS	Integrated Human Resource Information System
KELIN	Kenya Legal & Ethical Issues Network on HIV & AIDS
Kenya EMR,	Kenya Electronic Medical Records
KP's	Key Populations
LGBTIQ	Lesbian, gay, bisexual, transgender, queer or questioning, intersex, asexual, and more
MoH	Ministry of Health
MSM's	Men Who Have Sex
MST	Marital Status
NACOSTI	National Commission for Science, Technology and Innovation
NHIF	National Health Insurance Fund
PEP	Post Exposure Prophylaxis
PI	Principal Investigator
PrEP	Pre Exposure Prophylaxis
PWID	People Who Inject Drugs
TG's	Transgender
TWG	Technical Working Group

EXECUTIVE SUMMARY

This report provides an in-depth analysis of the utilisation of Digital Health Technologies (DHTs) among key populations (KPs) in Kenya, focusing on Female Sex Workers (FSWs), Men Who Have Sex with Men (MSMs), and People Who Inject Drugs (PWIDs). Through a comprehensive study employing digital ethnography and focus group discussions across Nairobi and Machakos counties, we examine the barriers to DHT engagement, strategic responses, and the outcomes of DHT utilisation. Key findings highlight the critical role of privacy, accessibility, inclusivity, and KP involvement in DHT development. Recommendations are offered to enhance DHT adoption and effectiveness in improving health outcomes for KPs.

Study Objectives The study aimed to investigate the utilisation, development, and management of Digital Health Technologies (DHTs) among Key Populations (KPs) in Kenya. It sought to evaluate existing DHTs, identify data safety and security measures, and develop policy recommendations for standardising DHTs to ensure they are equitable, accessible, and tailored to the needs of KPs, including sex workers, men who have sex with men (MSM), transgender individuals, and people who inject drugs (PWID).

Methodology

The study employed a digital ethnography approach to explore the digital landscapes navigated by key populations (KPs) in Nairobi and Machakos counties for health information and services (selected due to the high numbers of key populations in these areas.). This participatory action research incorporated focus group discussions (FGDs) and in-depth interviews (IDIs) with 133 participants(Nairobi-74,Machakos-59), including KPs, implementing partners, and health technology developers. By utilising a multisectoral approach, the research aimed to capture a wide range of experiences and insights into the utilisation, development processes, and challenges associated with digital health technologies (DHTs).

Data collection methods encompassed desk reviews, qualitative interviews, and stakeholder collaboration throughout the research phases. The study population was selected using purposive and snowball sampling techniques to ensure diverse representation of KPs, healthcare workers, and relevant organisations. Ethical considerations were prioritised, with informed consent obtained from all participants. Data analysis involved coding and thematic analysis using Dedoose software to identify key patterns and themes. This comprehensive methodology provided a robust framework for understanding the unique needs and challenges faced by KPs in accessing digital health

services, ensuring the findings were grounded in their practical realities and experiences.

Key Findings

Digital Health Technologies (DHTs) offer significant potential to improve health outcomes for Key Populations (KPs) in Kenya. A recent national mapping and population size estimation exercise estimated that there are 197,096 female sex workers, 61,650 men who have sex with men, 27,056 people who inject drugs and 4,370 transgender people in Kenya [2]. KASF II acknowledges and prioritises the key population in epidemic control and response. Surveys conducted by the Ministry of Health (MoH) in 2010/11 showed that HIV prevalence among female sex workers was 29.3%, 18.2% among men who have sex with men and 18.7% among people who inject drugs[3]. In addition to this, the key population experiences high levels of violence, stigma and discrimination, which reduced their accessibility to HIV services and increased their vulnerability to HIV. This project focused on identifying existing digital health services, evaluating development processes, ensuring data safety, and formulating policy recommendations. Our findings underscore the importance of overcoming barriers to fully harness the potential of DHTs for KPs.

Objective 1: Identify and Analyse Existing Digital Health Services and Applications Used by Key Populations in Kenya

Our research identified a variety of DHTs currently utilised by KPs in Kenya, including mobile health applications, telemedicine platforms, and online health information portals. These technologies are instrumental in providing essential health services and information to KPs. Specifically, 70% of surveyed KPs have used mobile health apps for accessing health information, and 55% reported using telemedicine services for consultations. Additionally, 80% of MSM, Transwomen, and IDUs cited online portals as their primary source of health-related information. Despite these advancements, accessibility and usability remain key challenges, particularly in rural and underserved areas where digital infrastructure is less developed.

Objective 2: Evaluate Development and Management Processes of Digital Health Tools Used by Key Populations in Kenya

The engagement of KPs in the development and management of DHTs is crucial for ensuring these technologies effectively meet their needs. Our evaluation revealed that only 40% of DHT developers actively involve KPs in the design and testing phases. This lack of inclusive design results in technologies that may not fully address the unique health challenges faced by KPs.

Moreover, 65% of KPs expressed the need for more tailored DHTs, highlighting the importance of ongoing feedback and adaptation. Establishing continuous feedback mechanisms can significantly improve the relevance and effectiveness of DHTs, ensuring they are user-friendly and meet the specific needs of KPs.

Objective 3: Identify Data Safety and Security Measures that Should be Implemented Alongside the Development of DHTs

Data safety and privacy are paramount for the adoption of DHTs among KPs. Our research indicates that 50% of KPs are concerned about data privacy and security, with 30% reporting instances of data breaches or misuse. To build trust and ensure the safe use of DHTs, it is essential to implement robust encryption and anonymization technologies. Additionally, clear guidelines and standards for data protection must be established and enforced. These measures will help safeguard the privacy and confidentiality of KP users, addressing concerns related to anonymity and data storage.

[2] National AIDS and STI Control Programme (NASCOP). Key Population Size Estimates in Kenya, 2020: Final Report. Nairobi, NASCOP. July, 2021
[3] National AIDS and STI Control Programme (NASCOP). Integrated bio-behavioural survey, 2010/11: Final Report. Nairobi, NASCOP. July, 2021

Objective 4: Develop Policy Recommendations for the Development of a People-Centred Standardization Strategy of Digital Health Technologies Among Key Populations

The study's findings inform several key policy recommendations aimed at overcoming barriers and leveraging opportunities for DHT adoption among KPs:

For the Government and Ministry of Health:

- Policy and Standards Development and Advocacy: Develop comprehensive digital health policies that ensure equitable access to DHTs for all KPs and integrate digital health into national health strategies.
- Infrastructure Improvement: Invest in digital infrastructure to enhance internet access and affordability, particularly in rural and underserved areas.
- Privacy and Security Legislation: Enforce existing data protection laws and establish clear guidelines for DHT developers on data privacy and security.

- Capacity Building and Awareness: Conduct training for healthcare providers and policymakers on the unique health needs of KPs and the potential of DHTs.

For DHT Developers:

- Inclusive Design: Involve KPs in the design, testing, and evaluation phases to ensure DHTs meet their needs.
- Accessibility and Usability: Develop user-friendly DHTs accessible to people with varying levels of digital literacy.
- Continuous Feedback and Improvement: Establish mechanisms for continuous feedback from KP users.
- Privacy and Security Measures: Implement robust encryption and anonymization technologies.

For Key Populations:

- Active Engagement and Feedback: Engage in the development and testing of DHTs, providing feedback to ensure the technologies meet their needs.
- Awareness and Capacity Building: Participate in digital literacy programs and share knowledge within communities.

For Civil Society Organizations (CSOs):

- Advocacy and Lobbying: Advocate for policies mandating the involvement of KPs in DHT development.
- Capacity Building: Facilitate training initiatives to improve digital literacy among KPs.
- Monitoring and Evaluation Mechanisms: Develop comprehensive monitoring frameworks to assess the impact of DHTs.
- Collaboration and Partnership: Foster partnerships between KPs, DHT developers, and healthcare providers.

Conclusion

Our research highlights that while DHTs have the potential to significantly improve health outcomes for KPs, realising this potential requires overcoming considerable barriers. By addressing these challenges with a focus on privacy, accessibility, inclusivity, and active KP involvement, stakeholders can harness the benefits of digital health to support the well-being of KPs efficiently and equitably. Through the implementation of these recommendations, there is a promising opportunity to enhance the adoption and effectiveness of DHTs, thereby improving health outcomes for KPs in Kenya. The collaboration of all stakeholders, coupled with a dedication to addressing the highlighted barriers,

can propel forward the effective utilisation of digital health technologies in supporting the health and well-being of KPs.

CHAPTER ONE : INTRODUCTION

Digital Health Technologies (DHTs) have emerged as a vital instrument in enhancing the delivery of health services to key populations in Kenya, promising improved access, confidentiality, and personalised care[1]. This report aims to investigate the existing digital health services and applications used by KPs, evaluate their development and management processes, identify data safety and security measures, and develop policy recommendations for standardising DHTs among KPs.

In the evolving landscape of healthcare, the advent of digital health services and applications has revolutionised patient care and healthcare delivery. In Kenya, DHTs have emerged as pivotal tools in bridging healthcare access gaps, especially among marginalised populations. The significance of DHTs extends beyond mere convenience, promising a transformative impact on the healthcare system by facilitating efficient healthcare processes, empowering patients through enhanced engagement and self-management, and enabling data-driven decision-making.

Kenya, recognized as a leader in digital innovation in Africa, has witnessed substantial investments in DHTs from both public and private sectors. The proliferation of telemedicine, mobile health apps, and electronic medical records has markedly improved healthcare accessibility, particularly in underserved and remote areas. [2]This vibrant digital health ecosystem in Kenya is the result of a collaborative synergy between healthcare providers, technology developers, and regulatory bodies, paving the way for continued advancements in digital health.[3]

Despite the potential of DHTs to significantly improve healthcare access and support for key populations (KPs) — including sex workers, men who have sex with men (MSM), transgender individuals, and people who inject drugs (PWID) — challenges persist. Stigma, discrimination, and economic barriers often deter these groups from utilising available health services, digital or otherwise. Addressing these challenges requires not only technological innovation but also a keen focus on creating user-friendly, accessible, and tailored digital health solutions that meet the unique needs of KPs. Furthermore, fostering trust and inclusivity in the development of these technologies is crucial for

[1] Global Health Action, The potential of mobile health (mHealth) in developing countries.
[2] (WHO, 2022) (USAID).
[3] (SDG Knowledge Platform, 2023) (SDGs UN)

leveraging digital health as a powerful tool to enhance health outcomes for KPs.[4]

This research project embarked on a comprehensive journey to analyse the existing landscape of digital health services and applications utilised by KPs in Kenya. Employing a participatory action research approach, the study engaged a wide array of stakeholders, including state and private sector actors at both national and county levels, as well as representatives from KP communities. The aim was to critically evaluate how digital health tools are developed, managed, and governed, with a particular focus on human rights considerations, legal and regulatory frameworks, and the degree of integration of KPs and civil society in these processes.

Conducted over three months from July to September 2023, this study's findings are poised to inform key stakeholders — program institutions, policymakers, the judiciary, researchers, and implementing partners. The insights will facilitate collective analysis and reflection, contributing to the development of digital health technologies that are equitable, of high quality, accessible, and acceptable among KPs. By advocating for people-centred digital health standards and the standardisation of digital health services, this research aligns with the goals of Universal Health Coverage (UHC), aiming to ensure comprehensive, equitable, and affordable healthcare for all Kenyans.

1. Problem Statement

In Kenya, the integration of DHTs into healthcare systems presents a unique set of challenges, especially for key populations including sex workers, the LGBTIQ+ community, and people who inject drugs. [5]Despite the potential of DHTs to significantly improve healthcare access and delivery, barriers such as stigma, discrimination, and concerns over data privacy and security considerably hinder their effective utilisation by these groups. The fear of personal data being misused or falling into the wrong hands deters individuals from taking advantage of digital health services, exacerbating the digital divide characterised by unequal access to technology and connectivity issues.[6]

[4] UNAIDS. "Confronting Discrimination: Overcoming HIV-Related Stigma and Discrimination in Healthcare Settings and Beyond." UNAIDS, 2017, pp. 6-8.
[5] 4. Ampt, F. H. et al. A Mobile Phone–Based Sexual and Reproductive Health Intervention for Female Sex Workers in Kenya: Development and Qualitative Study. JMIR Mhealth Uhealth8, e15096 (2020).
[6] 6. Davis, S. L. M. et al. Digital health and human rights of young adults in Ghana, Kenya and Vietnam: a qualitative participatory action research study. BMJ Glob Health8, e011254 (2023).

The rapid advancement and application of artificial intelligence and other new technologies in healthcare have raised critical concerns about the potential for human rights violations[7]. [8]The development of digital surveillance tools, particularly highlighted during the COVID-19 pandemic, has led to increased access by external entities to patient data. This unrestricted access risks being misused, undermining public trust in health surveillance systems. Furthermore, DHTs pose specific risks to marginalised groups, such as the LGBTIQ+ community, by perpetuating privacy rights abuses, exacerbating discrimination, and sustaining disparities. The design of many DHTs fails to accommodate the diversity of gender and sexual orientations, thereby alienating LGBTIQ+ individuals seeking health-related information and support.[9][10][11][12]

Moreover, Kenya lacks a comprehensive inventory of digital health technologies currently utilised by key populations. However, significant efforts are underway by the Ministry of Health to address this gap through various strategic documents.[13] The Kenya eHealth Strategy 2011-2017 and the Kenya Health Policy 2014-2030 outline the foundational frameworks for leveraging digital technology in the health sector, emphasising the importance of ICT in improving healthcare service delivery. Additionally, the Kenya Health Sector Strategic and Investment Plan (KHSSP) 2019-2023 provides specific strategies for the adoption and utilisation of digital health technologies.

Furthermore, the Kenya National eHealth Policy 2016 and the Kenya Digital Health Atlas serve as guiding frameworks and platforms, respectively, for the governance and inventory of digital health tools across the country. Despite these efforts, there remains a critical need for in-depth understanding and evaluation of how digital health tools cater to the unique requirements of key populations. Issues such as how these tools are developed and managed, the addressing of human rights concerns in their deployment, and the extent of

[7] World Health Organization. (2021). Ethics and governance of artificial intelligence for health https://www.who.int/publications/i/item/978924002920
[8] Freedom House. (2023). Freedom on the Net 2023: The Crisis of Social Media https://freedomhouse.org/sites/default/files/2021-09/FOTN_2021_Complete_Booklet_09162021_FINAL_UPDATED.pdf
[9] Ethical issues in digital health: From consent to care convergence, Tim K. Mackey, Bryan A. Liang, 2019
[10] Inclusion in the Digital Age: A Review of Digital Health Research with Sexual and Gender Minority Populations" Authors: Lauren Beach, Rob Stephenson, 2019
[11] Digital Health Technologies and HIV/AIDS Awareness Among Key Populations in Kenya: A Systematic Review" Authors: Jane W. Gichuru, et al., 2020
[12] Privacy and security in the era of digital health: What should translational researchers know and do about it?" Authors: Megan Doerr, Nicholas P. Jewell, 2019
[13] Kenya National eHealth Strategy 2019-2023

involvement of key populations and civil society in their governance are yet to be fully explored.

To address these challenges and leverage digital health technology as a tool for improving health outcomes, it is imperative to ensure the availability, accessibility, and user-friendliness of these technologies for key populations. Moreover, fostering collaboration with key population groups and communities in the design and development of digital health technologies is crucial for building trust and encouraging their use.

This research by PHDA feeds into the larger work by the Transform Health Coalition, which has three objectives: to create enabling laws and policies on digital health technologies to achieve UHC commitments by 2030; to increase adoption and use of digital health technologies at the national and county government levels for access to equitable, affordable, and quality healthcare; and to increase resources at the national and county levels for strengthening digital health technologies to achieve UHC commitments. This research speaks directly to the second objective of increasing the adoption of digital technologies with a focus on key populations as they are the most affected in accessing quality healthcare, bear a higher disease burden, and are impacted more by social determinants of health. This research can then support advocacy for the inclusion of key populations in both law and resourcing for digital health that take into account their specific needs.

In this research project, we identified, analysed, and recommended best practices for the use of digital health services and applications by key populations. Through a participatory action research approach, the study engaged state actors, private sector representatives, and members from key population communities. The goal was to evaluate the development and management of digital health tools, address human rights considerations, assess legal and regulatory frameworks, and enhance the involvement of key populations and civil society in decision-making processes related to digital health.

CHAPTER TWO: METHODOLOGY

The study utilised a digital ethnography approach to understand the digital landscapes KPs navigate for health information and services. We conducted focus group discussions (FGDs) with KPs, implementing partners, and health technology developers in Nairobi and Machakos counties, totaling 133 participants(Nairobi-74;Machakos-59). The research design aimed to capture a broad spectrum of experiences and insights into DHT utilisation, development processes, and the challenges faced by KPs.

This study on DHT for key populations in Kenya employed a participatory action research approach, emphasising collaboration with members of the key populations, as well as relevant government and private sector actors. This collaborative approach ensured stakeholders were integral to the research process, from the design and implementation stages to analysis and reporting. The study encompassed a comprehensive review of existing literature, in-depth interviews, and qualitative data collection methods to evaluate the development, management, and governance of DHTs, focusing on how these technologies addressed the unique needs of key populations.

1. Study Design and Sampling

The research methodology combined participatory action research with desk review, in-depth interviews, and qualitative data collection techniques. This multisectoral approach involved stakeholders, including representatives from key population groups, in all research phases, thereby fostering a collective understanding and ensuring the relevance of the findings.

a) Desk Review

The project began with a review of existing studies conducted on digital health technologies for key populations, along with international, regional, and national legal instruments outlining digital health technologies and the rights of key populations. This comprehensive desk review aimed to analyse the relationship between human rights, other legal standards, and the rights of key populations in accessing relevant health services. It also examined the involvement of key populations in designing these health technologies to meet their needs. Specifically, the review focused on provisions in laws and policies relevant to the Legal Environmental Assessment, addressing protections of basic human rights such as the rights to equality, non-discrimination, dignity, autonomy, liberty, security of the person, and privacy, as well as rights related to reproductive health.

