Enhancement of access to COVID-19 & TB simultaneous screening, COVID-19 testing using Ag-RDTs and linkage to care in selected Counties in Kenya via CHP led door-to-door testing and health facility testing at levels 2 and 3

REPUBLIC OF KENYA
MINISTRY OF HEALTH

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Contents

List of Abbreviations

ACSM	Advocacy Communication and Social Mobilization
ACT-A	Access to COVID-19 Tools (ACT) Accelerator
Ag-RDT	Antigen based RDT
BMI	body mass index
CHA	Community Health Assistant
CHC	Community Health Committee
CHEW	Community Health Extension Worker
CHMT	County Health Management Team
CHO	Community Health Officer
CHP	Community Health Promoter
CHS	Community Health Strategy
CHSC	Community Health Service Coordinator
CHT	Community Health Toolkit
CHU	Community Health Unit
CIF	Case Investigation Form
cMNH	Community-based Maternal and New-born Health
COVID-19	Coronavirus disease 2019
DHARC	Digital Health Applied Research Centre
DOT	Directly Observed Therapy
HBIC	Home-Based Isolation and Care
HCW	Health Care Worker
HF	Health Facility
HH	household
HIV	Human Immunodeficiency Virus
HRIO	Health Records and Information Officer
iCCM	Integrated Community Case Management of Common Childhood diseases
IPC	infection prevention and control
JKUAT	Jomo Kenyatta University of Agriculture and Technology
JKUAT-IERC	JKUAT-Institutional Ethical Review committee
JKUATES	JKUAT Enterprises Ltd
KEPH	Kenya Essential Package for Health
KHIS	Kenya Health Information System
KMFL	Kenya Master Facility List
MCHUL	Master Community Health Unit List
MoH 100	Community Referral Form
MoH 513	Household Register
MoH 514	Service Delivery Logbook
MoH 515	Community Health Extension Worker Summary
MoH-K	Ministry of Health Kenya
mRDT	malaria rapid diagnostic test
NHIF	National Hospital Insurance Fund
NSP	National Strategic Plan
NTLD-P	National Tuberculosis Leprosy and Lung Disease Program

PCR	polymerase chain reaction
PHC	Public Health Care
PHEOC	Public Health Emergency Operations Centre
PHO	Public Health Officer
PI	Principal Investigator
PPE	Personal Protective Equipment
RDT	Rapid Diagnostic Test
RT-PCR	reverse transcription polymerase chain reaction
SARS-COV-2	Severe acute respiratory syndrome coronavirus 2
SCHMT	Sub-County Health Management Team
TaT	turnaround time
TB	Tuberculosis
ToT	Trainer of Trainer
UHC	Universal Health Coverage
UI	User Interface
VM	virtual machine
WHO	World Health Organization

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1 INTRODUCTION

1.1 BACKGROUND

Coronavirus disease 2019 (COVID-19) is an ongoing global pandemic caused by the novel Severe acute respiratory syndrome coronavirus 2 (SARS-COV-2). This pandemic has had an unprecedented impact on the health, economic, and social well-being of Kenyans. As of 28th March 2022, 323,374 positive cases and 5,647 deaths had been reported (WHO, 2022). Efforts to track the disease progress and its public health impact largely depend on effective screening, availability of fast and equitable access to diagnostic testing and a rapid turnaround in communication of test results to suspect cases. The epidemiological situation in Kenya appears to be improving. The fifth COVID-19 wave peaked in early January 2022, when almost 5,000 new daily infections were recorded. As of March 2022, the number of recorded daily infections dropped to less than 50. However, it is impossible to predict how the epidemiological situation will further evolve, and whether COVID-19 is set to become an endemic disease, or if new variants will emerge leading to new acute surges.

Kenya has mainly undertaken targeted testing for COVID-19 a strategy that has been occasioned by inadequate COVID-19 tests, high costs associated with COVID-19 reverse transcription polymerase chain reaction (RT-PCR), inadequate human resources and limited laboratory facilities. This has limited the roll-out of COVID-19 testing services to communities in Kenya. Moreover, Kenya's national testing guidelines limit the decentralization of testing by stipulating that test can only be administered by laboratory technicians [7]. Currently, public tests are primarily available at levels 4-6 health facilities, with some limited extension to level 3 health facilities. According to the guidelines, only laboratory technicians perform tests at these facilities. Consequently, Kenya's testing strategy excludes approximately 10,000 healthcare workers at levels 2 and 3 health facilities and approximately 90,000 Community Health Promoters (CHPs), previously referred to as community health volunteers, who conduct door-to-door visits, significantly limiting the scale and decentralization of testing.

Leveraging COVID-19 Antigen based RDTs (Ag-RDTs) at the community level is critical to complement capacity constrained polymerase chain reaction (PCR)-testing which has been the predominant type of testing in Kenya to date. Kenya's Interim Antigen Testing Guide (2021) highlights the shortfalls of PCR tests which include the fact that they: i) are expensive, ii) have limited accessibility, particularly outside Nairobi, iii) require a high level of human capacity and skill, and iv) have long turn-around times. Relative to PCR tests, Ag-RDTs: i) are cheaper to produce and purchase, ii) have fewer infrastructure and human capacity constraints, meaning testing can reach areas underserved by PCR capacity, and iii) have shorter result turnaround times (TaTs). COVID-19 has put enormous demand on laboratory infrastructure and requires an unprecedented rapid scale-up of testing capacity at all levels of the health care system. Therefore, an Ag-RDTs-led strategy is crucial to scale-up and increase the impact of testing.

Kenya administered 0.7 COVID-19 tests per 1000 population per week in February 2022, with a cumulative total of over 3.4 million tests administered over the pandemic. Therefore, Kenya would need to perform an additional 340,000 tests per week to reach the Access to COVID-19 Tools (ACT) Accelerator (ACT-A) targets. Additionally, less than 30% of the adult population has been fully vaccinated, leaving large populations highly vulnerable to infection. This also brings additional risks of the spread of new variants, including the spread of Omicron in sub-Saharan Africa. Testing is therefore essential to ensure that COVID-19 outbreaks are detected early and contained, and emergence of new variants of the virus are monitored. Furthermore, successfully scaling-up testing in Kenya could also have a catalytic effect on other

African countries by providing a road-map for successful scale-up and demonstration of the value of testing more broadly.

Tuberculosis (TB) accounts for more than 10 million new cases per year globally, but less than two thirds of the cases are reported. Prevention and control of TB consists of a combination of measures designed to minimize the risk of transmission within populations. A three-level hierarchy of controls comprising administrative and environmental controls, and respiratory protection have been shown to reduce and prevent the risk of transmission and exposure to TB (NTLD-P, 2014, WHO, 2019). Concerted efforts during the past two decades - first under the Directly Observed Therapy (DOT) strategy and later the Stop TB Strategy - have made remarkable worldwide progress in controlling TB and caring for patients with TB. However, millions of people with TB are still not notified to public health authorities, and the declines in TB deaths and incidence are still too slow. According to the Kenya TB prevalence survey of 2016 the crude prevalence of bacteriologically confirmed TB was highest in males at 530 (442-618) per 100,000 population compared to females at 208 (162-255) per 100,000 (GOK, 2016).

In 2019 about 60% of the estimated TB cases were either not diagnosed or diagnosed but not notified to the National Tuberculosis Leprosy and Lung Disease Program (NTLD-P) (NTP) (WHO, 2020). The National Strategic Plan (NSP) for TB, leprosy, and lung health 2019-2023 envisions a country free of TB and leprosy, and with a reduced burden of lung disease overall. To achieve this there is need to close the gaps along the care continuum to find, treat, and cure all people with TB. These call for a redoubling of efforts for early identification and treatment of all cases of TB, as envisioned in World Health Organization (WHO)'s End TB Strategy approved by the World Health Assembly in 2014. Intensifying efforts to increase early case detection is a key component of improving TB care and preventing the disease.

Detecting TB cases only from among persons presenting themselves to health facilities with suggestive symptoms has until recently been the principal approach to case-finding. However, the remaining case-detection gap, particularly in certain vulnerable populations, along with the persistence of delays in diagnosis and the accompanying continued transmission in the community, highlight the need for a more active approach to detect TB early, hence the need to consider systematic screening for active TB in selected risk groups. To achieve this, there is need to close gaps along the care continuum to find, treat, and cure all people with TB. Currently, CHPs in Kenya are trained to routinely screen for TB and refer the presumptive cases to the link health facilities. In addition, they are also involved in contact screening and tracing of cases lost to follow-up [1].

Before COVID-19, TB was the leading cause of death from an infectious disease globally. Although great improvements have been made over the past several years to find and treat TB in the highest burden countries, there was a drastic decline in diagnosis and treatment of TB in 2020 due to the COVID-19 pandemic. Recent data in 9 countries representing 60% of the global TB burden show a decline in TB detection ranging from 16-41%. This drop has brought the overall number of people diagnosed and treated for TB in these countries to 2008 levels, a setback of 12 years. According to MoH-Kenya (2021) the performance of the TB program declined due to the stigma associated with overlapping symptoms between TB and COVID-19 that may have caused people to conceal such symptoms in fear of being diagnosed with COVID-19. Persons with respiratory symptoms felt stigmatized because of the prevailing COVID-19 pandemic. In addition, with fewer people coming to the health facilities, detection and notification of people with TB declined by nearly 25% compared to the 2019 baseline. WHO estimates that these COVID-19 related disruptions in access to TB related services could cause an additional half a million TB deaths (WHO, 2021).

Control of the COVID-19 and TB is dependent on early and accurate diagnosis, containment of clusters of infection and the interruption of community transmission, to mitigate the impact on human health. Diagnostic testing is a critical and necessary step for the detection and control of COVID-19 and TB. Testing would identify the pathogens responsible for each of the diseases, guide appropriate treatment, inform contact tracing, and help countries allocate resources and staff. Providing a COVID-19 screening and testing to all those who need it requires rapid expansion of diagnostic testing capacity. Additionally, screening and referral of TB presumptive cases in the community using CHPs facilitates early detection and interventions, mitigating TB related complications and spread in the community. It is worth noting that the Ministry of Health Kenya (MoH-K), with support of partners, has developed interim guidelines on COVID-19-TB bidirectional screening which was rolled out from April 2022. These guidelines are targeted primarily at facility-based healthcare workers, and it would therefore be important to customize training materials on bidirectional COVID-19-TB screening for CHPs with the aim of improving detection of presumptive COVID-19 and/or TB cases.

This pilot relied on the use of more easily obtained nasal swabs to enhance COVID-19 testing in the community settings. This project leveraged on use of CHPs to undertake door-to-door bidirectional screening of COVID-19 and TB, and testing of COVID-19 using Ag-RDTs and GeneXpert for TB. This approach was favourable owing to the low cost of implementation and the network of CHPs that provided door-to-door services in other disease areas like Human Immunodeficiency Virus (HIV) and TB. In addition, the project piloted the decentralization of testing to levels 2 and 3 Health Facilities (HFs) to move testing as close to the community as possible. By reducing the service distances for clients, increasing access to COVID-19 and TB testing with a shorter TaT for results communication, and by using Primary Healthcare Providers (nurses-at Level 2 and laboratory officers-at level 3 facilities) the cost-effectiveness of this approach could not be overstated. Moreover, successful implementation of testing at community settings and decentralization to primary healthcare levels could have a catalytic effect on other African countries by providing a roadmap for enhancing COVID-19 and TB screening, testing and linkage to care.