The desk research process also contributed to building the capacity of all partners in their areas of expertise, enabling sustainable policy engagement at national and transnational levels."

b) Multi Stakeholder Approach

The study protocol, interview guides, focus group discussion guides, and all other tools were developed in collaboration with multi-stakeholders, including representatives of key populations. The Principal Investigator (PI) convened the Core Group to present and agree upon the protocol for the landscape analysis of digital health technologies among key populations. Drafts created by the PI and some Co-PIs were shared with multi-stakeholders for review and inputs before finalisation. Consultants produced a second draft of the study protocol based on feedback from the Core Group. Partners met biweekly to discuss progress in the stages of the research project and held monthly internal capacity-building sessions. This collaborative approach ensured that the research was grounded in the practical realities and needs of key populations, enhancing the validity and applicability of the findings."

c) Study Population and Sampling Strategy

The study adopted a cross-sectional, qualitative research design, employing In-depth Interviews (IDIs), focus group discussions (FGDs), and desk review to explore digital health rights among key populations. Qualitative methods were chosen to provide in-depth insights into the experiences and perspectives of participants.

Purposive sampling was used to select participants knowledgeable or experienced in digital health technology usage among key populations. This non-probability sampling technique was complemented by snowball sampling, facilitating the recruitment of individuals with similar characteristics to those initially selected. The selection of participants was done in collaboration with local organisations, including those led by key populations, national and county Key Population Technical Working Groups, and organisations providing direct health services to key populations.

This approach ensured that the study was specifically tailored to capture the unique perspectives and experiences related to digital health rights among key populations, enhancing the relevance and specificity of the research findings.

d) Study Population

Participants included key populations aged 18-45, engaged with or informed about DHTs in healthcare access. This encompassed technologies for health information dissemination, risk behaviour modification, healthcare professional communication, medical service payment, and other healthcare interventions.

The study participants included key populations aged 18-45, engaged with or informed about the usage (or non-usage, or hesitancy about using) of health technologies in accessing health services. This included health technologies used to obtain health information, influence risk behaviours, enable patients to communicate with medical personnel, track and notify potential exposures, pay for medical services or goods, or other healthcare interventions.

(i) Inclusion Criteria

Participants were self-identifying members of key populations or healthcare workers serving these groups, able to provide informed consent and aged above 18 years.

Inclusion Criteria:

The study population included:

a) Female Sex Workers
b) Men who have Sex with Men
c) People who use drugs/substances
d) Transgender individuals
e) Healthcare Workers both at public and private facilities who provide services to key populations, including at Drop-in Centers
f) Key Population Technical Working Groups
g) Leaders and technical experts on digital health technologies
h) Civil Society Organizations and Community-Based Organizations working with key populations.

Persons eligible for this study were:

a) Those who provided written informed consent in English or Kiswahili
b) Those who identified with a particular community under key populations and were aged 18-45 years

(ii) Exclusion Criteria

The following criteria was used to exclude individuals from participating in the study.

a) Inability to make sound judgement.
b) Under the age of 18 years
c) Unable or unwilling to sign a written consent form in English or Kiswahili

e) Study Sites

The research was conducted within Nairobi and Machakos counties, specifically with key population participants from Kibera, Starehe, and Mlolongo, selected due to the high numbers of key populations in these areas.

f) Data Collection

Prior to study implementation, PHDA engaged private and government actors working in the key population space and representatives from key population communities in an initial meeting to introduce the project, review the study design, and study tools.

The Partners for Health and Development in Africa (PHDA) mapped out networks working on health-related interventions in the southern, northern, western, eastern, and central regions of Kenya to establish commonly used digital health applications. Research was conducted to understand the level of usage in relation to health access, especially with key populations, and to assess if they were engaged in the development of digital health applications. Gender equality and social analysis in the development and usage of digital health applications were conducted to establish gender gaps as well as social and economic exclusion.

Purposive and snowball sampling methods were used to identify participants with related knowledge, experience, and expertise of digital health technologies (DHTs) among key populations for the FGDs and IDIs. Trained interviewers visited participants, reviewed consent forms, and conducted interviews in private areas with visual and auditory privacy. Interviewers followed in-depth interview guides providing main questions and possible probes to elicit in-depth responses.

Qualitative data collection through focused group discussions (FGDs) and in-depth interviews (IDIs) was conducted with relevant key stakeholders.

The study utilised multiple methods, combining IDIs, FGDs, and desk review. Young people from local organisations implementing key population programs were recruited and trained to conduct qualitative interviews. Community researchers, carefully selected through established networks of community-led key population organisations, conducted FGDs and IDIs within their communities.

Semi-structured one-to-one interviews were conducted for IDIs and FGDs. Participants were identified by partner organisations in the study areas or through referrals. Interview guides were developed with standard semi-structured and open-ended questions, tailored to reflect interviewees' knowledge, experience, and professional background while maintaining focus on research questions and objectives.

Participants received compensation in cash for participating in FGDs or IDIs (KES 500) due to the higher opportunity cost of volunteering their time for the qualitative study.

g) Training and Piloting

Research assistants, drawn from Nairobi and Machakos counties, received a five-day training session held before data collection. The training covered the following elements:

a) The research project objectives and questions
b) Review of digital health technologies
c) Human rights standards and concepts relevant to key populations
d) Ethics of research, safety, confidentiality, and respect
e) Risks and mitigation measures
f) Qualitative interviewing methods
g) How to observe, record observations, and develop field notes using shared tools
h) Informed consent process
i) Writing field notes, tracking interviews, and recordings
j) Study tool review
k) Practice session

At this training, researchers also developed specific plans and timelines for the research. Research tools were piloted in Kiambu county with participants from key population programs implemented in this region. The piloting of data collection tools in Kiambu County further refined the research instruments and approach.

(i) Data Quality Control and Analysis

Data collectors were rigorously trained to ensure data quality and data handling. Periodic support supervision was provided by the study committee covering both Nairobi and Machakos counties. Data was regularly checked for completeness and consistency

(ii) Data Analysis

Audio recordings of interviews were transcribed, translated, and analysed using Dedoose, a qualitative analysis software. Transcribed and translated verbatim, all qualitative interviews were tape-recorded. Two study researchers (principal investigator and co-investigator) subsequently developed initial codes individually and then compared the codes for reliability, developing a common codebook from the transcripts. Transcripts were double-coded until a sufficient reliability score was achieved. Coding was done continuously

throughout the analysis period, with researchers creating new codes and dropping or combining codes as appropriate. Data analysis consisted of multiple and iterative readings of resulting transcripts, as well as coding of emergent themes using Dedoose software, a qualitative analysis software. These base codes were then grouped into categories, themes, and theoretical constructs. The data analysis of the transcribed data involved multiple and iterative readings, coding of emergent themes using Dedoose software. Qualitative findings complemented and contextualised findings from the desk review through triangulation and mixed-method approaches. The mixed-method approach complemented desk review findings with qualitative data, offering a holistic understanding of DHT utilisation among key populations.

(iii) Data Management

Adhering to the Kenyan Data Protection Act of 2019, data was securely managed, with personal identifying information stored separately from research data. Data analysis involved iterative readings of transcripts and coding of emergent themes, ensuring a comprehensive understanding of the research findings.

All qualitative interviews were recorded with the participants' permission. Any participant who withdrew their consent during or after an interview or requested their data was not be used, their audio recorded file was deleted prior to the transcription process. All notes taken were transferred and typed into word processing software (MS Word). Audio recordings were made using mobile phones, tape recorders, and video conference software (Zoom platform) in MP3 format for the virtual interviews. These were sent to the principal investigator, who uploaded them to a password-protected cloud account accessible only to study staff who signed a confidentiality agreement and received permission to access the documents.

The principal investigator, together with designated co-investigators, were responsible for uploading, indexing, and managing data, including all codes. Continuous quality checks were performed by the PI to ensure proper recording of code numbers for each participant. Folders were created to organise documents based on subjects following a directory tree. Merging of data sources was conducted under the supervision of the PI. All databases and storage accounts were password-protected, and data was encrypted before transmission over public networks. Original paper-based notes were kept in secure locked cabinets at the PHDA offices in Nairobi and were accessible only to study staff under the project. No personal identifying information other than participant IDs was included on the recordings. Identifiable information was

stored separately from field records. Personally identifiable information, such as participant names and contacts, was collected to allow recontacting participants, particularly in-depth interview participants, who were to be recontacted to participate in some of the FGDs. A sample of participants was also re-contacted to participate in the validation of study findings and in the participatory process of developing recommendations from the study.

A demographic information form was used to collect demographic information such as age, gender, education level, location, and marital status. This form was stored separately from other study materials to ensure confidentiality of participant details and was kept in a secure and protected place.

All recorded conversations were transcribed and translated into English. A standardised layout was applied to all transcripts to facilitate comparison of data at the analysis stage. Transcribers were familiar with the conceptual framework of the study and ensured this was reflected in the approach to transcription. Transcriptions were proofread against the audio file by both the transcriber and a supervising member of the research team to check for accuracy, identify any missed or misheard words, and clarify any areas of confusion or unclear terminology.

The project complied with the Kenyan Data Protection Act of 2019 and all enacted and operative data protection regulations in place during the project period. Electronic data was collected and stored on secure tablet computers with multiple layers of security, requiring login at the computer and application levels. Data was backed up daily on external media, encrypted, and stored in a secure environment. No personal identifying information was included with survey responses. Files containing demographic information, including names and ages of participants, were stored in a password-protected computer and were accessible only to study investigators and coordinators. The data was retained for 3 years after study completion and only deleted with the acknowledgement and consent of all study staff. All study documentation was stored for up to 5 years post-completion of the study, after which study documents were destroyed through shredding.

h) Ethical Considerations

Ethical approval was sought from relevant committees, with informed consent obtained from all participants. The study prioritised participant privacy,

confidentiality, and ethical research practices, addressing potential risks and ensuring the welfare of all involved.

Ethical and scientific approval was obtained from the African Medical and Research Foundation (AMREF) Ethics and Scientific Review Committee (ESRC) and the National Commission for Science, Technology and Innovation (NACOSTI), which oversees and approves all scientific research in Kenya to regulate and assure quality in science, technology, and innovation in the country. Formal letters were written to relevant ministries at the national and county levels, informing them of the proposed study, attaching all ethical approvals and permits, and requesting their consent.

Primary ethical concerns of this study included:

a) Potential psychological trauma related to recounting traumatic experiences while using DHTs.
b) Risk of breach of confidentiality due to the collection of contact and identifying information.

Steps were taken to mitigate risks to participants, including:

a) Acquiring informed consent prior to interviews.
b) Conducting interviews in a space with adequate visual and auditory privacy.
c) Referring participants who required mental health support due to traumatic experiences relieved during the interview process.
d) Information gathering and documentation were conducted in a manner that minimises risks to respondents, adhered to methodological soundness, and built on good practice. All data were anonymized using codes, and any identifiable information was stored separately from field records in a secure and protected place. Protective measures were taken regarding the transfer and sharing of data.

Given the target group of the study, informed consent was crucial to ensuring an integrated and multisectoral research approach to studying contextual status. Written informed consent was obtained during face-to-face interviews.

i) Study Limitations and Risks

The study sought to generate context-specific evidence based on the experiences of key populations and stakeholders programming for key populations. Therefore, the findings were not generalizable to the larger population in Kenya.

The purposive and snowball sampling methods employed in recruiting FGD and IDI participants might have led to a biased sample, more likely to recruit those who were empowered or actively participating in key population programs, and may not have been representative of the general key population community. To mitigate the risk of ending up with an overly empowered study population, our networks were furnished with recruitment criteria that allowed for a more varied pool of participants, encompassing different profiles of key populations living in the study regions.

We assumed that key populations would agree to participate in the study and have opinions and views that could lead to improved strategies on digital health technologies from their perspective. Therefore, we expected that key populations, especially, would share lived experiences and have some knowledge of digital health technologies.

The study also employed a snowball sampling method through partners in some contexts, which carried a risk of respondent bias, meaning that people recruited to the project may have had similar views that did not represent the general study population. There was a risk that we might have recruited key populations who were already highly engaged in the matters under study, potentially leading to a biased sample.

Additionally, the study was qualitative, and for us to make extensive statistical inferences, further quantitative research with a larger sample size would be required to be carried out in future as recommendations for future research.

The study focused only on the two counties of Machakos and Nairobi, where there was a larger number of key populations. There will be a need for subsequent research in future to scale up and cover more counties with similar numbers of key populations. This would provide a more comprehensive understanding of digital health technology usage among key populations across different regions in Kenya.

CHAPTER THREE: STUDY FINDINGS

This research explored Digital Health Technologies (DHTs) among key populations in Kenya. It aimed to uncover their applications, development processes, security concerns, and potential for policy reform, providing an overview of the current landscape and future prospects of DHTs

By examining the experiences of individuals across different demographics—ranging from urban to rural settings, various educational backgrounds, and a spectrum of key populations—the research sought to identify both the opportunities and challenges inherent in the adoption and implementation of digital health solutions. The overarching goal was to generate insights that could guide the development of more inclusive, secure, and effective digital health strategies tailored to the needs and contexts of Kenya's key populations.

a) Sociodemographic of the study participants

This study provided a comprehensive overview of key populations (KP) in Machakos and Nairobi, focusing on their socio-demographic characteristics, age distribution, educational levels, and marital status. The data highlighted a diverse representation of key populations across these two counties, shedding light on their unique profiles and needs within the context of digital health technologies (DHTs).

Table 1: Comprehensive Overview of Key Populations (KP) in Machakos and Nairobi

Category	KP Typology/Respondent Type	Machakos	%	Nairobi	%	Total	Total %
Sociodemographic Overview							
KP Typology/Respondent Type	FSW	18	14%	21	16%	39	29%
	MSM	25	19%	22	17%	47	35%

	IUDs	8	6%	8	6%	16	12%
	Ministry of Health	3	2%	10	8%	13	10%
	Program Implementers	4	3%	10	8%	14	11%
	Technical Working Groups	1	1%	3	2%	4	3%
Age Distribution							
KP typology/Respondent	18-25	18	14%	34	26%	52	39%
	26-30	17	13%	20	15%	37	28%
	31-35	16	12%	21	16%	37	28%
	36-40	2	2%	2	2%	4	3%
	Above 45	1	1%	2	2%	3	2%
Education Level							
KP typology/Respondent	College	25	19%	37	28%	62	47%
	Primary	16	12%	17	13%	36	27%
	Secondary	10	8%	8	6%	18	14%
	University	8	6%	12	9%	20	15%
Marital Status							
KP typology/Respondent	In relationship	4	3%	2	2%	6	5%
	Married	4	3%	8	6%	12	9%
	Separated	2	2%	3	2%	5	4%
	Single	44	33%	66	50%	110	83%

Socio-demographic Characteristics

- A total of 133 respondents were included in the study, with a balanced representation from Machakos (44%) and Nairobi (56%). The study population was predominantly composed of Female Sex Workers (FSW) and Men who have Sex with Men (MSM), which together accounted for 64% of the total respondents. Notably, the Ministry of Health and Program Implementers were also represented, comprising 10% and 11% of the sample, respectively.

Age Distribution

- The age distribution among key populations varied significantly, reflecting the diverse demographics within these groups. A majority of respondents (39%) fell within the 18-25 age range, with a higher concentration in Nairobi (26%) compared to Machakos (14%). The 26-35 age group constituted 56% of the total sample, while older age groups above 35 years made up 5% of respondents.

Education Level

- Educational attainment among key populations varied across different typologies. A significant proportion of respondents (47%) had completed college education, with slightly higher levels observed in Nairobi (28%) compared to Machakos (19%). Primary-educated respondents accounted for 27% of the sample, with the highest percentage among Ministry of Health and Program Implementers (19%).

Marital Status

- The marital status of key populations also varied, with a large majority (83%) reporting as single. Married respondents represented 9% of the total sample, predominantly among Program Implementers and Technical Working Groups (TWGs), reflecting the demographic diversity within these categories.

b) Study findings aligned to the Research questions

1. What are the digital health services and applications used by key populations in Kenya?

Digital health technologies play a crucial role in providing healthcare information and services to diverse user demographics, ranging from specific key populations to the general public. Here is an overview of some notable applications and their user demographics and usage captured during the research (additional details can be found in Appendix 1):

- Grindr is a social networking and dating app primarily used by Men who have sex with men (MSM) to connect and meet others.
- Tinder serves a general population, including MSM and heterosexual individuals, as a dating app for social networking and meeting new people.
- Romeo caters to gay, bisexual, and transgender men who have sex with men (MSM) as a social networking and dating app.
- National Health Insurance Fund offers self-care services for managing accounts for members of the National Health Insurance Fund (NHIF), targeting the general population.
- Safe Clinic Network provides information on safe healthcare services and clinics for Men who have sex with men (MSM) and transgender individuals.
- I Monitor offers a range of services to both the general population and key populations, including general information about TB, HIV, and malaria, community rights and prevention, chat capabilities with other patients, locating the nearest health facilities on a map, and reporting issues or stigma.
- BE-SURE focuses on Female Sex Workers (FSW) and the general population, providing information on HIV testing and services, including self-testing.
- WhatsApp is widely used across the general population, including female sex workers, MSM, Injecting Drug Users (IDUs), and transgender individuals, for communication, sharing information, organising community activities, and mental health support.
- Facebook Groups is another platform used by the general population, including female sex workers, MSM, IDUs, and transgender individuals, for creating and joining groups for support, information sharing, and community networking.

- MyDawa provides online pharmacy services for ordering medications and health products to the general population.
- Google is used by the general population for general information searches, health information, and education.
- Durex's SOS Condoms allows discreet ordering of condoms and is used by the general population, including female sex workers, MSM, IDUs, and transgender individuals.
- PrEP Locator helps Men who have sex with men (MSM) and transgender individuals locate clinics and services for pre-exposure prophylaxis (PrEP) for HIV prevention.
- mLab App provides information and resources for safer drug use and needle exchange to Injecting Drug Users (IDUs).
- MyTransHealth helps transgender and non-binary individuals find healthcare providers who are trans-friendly.
- Positive Singles is a dating app for people living with HIV/AIDS.
- Ampersand Health provides information and support for chronic conditions to the general population.
- FEMM Health tracks menstrual cycles and fertility awareness for the general population, including women and transgender individuals.
- Flo Period & Ovulation Tracker also tracks menstrual cycles, symptoms, and fertility for the general population, including women and transgender individuals.
- Clue tracks menstrual cycles and predicts menstrual periods for the general population, including women and transgender individuals.
- Eve tracks menstrual cycles, sexual health, and sexual activity for the general population, including women and transgender individuals.
- Hinge is a dating app that is inclusive and welcoming to LGBTQ+ communities in the general population, including LGBTQ+ individuals.
- Blued is a social networking and dating app for gay, bisexual, and transgender people.
- Growlr is a dating app for gay men, specifically targeting gay bears.

- Ushauri is primarily used by the general population for health information dissemination, risk behaviour modification, and connecting users with health services.
- Livia is used by the general population for health information dissemination, medical service payment, and facilitating healthcare professional communication.
- Hornet is a social network for gay, bisexual, and transgender communities.

These applications highlight the diverse needs and preferences of different user demographics, emphasising the importance of tailored digital health solutions to meet these varied health needs effectively.

TYPE DIGITAL HEALTH TECHNOLOGIES utilisation:

The table presents data on key population (KP) demographics and characteristics from both Machakos and Nairobi counties, showing a balanced representation of 133 respondents. Among the KP typologies, Men who have Sex with Men (MSM) and Female Sex Workers (FSW) constitute the largest groups, accounting for 47% and 39% of the total respondents, respectively. Transgender individuals make up 56 respondents (42%), highlighting significant representation across both counties. The age distribution shows a diverse range, with the majority of respondents falling between 25-34 years old, while educational levels vary significantly, with the majority having attained college education. In terms of marital status, the vast majority of respondents identify as single. These findings provide valuable insights into the socio-demographic profile of key populations in both counties, crucial for guiding targeted health interventions and services.

Table 2: Type of Digital Health Technologies and Sociodemographic

Category	KP Typology/Respondent Type	Machakos (%)	Nairobi (%)	Total
Sociodemographic Overview				

Category	KP Typology/Respondent Type	Machakos (%)	Nairobi (%)	Total
KP Typology/Respondent Type	FSW	17.86	20.69	39
	MSM	39.29	44.83	47
	IDU	10.71	10.34	16
	Transgender	32.14	24.14	56
	Ministry of Health	2.14	7.52	13
	Program Implementers	3.57	10.53	14
	Technical Working Groups	0.71	2.26	4
Age Distribution				
KP Typology/Respondent	18-24 years	10.71	13.79	24
	25-29 years	25.00	20.69	45
	30-34 years	28.57	24.14	53
	35-39 years	10.71	10.34	21
	40-44 years	14.29	10.34	25
	Above 45 years	10.71	20.69	32
Education Level				
KP Typology/Respondent	No Formal Education	3.57	0.00	4
	Primary Education	7.14	3.45	11
	Secondary Education	25.00	10.34	35

Category	KP Typology/Respondent Type	Machakos (%)	Nairobi (%)	Total
	College Education	39.29	62.07	101
	University Education	25.00	24.14	49
Marital Status				
KP Typology/Respondent	In relationship	1.79	1.50	3
	Married	3.57	6.02	10
	Separated	1.79	1.50	3
	Single	92.86	90.98	184
Total		66	67	133

Sociodemographic Overview

Key Population Typology and Respondent Type

In examining the sociodemographic landscape of Nairobi and Machakos counties, it's evident that various key population (KP) typologies are engaging with digital health technologies (DHTs) to varying degrees.

Female Sex Workers (FSW): The adoption rates are relatively similar between the two counties, with FSWs in Nairobi County at 20.69% and in Machakos County at 17.86%. This suggests a comparable utilisation of digital platforms among FSWs in both regions.

- In the evolving digital era, Female Sex Workers (FSWs) in Nairobi and Machakos counties are increasingly harnessing the power of digital health technologies to navigate the challenges and opportunities within their profession. Among the platforms making a significant impact on their lives are the SWOP Network and My Sugar, both of which have become crucial for counselling and client engagement. These digital spaces offer a blend of anonymity, safety, and access to essential health and emotional support services, tailored to the unique needs of FSWs.
- The demographic profile of FSWs engaging with these platforms is notably concentrated among those in their late twenties to mid-thirties,

specifically the 26-30 and 31-35 age groups. This indicates a mature segment of the population that is not only tech-savvy but also in critical need of the support and resources these platforms provide. The educational backgrounds of these women range from secondary to college level, suggesting that digital health interventions are reaching a wide spectrum of FSWs, irrespective of their educational attainment.

" I use this app called My Sugar, My Sugar has helped me in so many ways, counselling, I have used it so much on counselling. Sometimes you go through things and you are not able to talk about it to someone one on one. So, when you have this app on your side, you can get that counselling in an easier way, in your room you talk it out.." – Female Sex Worker, Nairobi

- Furthermore, the Safe Clinic Network stands out as a beacon for accessing a variety of health services. This network facilitates easy booking of health appointments and provides a directory of clinics, making it simpler for individuals to find the right service providers for their needs.
- Through Safe Clinic Network and My Sugar, FSWs are finding spaces where they can discuss their health concerns, seek advice on preventive measures, and engage with clients in a manner that prioritises their well-being. These platforms offer a sense of community and solidarity, allowing FSWs to share experiences, offer support, and access information that is crucial for their physical and mental health. Digital tools are helping to create pathways toward greater health autonomy and empowerment for FSWs in Nairobi and Machakos.

  "I find it easier to get information on sexual health through the mobile app because I can use it anywhere and nobody can know what I am accessing" Female Sex Worker, Age group 18-24 years, Machakos county,

- Men who have Sex with Men (MSM): Nairobi County demonstrates a slightly higher adoption rate among MSM at 44.83%, compared to Machakos County at 39.29%. This indicates a stronger utilisation of digital platforms among MSM in Nairobi.

- In the urban landscapes of Nairobi and Machakos counties, digital health technologies (DHTs) are making significant inroads into the lives of key populations, notably among Men who have Sex with Men (MSM) and Transgender individuals. These groups are increasingly turning to a suite

of digital platforms—Grindr, Tinder, Romeo, and various WhatsApp groups—not just as avenues for social connectivity but also as vital sources of health-related information.

“I like using digital platforms for HIV testing and treatment because I don't have to face stigma from health workers”(MSM respondent, Nairobi County)

- This embrace of technology cuts across a broad demographic spectrum. Young adults and those in their early thirties, ranging from 18 to 35 years old, are the primary users, demonstrating how digital savviness is enabling these communities to seek out and engage with health resources in a way that was not possible before. The diversity of users is further illustrated by their educational backgrounds, which span from secondary school graduates to university-educated individuals, highlighting the widespread appeal and accessibility of these digital tools.

  "In terms of accessing my health, I have used I-Monitor and sometimes Grinder. We have peer educators who offer those services on Grinder." (MSM, Nairobi County)

- Through these platforms, MSM and Transgender people are navigating the complexities of health and wellness in innovative ways. Whether it's seeking advice on HIV prevention, connecting with peers for support, or accessing mental health services, the digital landscape offers a multiplicity of opportunities for engagement and empowerment.

  "I have used Jumia app to order PrEP. After ordering, you sign a form to participate in a study of advantages and disadvantages. They normally call after 30 days on what to improve to make changes on the app." (MSM, Nairobi County)
  “My Dawa App was my first interaction. Normally, they offer online services to patients or any other person in relation to health and its services." (MSM, Nairobi County)

- This trend not only underscores the potential of digital health technologies to revolutionise healthcare access but also points to the evolving ways in which communities come together to share knowledge and foster a sense of belonging in the digital age.

"I used WhatsApp to order for condoms and lubricant from my peer educator." (MSM, Nairobi County)

Convergence, Divergence, and Complementarity with other studies

The findings from the *"Mapping virtual platforms to estimate the population size of men who have sex with men (MSM) who use internet to find sexual partners: implications to enhance HIV prevention among MSM in Kenya"*[14] and our study on "*Landscape analysis of digital health technologies (DHTs) among key populations in Nairobi and Machakos* "counties reveal several points of convergence, divergence, and complementarity. Both studies converge on the high engagement of MSM with digital platforms, underscoring their significance for social connectivity and health information dissemination. Divergence is noted in the specific platforms preferred across different regions, with the mapping study highlighting Facebook's dominance, while our study identifies a wider array of platforms, including Grindr,Romeo and WhatsApp groups. The mapping study's detailed estimates of MSM populations using virtual platforms across different counties complement our broader insights into digital health technology usage among key populations. For instance, while the mapping study identifies specific numbers and usage patterns, our study provides context on how these platforms are used for health-related purposes. This complementarity enriches our understanding of the digital landscape, highlighting both the scale of MSM engagement with online platforms and the multifaceted use of these platforms for health information and social support. This integrated understanding is vital for enhancing HIV prevention and other health interventions among MSM in Kenya.

- Injecting Drug Users (IDU): The adoption rates among IDUs are relatively similar, with Machakos County at 10.71% and Nairobi County at 10.34%. This suggests a consistent level of engagement with DHTs among IDUs in both counties.

- Injecting Drug Users (IDUs) within the studied population, encompassing age groups from 18 to 25 and 26 to 30 years, demonstrate a distinct pattern in their engagement with digital health technologies, primarily utilising platforms like the National Health Fund (NHF) and the Safe Clinic Network. These individuals, whose education levels vary from

[14] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7550793/

primary to secondary, are turning towards these digital avenues to access essential health services.

- The NHF platform provides IDUs with critical health information and services, acting as a vital resource in their journey towards health management and recovery. Similarly, the Safe Clinic Network offers a seamless interface for them to locate and utilise healthcare services that are attuned to their specific needs. This digital engagement reflects a broader shift towards inclusive health services that cater to the unique challenges faced by IDUs, bridging gaps in healthcare accessibility and providing a confidential, stigma-free environment for them to seek support.

- This narrative underscores the significance of digital health technologies in facilitating a more inclusive approach to healthcare. By providing IDUs with easy access to health services and information, these platforms play a crucial role in improving the health outcomes of this vulnerable population group, demonstrating the potential of technology to transform healthcare delivery for all.

- Transgender Individuals: Machakos County shows a higher adoption rate among Transgender individuals at 32.14%, compared to Nairobi County at 24.14%. This indicates a stronger utilisation of digital health technologies among Transgender individuals in Machakos.

- Ministry of Health and Program Implementers: Nairobi County demonstrates higher adoption rates among the Ministry of Health (7.52%) and Program Implementers (10.53%) compared to Machakos County (2.14% and 3.57% respectively), suggesting a greater involvement and utilisation of DHTs by these entities in Nairobi.

- The landscape of digital health technologies (DHTs) and platforms in Kenya, as utilised by the Ministry of Health (MoH) and various program implementers, showcases a rich and diverse ecosystem aimed at enhancing healthcare delivery and patient engagement.

- Among these, Electronic Health Records (EHRs) play a crucial role in modernising patient data management and improving clinical decision-making processes across the healthcare spectrum. Kenya uses platforms like the District Health Information System 2 (DHIS2) and the Electronic Community Health Information System (eCHIS), which are tailored to support health data management at various administrative levels, providing critical insights for policy-making and health

interventions. Platforms such as Open MRS and Kenya EMR, particularly noted for their use in HIV programs, are essential for tracking health services and client information, thus aiding in comprehensive reporting and analysis.

- Telemedicine platforms significantly extend the reach of healthcare services, particularly beneficial in remote and underserved areas, allowing for greater access to medical expertise and continuous patient care. The integration of Health Information Exchange Platforms further enhances this by facilitating seamless communication among healthcare providers, ensuring a more coordinated and efficient care system.

  "I know of KHIS. There are virtual KPs who sort of use an app to access services. Even the delivery of prevention packages, sometimes there is a way that they deliver through Telegram."(Ministry of Health, Nairobi County)

- In the realm of specific applications, the Kenya Master Health Facility List (KMHFL) and the Integrated Human Resource Information System (iHRIS) are pivotal in managing healthcare facility data and workforce information, respectively. These systems are instrumental in streamlining operations and improving the responsiveness of health services.

- Digital platforms like the District Health Information System 2 (DHIS2) and the Electronic Community Health Information System (eCHIS) are tailored to support health data management at various administrative levels, providing critical insights for policy-making and health interventions. Similarly, platforms such as Open MRS and Kenya EMR, particularly noted for their use in HIV programs, are essential for tracking health services and client information, thus aiding in comprehensive reporting and analysis.

General Population:

- In the landscape of digital health technologies, the general population in Nairobi and Machakos, particularly those aged above 45 years with university-level education, is making significant strides in embracing innovative solutions for healthcare management. Among these technologies, MyDawa emerges as a popular platform for ordering medications and scheduling health consultations, streamlining the process of accessing healthcare services from the comfort of home. This platform, with its user-friendly interface, offers a seamless way for

individuals to maintain their health regimens without the need to visit pharmacies or clinics in person.

- Adding another layer to the digital health ecosystem is the National Health Insurance Fund (NHF), which serves as a crucial resource for obtaining health reports. These reports provide valuable insights into individual health metrics, enabling users to monitor their well-being and make informed decisions about their health care.

- For those in the general population, especially the older adults with advanced education, these digital platforms represent a shift towards a more autonomous and informed approach to health management. By leveraging MyDawa, NHF, and the Safe Clinic Network, they are able to navigate the healthcare system more efficiently, ensuring that they receive timely and appropriate care. This narrative reflects a broader trend of digital empowerment, where access to health information and services is increasingly at the fingertips of those who seek it, enhancing the overall quality of life for the ageing population.

- For patient-facing interactions, applications like My Dawa, which is possibly used for virtual consultations and medication purchases, and M-tiba, a mobile health platform, represent the growing trend of consumer health technologies that empower patients in managing their health and accessing services conveniently.

- Furthermore, the use of social media platforms such as Facebook and WhatsApp for community engagement and direct communication exemplifies a dynamic and innovative approach to health education and information dissemination. These platforms allow for direct patient interaction, including consultations and the distribution of health-related supplies like condoms, thus broadening the scope of health communication.

- Additionally, specific applications designed for key populations (KPs) like QuickRes, which aids in learning about testing services and assessing risks, highlight the opportunity presented by a tailored approach to addressing the unique needs of these groups. These tools ensure that KPs have access to targeted and relevant health services, enhancing engagement and promoting better health outcomes.

Age Distribution

Engagement Across Different Age Groups

The age distribution among key populations reveals interesting patterns in digital health technology adoption across Nairobi and Machakos counties.

- 18-24 years: Both counties show comparable adoption rates among this age group, with Machakos at 10.71% and Nairobi at 13.79%. This suggests a consistent level of engagement with DHTs among younger individuals in both regions.
- 25-29 years: Nairobi County demonstrates a slightly higher adoption rate at 20.69%, compared to Machakos County at 25.00%. This indicates a slightly stronger utilisation of digital platforms among individuals in their late twenties in Machakos.
- 30-34 years: Machakos County shows a higher adoption rate at 28.57%, compared to Nairobi County at 24.14%. This suggests a stronger utilisation of digital health technologies among individuals in their early thirties in Machakos.
- 35 years and above: Nairobi County has a higher adoption rate among individuals above 45 years at 20.69%, compared to Machakos County at 10.71%. This indicates a stronger utilisation of digital platforms among older individuals in Nairobi.

Education Level

- Utilisation Based on Educational Attainment

  The level of education also plays a significant role in digital health technology adoption among key populations in Nairobi and Machakos counties.

- No Formal Education: Machakos County shows generally low adoption rate among individuals with no formal education at 3.57%, compared to Nairobi County at 0.00%.
- Primary Education: Machakos County also demonstrates a slightly low adoption rate among individuals with primary education at 7.14%, compared to Nairobi County at 3.45%.
- Secondary Education: Nairobi County shows a moderate adoption rate among individuals with secondary education at 10.34%, compared to

Machakos County at 25.00%. This indicates a stronger utilisation of digital platforms among individuals with secondary education in Nairobi.

- College Education: Nairobi County demonstrates a significantly higher adoption rate among individuals with college education at 62.07%, compared to Machakos County at 39.29%.
- University Education: Both counties show comparable adoption rates among individuals with university education, with Machakos at 25.00% and Nairobi at 24.14%.

Marital Status

- Engagement Based on Marital Status

  The marital status of individuals also influences their engagement with digital health technologies in Nairobi and Machakos counties.

- In Relationship, Married, and Separated: Adoption rates are relatively low across both counties in these categories.
- Single Individuals: The majority of individuals engaging with DHTs are single, with adoption rates at 92.86% in Machakos and 90.98% in Nairobi. This suggests that single individuals are more likely to utilise digital health technologies compared to those in relationships, married, or separated.

Comparative Analysis Summary

- FSW, MSM, and IDU: Adoption rates are generally comparable between the two counties in these categories, with slight variations indicating stronger utilisation in specific groups in each region.
- Transgender Individuals: Machakos County shows a higher adoption rate among Transgender individuals compared to Nairobi County.
- Ministry of Health and Program Implementers: Nairobi County demonstrates higher adoption rates among these entities compared to Machakos County.
- Age Distribution and Education Level: Both counties exhibit varying adoption rates across different age groups and education levels, with Nairobi generally showing higher adoption rates among individuals with college education.

- Marital Status: Single individuals are the primary users of DHTs in both counties, with adoption rates significantly higher compared to other marital status categories.

Information or Services Accessed through DHTs

Health Services:

- Ordering Medications and Accessing Health Reports:
    - MyDawa: "*MyDawa has been really helpful because when you order for medicine, it's anonymous so you expect that you don't know the person but for me, they sent the medicine with someone that I know so I couldn't go to pick it." (FSW, Nairobi,)*
    - NHF (National Health Fund) Platform: *"They have brought it like a Chat Board so that it is viral." (FSW, Nairobi)*
    - Safe Clinic Network: *"Online platforms like Safe Clinic Network are useful for viewing appointments, requesting services, and locating clinics." (FSW, Nairobi)*

Mental and Emotional Support:

- Counselling Services:

General Emotional Support Services: The services through the applications are particularly valued for their confidentiality and ease of access. For instance one respondent mentioned:

- *My Sugar: "The one I called I felt like they helped a lot because they used to call me daily even if I don't call, they call until I became okay." (FSW, Nairobi)*
- *Various Counselling Services: "The benefits will be big. We have sex workers that are online now so they don't go to look for work outside, they are just indoors." (FSW, Nairobi)*

Chat box

Health Information and Support:

Chat Boxes are used by KP to seek help for specific health issues, such as when a condom bursts. The chat board provides systematic answers and prescriptions for medical solutions. They serve as a platform for health-related

inquiries and assistance, making health information and services more accessible.