This project in addition, contributed towards the attainment of the WHO and ACT-A partnership goal of testing of at least 1 test per 1,000 populations and 7 tests per 1,000 population people per week, respectively (WHO, 2020). Further, it also provided an excellent opportunity to demonstrate the role CHPs can play in improving access to diagnostics for other disease where easy to use tests are available. In addition, the pilot involved customization of the *Kenya COVID-19 Tracker app* by Medic Mobile which was used for the bidirectional screening and subsequent testing of COVID-19 and TB among *Boda Boda* riders in the Nairobi Metropolis conducted by MoH-K, Jomo Kenyatta University of Agriculture and Technology (JKUAT) and FIND in 2022. The team helped in the development of streamlined data capture tools for bidirectional screening of COVID-19-TB, and capture of testing data for COVID-19 to ensure standardized and efficient reporting at the community level. The reporting processes at different levels was established and tweaked so that the data collection tools become aligned to broader MoH-K reporting systems where possible.

1.2 RATIONAL

Testing continues to play a pivotal role in the overall approach to preventing the transmission of COVID-19 and TB globally. Up to a third of individuals who test positive for COVID-19 have no symptoms at all and can therefore spread it unknowingly. Similarly untreated TB patients can propagate community spread. Epidemiologic evidence has demonstrated that presymptomatic and asymptomatic transmission of virus

has driven the current COVID-19 epidemic ([3]). To limit COVID-19 and TB outbreaks, screening, and testing are needed to identify as many individuals who are transmitting infection as quickly as possible so they can be isolated and their contacts can be identified, treated and/or quarantined ([5], [11]). COVID-19 and TB bidirectional screening aims to ensure that all presumptive COVID-19 patients who visit a health facility are screened for TB, and vice versa, in the same visit. It outlines processes for joint clinical management of both diseases and includes a data management section.

Since the beginning of the COVID-19 outbreak, WHO has emphasized the importance of testing. Without testing, tracking, or containing the spread of the virus, address urgent clinical needs, test the efficacy of vaccination, and detect the emergence of new variants is a major challenge. Antigen tests may play a key role in rapidly identifying those at highest risk for transmitting the disease. However broad use of testing requires broad acceptance of testing procedures. The commonly used nasopharyngeal swab is not conducive to frequent retesting as most patients find the nasopharyngeal swabs invasive and uncomfortable. In this pilot the use of more easily obtained nasal swabs will enhance testing in the community settings. This project leveraged on use of CHPs to undertake door-to-door testing using COVID-19 Ag-RDT. TB screening will also be carried out concurrently by CHPs using the dual screening algorithm that was successfully used in the *Boda Boda*, study. Given poor prognosis of people with TB and COVID-19 co-infection in addition to the high burden of TB, countries should strive to test people diagnosed with COVID-19 for TB, and to test people diagnosed with TB for COVID-19. Screening and testing for both diseases would facilitate in detection of cases, guide in appropriate treatment, inform contact tracing, and help countries allocate appropriate resources and staff.

This approach is favourable owing to the low cost of implementation and the network of CHPs that gives door-to-door services in other disease areas like HIV and TB. In addition, decentralization of testing to level 2 & 3 health facilities will also be cost effective as it will depend on utilization of nurses and other healthcare workers in these facilities that provide primary healthcare services. Moreover, successful implementation of testing at community settings and decentralization to primary healthcare levels could have a catalytic effect on other African countries by providing a roadmap for enhancing COVID-19 testing and TB screening and linkage to care. In addition, this project contributed towards the attainment of the WHO and ACT-A partnership goal of testing of at least 1 test per 1,000 populations and 7 tests per 1,000 population people per week, respectively (WHO, 2020). Further, it also provided be an excellent opportunity to demonstrate the role CHP can play in improving access to diagnostics for COVID-19 and even other disease where easy to use tests are available.

1.3 STUDY OBJECTIVES

The main Objective of this study was enhancement of access to TB and COVID-19 simultaneous screening, COVID-19 testing using Ag-RDTs and linkage to care in selected Counties in Kenya via CHP led door-to-door testing and health facility testing at levels 2 and 3.

The specific objectives were:-

1.3.1 SPECIFIC OBJECTIVES:

(1). To demonstrate the feasibility of decentralization of integrated COVID-19 and TB diagnosis via CHPs and through devolution of rapid COVID-19 testing to lower levels of health facilities

Feasibility of decentralization was demonstrated through recruitment and training of CHPs from various Community Health Units (CHUs) in the four implementation counties. In addition, for counties where L2 and L3 HFs do not have laboratories, nurses were trained to test for COVID-19. In this exercise, a digital screening tool that integrated COVID-19 and TB screening was implemented.

(2). To integrate COVID-19 and TB screening at HF level and community level

Integration of COVID-19 and TB screening at both HF and community levels was achieved through implementation of the digital screening tool.

(3). To determine COVID-19 positivity rates among symptomatic and asymptomatic study participants

COVID-19 positivity rates among both symptomatic and asymptomatic cases were calculated. This was made possible by screening every participant for for COVID-19 and testing despite the outcome of the screening process.

(4). To create demand for COVID-19 and TB testing among community members.

Demand for COVID-19 and TB testing was created through aggressive door to door community mobilization by CHPs, and through outreach activities that were popularized by local community radio stations.

(5). To facilitate linkage to care for presumptive TB cases referred from the community

Any TB presumptive cases identified in the community by the CHPs were referred to respective link HF for treatment, and the process documented through Community Referral Form (MoH 100).

(6). To determine the proportion of TB positive cases out of all the presumptive cases tested.

TB positivity rates among the presumptive cases identified was computed and documented.

(7). To use digital tools to enhance data collection and transmission of test results.

A major deliverable of this project was the use of digital tools to enhance data collection, transmission and analysis, in addition to providing decision support to the CHPs through a digital algorithm. All this was achieved using a tool developed on Medic Mobile's *Kenya COVID-19 Tracker app* which is built on the Community Health Toolkit (CHT) core framework.

All the objectives set out at the onset of this pilot activity were achieved and are discussed in detail in the sections that follow.

2 TECHNICAL APPROACH

2.1 ORGANISATION OF KENYA'S HEALTHCARE SERVICE DELIVERY SYSTEM

Kenya's healthcare system is structured in a hierarchical manner that begins with primary healthcare, with the lowest unit being the community, and then graduates, with complicated cases being referred to higher levels of healthcare. Primary care units consist of dispensaries and health centres. The current structure consists of the following six levels:

1. Level 1: Community
2. Level 2: Dispensaries
3. Level 3: Health centres
4. Level 4: Primary referral facilities
5. Level 5: Secondary referral facilities
6. Level 6: Tertiary referral facilities

This pilot activity devolved testing for COVID-19 to the lower levels (2 and 3) and to the community through the CHPs. At the onset of COVID-19, testing was only possible at highly specialized labs at the national level. With time, most of the labs in level 4s across the country had built capacity to test for COVID-19 via RT-PCR. However, this was still very expensive and unavailable in most level 2 and 3 health facilities. Using simple and easy to use COVID-19 Rapid Diagnostic Tests (RDTs), this pilot devolved the testing of COVID-19 and enhanced access for COVID-19 testing services. Through this strategy, the pilot was able to unlock testing potential for the country.

2.2 KENYA'S COMMUNITY HEALTH STRATEGY

> Each CHU, catering for a population of approximately 5000 people is assigned one CHA/CHO and 10 CHPs who offer promotive preventative and basic curative services.

This pilot study explored the use of the Community Health Strategy (CHS) and leveraged on the large network of CHPs through their CHUs to enhance access to COVID-19 testing and TB screening. Kenya's CHS provides a mechanism for the delivery of the basic Kenya Essential Package for Health (KEPH) at the community level. Driven by the motto: *Afya Yetu, Jukumu Letu -Our Health, Our responsibility* the CHS has a vision of healthy people living healthy and good quality lives in robust and vibrant communities that make up a healthy and vibrant nation. Through the CHS it is envisioned that households and communities will actively and effectively be involved and enabled to increase their control over their environment in order to improve their own health statuses [10].

The CHS prioritizes accessing vulnerable population groups and communities especially those living below the poverty line and key community segments with inadequate access to health services. It aims at enhancing access to health services for everyone by ensuring facility access within a radius of 5 kilometers. This way, the strategy responds to challenges communities face due to inadequate availability, awareness and acceptability of health services on one hand, and limited access to the services due to distance and prohibitive costs on the other [10]. It is this opportunity that this pilot activity leveraged on to enhance access to testing services as well as gain insights into opportunities present for enhancing Kenya's CHS. This is going to be one of the drivers of the implementation of Universal Health Coverage (UHC) by further leveraging on primary healthcare delivery process.

2.2.1 RECRUITMENT OF A COMMUNITY HEALTH PROMOTER (CHP)

In Kenya, a CHU is a health service delivery structure within a defined geographical area covering a population of approximately 5,000 people. Each unit is assigned one Community Health Assistant (CHA) or a Community Health Officer (CHO) and 10 CHPs who offer promotive preventative and basic curative services [9]. A CHP is a member of the community selected to serve in a community health unit. The Promoter's recruitment, training and roles is as prescribed in the Kenya Community Health Policy (2020 – 2030)[8]. According to the current Kenya community Health Policy, to qualify as a CHP, individuals shall be required to meet the conditions outlined below:

1. Must be a citizen of Kenya.
2. Must meet the requirements of chapter six of the constitution.
3. Should be above the age of 18 and of sound mind.
4. (S)he must be a responsible and respected member of the community.
5. Is self-supporting and understands that the role of a community health promoter does not draw a monthly income.
6. Is willing and ready to provide services to the community without charging.
7. (S)he must be a resident (including overnight stay) of respective community that is selecting him / her for a continuous period of not less than five years prior to the appointment date.
8. Is a form four leaver and literate, unless where the situation does not allow.
9. Is not disqualified for appointment to office by the above criteria or by any law.

A CHP is selected at a community meeting or *Baraza* called by the area leader or the community health committee. Once selected, the CHPs undergoes training to prepare him/her to serve households that would be organized as a community health unit.

2.2.2 DUTIES OF A CHP

Based on [8], the main duties of a CHP includes:

1. Deliver key health messages to households as outlined in the KEPH.
2. Registration of households at frequencies stipulated in the guidelines.
3. Guide the community on health improvement and disease prevention.
4. Treat common ailments and minor injuries with support and guidance from CHAs including the implementation of Community-based Maternal and New-born Health (cMNH) and Integrated Community Case Management of Common Childhood diseases (iCCM).
5. Diagnose, treat, manage or refer accordingly, common childhood illnesses such as diarrhoea, malaria, malnutrition and pneumonia.
6. With support from the CHA, stock the CHP kit with supplies provided through the respective link facility or other mechanisms outlined in the guidelines/strategy.
7. Refer cases to respective link facilities.
8. Promote care seeking behaviour and compliance with treatment and advice.
9. Visit homes to determine the health situation and initiating dialogue with household members to undertake the necessary action for improvement.
10. Recognize danger signs among household members and refer as appropriate.
11. Promote appropriate home care for the sick, supported by CHAs and link facilities.
12. Participate in community dialogue and action days organized by CHAs/Community Health Committees (CHCs).
13. Participate in monthly feedback meetings as organized by the CHA/CHO.
14. Be available to the community to respond to questions and provide advice.
15. Motivate members of the community to adopt health promoting practices.

16. Organize, mobilize and lead village health activities.
17. Maintain household registers and keep records of community health related events.
18. Report to the CHA activities they have been involved in and health problems they have encountered that need to be brought to the attention of higher levels.

CHPs had their capacity enhanced, and they got an opportunity to use a digitized algorithm that provided decision support. In addition, the digital platform provided CHPs with an opportunity to transmit data digitally.

In this activity, the CHPs were refreshed on the screening for TB. In addition, they were trained on the use of a digitized algorithm to screen for TB and COVID-19 and use Ag-RDTs to test for COVID-19. Through this activity, the CHPs had their capacity enhanced, and they got an opportunity to use a digitized algorithm that provided decision support. The CHPs were also transmitting data using a digital platform to the Digital Health Applied Research Centre (DHARC) server in addition to using all the MoH-K data collection tools namely the MoH 100, Household Register (MoH 513) and Service Delivery Logbook (MoH 514).

2.3 STUDY AREA

The pilot on enhanced access to COVID-19 and TB simultaneous screening, COVID-19 testing and linkage to care via CHP led door-to-door testing and health facility testing at levels 2 and 3 using Ag-RDTs was conducted among communities in Kajiado, Mombasa, Machakos and Nairobi counties. Figure 1 shows the geographical representation of the study area, and Table 1 provides a list of the sub-counties and wards in the respective study counties. Further, a description of the study region is provided below.

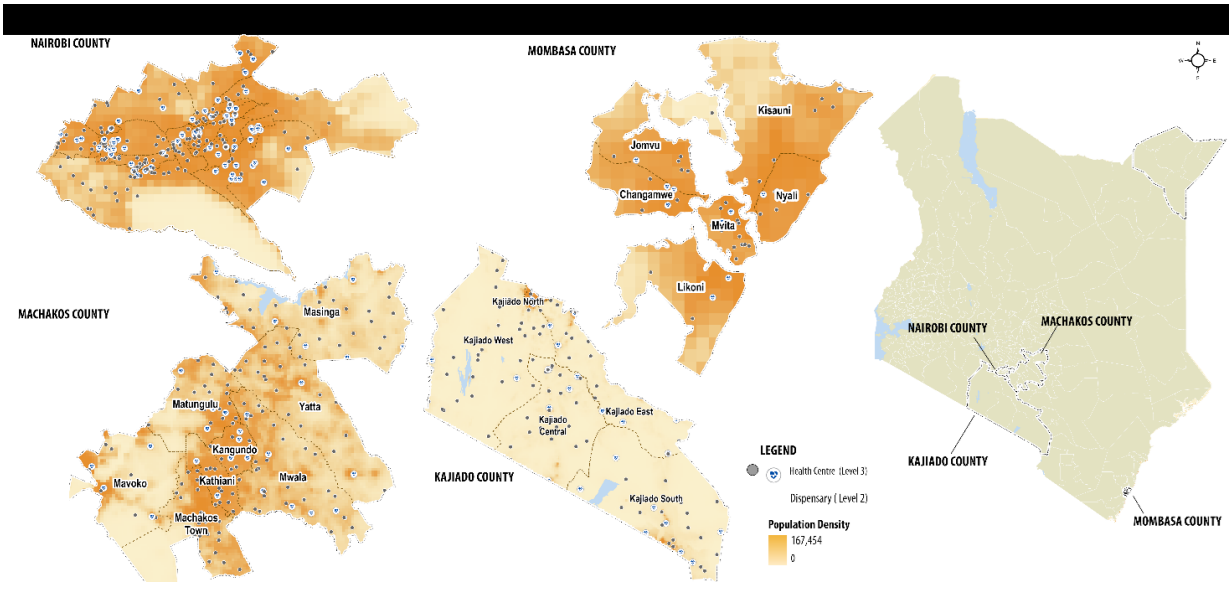

FIGURE 1: **A MAP OF THE PILOT IMPLEMENTATION AREA**

TABLE 1: **A LIST OF THE PILOT COUNTIES, SUB-COUNTIES AND WARDS**

COUNTY	SUB-COUNTY	WARDS
Kajiado	Kajiado North	Olkeri, Ongata rongai, Nkaimurunya, Oloolua, Ngong
	Kajiado South	Entonet/ Lenkisi, Mbirikani/ Eselen, Keikuku, Rombo, Kimana
	Kajiado Central	Purko, Ildamat, Dalalekutuk, Matapato north, matapato south
	Kajiado West	Keekonyokie, Iloodokilani, Magadi, Ewuaso Oonkidong'i , Mosiro
	Kajiado East	Kaputiei North, Kitengela, Oloosirkon/Sholinke, Kenyawa-poka, Imaroro

Continued on next page

TABLE 1: A list of the pilot counties, Sub-Counties and wards – *continued from previous page*

COUNTY	SUB-COUNTY	WARDS
Machakos	Masinga	Kivaa, Masinga, Central, Ekalakala, Muthesya, Ndithini
	Yatta	Ndalani, Matuu, Kithimani, Ikomba, Katangi
	Kangundo	Kangundo North, Kangundo Central, Kangundo East, Kangundo West
	Matungulu	Tala, Matungulu North, Matungulu East, Matungulu West, Kyeleni
	Kathiani	Mitaboni, Kathiani Central, Upper Kaewa/Iveti, Lower Kaewa/Kaani
	Mwala	Mbiuni, Makutano/Mwala, Masii, Muthetheni, Wamunyu, Kibauni
	Machakos town	Kalama, Mua, Mutitini, Machakos Central, Mumbuni North, Kola Muvuti/Kiima-Kimwe
	Mavoko	Athi River, Kinanie, Muthwani, Syokimau/Mulolongo
Mombasa	Jomvu	Miritini, Mikindani, Jomvu Kuu
	Chamgamwe	Port Reitz, Kipevu, Airport, Changamwe, Chaani
	Kisauni	Mjambere, Junda, Bamburi, Mwakirunge, Mtopanga, Magogoni, Shanzu
	Likoni	Mtongwe, Shika Adabu, Bofu, Likoni, Timbwani
	Mvita	Mji wa Kale, Tudor, Tononoka, Shimanzi, Majengo
	Nyali	Frere Town, Ziwa la' Ngomb'e, Mkomani, Kongowea Kadzandani
Nairobi	Westlands	Kitisuru, Parklands/Highridge, Karura, Kangemi, Mountain View
	Dagoretti North	Kilimani, Kawangware, Gatina, Kileleshwa, Kabiro
	Dagoretti South	Mutu-Ini, Ngando, Riruta, Uthiru/Ruthimitu, Waithaka
	Langata	Karen, Nairobi West, Mugumu-Ini, South C, Nyayo Highrise
	Kibra	Laini Saba, Lindi, Makina, Woodley/Kenyatta/ Golf Course, Sarangombe
	Roysambu	Githurai, Kahawa West, Zimmerman, Roysambu, Kahawa
	Kasarani	Clay City, Mwiki, Kasarani, Njiru, Ruai
	Ruaraka	Baba Dogo, Utalii, Mathare North, Lucky Summer, Korogocho
	Embakasi South	Imara Daima, Kwa Njenga, Kwa Rueben, Pipeline, Kware
	Embakasi North	Kariobangi North, Dandora Area I, Dandora Area II, Dandora Area III, Dandora Area IV
	Embakasi Central	Kayole North, Kayole Central, Kayole South, Komarock, Matopeni/ Spring Valley
	Embakasi East	Upper Savannah, Lower Savannah, Embakasi, Utawala, Mihango
	Embakasi West	Umoja I, Umoja II, Mowlem, Kariobangi South, Maringo/Hamza
	Makadara	Viwandani, Harambee, Makongeni, Pumwani, Eastleigh North
	Kamukunji	Eastleigh South, Airbase, California, Ngara, Nairobi Central
	Starehe	Pangani, Ziwani/Kariokor, Landimawe, Nairobi South, Hospital
	Mathare	Mabatini, Huruma, Ngei, Mlango Kubwa, Kiamaiko

2.3.1 KAJIADO COUNTY

Kajiado County spans an area of 21,871.1 km^2 and has a population of 1,117,840 people translating to a population density of 51 people per km^2 (Kenya Population and Housing Census, 2019). It neighbours the counties of Nairobi, Machakos, Makueni, Narok, Taita Taveta and Kiambu, and the Republic of Tanzania to the south. The county has 5 sub-counties namely, Kajiado Central, Kajiado North, Kajiado East, Kajiado West and Kajiado South with twenty-five (25) administrative Wards (Table 1). The county has four (4) distinct settlements patterns, namely, urban, peri-urban and rural (sedentary) and the hard-to-reach community of pastoralists, accounting for about 20% of the total population in the county. The main economic activities of the county include commerce, pastoralism, crop agriculture and tourism. The county has five (5) level 4 hospitals, twenty-two (22) level 3, seventy-nine (79) level 2 HFs and ninety-six (96) functional CHUs.

2.3.2 MOMBASA COUNTY

Mombasa County is the smallest county in Kenya spanning an area of 219.9 km2 with a population of 1,208,333 people translating to a population density of 5,495 people per km^2 (Kenya Population and Housing Census, 2019). It borders the Indian Ocean to the east and south-east, Kilifi County to the north and Kwale to the west and south-west. The county has six (6) sub-counties namely: Jomvu, Changamwe, Kisauni, Likoni, Mvita and Nyali with a total of thirty (30) administrative wards (Table 1). The main economic activity of the county is tourism. The county has one (1) level 5 hospital, three (3) level 4 hospitals, eight (8) level 3, thirty-four (34) level two HFs and forty (40) functional CHUs.

2.3.3 MACHAKOS COUNTY

Machakos County spans an area of 6,042.7 km^2 with a population of 1,421,932 people translating to a population density of 235 people per km^2 (Kenya Population and Housing Census, 2019). It borders Embu, Murang'a and Kiambu counties to the north, Nairobi and Kajiado counties to the west, Makueni County to the south and Kitui County to the east. The county has eight (8) sub-counties namely, Masinga, Yatta, Kangundo, Matungulu, Kathiani, Mavoko, Mwala and Machakos town with a total of forty (40) administrative wards (see Table 1). The main economic activities of the county include fruit farming, livestock farming, sand harvesting and trade. The county has one (1) level 5 hospital, seven (10) level 4 hospitals, twenty-nine (28) level 3, one hundred forty (154) level two HFs and one hundred and fifty-seven (157) functional CHUs.

2.3.4 NAIROBI COUNTY

Nairobi County doubles up as the capital and largest city of Kenya. According to the 2019 Kenya Population and Housing Census, 4,397,073 inhabitants lived in Nairobi County within 696 km^2 (Coordinates: 1.2921°South, 36.8219°East). It borders Kiambu County to the North and West, Kajiado to the South and Machakos to the East with Kiambu County sharing the longest boundary with Nairobi County. The County has 17 sub-counties namely, Westlands, Dagoretti North, Dagoretti South, Langata, Kibra, Roysambu, Kasarani, Ruaraka, South, Embakasi North, Embakasi Central, Embakasi East, Embakasi West, Makadara, Kamukunji, Starehe and Mathare. The sub-counties are further sub-divided into 85 administrative wards (Table 1). The county is urban and is the largest industrial center in Kenya. The principal products include processed food, beer, vehicles, soaps, construction material, engineering, textiles, and chemicals. In addition, a thriving sector provides employment to carpenters, metal workers, furniture makers, mechanics, and retailers. The county has three (3) level six hospitals, four (4) level 4 hospitals, thirty-seven (37) level 3, sixty-one (61) level 2 HFs and four hundred and sixty-five (465) functional CHUs.

2.4 TARGET POPULATION

The pilot focused on household members visited by the one thousand one hundred and sixteen (1116) CHPs who were trained, and clients attending level 2 and level 3 healthcare facilities in Kajiado, Nairobi, Machakos, and Mombasa counties (about 410 HFs in total). Each of the CHPs, and the officers testing at various HFs carried out 5 to 10 tests per day.