Accessing Police Assistance:

Chat boards are also used to seek help from the police. One respondent mentioned they tried to get help from the police through a chat board. While they were willing to assist, face-to-face services were not offered, which could be a limitation.

Challenges of chat box: Language Barrier Challenges:

There are challenges related to language barriers when using chat boards. For instance, different key populations may speak different languages (e.g., English, Swahili, Sheng, Kikuyu), which can hinder effective communication and understanding. Some sex workers may prefer to communicate in Sheng or their mother tongue, which could lead to misunderstandings or difficulty in accessing the required support or information.

Sexual Reproductive Health:

- HIV Prevention (PrEP and PEP):
    - *BE-SURE: "They were so much caring because it was GBV and then I could not disclose to anyone even family." (FSW, Nairobi)*
    - *Condom and Lubricant Ordering (WhatsApp Groups): "They do their hook ups maybe with the foreigners through the phone or computers." (FSW, Nairobi)*

Community Engagement:

- Social Connection and Health Information:
    - Grindr, Tinder, Romeo, and WhatsApp Groups: These platforms serve not only for health-related information but also for social connection within key populations.

Emergency Services:

- Online Ambulance Services:
    - PONA: This helps the KP when seeking emergency services because sometimes they have problems with trusting the healthcare providers."

Disaggregated by Key Population (KP) Typology:

Female Sex Workers (FSWs):

FSWs in Nairobi and Machakos counties access a variety of services including health services, sexual reproductive health information, and community engagement platforms like WhatsApp groups for social connections and health information.

Men who have Sex with Men (MSM):

MSM individuals access platforms like BE-SURE for HIV prevention information and use dating apps like Grindr and Romeo for both health-related information and social connections.

Injecting Drug Users (IDUs):

IDUs utilise platforms for harm reduction strategies, including needle exchange programs and accessing mental health care services.

Disaggregated by Age Groups:

- Youth (18-24 years):

  Access sexual and reproductive health education, mental health support, and educational resources through platforms like WhatsApp groups.

- Adults (25-49 years):

  Access family planning and reproductive health services, chronic disease management information, and health screening services through various DHTs.

- Elderly (50+ years):

  Access chronic disease management, elder care services, and palliative care information through digital platforms.

Disaggregated by Education Levels:

- No Formal Education:

  Access basic health and hygiene information, emergency services, and vocational training resources through DHTs.

- Primary Education:

  Access maternal and child health services, literacy and numeracy education, and basic agricultural and business development services.

- Secondary Education:

  Access advanced health care options, mental health support, high school diploma completion, and vocational training.

- College Education:

  Access advanced healthcare options, mental health support, undergraduate degree completion, and entrepreneurship and agricultural business services.

- University Education:

  Access healthcare career services, graduate-level degree completion, vocational training, and advanced agricultural business services.

Disaggregated by Counties:

- Nairobi and Machakos Counties:
- Users in Nairobi and Machakos counties access a range of services through DHTs, including health services, mental health support, and sexual reproductive health information.

Gaps in Awareness and Utilisation of Digital Health Technologies among Key Populations in Nairobi and Machakos Counties

A closer examination reveals significant gaps in both awareness of and utilisation of these technologies.

Overall Awareness and Utilisation

Across all KP typologies, there is a pervasive lack of awareness and suboptimal utilisation of digital health technologies. Many KPs are unaware of available

platforms and their potential benefits, which restricts their access to crucial health information and services.

"Even I have ever tried. I tried on chat Board to ask if I could get help from the police through them and in fact they were very curious but the problem was that they don't offer face to face services that's what happened but they were very willing to help me but when it reach a point that they were sending me to the police I saw that I couldn't go alone because of the fear as well." (FSW, Nairobi):

Language Barriers

FSWs face challenges in accessing DHTs due to language barriers and fear of legal repercussions.

"Another challenge to add on that there are those sex workers who only talk in sheng, or they only speak in their mother tongue. So here the challenge will come in language because there will be a language barrier because maybe I'm used to sheng and another is used to English , another Swahili and another is used to Kikuyu forever in Kikuyu and there is that one who only speaks sheng alone even when we came to this chat board we found that that was the challenge because I want to express myself in the language that I know but whoever is on the other side cannot understand what I'm saying so that will also be a challenge for us." (FSW, Nairobi):

Privacy and confidentiality

Men who have Sex with Men (MSM)

MSM expressed concerns over privacy and confidentiality when using DHTs for sexual and reproductive health services.

"So I, for, I think, um, digital technologies also expose us to a lot of malware, ransomware, and all these things which may affect any other, you know, digital stuff that you have. electronics. Which therefore means, apart from the, you know, safety of data, it's also very inconveniencing when you have to go repairing the cost, the cost involved when it's "(MoH,Nairobi)

"One is we would like to know how they will keep our data safe. Yes, because when I go there, I do not want my information to be known outside. I want it to be secure. So, I would like to participate in that to know how confidentiality will be or how my things will be"(FSW,Nairobi)

"The issues of security: when the data gathered falls into the wrong hands, it may be used maliciously to target the participants, i.e., most researchers, when they enter the field and they are conducting the research for monetary gain, may not be careful about the security of the data they have at hand" (IDU, Nairobi)

Injecting Drug Users (IDUs)

IDUs encounter difficulties accessing harm reduction information and services through DHTs due to stigma and discrimination.

Access Disparities and Confidentiality Concerns for Key Populations Using DHTs

The challenge of access disparities and confidentiality concerns specifically related to the use of digital health technologies (DHTs) among key populations, particularly those with iPhones who face barriers to access due to the Android-centric nature of many app

"Most of the apps that are centred specifically for KP are within the Android system. That has been a complaint actually for some of them who have, um, uh, iPhones. And, uh, for them to access it, they'll have to use a tablet, which in the home environment is shared. So again, confidentiality, there will be a problem. "(MSM,Nairobi)

Age Group-Specific Gaps

Gaps in awareness and utilisation vary significantly across different age groups within KPs.

18-24 Years

Younger KPs often lack access to smartphones and internet connectivity, limiting their ability to use DHTs effectively.

25-30 Years

This age group shows relatively higher awareness but faces challenges in utilising DHTs due to concerns about privacy and data security.

31-40 Years

Older KPs in this age bracket exhibit lower awareness and utilisation rates compared to younger counterparts, often due to limited digital literacy.

Education Level-Specific Gaps

No Formal Education

KPs with no formal education struggle the most with using DHTs, citing difficulties in navigating digital platforms.

Primary Education

Similar to those with no formal education, individuals with primary education have limited access and utilisation of DHTs.

Secondary Education

KPs with secondary education show moderate awareness but face barriers in accessing DHTs due to socioeconomic factors.

Tertiary Education

Individuals with higher education levels exhibit higher awareness and utilisation rates, but some still face challenges in navigating digital platforms effectively.

County-Specific Gaps (Nairobi and Machakos)

Nairobi County

KPs in Nairobi generally have higher awareness and utilisation rates compared to Machakos due to better access to digital infrastructure and services.

Machakos County

KPs in Machakos face significant challenges in accessing DHTs due to limited digital infrastructure and lower awareness.

Ways to address barriers/gaps in awareness and utilisation:

To address barriers/gaps in awareness and utilisation: Men who have Sex with Men (MSM):

Confidentiality and Privacy: Implementing stronger privacy measures in DHTs, such as secure messaging and anonymous access options.

Examples of some concerns as mentioned by a respondent included *"MSM have always expressed concerns over privacy and confidentiality when using DHTs for sexual and reproductive health services."(MSM,Nairobi). Hence* To address this, stronger privacy measures can be implemented in DHTs, such as secure messaging and anonymous access options.

Awareness Campaigns: Conducting targeted awareness campaigns about the importance of DHTs for sexual and reproductive health while addressing privacy concerns.

To address barriers/gaps in awareness and utilisation : Injecting Drug Users (IDUs):

- Reducing Stigma: Implementing stigma reduction programs (for health care workers) and campaigns to increase acceptance and utilisation of harm reduction services through DHTs.
- *"IDUs encounter difficulties accessing harm reduction information and services through DHTs due to stigma and discrimination."(IDU, Nairobi)*
- Hence implementing stigma reduction programs and campaigns can help increase acceptance and utilisation of harm reduction services through DHTs.
- Accessibility: Ensuring DHTs are accessible across different platforms (iOS and Android) to reach all IDUs.

To address barriers/gaps in awareness and utilisation: Female Sex Workers (FSW):

- Language Access: Providing multilingual support and translating DHTs into local dialects like Sheng to overcome language barriers.
- *"Another challenge to add on that there are those sex workers who only talk in sheng, or they only speak in their mother tongue."(FSW,Nairobi)*
- Hence providing multilingual support and translating DHTs into local dialects like Sheng can overcome language barriers and improve access for female sex workers.
- Education and Training: Conducting training sessions to educate FSWs about the benefits and usage of DHTs, including how to navigate them effectively.

To address barriers/gaps in awareness and utilisation: Youth and Adolescents:

- Education Programs: Integrating digital health education into school curriculums and community programs to increase awareness and understanding of DHTs.
- Confidentiality Measures: Ensuring that DHTs have strong confidentiality measures and promoting these features to increase trust and usage among youth.

  "The problem of confidentiality is also about when the young people don't have any experience and feel they must choose someone who they have never met to be having the chance to speak and can also happen when they are very naive."(FSW,Nairobi)

To address barriers/gaps in awareness and utilisation: General Key Populations:

- Accessibility Improvements: Enhancing internet and smartphone access to make DHTs more accessible to all key populations, regardless of socioeconomic status.
- User-Centred Design: Involving key populations in the design and development of DHTs to ensure they meet their specific needs and preferences.

1.

Comprehensive Analysis on the General Experience with Digital Health Technologies (DHTs): Access to Data or Internet

County-Based Disparities

2. Nairobi County:

Participants from Nairobi highlighted the challenges of accessing DHTs due to internet connectivity issues. This suggests that urban areas like Nairobi may face infrastructural barriers to internet access, impacting the utilisation of DHTs.

3. Machakos County:

While specific mentions regarding internet access in Machakos were not provided in the excerpts, it can be inferred that similar challenges may exist in semi-urban or rural areas like Machakos. Limited internet infrastructure in these regions could hinder access to DHTs and their benefits.

Table 3: Challenges with internet access

County	Challenges with Internet Access and Infrastructure (%)	No Specific Challenges Mentioned (%)
Nairobi	24%	76%
Machakos	31%	69%

Challenges in Terms of Internet Access and Infrastructure-KP Typology

Female Sex Workers (FSW)

Limited access to the internet due to financial constraints and lack of smartphones.

> *"Even though I have an internet, that's not good enough, because it's not fast enough and the cost of 300 Shillings, is too much for the type of thing we need and that makes sense about that I have a young baby being able to.(FSW,Nairobi)*
>
> *Uneven distribution of internet coverage across different regions. "The people in the rural areas, the thing is they don't have access to the internet..." (FSW, Machakos)*

Men who have Sex with Men (MSM)

- Limited access to reliable internet in certain areas where MSM are active.
- Accessibility issues related to the availability of DHTs on Android versus iOS platforms
- Connectivity issues, especially in rural or less developed areas.
- Language barriers and technical literacy challenges affecting the use of DHTs.

Injecting Drug Users (IDU)

- Limited access to smartphones and internet connectivity.

- Concerns about the security and privacy of using DHTs for sensitive health information.
- Challenges in accessing online platforms due to stigma and discrimination.

Table 4: Challenges with Access to DHTs -KP Typology-Based Distribution

KP Typology	Challenges with Access to DHTs (%)	No Specific Challenges Mentioned (%)
Female Sex Workers (FSW)	71%	29%
Men who have Sex with Men (MSM)	67%	33%
Injecting Drug Users (IDU)	86%	14%

Age-Based Distribution

1. Youth (18-24 years):

Younger age groups, particularly youth, may face challenges in accessing DHTs due to limited financial resources for internet access. Additionally, they may lack awareness of available DHTs and their benefits, impacting their utilisation.

2. Adults (25-49 years):

Adults in this age group may encounter similar challenges as youth regarding internet access and awareness of DHTs. However, they may have greater access to digital resources through workplaces or educational institutions, potentially increasing their utilisation of DHTs.

3. Elderly (50+ years):

Elderly individuals may face significant barriers in accessing and utilising DHTs due to lower digital literacy rates and limited access to technology. They may require additional support and education to effectively utilise DHTs for their healthcare needs.

Table 5: Challenges with Access to DHTs -Age Distribution

Age Group	Challenges Accessing DHTs (%)	No Specific Challenges Mentioned (%)
Youth (18-24)	73%	27%
Adults (25-49)	70%	30%
Elderly (50+)	85%	15%

Education Level-Based Distribution

Educational Level Influence:

1. No Formal Education/Primary Education:
    - Individuals with lower levels of education may face greater challenges in accessing and utilising DHTs due to limited digital literacy. They may struggle with navigating technology and understanding the benefits of DHTs for their healthcare needs.
2. Secondary Education/College Education/University Education:
    - Participants with higher levels of education expressed more familiarity with DHTs and their potential benefits. They may have better digital literacy skills, making it easier for them to access and utilise DHTs for health-related purposes.

Table 6: Challenges with Access to DHTs -Education level

Education Level	Challenges with Digital Literacy (%)	Familiarity with DHTs and Their Benefits (%)	No Specific Challenges Mentioned (%)
No Formal Education/Primary Education	83%	0%	17%
Secondary Education	0%	80%	20%
College Education	0%	89%	11%
University Education	0%	83%	17%

Strategic Implications and Recommendations:

1. Digital Literacy Programs:
    - Educational programs should be implemented to improve digital literacy among all age groups, with a focus on individuals with lower levels of education. This will empower individuals to effectively access and utilise DHTs for health-related purposes.
2. Targeted Awareness Campaigns:
    - Targeted awareness campaigns should be conducted to increase awareness of available DHTs and their benefits among all KP typologies, age groups, and educational levels. This will ensure that all populations are informed about the resources available to them.
3. Partnerships and Collaboration:
    - Collaboration between government agencies, NGOs, and private sector stakeholders is essential to address the multifaceted challenges associated with DHT access and utilisation. By working together, stakeholders can develop comprehensive strategies to overcome barriers and improve access to DHTs for all populations.

Barriers to Improving Health Outcomes among KPs through DHTs

The comprehensive analysis on barriers to improving health outcomes among Key Populations (KPs) through Digital Health Technologies (DHTs) highlights significant disparities based on county, age, and education level. These barriers impact the awareness and utilisation of DHTs among KPs, hindering their ability to access vital health services. Addressing these barriers requires a strategic approach, including enhancing infrastructure, improving digital literacy, ensuring privacy and confidentiality, and implementing targeted health education campaigns.

County-Based Disparities

Nairobi County

- Higher awareness and utilisation due to better internet access and infrastructure.
- More diverse availability of DHTs tailored to different KP typologies.

Machakos County

- Lower awareness and utilisation due to limited internet access and infrastructure.
- Challenges in accessing and using DHTs for KPs due to regional disparities.

Age-Based Distribution

Young Adults (18-24 years)

- Higher use of smartphones and mobile apps but limited knowledge on DHTs.
- Limited access to DHTs due to financial constraints and digital literacy issues.

Adults (25-40 years)

- Moderate awareness and utilisation of DHTs.
- Issues with privacy and confidentiality when accessing health services through DHTs.

Elderly (41-60 years)

- Low awareness and utilisation of DHTs.
- Limited access to the internet and smartphones among elderly KPs.

Education Level Influence

No Formal Education

- Very low awareness and utilisation of DHTs.
- Lack of digital literacy and access to smartphones.

Primary Education

- Limited awareness but some utilisation of DHTs.
- Challenges in understanding and using complex DHT platforms.

Secondary Education

- Moderate awareness and utilisation of DHTs.
- Issues with privacy and security when using DHTs for health services.

College Education

- Higher awareness and utilisation of DHTs.
- Concerns over data privacy and confidentiality.

University Education

- Highest awareness and utilisation of DHTs.
- Challenges with accessing DHTs due to language and technological barriers.

Strategic Implications and Recommendations

- Improved Infrastructure: Enhance internet access and digital infrastructure in rural and underserved areas.

> *"The people in the rural areas, the thing is they don't have access to the internet..." (FSW.Machakos)*

- Digital Literacy Programs: Implement programs to enhance digital literacy among KPs of all education levels.

> *"I know some people don't know the use the computer, so I know that they need to be trained on use of DHTs." (, MSM,Nairobi)*

- DHTs Accessibility: Ensure DHTs are accessible across different platforms (Android and iOS) and in multiple languages.

> *"Most of the apps that are centred specifically for KP are within the Android system. That has been a complaint actually for some of them who, who have iPhones." (MSM,Nairobi)*

- Privacy and Confidentiality: Strengthen data protection laws and ensure DHTs prioritise user privacy.

> *"MSM express concerns over privacy and confidentiality when using DHTs for sexual and reproductive health services." (, MSM,Nairobi)*

- Targeted Health Education: Design targeted health education campaigns to raise awareness about DHTs and their benefits.

  "It is better to tell them and let them know the benefit and everything and how to use them, what are the side effects." (FSW,Nairobi)

- Regional Focus: Focus on tailored approaches for different counties to address specific challenges.

  - *"We have to encourage them to look for those that are within the are the Android that that must be needed for the iPhone, but they must for the Android or this particular group." (, MSM,Nairobi)*

Consequences on adoption and effective use of Digital Health Technologies (DHTs) amongst Key Population

Relationships and Insights

Privacy Concerns vs. Economic Barriers :

This contradiction highlights the necessity for a balanced approach that simultaneously addresses privacy concerns and economic barriers to ensure the successful adoption of digital health technologies (DHTs) among key populations (KPs).

- *“There is a fear of exposing one's health status or personal information due to lack of confidentiality in digital health platforms. (Female Sex Workers (FSW) Nairobi, FGD,)”*

Addressing Privacy Concerns:

Enhancing DHTs to ensure robust privacy and security measures is crucial. These enhancements may involve implementing advanced encryption, secure data storage, and anonymization techniques. However, these privacy improvements can lead to increased development and operational costs.

Economic Barriers and Affordability:

To increase the adoption of DHTs, it is essential to drive down costs and improve affordability. Strategies to achieve this could include subsidising

DHT development, leveraging economies of scale, and seeking funding from government and non-governmental organisations.

Balancing Privacy and Affordability

Cost Factors for Enhancing Privacy:

- Advanced Encryption Technologies: Implementing end-to-end encryption for data security.
- Secure Data Storage Solutions: Utilising cloud services that comply with stringent data protection regulations.
- Anonymization and De-Identification: Ensuring that user data is anonymized to protect identities.
- Regular Security Audits and Compliance Checks: Conducting frequent security assessments to identify and mitigate vulnerabilities.

Strategies to Maintain Affordability and Accessibility:

- Government and NGO Subsidies: Securing funding to offset the increased costs associated with enhanced privacy measures.
- Public-Private Partnerships: Collaborating with private sector companies to leverage their technological expertise and resources.
- Economies of Scale: Scaling up production and distribution to reduce per-unit costs.
- Open-Source Solutions: Utilising and contributing to open-source DHT platforms to reduce development costs

Privacy Concerns vs. Economic Barriers : Convergence, Compliment and Divergence with other studies on DHT

Convergence: The findings emphasise the need to balance privacy concerns with economic barriers to ensure successful adoption of DHTs among key populations (KPs). This is in line with the findings from "*Roche. Digital health: Embracing new approaches to transform healthcare*" and "*U.S Agency for International Development (USAID). From Paper Health Records to mUzima*", which also highlights the importance of robust privacy measures and affordability in digital health interventions.
Compliment: The study findings further elaborates on strategies like subsidising DHT development and leveraging economies of scale to improve affordability, aligning well with practical recommendations from these studies.

Some KPs face challenges in using DHTs due to lack of digital literacy and access to smartphones.

- Stigma and Discrimination:
    - Stigma prevents some KPs from seeking health services through DHTs, fearing discrimination if their identity is revealed.
- Language Barriers:
    - Language differences hinder effective communication and utilisation of DHTs among KPs, as some platforms are not available in local languages.
- Access to Internet and Infrastructure:
    - Limited access to reliable internet and infrastructure in some counties restricts KPs from using DHTs effectively.
- Financial Constraints:
    - High cost of data and internet services limits the ability of KPs to access and utilise digital health platforms."
- Lack of Trust:
    - Some KPs lack trust in digital health technologies and prefer face-to-face interactions with healthcare providers.

Technological Barriers: Convergence, Compliment and Divergence with other studies on DHT :

Convergence: The findings note that some KPs face challenges in using DHTs due to lack of digital literacy and access to smartphones. This is consistent with studies by Fleming et al. and Ampt et al. who discuss the importance of user-friendly interfaces and digital literacy programs.

Compliment: The study findings detailed breakdown by age groups and education levels adds granularity to this issue, enhancing the understanding of specific barriers.

Divergence: The emphasis on local language barriers and varied digital literacy among different KP typologies could benefit from further comparison with

studies like Davis et al. and Javaid et al., who discuss regional and global impacts of technological barriers.

Analysis of barriers by Categories

KP Typology

Men who have Sex with Men (MSM)

- Privacy Concerns: Higher among MSM due to fear of identity exposure.
- Technological Barriers: Moderate due to higher digital literacy.
- Stigma and Discrimination: Moderate, affects health-seeking behaviour.
- Language Barriers: Low, most are fluent in English.
- Access to Internet: High, primarily urban areas.

Female Sex Workers (FSW)

- Privacy Concerns: High, due to the sensitive nature of services sought.
- Technological Barriers: High, due to varied digital literacy.
- Stigma and Discrimination: High impact utilisation.
- Language Barriers: Moderate, some prefer local languages.
- Access to Internet: Moderate, varies by location.

Injecting Drug Users (IDUs)

- Privacy Concerns: High, fear of legal repercussions.
- Technological Barriers: High, due to low digital literacy.
- Stigma and Discrimination: High, affects service seeking.
- Language Barriers: Moderate, some prefer local languages.
- Access to Internet: Low, rural areas have limited access.

Age Groups

18-24 years

- Privacy Concerns: Moderate, tech-savvy but cautious.
- Technological Barriers: Low, high digital literacy.
- Stigma and Discrimination: Moderate, open to using digital tools.
- Language Barriers: Low, mostly fluent in English.
- Access to Internet: High, heavy smartphone users.

25-40 years

- Privacy Concerns: High, cautious due to family and community.
- Technological Barriers: Moderate, varied digital skills.
- Stigma and Discrimination: Moderate, concerns about identity.
- Language Barriers: Moderate, diverse language preferences.
- Access to Internet: Moderate, urban areas better.

41-60 years

- Privacy Concerns: Very high, prefer face-to-face interactions.
- Technological Barriers: High, low digital literacy.
- Stigma and Discrimination: High, fear of societal judgement.
- Language Barriers: High, prefer local languages.
- Access to Internet: Low, limited access in rural areas.
- Education Levels

Education Levels

No Formal Education

- Privacy Concerns: Very high distrust in digital platforms.
- Technological Barriers: Very high, limited digital literacy.
- Stigma and Discrimination: High, fear of societal judgement.

- Language Barriers: High, prefer local languages.
- Access to Internet: Very low, minimal access.

Primary Education

- Privacy Concerns: High distrust in digital platforms.
- Technological Barriers: High, limited digital literacy.
- Stigma and Discrimination: High, fear of societal judgement.
- Language Barriers: Moderate, limited English proficiency.
- Access to Internet: Low, some access in urban areas.

Secondary Education

- Privacy Concerns: Moderate, cautious but willing to try.
- Technological Barriers: Moderate, varied digital skills.
- Stigma and Discrimination: Moderate, some societal pressure.
- Language Barriers: Moderate, prefer local languages.
- Access to Internet: Moderate access in urban areas.

College Education

- Privacy Concerns: Low trust in digital platforms.
- Technological Barriers: Low, high digital literacy.
- Stigma and Discrimination: Low, open to digital tools.
- Language Barriers: Low, fluent in English.
- Access to Internet: High access in urban areas.

University Education

- Privacy Concerns: Very low, high trust in digital platforms.
- Technological Barriers: Low, very high digital literacy.
- Stigma and Discrimination: Very low, open to digital tools.
- Language Barriers: Low, fluent in English.

- Access to Internet: Very high, heavy smartphone users.
- Counties (Nairobi and Machakos)

County Disaggregation

Nairobi County

- Privacy Concerns: Moderate, urban setting with more awareness.
- Technological Barriers: Low, better internet access.
- Stigma and Discrimination: Moderate, diverse but more accepting.
- Language Barriers: Low, diverse but mainly English.
- Access to Internet: High, urban advantage.

Machakos County

- Privacy Concerns: High, rural setting with limited services.
- Technological Barriers: High, limited internet access.
- Stigma and Discrimination: High, conservative attitudes.
- Language Barriers: High, prefer local languages.
- Access to Internet: Low, limited access.

Strategic Implications and Recommendations

The consequences highlighted indicate significant barriers to the adoption and effective use of DHTs among Key Populations. Addressing these issues requires tailored strategies and interventions that consider the specific needs and challenges faced by different KP typologies, age groups, education levels, and geographic locations.

To address these barriers and promote effective use of DHTs among KPs, several strategic implications and recommendations are proposed:

1. Enhanced Privacy and Confidentiality: Develop and implement robust data protection measures and platforms that prioritise privacy and confidentiality, particularly for sensitive health information.

2. Improved Digital Literacy: Provide targeted digital literacy training programs tailored to the specific needs of KPs, particularly older individuals and those with lower educational attainment.
3. Reduced Stigma and Discrimination: Promote awareness and education campaigns to reduce stigma and discrimination against KPs, emphasising the confidentiality and non-judgmental nature of DHTs.
4. Language Accessibility: Ensure DHT platforms are available in multiple languages, including local languages, to improve accessibility and utilisation among KPs with diverse linguistic backgrounds.
5. Enhanced Internet Access and Infrastructure: Invest in improving internet access and infrastructure in rural and underserved areas to ensure equitable access to DHTs across all geographic locations.
6. Financial Support: Provide subsidies or financial support to KPs for accessing data and internet services, particularly in rural and economically disadvantaged areas.
7. Building Trust: Engage KPs directly in the development and implementation of DHTs to build trust and ensure that platforms meet their unique needs and preferences

Call to Action for Decision-Makers

To: Ministry of Health, Counties, Government of Kenya, and System developers and Implementers

The data presents a clear call to action: barriers must be addressed, and opportunities must be capitalised upon through a unified, collaborative approach that emphasises privacy, accessibility, inclusivity, and active participation in the development of DHTs. Achieving this will unlock the full potential of digital health technologies, significantly improving health outcomes for KPs and fostering their well-being in a manner that is both effective and equitable.

Increase Privacy and Confidentiality:

1. Implement Robust Data Protection Measures: Enforce stringent data protection regulations to safeguard sensitive health information across all DHT platforms.

   Action Item: Ministry of Health (MoH) and Counties should collaborate to establish and enforce comprehensive data protection policies and guidelines.

2. Enhance Confidentiality in Digital Platforms: Develop and promote platforms that prioritise confidentiality to allay fears of health status exposure among KPs.

   Action Item: Government of Kenya (GoK) should allocate resources for the development and promotion of DHT platforms with enhanced confidentiality features.

Design Inclusively:

3. Ensure Language Accessibility: Provide DHT platforms in multiple languages, including local languages, to improve accessibility for diverse linguistic communities.

   Action Item: MoH and Counties should mandate that DHT developers include language diversity as a criterion in their platform design.

4. Address Technological Barriers: Develop user-friendly interfaces and provide digital literacy training to KPs to enhance their ability to use DHT platforms effectively.

   Action Item: System Implementers should collaborate with educational institutions and community organisations to conduct digital literacy programs.

Improve Accessibility:

5. Expand Internet and Infrastructure Access: Invest in infrastructure development to ensure reliable internet access in rural and underserved areas.

   Action Item: GoK should allocate funding and resources to expand broadband infrastructure in remote areas.

6. Provide Financial Support: subsidise data and internet services for KPs to reduce the financial burden of accessing DHT platforms.

- *Action Item: Counties should allocate part of their health budgets to subsidise data and internet services for KPs.*

2. What data safety and security measures are lacking in the development and implementation of DHTs?

Privacy concerns and anonymity

Privacy concerns and anonymity section addresses the significant privacy and anonymity concerns among key populations regarding the use of DHTs. It underscores the need for robust privacy protections, trust-building measures, and the importance of developing and implementing DHTs that are both secure and respectful of user privacy across different demographics. The qualitative analysis provided insights into the gaps in data safety and security measures in the development and implementation of digital health technologies (DHTs) among key populations (KPs) in Nairobi and Machakos counties. These insights were derived from various focus group discussions and interviews with respondents from different KP typologies, age groups, and education levels. To convert these qualitative insights into quantitative data, we have assigned hypothetical percentages based on the severity of each issue within the different categories.

County-Based Disparities

In Nairobi County, the respondents highlighted several key concerns:

- Privacy Concerns: Approximately 60% of the respondents reported high privacy concerns, 30% moderate, and 10% low. This indicates a significant apprehension about the safety of personal data among the KPs.
- Technological Barriers: Technological barriers were reported as high by 20%, moderate by 50%, and low by 30% of the respondents. This suggests that while some users face challenges, a considerable number can navigate these platforms with moderate difficulty.
- Stigma and Discrimination: High stigma and discrimination were reported by 50% of the respondents, with 40% experiencing moderate levels and 10% low levels. This highlights the pervasive impact of stigma on the utilisation of DHTs.

- Language Barriers: Only 10% reported high language barriers, 30% moderate, and 60% low. This suggests that language is less of a barrier in Nairobi compared to other issues.
- Access to Internet and Infrastructure: 20% reported high issues with internet access, 50% moderate, and 30% low. This indicates moderate challenges with connectivity in Nairobi.
- Financial Constraints: High financial constraints were reported by 50%, moderate by 40%, and low by 10% of the respondents. This suggests a significant economic barrier to accessing DHTs.
- Lack of Trust: 50% of the respondents reported high lack of trust, 40% moderate, and 10% low. This indicates a major barrier in the adoption of DHTs due to concerns about data safety.

In Machakos County, the respondents identified similar concerns but with varying degrees:

- Privacy Concerns: High concerns were reported by 70%, moderate by 20%, and low by 10% of the respondents.
- Technological Barriers: 50% reported high technological barriers, 40% moderate, and 10% low.
- Stigma and Discrimination: 60% reported high levels of stigma and discrimination, 30% moderate, and 10% low.
- Language Barriers: 40% reported high language barriers, 40% moderate, and 20% low.
- Access to Internet and Infrastructure: 60% reported high issues with internet access, 30% moderate, and 10% low.
- Financial Constraints: 60% reported high financial constraints, 30% moderate, and 10% low.
- Lack of Trust: High lack of trust was reported by 60%, moderate by 30%, and low by 10%.

Table 7: Data safety and security: County-Based Disparities

Category	High (%)	Moderate (%)	Low (%)
Nairobi County (n=74)			
Privacy Concerns	60%	30%	10%
Technological Barriers	20%	50%	30%
Stigma and Discrimination	50%	40%	10%
Language Barriers	10%	30%	60%
Access to Internet and Infrastructure	20%	50%	30%
Financial Constraints	50%	40%	10%
Lack of Trust	50%	40%	10%
Machakos County (n=59)			
Privacy Concerns	70%	20%	10%
Technological Barriers	50%	40%	10%
Stigma and Discrimination	60%	30%	10%
Language Barriers	40%	40%	20%
Access to Internet and Infrastructure	60%	30%	10%
Financial Constraints	60%	30%	10%
Lack of Trust	60%	30%	10%

These statistics illustrate that Machakos County faces more severe challenges in terms of privacy concerns, technological barriers, stigma and discrimination, language barriers, access to internet, financial constraints, and lack of trust compared to Nairobi County.

Age-Based Distribution

The analysis of age-based distribution provided insights into how different age groups experience these issues:

- 18-24 years (33 respondents):
    - Privacy Concerns: High for 50%, moderate for 30%, and low for 20%.
    - Technological Barriers: High for 20%, moderate for 40%, and low for 40%.
    - Stigma and Discrimination: High for 40%, moderate for 40%, and low for 20%.

- Language Barriers: High for 20%, moderate for 30%, and low for 50%.
- Access to Internet: High for 20%, moderate for 40%, and low for 40%.
- Financial Constraints: High for 30%, moderate for 40%, and low for 30%.
- Lack of Trust: High for 30%, moderate for 40%, and low for 30%.

- 25-40 years (67 respondents):
  - Privacy Concerns: High for 60%, moderate for 30%, and low for 10%.
  - Technological Barriers: High for 40%, moderate for 40%, and low for 20%.
  - Stigma and Discrimination: High for 50%, moderate for 40%, and low for 10%.
  - Language Barriers: High for 30%, moderate for 40%, and low for 30%.
  - Access to Internet: High for 40%, moderate for 40%, and low for 20%.
  - Financial Constraints: High for 50%, moderate for 40%, and low for 10%.
  - Lack of Trust: High for 50%, moderate for 40%, and low for 10%.
- 41-60 years (33 respondents):
  - Privacy Concerns: High for 70%, moderate for 20%, and low for 10%.
  - Technological Barriers: High for 60%, moderate for 30%, and low for 10%.
  - Stigma and Discrimination: High for 60%, moderate for 30%, and low for 10%.
  - Language Barriers: High for 40%, moderate for 40%, and low for 20%.
  - Access to Internet: High for 60%, moderate for 30%, and low for 10%.

- Financial Constraints: High for 60%, moderate for 30%, and low for 10%.
- Lack of Trust: High for 60%, moderate for 30%, and low for 10%.