2.5 ENTRY STRATEGY

Project was enthusiastically received and supported. Necessary letters of support to counties through the Council of Governors were issued. Authority to carry out the project in the selected counties was granted by the respective county governments.

Sensitization meetings were held with MoH-K at National and County governments to obtain concurrence and participation in the project activities. At the national level, sensitization meetings were held with the National MoH-K team, while at the counties, meetings will be held with respective County Health Management Team (CHMT). The meetings provided fora for engagement of county and national MoH-K focal points in protocol alignment and for county-level approvals. This enabled the mapping of CHUs and HFs from which CHPs and Health Care Workers (HCWs) will be identified for the pilot. In addition, further consultations and sensitization meetings were held at the office of the county commissioner. This facilitated demand creation at the community levels given permission granted by the local authorities. Through the office of the County commissioner, the local area Chiefs and assistant Chiefs granted permission for mobilization and sensitization of the community through the local *barazas*. This eased the implementation of the pilot activities at the community level.

2.6 DUAL SCREENING ALGORITHM FOR COVID-19 AND TB

All enrolled participants were taken through a digitized Case Investigation Form (CIF) which integrated a series of questions on symptoms or risk factors common to both COVID-19 and TB, including additional questions specific to each disease, in line with MoH-K guidelines. The screening questions are summarized in Table 2.

TABLE 2: **DUAL COVID-19–TB SCREENING QUESTIONS**

COVID-19	TB
Cough of any duration	
Fever or chills	
Chest Pain	
Shortness of breath or difficulty breathing	Drenching night sweats
Fatigue	Unintended weight loss
Muscle or body aches	BMI less than 18.5
Headache	Recent contact with confirmed TB case
New loss of taste or smell	
Sore throat	
Congestion or runny nose	
Nausea or vomiting	
Diarrhoea	
Recent contact with confirmed COVID-19 case	

From Table 2, the green panel represents risk factors common to both COVID-19 and TB, the grey cells represent COVID-19 specific symptoms, and the pink cells represent the TB specific symptoms. This dual screening algorithm was automated in the *Kenya COVID-19 Tracker app* and used to screen the pilot activity participants. However, testing for COVID-19 was not based on screening. All the consenting clients who were enrolled for the pilot activities were tested for COVID-19 using the **Panbio COVID-19 Ag Rapid Test Device (nasal)** by Abbott, or the **CADY COVID-19 Antigen Rapid Test** by Revital Healthcare (EPZ) Limited,

regardless of whether they presented with any symptoms or not. All those reporting TB risk factors were sent for TB testing as per MoH-K protocols. For this activity, since there was no way of collecting height and weight at the community level to check the body mass index (BMI) for the participants, this specific symptom was omitted from the automated algorithm.

For the purposes of analysis, classification based on screening was as follows:

1. "No" to all the symptoms – The client has no symptoms for any of the diseases → COVID-19 Ag-RDT testing.
2. "Yes" to only one of the green and no to all other symptoms – probing if there are any other symptoms, however mild was necessary for a clear determination of what disease the client could be presenting symptoms for.
3. "Yes" to any two green, regardless of grey or pink responses – TB suspect case AND COVID-19 suspect case → COVID-19 Ag-RDT testing + referral for TB Testing.
4. "Yes" to any pink, "yes" to any green, and "yes" to any grey – TB suspect case AND COVID-19 suspect case → COVID-19 Ag-RDT testing + referral for TB testing.
5. "Yes" to any pink, and "yes" to any grey regardless of the responses for green – TB suspect case AND Ag-RDT suspect case → COVID-19 Ag-RDT testing + referral for TB testing.
6. "Yes" to any pink, "no" to all green and grey – TB suspect case ONLY → COVID-19 Ag-RDT testing + referral for TB testing.
7. "Yes" to any pink, "yes" to any green, and "no" to all grey – TB suspect case ONLY → COVID-19 Ag-RDT testing + referral for TB testing.
8. "Yes" to any grey, "no" to all green and pink – COVID-19 suspect case ONLY → COVID-19 Ag-RDT testing.
9. "Yes" to any grey, "yes" to any green, and "no" to all pink – COVID-19 suspect case ONLY → COVID-19 Ag-RDT testing.

2.7 SCREENING ALGORITHM FOR COVID-19, TB AND MALARIA

During the commencement of the study, one of the manufacturing companies, Revital Healthcare (EPZ) Limited, who provided some of the COVID-19 RDT kits, made a donation of 2500 malaria rapid diagnostic tests (mRDTs), and the study team incorporated this in the study. Given their small number, the mRDTs were only used on Mombasa since Mombasa county is considered to be a stable endemic malaria zone compared with the other 3 implementation Counties. This provided an opportunity to incorporate malaria symptoms into the algorithms presented in Table 2, to produce the algorithm presented in Figure 2.

From Figure 2, the symptoms at the intersections of each of these diseases are common and would give rise to a client being tested for both if they presented with these symptoms. However, for this activity, the only common symptom between TB and malaria, was fever which is common for all three. For this reason, fever alone needed further probing for additional information before a decision could be made. This additional malaria component was only implemented by the CHPs.

Again, for purposes of analysis, the modified classification was as follows, based on the labels 1 to 7:-

1. "No" to all the symptoms – The client has no symptoms for any of the diseases → COVID-19 Ag-RDT testing.
2. "Yes" to 1 only and "no" to all others – probe if there are any other symptoms, however mild was necessary for a clear determination of what disease the client could be presenting symptoms for. This probe includes ascertaining if it is a yes to any 7.

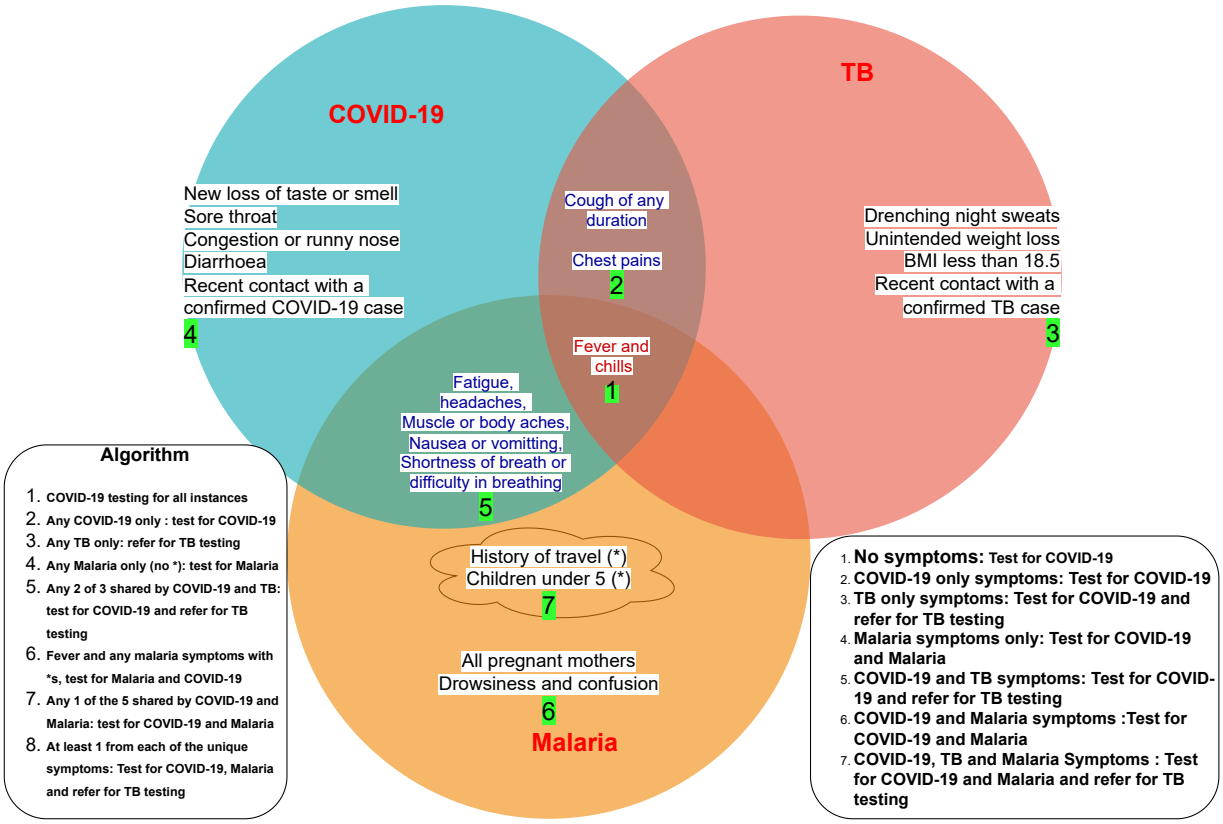

FIGURE 2: **SCREENING ALGORITHM FOR COVID-19, TB AND MALARIA**

3. "Yes" to 1, and any of 7, or both – malaria suspect case → COVID-19 Ag-RDT testing + mRDT Testing.
4. "Yes" to only one of 2, and "no" to all others – probe if there are any other symptoms, however mild was necessary for a clear determination of what disease the client could be presenting symptoms for.
5. "Yes" to 1 and any one of 2, and "no" to all others – COVID-19 AND TB suspect case → COVID-19 Ag-RDT testing + referral for TB testing.
6. "Yes" to all 2 of 2 and any or none of 1,3 and 4, and "no" to all others– COVID-19 suspect AND TB suspect case → COVID-19 Ag-RDT testing + referral for TB testing.
7. "Yes" to any from 3, "no" to all others – TB suspect case ONLY → Ag-RDT testing + referral for TB testing.
8. "Yes" to any from 4, "no" to all others – COVID-19 suspect case ONLY → Ag-RDT testing.
9. "Yes" to any from 6, "no" to all others – malaria suspect case ONLY → Ag-RDT testing + mRDT testing.
10. "Yes" to any from 5, none or any from 4,6,7 – COVID-19 suspect case and malaria suspect case → Ag-RDT testing + mRDT testing.
11. "Yes" to any from 2 and 5, and "no" or yes to any other – COVID-19 suspect case, malaria suspect case and TB suspect case → Ag-RDT testing + mRDT testing + referral for TB testing .

2.8 HF TESTING WORKFLOW

Figure 3 is a schematic representation of the workflow as envisaged at health facility level. The HCWs who participated in the pilot installed the *Kenya COVID-19 Tracker app* on an android enabled mobile gadget. The HCWs used this app to register and undertake simultaneous screening of COVID-19 and TB among the clients who were enrolled in this pilot activity. This was designed to ensure that the pilot activities were not in any way disruptive with respect to any other activities that the HCW undertake at the HF. The

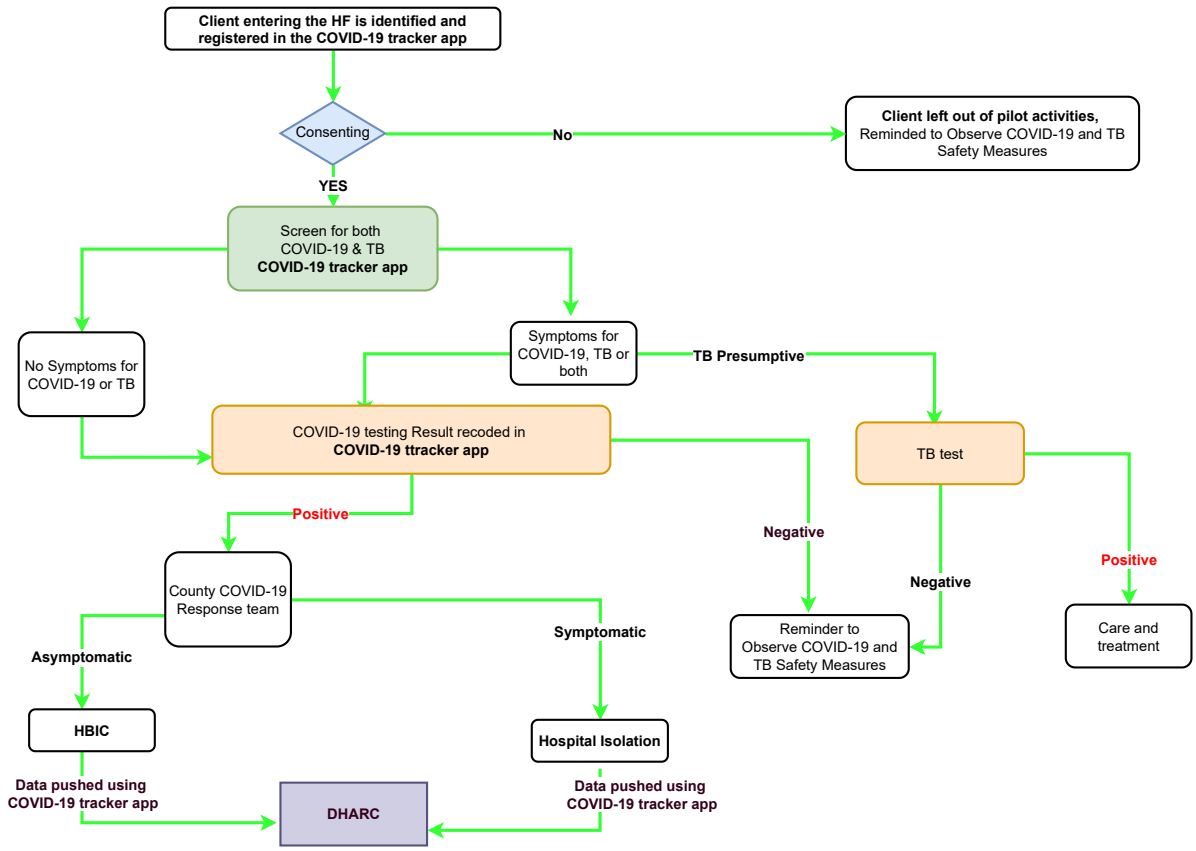

FIGURE 3: **WORKFLOW FOR THE HF LED PILOT ACTIVITIES**

clients or participants gave a verbal consent to be enlisted as part of the pilot activity. Any client who declined to take part was left out of the pilot activities after being reminded to observe COVID-19 and TB safety measures. Every participating HCW (either a nurse, a medical laboratory technologist, or a clinical officer depending on the operational structure of the HF) was required to screen and test on average, the first 2 consenting clients per day. However, in some instances, it was noted that they were able to screen up to 5 consenting clients per day.

A consenting client was screened for both COVID-19 and TB using the screening algorithm provided for in the *Kenya COVID-19 Tracker app*. However, testing for COVID-19 was not based on screening. All the consenting clients who were enrolled for the pilot activities were tested for COVID-19 using the Panbio COVID-19 Ag Rapid Test Device (nasal) by Abbott or the CADY COVID-19 Antigen Rapid Test by Revital, regardless of whether they presented with any symptoms or not. Those presumptive for TB were tested for TB as per the MoH-K TB-testing guidelines. Those who tested negative were released and reminded to observe COVID-19 and TB safety measures. All positive COVID-19 cases were reported to the County COVID-19 response team. COVID-19 cases that did not meet the threshold for hospitalization were placed under Home-Based Isolation and Care (HBIC). Notably, there were no symptomatic cases of COVID-19 who required hospitalization.

Alongside the usual data transmission channel employed at the HF, the HCW recorded this information in the *Kenya COVID-19 Tracker app* and this data was shared with the DHARC team for analysis. This also provided a chance to test the decision support algorithm provided in the tool.

2.9 CHP TESTING WORKFLOW

The testing workflow was largely determined by the adopted data flow approach. This was envisioned to follow the structures of the CHS which begins from the community to the national level through the relevant platforms. At the community level, data is collected by the CHPs and submitted to the Community Health Extension Workers (CHEWs), who summarize the data and submit the same vertically to the link facility. From here information is submitted to the Sub-County Health Management Team (SCHMT) who key in the data into the Kenya Health Information System (KHIS) electronically. Figure 4 depicts the data flow, which currently utilizes paper-based tools and the whole process is manual since the CHP must physically relay they paper-based reports to the CHAs and/ or CHEWs when they make their regular HF visits. This pilot implemented a digital tool for data transmission by the CHP to the DHARC server where the data was stored.

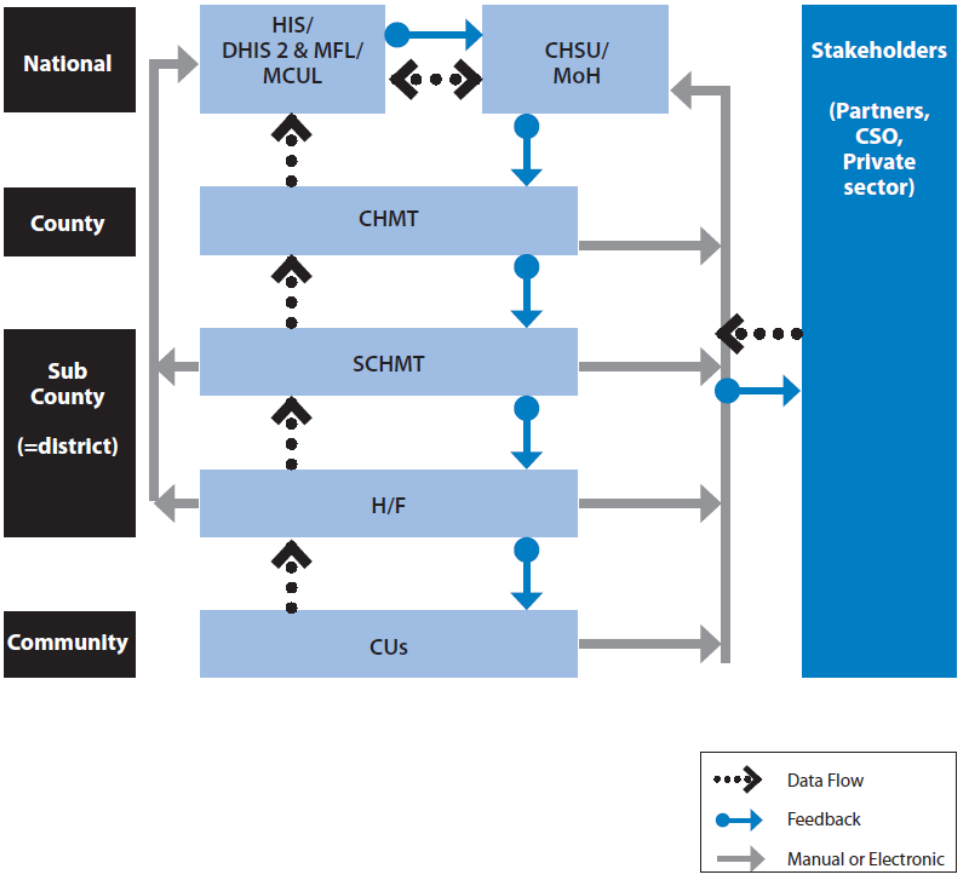

FIGURE 4: CHP DATA INFORMATION FLOW
ADOPTED FROM THE CHS M&E PLAN 2014-2018

Figure 5 is a schematic representation of the workflow as envisaged for the activities that were carried out by the CHPs. The CHP who participated in the pilot installed the *Kenya COVID-19 Tracker app* on their android enabled mobile gadgets. The CHPs used this application to register and to simultaneously screen participants for COVID-19 and TB at the household level. Every participating CHP screened and tested on average, the first 10 consenting clients per day. This was not in any way disruptive to the other activities conducted by the CHP. The participants gave verbal consent to be enlisted as part of the pilot. Clients who declined to participate were left out of the pilot activities but reminded to observe COVID-19 and TB safety measures.

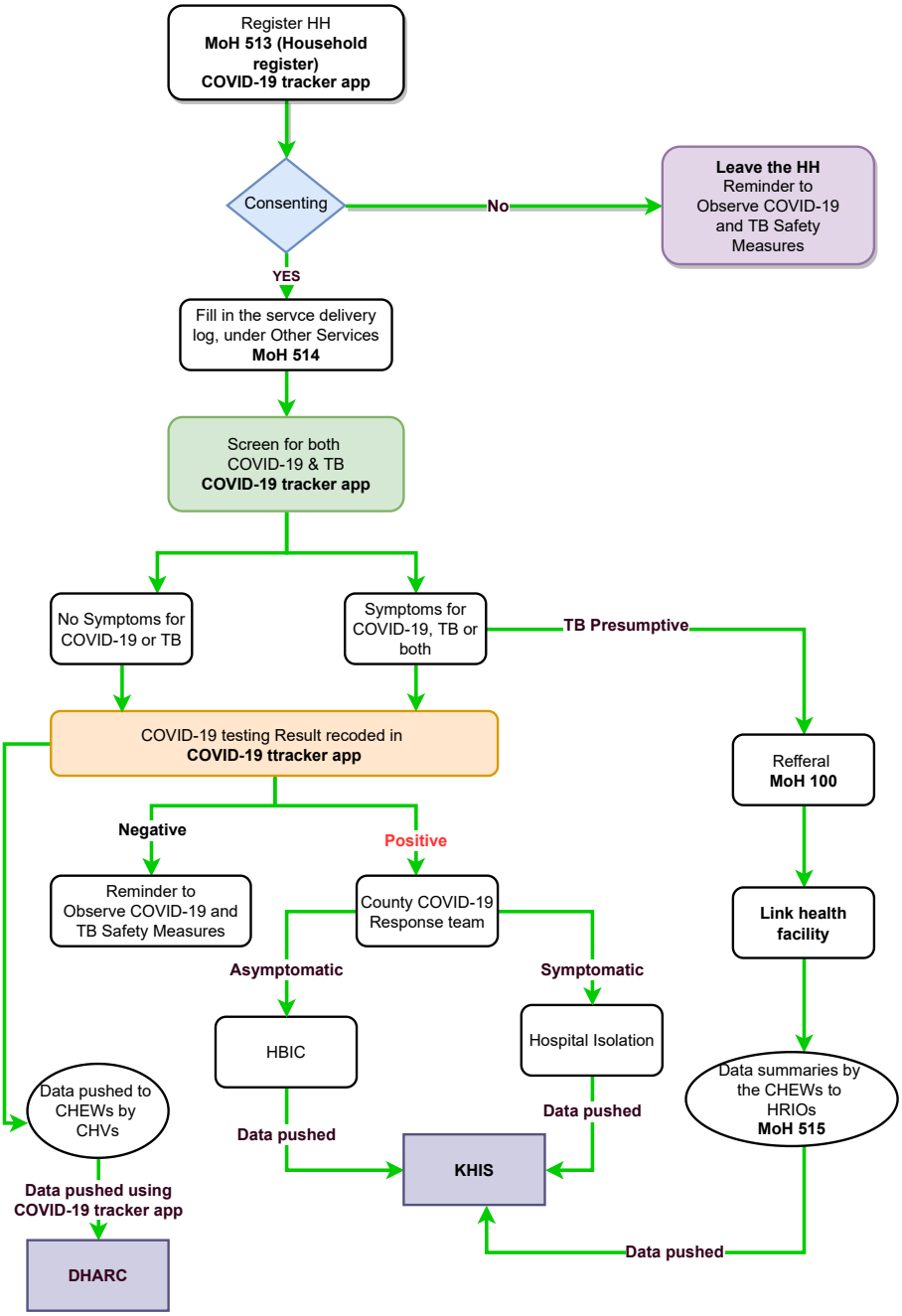

FIGURE 5: **PILOT CHP LED ACTIVITIES WORKFLOW**

A consenting client was screened for both COVID-19 and TB. For the CHP, the BMI risk factor for TB was not considered since it was not possible to implement at the household level. However, just like in the HF setting, testing for COVID-19 was not based on screening. Those presumptive for TB were referred to the link HF for sputum sample collection as per the procedures and protocols followed by the HF. The study team however made a follow-up to establish if the link HF collected the samples and conducted the tests.