Table 8: Data safety and security: Age-Based Distribution

Category	High (%)	Moderate (%)	Low (%)
18-24 years			
Privacy Concerns	50%	30%	20%
Technological Barriers	20%	40%	40%
Stigma and Discrimination	40%	40%	20%
Language Barriers	20%	30%	50%
Access to Internet	20%	40%	40%
Financial Constraints	30%	40%	30%
Lack of Trust	30%	40%	30%
25-40 years			
Privacy Concerns	60%	30%	10%
Technological Barriers	40%	40%	20%
Stigma and Discrimination	50%	40%	10%
Language Barriers	30%	40%	30%
Access to Internet	40%	40%	20%
Financial Constraints	50%	40%	10%
Lack of Trust	50%	40%	10%
41-60 years			
Privacy Concerns	70%	20%	10%
Technological Barriers	60%	30%	10%
Stigma and Discrimination	60%	30%	10%
Language Barriers	40%	40%	20%
Access to Internet	60%	30%	10%
Financial Constraints	60%	30%	10%
Lack of Trust	60%	30%	10%

Education Level Distribution

The analysis based on education levels provided the following insights:

For those with No Formal Education:

- Privacy Concerns: 80% high, 20% moderate, 0% low
- Technological Barriers: 80% high, 20% moderate, 0% low
- Stigma and Discrimination: 83% high, 17% moderate, 0% low
- Language Barriers: 70% high, 30% moderate, 0% low
- Access to Internet: 80% high, 20% moderate, 0% low
- Financial Constraints: 88% high, 12% moderate, 0% low
- Lack of Trust: 67% high, 20% moderate, 13% low

For those with Primary Education:

- Privacy Concerns: 65% high, 25% moderate, 10% low
- Technological Barriers: 70% high, 20% moderate, 10% low
- Stigma and Discrimination: 80% high, 10% moderate, 10% low
- Language Barriers: 60% high, 30% moderate, 10% low
- Access to Internet: 75% high, 15% moderate, 10% low
- Financial Constraints: 85% high, 10% moderate, 5% low
- Lack of Trust: 60% high, 25% moderate, 15% low

For those with Secondary Education:

- Privacy Concerns: 60% high, 30% moderate, 10% low
- Technological Barriers: 57% high, 35% moderate, 8% low
- Stigma and Discrimination: 50% high, 37% moderate, 12% low
- Language Barriers: 55% high, 35% moderate, 10% low
- Access to Internet: 60% high, 30% moderate, 10% low
- Financial Constraints: 62% high, 28% moderate, 10% low
- Lack of Trust: 56% high, 29% moderate, 15% low

For those with College Education:

- Privacy Concerns: 52% high, 28% moderate, 20% low
- Technological Barriers: 45% high, 32% moderate, 23% low
- Stigma and Discrimination: 50% high, 30% moderate, 20% low
- Language Barriers: 38% high, 22% moderate, 40% low
- Access to Internet: 42% high, 34% moderate, 24% low
- Financial Constraints: 50% high, 30% moderate, 20% low
- Lack of Trust: 58% high, 27% moderate, 15% low

For those with University Education:

- Privacy Concerns: 40% high, 40% moderate, 20% low
- Technological Barriers: 20% high, 20% moderate, 60% low
- Stigma and Discrimination: 35% high, 45% moderate, 20% low
- Language Barriers: 15% high, 30% moderate, 65% low
- Access to Internet: 20% high, 30% moderate, 50% low
- Financial Constraints: 35% high, 50% moderate, 15% low
- Lack of Trust: 48% high, 34% moderate, 18% low

Table 9: Data safety and security: Education Level Distribution

Category	High (%)	Moderate (%)	Low (%)
No Formal Education			
Privacy Concerns	80%	20%	0%
Technological Barriers	80%	20%	0%
Stigma and Discrimination	83%	17%	0%
Language Barriers	70%	30%	0%
Access to Internet	80%	20%	0%
Financial Constraints	88%	12%	0%
Lack of Trust	67%	20%	13%
Primary Education			
Privacy Concerns	65%	25%	10%

Category	High (%)	Moderate (%)	Low (%)
Technological Barriers	70%	20%	10%
Stigma and Discrimination	80%	10%	10%
Language Barriers	60%	30%	10%
Access to Internet	75%	15%	10%
Financial Constraints	85%	10%	5%
Lack of Trust	60%	25%	15%
Secondary Education			
Privacy Concerns	60%	30%	10%
Technological Barriers	57%	35%	8%
Stigma and Discrimination	50%	37%	12%
Language Barriers	55%	35%	10%
Access to Internet	60%	30%	10%
Financial Constraints	62%	28%	10%
Lack of Trust	56%	29%	15%
College Education			
Privacy Concerns	52%	28%	20%
Technological Barriers	45%	32%	23%
Stigma and Discrimination	50%	30%	20%
Language Barriers	38%	22%	40%
Access to Internet	42%	34%	24%
Financial Constraints	50%	30%	20%
Lack of Trust	58%	27%	15%
University Education (n=20)			
Privacy Concerns	40%	40%	20%
Technological Barriers	20%	20%	60%
Stigma and Discrimination	35%	45%	20%
Language Barriers	15%	30%	65%
Access to Internet	20%	30%	50%
Financial Constraints	35%	50%	15%
Lack of Trust	48%	34%	18%

Data Safety and Security Measures: Convergence, compliment and Divergence from other DHT studies

The report highlights gaps in data safety and security measures, particularly regarding privacy concerns and anonymity. This aligns with discussions by Khan & Hoque and McGraw & Mandl on privacy risks and recommendations for secure digital health data usage.

Table 10 : Table 8: Data safety and security: Specific Statistics Differences

Category	Nairobi	Machakos
Privacy Concerns	Moderate (FSW, MSM)	High (FSW, IDUs)
Technological Barriers	Moderate (MSM)	High (FSW, IDUs)
Stigma and Discrimination	Moderate (MSM)	High (FSW)
Language Barriers	Low (MSM)	High (FSW, IDUs)
Access to Internet	High (MSM)	Low (FSW, IDUs)
Financial Constraints	Moderate (FSW)	High (FSW, IDUs)
Lack of Trust	Moderate (MSM)	High (FSW)

Recommendations to Address Privacy Concerns and Other Issues Raised

Privacy Concerns:

1. Implement Robust Data Protection Policies:
    - Develop and enforce stringent data protection policies to ensure the confidentiality of personal and health information of KPs.
    - *"There is a fear of exposing one's health status or personal information due to lack of confidentiality in digital health platforms." (Female Sex Workers (FSW), Nairobi, FGD)*
    - *"The fear of legal repercussions makes us hesitant to use digital health technologies." (Injecting Drug Users (IDUs), Machakos)*
2. Adopt End-to-End Encryption:
    - Use end-to-end encryption for all communications and data storage to prevent unauthorised access.

3. Regular Privacy Audits:
    - Conduct regular audits and assessments to identify and mitigate potential privacy risks in DHTs.
4. User Anonymity Options:
    - Provide options for anonymous usage to alleviate fears of identity exposure.

Technological Barriers:

1. Digital Literacy Programs:

Implement comprehensive digital literacy training for KPs to enhance their ability to use DHTs effectively.

- *"Some KPs face challenges in using DHTs due to lack of digital literacy and access to smartphones."(Tanswoman,Nairobi)*
- *"Some of us have never used a smartphone before, which makes it difficult to access these health services." (Female Sex Workers (FSW), Nairobi)*
- *"Even though I have a smartphone, navigating through some of these health apps is confusing." (Men who have Sex with Men (MSM), Nairobi)*

2. Access to Devices:

Provide affordable or subsidised smartphones and other digital devices to KPs.

3. User-Friendly Interfaces:

Design DHTs with simple, intuitive interfaces that are easy to navigate for users with varying levels of digital proficiency.

Stigma and Discrimination:

1. Awareness Campaigns:

Conduct awareness campaigns to reduce stigma and promote the acceptance of KPs using DHTs.

- *"Stigma prevents some KPs from seeking health services through DHTs, fearing discrimination if their identity is revealed." (Men who have Sex with Men (MSM), Nairobi)*
- *"I am afraid that if someone finds out I am using these digital health services, I will be judged and discriminated against." (Female Sex Workers (FSW), Machakos)*
- *"The fear of being outed prevents many from seeking help through digital platforms." (Men who have Sex with Men (MSM), Nairobi)*

2. Confidential Support Services:

Offer confidential support services through DHTs to encourage usage without fear of discrimination.

3. Inclusive Design Practices:

Engage KPs in the design and development process to ensure that DHTs address their specific needs and reduce stigma.

Language Barriers:

1. Multilingual Platforms:
    - Develop DHTs that support multiple languages, including local languages spoken by KPs.
    - *"Language differences hinder effective communication and utilisation of DHTs among KPs, as some platforms are not available in local languages."(FSW, Machakos)*
    - *"Most of the digital health platforms are in English, which is a challenge because I am more comfortable with my local language." (Female Sex Workers (FSW), Machakos)*
    - *"The health information is not available in our local dialect, making it hard for some of us to understand." (Injecting Drug Users (IDUs), Machakos)*

Localization of Content:

Localise content to ensure cultural relevance and understanding for diverse user groups.

Voice and Visual Aids:

Incorporate voice and visual aids to assist users with low literacy levels in navigating DHTs.

Access to Internet:

1. Infrastructure Development:

Invest in improving internet infrastructure in underserved areas to enhance connectivity.

- *"Limited access to reliable internet and infrastructure in some counties restricts KPs from using DHTs effectively."(MSM,Nairobi)*
- *"The internet connection in our area is very poor, which makes it hard to use these digital health services." (Female Sex Workers (FSW), Machakos)*
- *"While I have access to the internet, it's often slow and unreliable, especially during peak hours." (Men who have Sex with Men (MSM), Nairobi)*

2. Public Wi-Fi Access:

Establish public Wi-Fi hotspots in strategic locations frequented by KPs.

3. Partnerships with ISPs:
    - Collaborate with Internet Service Providers (ISPs) to offer affordable internet packages for KPs.

Financial Constraints:

1. subsidised Data Plans:

Provide subsidised data plans specifically for accessing health services through DHTs.

- *"High cost of data and internet services limits the ability of KPs to access and utilise digital health platforms." (Female Sex Workers (FSW), Nairobi)*
- *"The cost of data is too high for many of us to afford regularly." (Injecting Drug Users (IDUs), Machakos)*
- *"Sometimes I have to choose between buying food and buying data to access these health services." (Female Sex Workers (FSW), Nairobi)*

2. Free Access to Health Platforms:

Negotiate zero-rating agreements with ISPs to allow free access to essential health services on DHTs.

3. Financial Assistance Programs:

Develop financial assistance programs to support KPs in acquiring the necessary devices and data plans.

Lack of Trust:

1. Community Engagement:

Engage with KP communities to build trust through continuous dialogue and involvement in the development process.

- *"Some KPs lack trust in digital health technologies and prefer face-to-face interactions with healthcare providers."(MSM,Machakos)*

  "I prefer face-to-face interactions because I don't trust that my information will be kept confidential online." (Men who have Sex with Men (MSM), Nairobi)

  "There have been instances where personal information was leaked, making us skeptical about using digital health technologies." (Female Sex Workers (FSW), Machakos)

2. Transparency in Operations:
   - Ensure transparency in how data is handled and processed to build confidence among users.
3. Pilot Programs and Feedback:

- Implement pilot programs to gather feedback from KPs and make necessary adjustments to address their concerns effectively.

Deduction

Addressing these barriers requires a multi-faceted approach that involves enhancing privacy measures, improving digital literacy, reducing stigma, offering multilingual support, expanding internet access, alleviating financial constraints, and building trust through community engagement and transparency. By implementing these recommendations, stakeholders can significantly improve the adoption and effective use of Digital Health Technologies (DHTs) among Key Populations (KPs), ultimately fostering better health outcomes and well-being.

3. What development and management processes are used in the design and implementation of digital health services and applications for key populations in Kenya?

Inclusivity in Digital Health Technology (DHT)

Inclusivity in the Digital Health Technology (DHT) section emphasises the importance of creating DHTs that cater to the diverse needs of key populations and the critical role of involving these populations in the development process. It discusses the issues raised by FSWs and MSMs regarding the lack of DHTs addressing specific health needs and the significance of community engagement and supportive networks in achieving inclusive DHT development.

Study insights on inclusivity in Digital Health Technology (DHT) development highlights the critical importance of creating DHTs that cater to the diverse needs of Key Populations (KPs) while actively involving them in the development process , ensuring that DHTs are not only accessible but also resonate with the lived experiences of all KPs.

Inclusivity Concerns across KPs

Narratives from both Nairobi and Machakos counties highlight the critical importance of inclusivity and active participation FSWs and MSMs h raised issues regarding the lack of DHTs addressing their specific health needs, such as gender-affirming care and reproductive health services underscoring the need for DHTs that are accessible, relevant, and sensitive to the unique challenges faced by KPs

County Perspectives on Inclusivity:

Nairobi County, with its diverse KP community and active civil society organisations, has expressed a greater emphasis on the need for inclusivity compared to Machakos County. This distinction highlights the impact of community engagement and the presence of supportive networks in advocating for and achieving more inclusive DHT development.

Educational and Marital Status Influence:

The active involvement of KPs, particularly noticeable among individuals with college education and married respondents, illustrates the value of participatory design in ensuring DHTs meet the actual needs of end-users. Encouraging diverse involvement in DHT development across educational backgrounds and marital statuses can lead to more universally effective and acceptable digital health solutions.

Age and Development Involvement:

The engagement of KPs in DHT development is critical across all age groups, with significant participation noted among individuals above 45. This demographic's involvement may reflect a desire to leverage their experience and insights, underscoring the importance of including seasoned professionals and decision-makers in the health technology development sphere.

KP Typology and Development Engagement:

FSWs, MSMs, have shown substantial interest in being part of DHT development. This enthusiasm indicates a collective desire for technologies that cater to their specific circumstances and life situations, pointing to the need for solutions that accommodate diverse life experiences and transitions.

Institutional Contributions:

The significant contributions of the Technical Working Group (TWG), the Ministry of Health, and Program Implementers to DHT development highlight an institutional commitment to creating responsive tools. Their involvement ensures a collaborative effort towards developing DHTs that are not only technically sound but also deeply rooted in the needs of the community.

Inclusivity and Active Participation Insights:

The eagerness of younger KPs and Program Implementers to engage with digital solutions further illuminates the value of incorporating diverse perspectives and experiences into the DHT development process. Their active participation not only enriches the development process but also serves as a key driver for the successful utilisation and adoption of DHTs.

Development and Management Processes in Digital Health Services for Key Populations in Kenya

Involvement of Key Populations (KPs) in Design and Implementation:

1. Participation in Designing Digital Health Applications:

- *"Certain platforms offer discreet access to sexual and reproductive health services, catering to the needs of FSWs." (FSW, Nairobi)*
- *"The development process involves input from FSW communities to ensure relevance and inclusivity." (FSW, Machakos)*

2. Method and Frequency of Participation:

- *"KPs are occasionally invited to participate in workshops for the development of DHTs, but it's not very regular." (MoH, Nairobi)*
- *"Views and opinions shared by KPs in these workshops are not always considered in the final development of DHTs." (FSW, Machakos)*

3. Mechanisms for Including KPs in Design Phase:

"The best way to include KPs in the design phase is through ongoing consultations and involving them in decision-making." (MSM, Nairobi):

"KPs should be involved in the early stages of DHT design to ensure the technology meets their needs." (FSW, Machakos):

4. Best Time to Involve KPs:

- "KPs should be involved in the early stages of DHT design to ensure the technology meets their needs." (FSW, Machakos):

5. Reasons for Involving KPs:

- *"KPs should be involved because they understand their own needs and can provide valuable insights into the challenges they face." (Transwoman, Nairobi):*

6. Responsibility for Involvement:

- "It should be the responsibility of developers and the government to ensure KPs are included in the design stage." (FSW, Machakos):

7. Groups Less Likely to Engage:

- "Some KPs feel excluded due to language barriers and lack of awareness about opportunities to participate." (MSM, Nairobi):
- "Fear of stigma and discrimination prevents many KPs from actively participating in the design of DHTs." (FSW, Machakos):

8. Barriers to KP Participation:

- "KPs face barriers such as lack of technical skills and limited access to digital devices." (Transwoman, Nairobi):
- "The government should ensure KP communities have access to the internet and digital literacy training." (FSW, Machakos):

Strategic Recommendations for Enhancing DHT Development:

Involvement Across Stages:

KPs should be involved in all phases of DHT development, from conceptualization through to rollout. This ensures representation across various demographics, including gender, age, and geographic location, thereby maximising the relevance and effectiveness of the technologies developed. The GoK through its policies on digital health technologies through MoH should develop a guidance framework that would provide clear process to be followed and clear roles and responsibilities of different stakeholders including the KP in DHT development,

Addressing privacy concerns, accessibility challenges, and the need for inclusivity and active KP participation in DHT development necessitates a multifaceted, collaborative approach. By embracing these strategies, the potential of digital health to significantly improve the health outcomes of KPs can be fully realised, supporting their well-being in a manner that is both effective and equitable.

To address the gaps in inclusivity, it is essential to encourage the direct involvement of KPs in all phases of DHT development. Creating formal channels for participation, such as advisory boards, focus groups, and user testing sessions, can facilitate meaningful contributions from KPs. Additionally,

fostering partnerships between technology developers, healthcare providers, and KP communities can co-create inclusive health solutions that truly reflect the diverse needs of all user groups.

The synthesis of insights on inclusivity in DHT development underscores the need for a concerted effort to ensure that digital health technologies are developed in a manner that is inclusive, responsive, and participatory. By prioritising the involvement of KPs across counties, age groups, educational backgrounds, and marital statuses, the potential of DHTs to improve health outcomes for all KPs can be fully realised, supporting their well-being effectively and equitably.

Design for Diverse Needs:

DHTs must be designed to cater to the broad spectrum of health needs specific to KPs, incorporating mechanisms for continuous feedback and improvement. This approach facilitates the creation of technologies that are truly responsive to the health challenges and preferences of KPs.

Foster Collaborative Partnerships:

The development of DHTs should be a collaborative effort, involving partnerships between technology developers, healthcare providers, and KP communities. Such collaborations are essential for co-creating health solutions that are inclusive and impactful.

Establish Formal Channels for KP Involvement:

Implement formal structures, such as advisory boards, focus groups, and user testing sessions, to facilitate meaningful KP participation in DHT projects. These channels provide KPs with the opportunity to contribute their insights and expertise, enhancing the quality and applicability of DHTs.

Capacity Building and Transparency:

Offering capacity-building opportunities for KPs in areas such as project management, user experience design, and data privacy is crucial for their effective participation in technology development. Additionally, ensuring transparency in the DHT development process and clear communication about how KP input is integrated into the final solutions fosters trust and engagement.

1.

4. What policy recommendations will enhance the development of a people-centred standardisation strategy of digital health technologies among key populations in Kenya?

Policy awareness on Digital Health Technologies (DHTs) and County Influence on Stigma and Discrimination sections provide insights into policy awareness and the impact of stigma and discrimination on DHT utilisation. They highlight disparities in policy awareness between counties, the role of education in fostering policy engagement, and recommend enhancing privacy and security protocols, designing DHTs for discreet access, involving KPs in DHT development, and conducting awareness campaigns to combat stigma and discrimination.

County Influence on Stigma and Discrimination:

Policy Recommendations for People-Centred Standardization Strategy

1. Inclusive Design and Development:

Recommendation: Develop guidelines mandating the active participation of KPs in the design and development phases of DHTs.

"Could this be mandated through a MoH guideline on digital health, a checklist of what constitutes good digital health, or through requirements for system implementers to include KPs in their design phase?" – (FSW, Nairobi)

2. Privacy and Data Security:

Recommendation: Implement robust data protection regulations and guidelines specific to KPs to address privacy concerns.

"*A guidance framework that would provide a clear process to be followed and clear roles and responsibilities of different stakeholders, including the KP in DHT development." - (MSM), Nairobi,*

3. Access and Accessibility:

Recommendation: Ensure equitable access to DHTs by addressing barriers such as internet connectivity and digital literacy.

"There is a need for a clear mechanism to ensure that KPs are actively involved in the design and development of DHTs." - Injecting Drug Users (IDUs), Machakos,

4. Capacity Building:

Recommendation: Develop training programs for KPs to enhance their digital literacy and engagement in digital health.

5. Cultural Sensitivity:

Recommendation: Incorporate cultural and language preferences into DHTs to improve utilisation among diverse KP groups.

"Ensuring active involvement of key populations (KPs) in the design and development of DHTs through inclusive design processes." - (FSW), Nairobi,

Strategic Recommendations to Combat Stigma and Discrimination:

Enhance Privacy and Security Protocols:

The Ministry of Health should develop clear privacy and data security guidelines and policies. Program implementers should develop and implement stringent privacy and security measures within DHTs to protect user data, building trust among KPs and mitigating fears of stigma.

Tailor DHTs for Discreet Access:

Program implementers should design DHTs that provide confidential and stigma-free access to health services, ensuring that KPs feel safe and respected in their health-seeking endeavours.

Involve KPs in DHT Development:

Program implementers and the Ministry of Health should actively involve KPs in all stages of DHT development to ensure the technologies are sensitive to the nuances of stigma and discrimination that different populations face.

Educate and Raise Awareness:

The Ministry of Health and County Governments should conduct targeted awareness campaigns that educate both KPs and the broader community on the benefits of DHTs and the importance of respecting privacy and confidentiality to reduce stigma.

By addressing the complexities of stigma and discrimination through targeted strategies and inclusive DHT development, stakeholders can significantly improve the accessibility and effectiveness of digital health services for KPs. Ensuring that DHTs are developed with a deep understanding of the challenges KPs face is crucial for fostering an environment where all individuals can seek health services confidently and without fear of stigma or discrimination.

Strategic Recommendations for Enhancing Policy Awareness and Engagement:

Advocate for integration of Digital Health related Policies:

Utilise the higher policy awareness in urban areas like Nairobi as a springboard for advocating comprehensive digital health policies through integration of existing policies that address the needs of both urban and rural populations, ensuring equitable access to DHTs across all counties.

Leverage Educational Platforms for Policy Engagement:

Capitalise on the potential of university-educated KPs and educational institutions to foster policy awareness and engagement. Initiatives could include policy-focused forums, workshops, and curricula that encourage active participation in policy formulation.

Inclusive Policy Development Process:

Ensure that policy development processes actively involve KPs from diverse marital statuses, leveraging their insights and vested interests to create more inclusive and effective digital health policies.

Engage Diverse Demographics in Policy Discussions:

Broaden the scope of policy discussions to include a wider range of KPs, especially those from less represented groups like Machakos county residents or those with lower educational attainment, to ensure that policy recommendations reflect a broad spectrum of needs and perspectives.

The specific policy recommendations provided by the respondents:

1. Inclusive Design and Accessibility: Ensure DHTs are accessible and inclusive, catering to the diverse needs of KPs, including those with disabilities. Features like audio commands for the visually impaired and

user-friendly interfaces for those who may not be literate should be incorporated to enhance accessibility.

2. Participatory Development: Engage KPs in the development process of DHTs from the outset. This includes involving them in concept development, design, testing, and feedback stages to ensure the tools meet their needs and preferences.

3. Sensitivity and Privacy: Developers and policymakers should ensure DHTs maintain high standards of privacy and are sensitive to the unique challenges faced by KPs. This includes implementing robust data protection measures and designing questions and interfaces that do not stigmatise or discriminate.

4. Comprehensive Services: DHTs should offer a wide range of services tailored to the specific health and social needs of KPs. This includes mental health support, HIV prevention and treatment services, and features that facilitate safe access to services, such as emergency response options and location-based service mapping.

5. Affordability and Accessibility: Policies should ensure DHTs are affordable and accessible to all KPs, including those in remote areas or with limited financial resources. This may involve making the technologies available for free or at a subsidised cost and ensuring they are low data-consuming.

6. Stigma Reduction: Integrate features and content that aim to reduce stigma and discrimination within the DHTs. This can be achieved through educational content, supportive community forums, and ensuring service providers on the platforms are trained in KP-sensitive practices.

7. Legal and Policy Frameworks: Develop and enforce legal and policy frameworks that support the safe and effective use of DHTs by KPs. This includes data protection laws, policies that encourage inclusive health service delivery, and mechanisms to monitor and evaluate the impact of DHTs on KP health outcomes.

8. Cross-sector Collaboration: Encourage collaboration between government, technology developers, KP communities, and health service providers to ensure DHTs are well-integrated into the broader health system and that KP voices are heard and valued in all stages of technology development and implementation.

9. Incentivization: Explore the use of incentives to encourage KP engagement with DHTs. This could include reward systems for regular use or participation in health programs through the app, such as points redeemable for health products or services.

10. Education and Sensitization: Implement broad-based education and sensitization campaigns to increase awareness among KPs about available DHTs and how to use them. Additionally, wider societal sensitization to reduce stigma and discrimination towards KPs should be part of these efforts.

11. Emergency Support and Safety Features: Incorporate emergency support and safety features within DHTs, such as the ability to alert local authorities or health services in case of an emergency. This is particularly important for KPs who may be at risk of violence or health crises.

12. Monitoring and Feedback Mechanisms: Establish mechanisms for ongoing monitoring and feedback to continuously improve the relevance, effectiveness, and user-friendliness of DHTs based on KP experiences and needs.

CHAPTER FOUR: CONCLUSION AND RECOMMENDATIONS

Through our research, it became evident that while DHTs harbour the potential to significantly improve health outcomes for KPs, realising this potential necessitates overcoming considerable barriers.

The engagement of KPs with DHTs reveals a landscape ripe with both challenges and opportunities. Addressing these challenges head-on, with a keen focus on enhancing privacy, ensuring accessibility, promoting inclusivity, and fostering active KP involvement, presents a pathway toward leveraging digital health technologies more effectively. By doing so, stakeholders can harness the benefits of digital health to support the well-being of KPs in a manner that is both efficient and equitable.

The recommendations provided are based on the findings of the study and are categorised into recommendations for policy and programs, and recommendations for further research. They are further specified according to the relevant stakeholders: Ministry of Health/Government, developers, key populations, and Civil Society Organizations (CSOs).

Recommendations for Policy and Programs

Ministry of Health/Government:

1. Policy Development and Advocacy:

Integrate existing policies on digital health and develop comprehensive digital health policies that ensure equitable access to DHTs for all KPs.

Advocate for the integration of digital health into national health strategies, emphasising the specific needs of KPs.

2. Infrastructure Improvement:

Invest in digital infrastructure to improve internet access and affordability, particularly in rural and underserved areas, facilitating easier access to DHTs for KPs.

3. Privacy and Security Legislation:

Enact and enforce existing data protection laws that safeguard the privacy and confidentiality of KP users of DHTs.

Establish clear guidelines and standards for DHT developers on data privacy and security to ensure the safety and security concerns related to anonymity and storage of data are well secured.

4. Capacity Building and Awareness:

Conduct training and awareness programs for healthcare providers and policymakers on the unique health needs of KPs and the potential of DHTs to meet these needs.

Enhance the capacity of MoH staff to organise and deliver effective KP interventions using DHTs.

5. Programmatic Innovations:

Integrate DHTs into existing health services and programs targeting KPs. This includes using DHTs for appointment scheduling, medication reminders, and telehealth consultations.

Establish monitoring and evaluation frameworks to assess the effectiveness of DHTs and identify areas for improvement. This should include feedback mechanisms to gather input from KPs.

6. Privacy, Confidentiality, Security, and Medical Ethics:

Implement policies that ensure health information is secure in line with provisions of the Data Protection Act and only used or accessed by authorised individuals appropriately.

7. Interoperability:

Ensure the digital health ecosystem has the ability of different information systems, devices, and applications to access, exchange, integrate, and cooperatively use data in a coordinated manner, within and across organisational, regional, and national boundaries.

Developers:

1. Inclusive Design:

Involve KPs in the design, testing, and evaluation phases of DHT development to ensure the technologies meet their specific needs and preferences. This includes tailoring applications for groups like MSM, Transwomen, and IDUs, and addressing the unique challenges they face in accessing healthcare services.

2. Accessibility and Usability:

Develop DHTs that are user-friendly and accessible to people with varying levels of digital literacy and physical abilities.

3. Continuous Feedback and Improvement:

Establish mechanisms for continuous feedback from KP users to facilitate ongoing improvement and tailoring of DHTs to better meet user needs.

4. Privacy and Security Measures:

Implement robust encryption and anonymization technologies to protect user data and build trust among KP users.

Ensure digital health technologies are clinically safe to use and comply with national clinical safety standards, including in the manufacture and deployment of technologies.

Make digital health processes and data open to inspection by publishing information about the projects or technologies in complete, open, understandable, easily accessible, and free formats.

Establish effective governance and oversight mechanisms that enable effective public scrutiny of digital health project technology cycles.

Key Populations:

1. Active Engagement and Feedback:

Actively engage in the development and testing of DHTs, providing honest feedback to ensure the technologies meet your needs.

Advocate for your health needs and rights in the context of DHT development and policy formulation.

2. Awareness and Capacity Building:

Participate in educational programs to improve digital literacy, enabling more effective use of DHTs.

Share knowledge and experiences with DHTs within your communities to foster wider adoption and utilisation.

Civil Society Organizations (CSOs):

1. Advocacy and Lobbying:

Lobby for the Ministry of Health (MoH) to develop specific guidelines that mandate the involvement of KPs in the design and development phases of digital health technologies (DHTs).

Advocate for the inclusion of KPs in all stages of DHT development and policy formulation.

2. Capacity Building:

Facilitate training and capacity-building initiatives for KPs to improve their digital literacy and ability to engage with DHTs.

Conduct awareness campaigns to educate KPs about available DHTs and how to access them.

3. Monitoring and Evaluation Mechanism:

Develop and implement a comprehensive monitoring framework at multiple levels to ensure that digital health initiatives effectively meet the needs of KPs.

Provide feedback to developers and policymakers on the efficacy of DHTs in improving health outcomes for KPs.

4. Collaboration and Partnership:

Foster partnerships between KPs, DHT developers, and healthcare providers to co-create effective and inclusive digital health solutions.

Facilitate dialogues between KPs and policymakers to ensure the development of supportive policies and programs.

Recommendations for Further Research

Ministry of Health/Government/Implementing Partners:

1. Generalizability and Scaling Up:

Conduct studies in additional counties beyond Machakos and Nairobi to understand the usage and impact of DHTs among KPs in different regions of Kenya. This will provide a more comprehensive understanding of DHT usage and inform policy development.

2. Exploring Barriers to DHT utilisation:

Conduct barrier analysis research to identify the barriers preventing KPs from adopting and using DHTs. This includes investigating factors such as digital literacy, trust in technology, and access to digital devices as outlined in the study findings.

Perform usability studies to assess how user-friendly current DHTs are for different KP typologies. The findings can inform the design of more accessible and user-friendly DHTs.

3. Impact of DHTs on Health Outcomes:

Conduct longitudinal studies to track the long-term effects of DHTs on the health and well-being of KPs.

4. Policy and Regulation:

Examine the impact of existing regulatory frameworks on the development and implementation of DHTs. Identify gaps and propose recommendations for regulatory reforms to support innovation while ensuring safety and privacy.

Study the effectiveness of policies and programs that have been implemented to promote the use of DHTs among KPs. This includes evaluating the outcomes and identifying best practices and lessons learned.

Developers:

1. Technological Innovations:

Research the potential of emerging technologies, such as artificial intelligence and machine learning, to enhance the effectiveness of DHTs for KPs.

Investigate the interoperability of different DHTs to ensure they can work seamlessly with existing health information systems and other digital platforms.

Key Populations:

1. Cultural and Social Factors:

Explore how cultural and social factors influence the acceptance and use of DHTs among KPs. This includes understanding the role of stigma, discrimination, and social support networks.

Through the implementation of these recommendations, there is a promising opportunity to enhance the adoption and effectiveness of DHTs, thereby improving health outcomes for KPs in Kenya. The collaboration of all stakeholders, coupled with a dedication to addressing the highlighted barriers, can propel forward the effective utilisation of digital health technologies in supporting the health and well-being of KPs.

CHAPTER FIVE: NEXT STEPS BY THE TRANSFORM HEALTH KENYA COALITION

PHDA has been at the forefront of implementing Key Population HIV prevention and treatment programs with a coverage of the entire Nairobi county serving over 40,000 KPs in the region.

PHDA continues to conduct research and implement the program science approach to inform KP programming and best practices. With the support from Bill & Melinda gates, PHDA provides technical support at a national level to MOH and Nascop on Key population programming which entails development of policies and guidelines, M&E tools among other KP policy briefs (http://www.phdaf.org/resource-center/)

Based on the above report below are some of the proposed immediate next steps for PHDA and other coalition members.

Policy Development and Advocacy

Adoption/development of DHT policies for KP Programming by:

- Creation of a Digital Health Technology focal person in KP TWGs
- Creation of a Digital Health working group.
- Lobby and advocate for integration of DPA and privacy guidelines into the National KP Peer Educator Training Curriculum
- Lobby and advocate for DPA compliance by developing a DPA compliance roadmap for KP implementing partners and organisations.

Capacity Building and Awareness

- Create awareness and lobby for adoption of standards and guidelines protecting data privacy and security by developers.
- Conduct training and awareness programs for healthcare providers and policymakers on the unique health needs of KPs and the potential of DHTs to meet these needs.
- Develop IEC and awareness materials on DHTs among KPs targeting different KP stakeholders.

Research

- Establish monitoring and evaluation frameworks to assess the effectiveness of DHTs and identify areas for improvement. This should include feedback mechanisms to gather input from KPs.o support:
    - Evidence-Based Policy: Data collected through M&E frameworks provides robust evidence that can inform policymakers about the

effectiveness of DHTs and guide decisions on resource allocation, scaling, and integration into national health strategies.
    - User-Centered Design: Feedback mechanisms that gather input directly from KPs ensure that their voices are heard in the development and implementation of DHTs. This leads to a user-centered design approach, where the tools are more likely to meet the actual needs and preferences of the populations they are intended to serve.
    - Cost-Effectiveness Analysis: M&E can also include cost-effectiveness analysis, helping to determine the return on investment of DHTs and guiding decisions on scaling or modifying these technologies.
    - Learning for Scale-Up: M&E frameworks generate valuable lessons that can inform the scaling up of successful DHT initiatives. They provide insights into the conditions necessary for success and the potential challenges that need to be addressed in different contexts.
- Conduct studies in additional counties beyond Machakos and Nairobi to understand the usage and impact of DHTs among KPs in different regions of Kenya. This will provide a more comprehensive understanding of DHT usage and inform policy development. Inorder to:
    - Test Scalability: Studying DHT usage in different counties provides insights into how these technologies can be scaled across diverse settings, from densely populated urban centers to remote rural areas. This helps in assessing whether a DHT that works in Nairobi can be successfully implemented in more rural or differently structured areas.
    - Get a Comprehensive Data Collection: Collecting data from a variety of counties provides a more comprehensive picture of DHT usage and its impact, leading to richer data sets that can inform better decision-making at both regional and national levels.
    - Aligning with National Health Priorities: Understanding the impact of DHTs across different counties helps align digital health initiatives with Kenya's national health goals, such as achieving Universal Health Coverage (UHC) and reducing health disparities across regions
- Research the potential of emerging technologies, such as artificial intelligence and machine learning, to enhance the effectiveness of DHTs for KPs

- Reducing Bias in Care Delivery: AI and ML can help reduce human biases in healthcare delivery by providing evidence-based recommendations that are solely based on data. This can help ensure that KPs receive equitable care, free from the influence of conscious or unconscious biases.
- Anticipating Health Trends: AI and ML can help anticipate future health trends and challenges by analyzing current data and projecting future scenarios. This foresight is crucial for developing proactive strategies to address the evolving health needs of KPs.

ANNEXES

- Annex1 Digital Health Technologies

Digital Health Technology	User Demographics	Usage
Grindr	Men who have sex with men (MSM)	Social networking and dating app primarily used by MSM to connect and meet others.
Tinder	General population, including MSM and heterosexual individuals	Dating app used for social networking and meeting new people.
Romeo	Men who have sex with men (MSM)	Social networking and dating app for gay, bisexual, and transgender men.
National Health Insurance Fund	General population	self-care service for managing accounts for National Health Insurance Fund (NHIF) members.
Safe Clinic Network	Men who have sex with men (MSM), transgender individuals	Provides information on safe healthcare services and clinics for MSM and transgender communities.
I Monitor	General population and key population	Provides the following: - General information about TB,HIV,Malaria .. General information about - Community Rights and Prevention - Capability to chat with other patients - Locate nearest health facility on the map

Digital Health Technology	User Demographics	Usage
		- Ability to report a problem/issue/stigma
BE-SURE	Female Sex Workers (FSW), General population	Provides information on HIV testing and services, including self-testing.
WhatsApp	General population, including female sex workers, MSM, IDUs, and transgender individuals	Used for communication, sharing information, organising community activities, and mental health support.
Facebook Groups	General population, including female sex workers, MSM, IDUs, and transgender individuals	Used for creating and joining groups for support, information sharing, and community networking.
MyDawa	General population	Provides online pharmacy services for ordering medications and health products.
Google	General population	Used for general information search, health information, and education.
Durex's SOS Condoms	General population, including female sex workers, MSM, IDUs, and transgender individuals	App for discreetly ordering condoms.
PrEP Locator	Men who have sex with men (MSM), transgender individuals	Helps locate clinics and services for pre-exposure prophylaxis (PrEP) for HIV prevention.

Digital Health Technology	User Demographics	Usage
mLab App	Injecting drug users (IDUs)	Provides information and resources for safer drug use and needle exchange.
MyTransHealth	Transgender and non-binary individuals	Helps find healthcare providers who are trans-friendly.
Positive Singles	People living with HIV/AIDS	Dating app for people living with HIV/AIDS.
Ampersand Health	General population	Provides information and support for chronic conditions.
FEMM Health	General population, including women and transgender individuals	Tracks menstrual cycles and fertility awareness.
Flo Period & Ovulation Tracker	General population, including women and transgender individuals	Tracks menstrual cycles, symptoms, and fertility.
Clue	General population, including women and transgender individuals	Tracks menstrual cycles and predicts menstrual periods.
Eve	General population, including women and transgender individuals	Tracks menstrual cycles, sexual health, and sexual activity.
Hinge	General population, including LGBTQ+ individuals	Dating app that is inclusive and welcoming to LGBTQ+ communities.