All the positive COVID-19 cases were reported to the County COVID-19 response team, and the asymptomatic and symptomatic cases that did not require hospitalization were placed under HBIC. Those who tested negative for COVID-19 using the Ag-RDT were released and reminded to observe COVID-19 and TB safety measures. Any clients who tested negative even after responding yes to four or more risk factors were also referred to the link HF by the CHP for further examination. There were no symptomatic

cases that required hospitalization. For quality checks, the supervising laboratory officer repeated some of the tests randomly to ascertain that the CHP was carrying out the task in the prescribed way as per the training.

In terms of data flow, alongside the usual data collection and transmission tools used by the CHP (MoH 100 (see Appendix H), MoH 513 (see Appendix I and MoH 514 (see Appendix J), the CHP input data in the *Kenya COVID-19 Tracker app* for onward transmission to the DHARC team for analysis after summarizing the same through the MoH-K paper-based tools and forwarding to the KHIS as per the usual data transmission channels.

3 PILOT ACTIVITIES AND PROCEDURES

3.1 DEVELOPMENT OF TRAINING MATERIALS

Training materials were developed after review of available literature on SARS-COV-2 and TB. The training for SARS-COV-2 focused on Ag-RDTs. The training for COVID-19 covered safety, infection prevention and control (IPC), sample collection, testing (reading and interpretation of results), disposal of medical waste, COVID-19. TB training covered only screening. Capture and transmission of data using the existing paper-based tools and supplementation with digital tools was covered for both COVID-19 and TB. The training materials included slide decks, trainers and facilitators manuals and job aids to be used by the CHPs and HCWs as they conduct screening and testing.

3.2 PROCUREMENT OF TESTING KITS

Before commencement of the pilot, all the kits and requisite Personal Protective Equipment (PPE) were procured and distributed to the study counties. JKUAT through JKUAT Enterprises Ltd (JKUATES) purchased 182,000 Panbio COVID-19 Ag Rapid Test Devices (nasal) by Abbott and 50,000 CADY COVID-19 Antigen Rapid Tests by Revital Healthcare (EPZ) Limited. These consignments were cleared by JKUATES and delivered at the JKUATES warehouse for onward distribution to the study sites. JKUAT received a donation of 2,500 mRDTs that were used by the pilot project in Mombasa county.

3.2.1 REPACKAGING OF CHP KITS

Smaller kits were prepared for each of the CHPs for ease of distribution.

1. PPEs, surgical masks, sodium hypochlorite, bio-hazard bags, and gunny bags were procured by JKUATES.
2. Concentrated solution of sodium hypochlorite was purchased and reconstituted to produce 0.5% chlorine decontaminant. This was packaged into 20ml squeezable dropper bottles
3. Hand sanitizers were purchased and repackaged into 100ml containers
4. All these different commodities were packaged into activity kits for CHPs. Each activity kit also contained 50 COVID-19 tests and for Mombasa, in some cases an additional 25 Malaria tests.

Distribution of the activity kits was done by each County, but facilitated by the project.

3.3 MAPPING OF CHUS, LEVEL 2 AND LEVEL 3 HEALTH FACILITIES

CHUs in each participating county were identified using the Master Community Health Unit List (MCHUL) and the respective MCHUL codes used. In addition, the link health facility of the CHU was identified. An average of 200 CHPs were identified based on having completed secondary level of education. In addition, ownership of an android phone by the CHP was a key consideration as these were used for transmission of results digitally. Level 2 and level 3 facilities in the pilot counties were included and mapped from the Kenya Master Facility List (KMFL). The selection of CHPs was aligned using the link HF, so that for every HF that serves as a link HF, an average of 2 CHPs will be selected.

At level 2 HFs that did not have labs, the CHAs were trained so that they could undertake the TB screening, and COVID-19 testing activities. At level 3 or level 2 facilities that had labs, both the CHA and a laboratory officer were trained and involved in the testing. An average 120 HCWs per facility at level 2 and level 3 facilities undertook the testing activities.

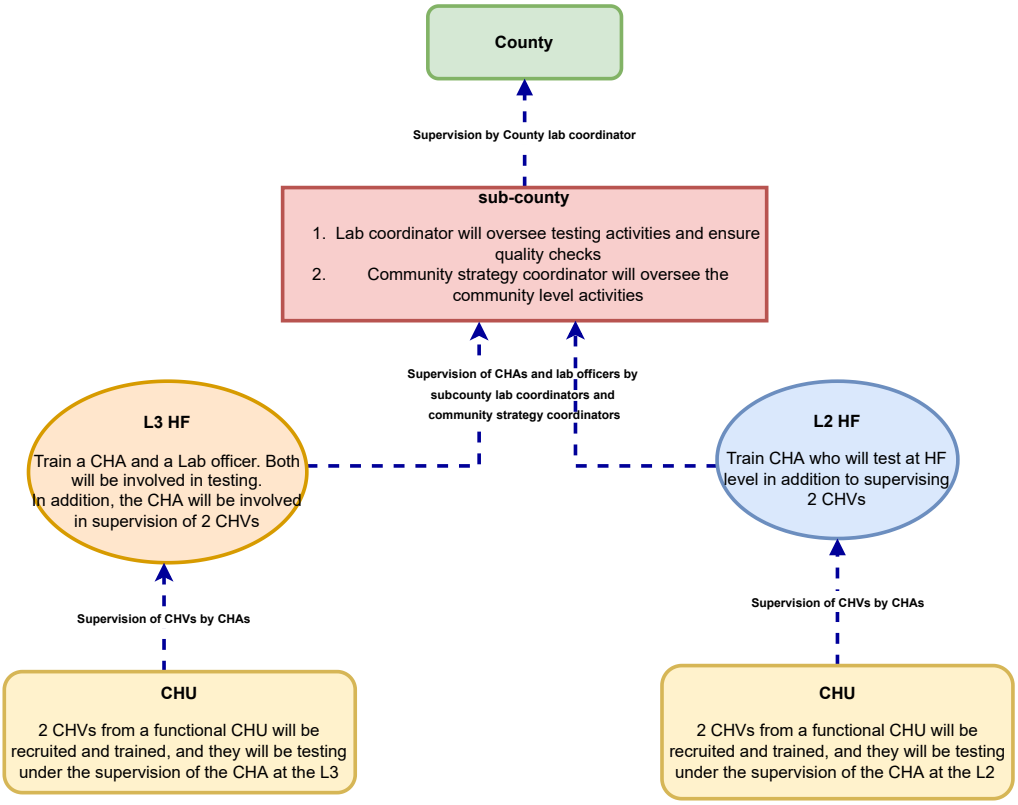

FIGURE 6: **REPORTING STRUCTURE FOR FIELD OFFICERS**

Figure 6 shows the reporting structure of the field officers. At least 2 CHPs were selected per CHU, and they were supervised by the CHAs at the link HF. The CHAs and laboratory officers from the HFs were supervised by the sub-county lab coordinator and the sub-county Community Health Service Coordinator (CHSC).

3.3.1 MACHAKOS

For Machakos County, 120 out of the 154 HFs at the primary health care level were considered for the pilot activities. This selection was done based on ease of access so that supervision by the project team would be possible, given that Machakos is a very vast county. Table 3 shows the distribution of the HFs by sub-county. In addition, a total of 240 CHPs were selected for the pilot activities. The actual list of HFs is in Appendix C.

TABLE 3: **DISTRIBUTION OF MACHAKOS HFS AND CHPS IN THE PILOT**

Subcounty	Athiriver	Kathiani	Kangundo	Yatta	Mwala	Matungulu	Masinga	Machakos	Kalama
No. of HFs	8	13	12	15	15	15	15	15	12
No. of CHPs	16	26	24	30	30	30	30	30	30

3.3.2 MOMBASA

Mombasa County has a total of 48 MoH-K owned HFs at the Public Health Care (PHC) level. All the 48 HFs were involved. In the level 3 and high volume level 2 facilities, a CHA and a laboratory officer were trained. In addition, 200 CHPs were trained for the pilot, distributed as shown in Table 28. The distribution of the CHPs was influenced by population density, since, despite being a small county, the population density in Mombasa is the highest in the country. The actual list of the HFs is given in Appendix D.

TABLE 4: **DISTRIBUTION OF MOMBASA HFS AND CHPS IN THE PILOT**

Subcounty	Likoni	Mvita	Changamwe	Jomvu	Kisauni	Nyali
No. of HFs	5	17	6	5	8	7
No. of CHPs	37	35	30	20	48	30

3.3.3 KAJIADO

For Kajiado County, a total of 77 HFs and 226 CHPs will participate in the pilot activity as per Table 5. The actual list of the HFs is given in Appendix F. This distribution on Kajiado is also influenced by ease of access. Kajiado is a vast county, and most of the rural population in the county are pastoralists. In addition, some places are hard to reach while at the same time sparsely populated, with poor road connectivity, and this informed the selection of HFs and CHUs to participate.

TABLE 5: **DISTRIBUTION OF KAJIADO HFS AND CHPS IN THE PILOT**

Subcounty	Kajiado South	Kajiado East	Kajiado North	Kajiado West	Kajiado Central
No. of HFs	22	16	4	18	17
No. of CHPs	71	41	20	48	46

3.3.4 NAIROBI

For Nairobi County, a total of 125 HFs and 450 CHPs participated in the activity with a distribution as shown in Table 6.

TABLE 6: **DISTRIBUTION OF NAIROBI HFS AND CHPS IN THE PILOT**

Subcounty	Dagoreti North	Dagoreti South	Kibra	Langata	Embakasi Central	Embakasi East	Embakasi South	Embakasi West	Embakasi North	Makadara	Kamkunji	Roysambu	Ruaraka	Westlands	Kasarani	Mathare	Starehe
No. of HFs	7	4	16	20	1	10	2	2	4	7	3	7	7	8	4	4	19
No. of CHPs	34	27	39	22	16	17	27	22	31	36	31	7	35	34	12	30	30

Nairobi County has the largest number of Active CHUs, and the biggest informal settlements. For this reason, the distribution considered the CHUs as well as the informal settlements and population density. Because of the population density and the informal settlements, the distribution was almost uniform across the Sub-counties, with minimal variability.

3.4 TRAINING OF TRAINERS (TOTS)

In each of the four (4) counties, thirty-three (33) healthcare workers were trained as Trainer of Trainers (ToTs) or master trainers. Of the 33 HCWs, 11 were drawn from the CHMT while 22 will be taken from Sub-County HCWs. The ToTs attended a three-day training to equip them with skills and competences to facilitate in-person training sessions for CHPs and HCWs on a package of activities including;

1. Collection of nasal swabs
2. Performing COVID-19 tests using Ag-RDTs
3. Reading and interpretation of the COVID-19 tests
4. Disposal of the used tests
5. Communication of results to the clients

6. Data capture in the relevant registers (MoH 100, MoH 513 and MoH 514)
7. Data capture in the digital tool
8. IPC for COVID-19
9. Screening for TB and collection of sputum samples.

In addition, for Mombasa county, there was an extra component of malaria testing which was added to the study. to this end, there was additional training on

1. Preparation for blood sample collection
2. Finger pricking using the lancet
3. Disposal of sharps in the sharp box
4. Collection of blood using the capillary tube
5. Performing the tests
6. Reading and interpretation of the Malaria tests

The training was delivered using various training methods, including power point presentations, role plays, demonstrations, and practical sessions.

3.5 TRAINING OF CHPS AND HCW

The cascade style of training was used, in which the ToTs took up the role of instructors. The ToTs conducted a three-day training for the CHPs and HCWs to enable them take up the activities of the entire workflow as listed above. In total, two hundred (200) CHPs from Mombasa, 226 from Kajiado, 240 from Machakos and 450 from Nairobi Counties, and an average of one hundred and twenty (120) HCW were trained from each of the four counties resulting in one thousand one hundred and sixteen (1,116) CHPs and four hundred and eighty (480) HCWs in the four Counties.

3.6 DEMAND CREATION AND DISTRIBUTION OF TESTING MATERIALS

To create demand for testing at the community and decentralized healthcare facility levels, mobilization messages were crafted in consultation with the Advocacy Communication and Social Mobilization (ACSM) teams from the Counties, and disseminated through various fora as follows;

1. during community gatherings (in Barazas, weddings, burial meetings) by Chiefs, Sub-Chiefs and village elders (Chairpersons of Nyumba Kumi)
2. door-to-door by CHPs as they made their household visits.
3. via announcements made in religious gatherings. For the HFs, COVID-19 health talks were delivered to clients by the HCWs.
4. via announcements made by local radio stations during outreach activities planned and conducted by the study team in conjunction with the health team. This was mainly used in Nairobi County.

In addition, demand creation posters were displayed at the HFs to sensitize clients as they receive services. County mechanisms for delivery of supplies were utilized in distributing testing materials to the CHPs and HFs.

3.7 KENYA COVID-19 TRACKER APP

We customized an existing application; *Kenya COVID-19 Tracker app* [6], built on the CHT[1] consisting of a number of open source technologies, for this study. The CHT client-interface is multichannel, however for the purpose of the project, the browser and smartphone User Interface (UI) was adapted. We had a local server instance on the back-end, and a mobile app on the front end, through which data was collected and synchronized to the server. The synchronization was configured to initialize in the evening to prevent

[1] https://docs.communityhealthtoolkit.org/core/

disruption of server services. We used the following modules from the CHT architecture shown in Figure 7[2]. CouchDB[3] back-end with the associated configuration files, browser applications through which the medic portal could be accessed, and targets for showing analytics on the dashboard.

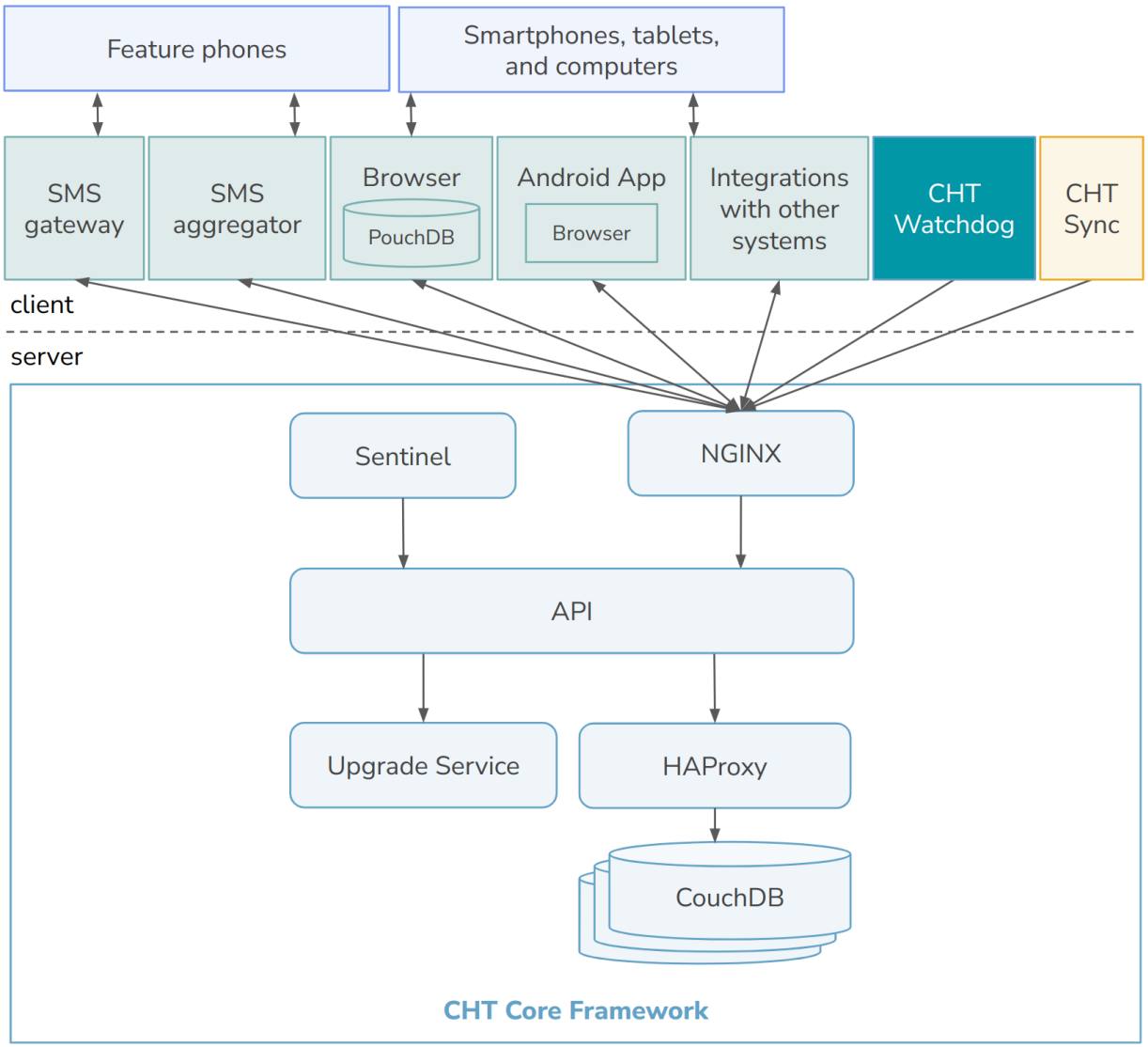

FIGURE 7: **ARCHITECTURE OF CHT INSTANCES**

3.7.1 CUSTOMIZATION OF THE KENYA COVID-19 TRACKER APP

1. **Configuration of the virtual machines (VMs) in the DHARC server**
   A VM was prepared from our local server to host the configuration files running on the Linux operating system called Ubuntu 20.04, and installed the following software's as required: nodejs version 12, npm, git, docker and docker-compose. Installation was done following the steps in the online documentation[4], and the core framework and cht-conf were installed together with a valid TLS certificate mapped to our VM IP address.
2. **Customization of the forms**
   The following forms were customized to reflect the study requirements
   (a) Household (HH) registration form

[2] https://docs.communityhealthtoolkit.org/core/overview/architecture/
[3] https://couchdb.apache.org/
[4] https://docs.communityhealthtoolkit.org/core/guides/

(b) Suspect case registration form
(c) Case investigation and lab request form

In addition, a multi-disease screening algorithm with symptoms for COVID-19, TB and malaria was embedded. this algorithm was designed to provide decision support to the CHPs.

3. **Creation of credentials for various cadres**
   In order to enable utility of the platform, credentials were created for the following cadres
   (a) CHPs
   (b) Lab officers
   (c) Supervisors (sub-County lab coordinators, sub-County Public Health Officers (PHOs) and CHEWs)
   (d) County leaders
   (e) Study team
4. **App deployment and use**
   We developed the project hierarchy as shown in Figure 8. All the accounts were created and tested before the pilot study. The Android Medic app container was downloaded from play store and configured with the URL of the server. After pilot testing, the app was rolled out to the field for use by both CHPs and HCWs at the PHC HFs that participated in the pilot.

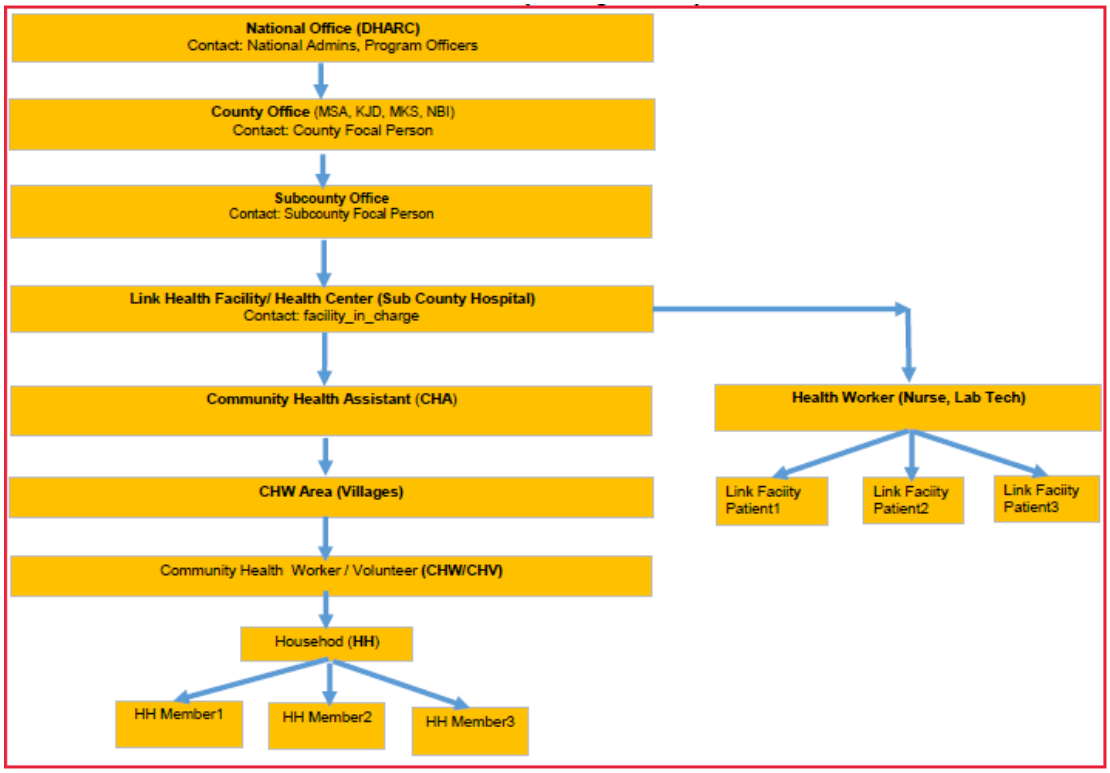

FIGURE 8: **CUSTOMIZED APP HIERARCHY**

5. **Development of the indicator dashboard for the study**
   Data was collected and aggregated, and targets on the dashboard were updated for the overall project and the four counties as shown in Figure 9. The dashboard was accessed by the research teams and the county teams.