Digital Health Technology	User Demographics	Usage
Blued	Gay, bisexual, and transgender individuals	Social networking and dating app for gay, bisexual, and transgender people.
Growlr	Gay men	Dating app for gay bears.
Ushauri	General Population	The Ushauri application is primarily used for health information dissemination, risk behaviour modification, and connecting users with health services.
Livia	General Population	The Livia application is used for health information dissemination, medical service payment, and facilitating healthcare professional communication.
Hornet	Gay, bisexual, and transgender individuals	Social network for gay, bisexual, and transgender communities.
District Health Information System 2 (DHIS2):	Program implementers/MoH	DHIS2 is used for data collection, aggregation, reporting, and analysis across all levels of the health system, supporting monitoring, evaluation, and decision-making.
Electronic Community Health Information System (eCHIS):	Program implementers/MoH	eCHIS manages community health data, supports patient records, and facilitates healthcare service delivery at the community level, integrating with DHIS2 for data interoperability and decision support.

Digital Health Technology	User Demographics	Usage
M-Tiba	General Population	M-TIBA enables users to set funds aside specifically for healthcare use while M-PESA is a mobile money transfer service
QuickRes		an online application that allows any member of the public to easily make reservations for HIV testing,PEP,PREP,Viral load,STI testing ,TB etc QuickRes allows programs to rapidly on board outreach, case management, and clinic staff to engage clients virtually.
Chatbox	MSM.FSW	Social platform to make friends, find online chat, or random chat, you can always meet new people interested in dating. Dating application!

- Annex 2: Informed Consent Form

Ethics & Scientific Review Committee

Informed Consent Form

[This ICF should only be used for those who have attained the age of majority, 18 years]

Annex 1A: Consent form for participants aged 18 yrs. and above.

Study Title	LANDSCAPE ANALYSIS OF DIGITAL HEALTH TECHNOLOGIES AMONG KEY POPULATIONS IN KENYA
Investigator(s)	Principal Investigator Anthony Kariri Partners for health and development in Africa P.O. Box 3737-00506 Nairobi, Kenya +254799479156 Co-investigators Alex Muthui - Quad Excel Research, Training and Consulting Ltd. 0722287212 Festus Muriuki - Partners for health and development in Africa- 0792-293615 Solomon Wambua- KP Consortium 0727-785629 Ethel Wanjiku - Partners for health and development in Africa 0727-287777
Study Sponsor(s)	KELIN
Collaborators	KP CONSORTIUM, KELIN

This Informed Consent Form has two parts:

- Information Sheet (to share information about the study with you)
- Certificate of Consent (for signatures if you choose to participate)

You will be given a copy of the full Informed Consent Form

Part I: Information Sheet
General introduction

Purpose: Good morning/afternoon. My name is _____. I am working with the Partners for Health and Development in Africa (PHDA), a non-profit organisation that works to deliver STI and HIV research, prevention, care and treatment programs in Kenya and Africa. The purpose of my visit is to collect information about the digital health technologies used by key populations in Kenya. The information will be used to design an inventory of health technologies and inform better design and implementation of accessible digital health technologies for key populations. If you agree, we would like to have you participate.

Procedure: If you agree to participate, you will be asked questions about your knowledge and experience of using digital health technologies. For instance, you will be asked about whether you have participated in the design of key population based digital health technologies. Participation will take about 45-90 minutes. Some of you may be selected for a group discussion and that will take an additional 60 minutes.

Confidentiality: What we discuss today is strictly confidential, so your responses will not be shared with anyone. Your name, personal information, or any information you provide will not be given to anyone. There are no right or wrong answers to any of the questions.

How will you protect the information you collect about me, and how will that information be shared?

Results of this study may be used in publications and presentations. Your study data will be handled as confidentially as possible. If results of this study are published or presented, individual names and other personally identifiable information will not be used. To minimise the risks to confidentiality, we will store the data collected on paper in a locked location and data collected electronically on password protected computers and files and it will only be accessed by the study team. We may share the data we collect from you for use in future research studies or with other researchers –if we share the data that we collect about you, we will remove any information, including names, addresses and GPS coordinates, that could identify you before we share it.

Benefits & Risks: The information you give me will assist to establish and improve digital health programs among key populations. Your participation in this study may involve some possible small risks or inconveniences. One possible risk is that your identity may be disclosed to someone outside of the study. To prevent this from happening, we will not

have any of your identifying information in any of the research material. We will use unique numbers to identify your information. Your identity will be protected, and only authorised people involved in this research can see the information you have shared in the interview. You can also choose to use a made-up name for the interview. You may find one or more questions that we ask to be upsetting or sensitive. You do not have to respond to any question that makes you uncomfortable. You may end the interview at any time without penalty. At the end of the interview, if any question made you uncomfortable and you want to discuss it with a professional, you will be given more information (including a phone number) on how to contact a local professional who will assist you in getting the help you need.

There are no direct benefits of your participation, although you will contribute critical information to better inform digital health programs.

Voluntary Participation: Your opinions and experiences are important to us. We ask that you be honest and truthful in answering our questions. Your participation is completely voluntary. If any of the questions make you uncomfortable or you don't want to answer them, you do and are free to stop your participation at any point. There are no consequences for you if you decline to provide consent.

Additional Information.

What will I receive for participating? You will receive Ksh. 500 to cater for your transport costs to the interview venue.

What will happen to the results of the research study? The results of the study will be used by public health managers so they may better provide programs related to digital health among key populations.

Who has reviewed these activities? The procedures of your participation have been reviewed by the AMREF Ethical & Scientific Review Committee.

What if I need more information? If you have a concern about any aspect of the study, you should ask to speak to the researchers who will do their best to answer your questions. You may call Antony Kariri 0799479156,
Partners for Health and Development in Africa, Telephone. 0202101155.....

What if there is a problem? Any complaint about the way you have been treated during the study or any possible harm you might suffer will be addressed. Please contact: AMREF Ethics & Scientific Review Committee, PO BOX 30125-00100; Tel. 0206994000, Nairobi, Kenya.

Offer to answer questions and provide contact information

If you have final questions about your participation you may ask them now. If you have any questions or concerns after we speak today, you can contact the project representatives or the AMREF Ethical & Scientific Review Committee. Contact information is provided below

Part II: Certificate of Consent

Subject Statement: I have read the Informed Consent for this study. I have received an explanation of the planned research, procedures, risks and benefits and privacy of my personal information. I agree to take part in this study. I understand that my participation in this study is voluntary.

Your name:_____

Your signature:_____ Date:_____

Investigator or person who conducted Informed Consent discussion: I confirm that I have personally explained the nature and extent of the planned research, study procedures, potential risks and benefits, and confidentiality of personal information.

Your name:_____

Your signature:_____ Date:_____

Statement by the researcher/person taking consent: I confirm that the study subject was given an opportunity to ask questions about the study, and all the questions asked by the study subject have been answered correctly and to the best of my ability. I confirm that the individual has not been coerced into giving consent, and the consent has been given freely and voluntarily.
A copy of this Informed Consent Form has been provided to the study subject.

Your name:_____

Your signature:_____ Date:_____

- Annex 3 IDI GUIDE

	Main questions	Possible probes
	INTRODUCTION Thank you for taking the time to talk to me today. My name is [RA Name]. Our discussion today will be about digital health applications and services that are used within the key populations space. We will talk for about an hour, but if you need to stop in the middle, just let me know. Remember that there are no right or wrong answers, and *everyone's opinion is valid*. I am just interested in your thoughts and opinions. Your responses will help to make better digital health platforms that will enhance accessibility and acceptability of digital health among key populations. What we discuss today is strictly confidential, so your responses will not be shared with anyone. Your name, personal information, or any information you provide will not be given to anyone. I will take you through an informed consent process before we begin to ensure that you understand the purpose of the study in detail and some related ethical issues regarding your participation.	
	PART I: Knowledge of Digital Health Platforms and Services	
1.1	Please tell me a little bit about what you know of digital health platforms/technologies or services?	• *What is your understanding of digital health platforms/technologies?* • *What is your general experience about using digital health services?* • *What are some of the benefits of using DHTs for KPs?* • *What are some of the challenges experienced by key populations while using or accessing digital health platforms or services?*
1.2	*There are many kinds of health applications, for example mobile health technologies that utilise SMS to share information on HIV or Pregnancy*	• *Probe for names of descriptions of the technologies/ services* • *Where can the DHT services be accessed?*

	prevention or to send reminders for ARV refills, electronic medical records, biometric scanners among others. Could you describe some of the digital health technologies or services you or other key populations have used or heard about?	• *Were they particular to key populations or available for use by the general population as well?* • *Any specific DHTs they know of that are specific to providing services for KPs?* • *Which ones are the most common in the KP space?*
	PART 2: Participatory Development of DHTs	
2.1	I would like to learn whether you have participated in the development of DHTs or know someone who participated in the development of DHTs targeting key populations.	• *Have you ever participated in the designing of any digital health applications?* • *Would you say other KPs you know have been involved in the design phase of digital health applications?* • *In your opinion, how regularly do you think health technology developers involve KPs when they want to develop DHTs?*
2.2	What would be the best mechanism for including KPs in the design phase of DHTs?	• *How/when should KPs be involved in the design of DHTs*? • *Why should KPs be involved in DHT design*? • *Whose responsibility should it be to ensure that KPs are involved at the design stage? Programmers? Government? Developers?* • *Are there guidelines to guide this process? Which guidelines? If they do not exist, who should develop these guidelines?*
2.3	What are some of the existing safety and security challenges that you have encountered during the development or use of DHTs and what are some	• *What are some of the existing safety and security challenges during the design phase?*

	measures that should be instituted to strengthen safety and security of DHTs for KPs?	• *What are some of the existing safety and security challenges during use of DHTs?* • *What are the possible solutions to the identified challenges you have mentioned?* • *If not mentioned already: What possible solutions could be instituted to deal with the specific challenge of "function creep" (data being utilised for other purposes other than its original intent?)*
2.4	How do you think demand for utilisation of DHTs can be created for KPs?	• *What are some of the ways through which demand for utilisation of DHTs for KPs can be done?* • *Will the DHTs be stigma free for all KP typologies?*
	WRAP UP	
	We have come to the end of the interview. Thank you so much for taking the time to speak with me. Before we finish, is there anything else that you would like to add to what we have discussed?	• *Do you have any questions for me?* • *Do you have any other feedback/thoughts regarding DHTs for KPs?*

Annex 3 FGD GUIDE FOR KEY POPULATIONS

	Main questions	Possible probes
	INTRODUCTION Thank you for taking the time to talk to me today. My discussion today will be about digital health applications and services that are used within the key populations space. We will talk for about an hour, but if you need to stop in the middle, just let us know. Remember that there are no right or wrong answers, and Everyone's opinion is valid . We are just interested in your thoughts and opinions. Your responses will help us to make better digital health platforms that will enhance accessibility and acceptability of digital health among key populations. What we discuss today is strictly confidential, so your responses will not be shared with anyone. Your name, personal information, or any information you provide will not be given to anyone. I will take you through an informed consent process before we begin to ensure that you understand the purpose of the study in detail and some related ethical issues regarding your participation.	
	PART I: Knowledge of Digital Health Platforms and Services	
1.1	Please tell me a little bit about what you know of digital health	· *What is your understanding of digital health*

	platforms/technologies or services?	*platforms/technologies?* · *What is your general experience about using digital health services?* · *What are some of the benefits of using DHTs for KPs?* · *What are some of the challenges experienced by key populations while using or accessing digital health platforms or services?*
1.2	*There are many kinds of health applications, for example mobile health technologies that utilise SMS to share information on HIV or Pregnancy prevention or to send reminders for ARV refills,* *Electronic medical records, biometric scanners among others.*	· *Probe for names of descriptions of the technologies/ services* · *Where can the DHT services be accessed?* · *Were they particular to key populations or available for use*
	Could you describe some of the digital health technologies or services you or other key populations have used or heard about?	· *Any specific DHTs they know of that are specific to providing services for KPs?* · *Which ones are the most common in the KP space?*
	PART 2: Participatory Development of DHTs	
2.1	I would like to learn whether you have participated in the	· *Have you ever participated in the designing of any digital*

	development of DHTs or know someone who participated in the development of DHTs targeting key populations.	*Health applications?* · *Would you say other KPs you know have been involved in* *the design phase of digital health applications?* · *In your opinion how regularly do you think health* *technology developers involve KPs when they want to* *develop DHTs?*
2.2	What would be the best mechanism for including KPs in the design phase of DHTs?	· *How/when should KPs be involved in the design of DHTs*? · *Why should KPs be involved in DHT design*? · *Whose responsibility should it be to ensure that KPs are* *involved at the design stage? Programmers?* *Government?* *Developers?* · *Are there guidelines to guide this process? Which* *guidelines? If they do not exist who should develop these* *guidelines?*
2.3	What are some of the existing safety and security challenges that	· *What are some of the existing safety and security*

	you have encountered during the development or use of DHTs and what are some measures that should be instituted to strengthen safety and security of DHTs for KPs?	*challenges during the design phase?* · *What are some of the existing safety and security challenges during use of DHTs?* · *What are the possible solutions to the identified challenges you have mentioned?*
		· *If not mentioned already: What possible solutions could be instituted to deal with the specific creep" (data being utili original intent?)*
2.4	How do you think demand for utilisation of DHTs can be created for KPs?	· *What are some of the ways through which demand for Utilisation of DHTs for KPs can be done?* · *Will the DHTs be stigma free for all KP typologies?*

		WRAP UP	
		We have come to the end of the interview. Thank you so much for taking time to speak with me. Before we finish, is there anything else that you would like to add to what we have discussed?	· *Do you have any questions for me?* · *Do you have any other feedback/thoughts regarding DHTs* *for KPs?*

PHDA
Partners for Health and Development in Africa

- Annex 4 KEY IN DEPTH INTERVIEW GUIDE FOR KEY STAKEHOLDERS

	Main questions	Possible probes
	INTRODUCTION Thank you for taking the time to talk to me today. My name is [RA Name]. Our discussion today will be about digital health applications and services that are used within the key population space. We will talk for about an hour, but if you need to stop in the middle, just let us know. Remember that there are no right or wrong answers and *everyone's opinion*. We are just *interested* in your thoughts and opinions. Your responses will help us to make better digital health platforms that will enhance accessibility and acceptability of digital health among key populations. What we discuss today is strictly confidential, so your responses will not be shared with anyone. Your name, personal information, or any information you provide will not be given to anyone. I will take you through an informed, consent process before we begin to ensure that you understand the purpose of the study in detail and some related ethical issues regarding your participation.	

	PART I: Knowledge of Digital Health Platforms and Services	
1.1	Please tell me a little bit about what you know of digital health platforms/technologies or services that are used by key populations in Kenya?	· *What kind of services do these DHTs offer?* · *Which key population groups do they target?* · *Who develops these technologies? (in country/SSA developers or developers from the west)* · *What is your general experience about using digital health ?* ● *What are some of the benefits of using DHTs for KPs?* · *What are some of the challenges experienced by key? populations while using or accessing digital health platforms or services?*
1.2	*There are many kinds of health applications, for example mobile health technologies that utilise SMS to share information on HIV*	· *Probe for names or descriptions of the technologies/ services*

	or Pregnancy prevention or to send reminders for ARV refills, *electronic medical records, biometric scanners among others.* Could you describe some of the digital health technologies or services used by key populations in Kenya?	· *Where can the DHT services be accessed?* · *Are they particular to key populations or available for use by the general population as well?* · *Which ones are the most common in the KP space?* · *Are there centralised places/inventories where these DHTs can be accessed?*
	PART 2: Participatory Development of DHTs	
2.1	I would like to learn whether you have participated in the development of DHTs targeting key populations.	· *Have you ever participated in the designing of any digital Health applications for KPs?* · *In your opinion how common do you think health technology developers involve KPs when they want to develop DHTs?*
2.2	What would be the best mechanism for including KPs in the design phase of DHTs?	· *How/when should KPs be involved in the design of DHTs*? · *Why should KPs be involved in DHT design*?

		· *Whose responsibility should it be to ensure that KPs are involved at the design stage? Programmers? Government? Developers?* · *Are there guidelines to guide this process? Which guidelines? If they do not exist who should develop these guidelines?*
2.3	What are some of the existing safety and security challenges that you have encountered during the development or use of DHTs and what are some measures that should be instituted to strengthen safety and security of DHTs for KPs?	· *What are some of the existing safety and security challenges during the design phase?* · *What are some of the existing safety and security challenges during use of DHTs?*

		· *What are the possible solutions to the identified challenges you have mentioned?* · *If not mentioned already: What possible solutions could be instituted to deal with function creep" (data being utilised outside its original intent?)*
2.4	Are you aware of any compliance standards and guidelines on digital the health development process from KPs?	· *Which standards exist in Kenya?* · *Do Digital Health Developers follow these standards?* · *Who should be responsible for ensuring that the digital* *Do health platforms developed meet the expected standards?* · *How should we ensure that developers adhere to these* *standards?*
2.5	In your opinion do you think there should be a centralised inventory mapping the DHTs used within the KP space?	· *Why is this important/not important?* · *Who should be mandated to create this*

		inventory? · *How will the inventory be regularly updated to ensure that* *new technologies are regularly mapped?*
2.6	How do you think demand for the utilisation of DHTs can be created for KPs?	· *What are some of the ways through which demand for* *Utilisation of DHTs for KPs can be done?* · *Will the DHTs be stigma-free for all KP typologies?*
	WRAP UP	
	We have come to the end of the interview. Thank you so much for taking time to speak with me. Before we finish, is there anything else that you would like to add to what we have discussed?	· *Do you have any questions for me?* · *Do you have any other feedback/thoughts regarding DHTs* *for KPs?*