3.8 REGISTRATION, TESTING AND TRANSMISSION OF RESULTS

Study participants were recruited from households and level 2 & level 3 HF. During their routine household visits, the CHPs obtained consent and recruited study participants from the household

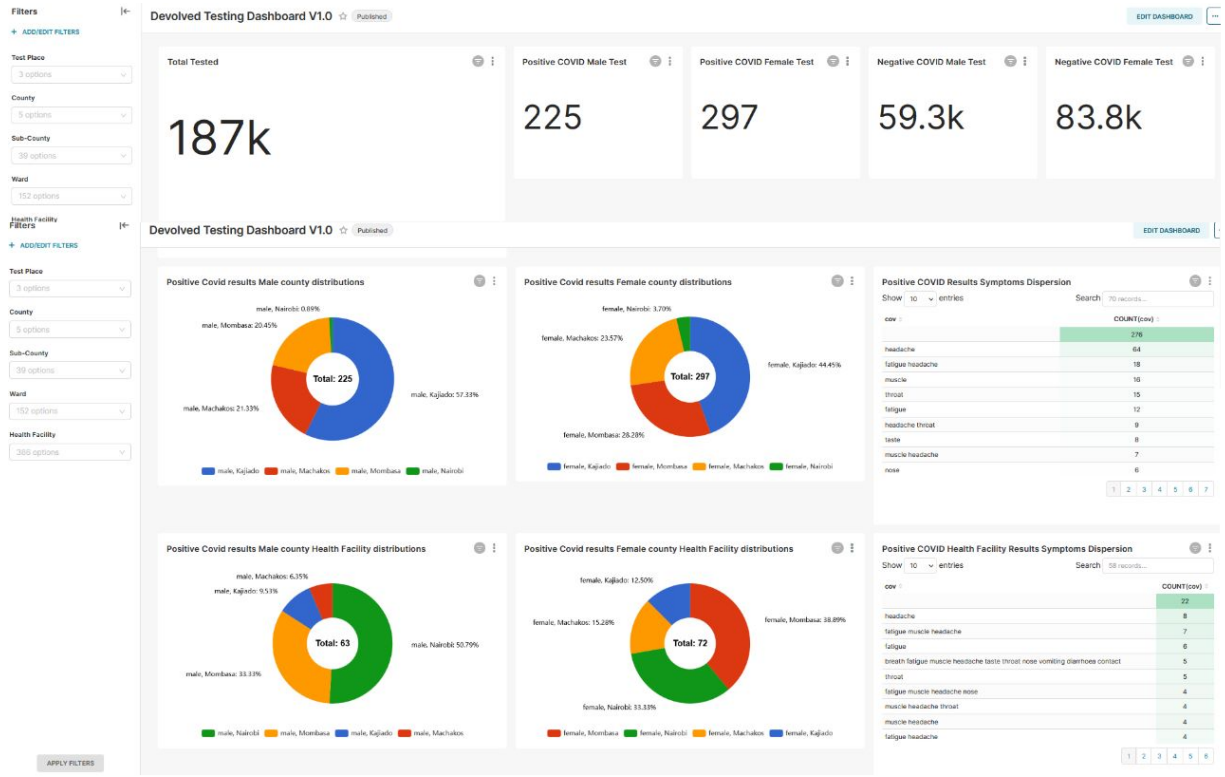

FIGURE 9: **TARGET ANALYTICS**

members registered in MoH 513. At level 2 health facilities the officer in charge of the facility obtained consent and recruited participants from among their walk-in clients while at level 3 health facilities the clinicians offering services to clients at all service delivery points screened and referred clients to the laboratory for testing.

In all the pilot sites, collection of nasal swabs, testing for COVID-19 and disposal of the medical waste was done in strict observance of the IPC requirements as recommended by MoH-K and with adherence to the manufacturer's instructions for use. For the sites where malaria testing was carried out, there was also strict adherence to IPC requirements. Samples were tested for COVID-19 using Ag-RDTs, and in Mombasa, finger-prick blood samples were also tested for malaria using mRDTs, and data captured in MoH-K approved tools. The CHPs used the MoH 514, which is a diary that CHPs use to collect information from the household during their visits.

COVID-19 data was captured in MoH 514 under the section "others" which allows for recording of services provided that are not listed among the indicators in the register. The MoH 514 was then submitted to the CHEWs for entry into the Community Health Extension Worker Summary (MoH 515) (see Appendix K). Data collected at the level 2 facilities was captured in the facility's registers while those collected at level 3 facilities were captured in laboratory registers and transmitted to the Health Records and Information Officers (HRIOs) to be keyed into the KHIS. Participants who turned positive for COVID-19 at the household level via CHP-led door-to-door testing but were asymptomatic were advised on HBIC to reduce chances of transmission to family members, friends and other contacts. Clients who tested positive for COVID-19 and were symptomatic via the door-to-door testing were referred for further management to the link HF using the MoH 100 (Figure 5).

Pilot participants who tested positive at the level 2 and level 3 facilities were appropriately managed through

the healthcare facilities system (Figure 3). The pilot team was able to follow-up on TB results through the County TB coordinators. To complement the MoH-K registers, the *Kenya COVID-19 Tracker app* by Medic mobile was used to register participants, capture, and transmit data. The COVID-19 and malaria testing data were transmitted to the DHARC server and then pushed to the MoH-K and Public Health Emergency Operations Centre (PHEOC) to enable national COVID-19 daily reporting. To ensure that CHPs and the HCWs adhere to the testing procedures, supervisory visits with be carried out weekly be the ToTs who were mainly lab personnel, and monthly by the JKUAT project management staff. Moreover, the CHPs will also be monitored by CHEWs and CHAs during their routine supervisory visits.

4 DATA ANALYSIS

4.1 DATA MANAGEMENT

To ensure confidentiality and anonymity of pilot subjects, data was downloaded, de-identified and stored in specific password protected computers. Only persons related to this pilot have been granted access to the data.

4.2 QUALITY ASSURANCE OF DATA ENTRY

All data collected from this pilot was captured on MoH-K registers and digitally on systems that have already been tested and are currently in use by the MoH-K.

4.3 DATA STORAGE AND RETENTION

Data was collected using the MoH-K registers supplemented by the *Kenya COVID-19 Tracker app*. This data was cascaded upwards and uploaded to the KHIS. COVID-19 results were relayed to PHEOC. In addition, data was reposited in the DHARC server. Data was shared with the county via the channels used in the county for data transmission. Any request to access data will have to be authorized by the CHMT and the Principal Investigators (PIs). For pilot purposes, data was downloaded weekly. Once downloaded, data was stored in password protected files and drives and was only accessible to the PIs.

4.4 DATA OWNERSHIP AND SHARING POLICY

All data collection is held on behalf of MoH-K who wholly own it and reserve the rights to share under the data protection act of 2019. However, under the existing partnerships with MoH-K, the pilot team had access to data relevant to the work. This was through the DHARC server for the COVID-19 and malaria data. For TB data, since the *TIBU* system is closed, the aggregated data for analysis was obtained by the study team through the respective County TB coordinators.

4.5 DATA ANALYSIS

Individual level data was collected via the *Kenya COVID-19 Tracker app* during this study. This included data on physical location, selected demographic characteristics, telephone contacts and individual responses to the screening questions for COVID-19, TB and malaria. In addition, for COVID-19 and malaria, test results were recorded on the *Kenya COVID-19 Tracker app*. In addition, small data collection cards used by the CHPs were also surrendered to the link HFs for safe keeping.

De-identified data from the study was downloaded from the DHARC server in Microsoft Excel format for analysis. Descriptive summaries were done mainly using Microsoft Excel. Analyzed data was summarized using tables and dashboards built using Apache superset, a modern, enterprise-ready business intelligence web application [12]. Table 7 gives a summary in terms of the number of people involved in the pilot activity, per county by gender. For Mombasa County, an additional two-week study period was considered during which, malaria screening and testing was Incorporated into the field activities. A total of 187,170 individuals were involved in this pilot study, 59% (110,575) of whom were women.

Kajiado County, one of the Counties in Kenya with the most hard to reach places, managed to enroll a total of 74,338 (39.7%) participants in the study, and this was the largest number enrolled by a single county in this pilot. This was followed by Mombasa County where 68,238 (36.4%) participants were enrolled, then Nairobi County with 23,330 (12.5%) and lastly Machakos County with 21,417 (11.4%).

TABLE 7: **TOTAL PILOT STUDY POPULATION BY GENDER**

County	Female	Male	Total
Kajiado	43,271 (58.17%)	31,117 (41.83%)	74,388 (39.7%)
Machakos	13,171 (61.50%)	8,246 (38.50%)	21,417 (11.4%)
Mombasa	40,330 (59.10%)	27,705 (40.90%)	68,035 (36.4%)
Nairobi	13,803 (59.16%)	9,527 (40.84%)	23,330 (12.5%)
Total	**110,572 (59.01%)**	**76,798 (40.99%)**	**187,170**

The study also sought to establish the levels of COVID-19 vaccination among the participants and it was found that 63.2% (118,291) of them had received vaccination. This data showed that Machakos had the highest levels of vaccination at 70% followed by Kajiado at 68%. Nairobi came third 65% and Mombasa was fourth at 55% vaccination.

From Table 8, we also see that only 41% (75,949) of those who participated in the pilot have an National Hospital Insurance Fund (NHIF) registration. Of importance to note is that 61% of the female participants and 57% of the male participants did not have NHIF registration.

TABLE 8: **NHIF REGISTRATION STATISTICS**

County		No	Yes	Total
Kajiado		38,468 (51.71%)	35,920 (48.29%)	74,388
	Female	22,729 (59.09%)	20,542 (57.19%)	43,271 (58.17%)
	Male	15,739 (40.91%)	15,378(42.81%)	31,117 (41.83%)
Machakos		14,927 (69.70%)	6,490 (30.30%)	21,417
	Female	9,344 (62.60%)	3,827 (58.97%)	13,171 (61.50%)
	Male	5,583 (37.40%)	2,663 (41.03%)	8,246 (38.50%)
Mombasa		42,754 (62.45%)	25,281 (37.55%)	68,035
	Female	25,912 (60.46%)	14,418 (56.85%)	40,330 (59.10%)
	Male	16,842 (39.54%)	10,863 (43.15%)	27,705 (40.90%)
Nairobi		15,072 (64.60%)	8,258 (35.40%)	23,330
	Female	9,311 (61.78%)	4,492 (54.40%)	13.803 (59.16%)
	Male	5,761 (38.22%)	3,766 (45.60%)	9,527 (40.84%)
Total		111,221 (59.21%)	75,949 (40.79%)	187,170

Of those without NHIF, 36.8% were from Mombasa, 35.5% from Kajiado, 14% from Nairobi and 13.8% from Machakos County. This data showed better enrolment into NHIF in the counties of Nairobi and Machakos, and poor enrolment in Mombasa and Kajiado.

4.5.1 LEVEL OF AWARENESS OF BOTH DISEASES BY THE COMMUNITY

Awareness of COVID-19 at the community is at 87% on average, slightly higher than TB at 77% across the 4 study Counties despite COVID-19 being relatively novel.

For effective control of infectious diseases at the community level, behavioural change is required since this affects design of and implementation of disease prevention campaigns.

This means information on the level of awareness of infections among target groups is required. Knowledge and awareness levels are needed to assess the magnitude of threat and determine if control measures would be effective. During this pilot activity, the team sought to establish the level of awareness of both COVID-19 and TB in the community. To establish this, study participants were asked whether they had received any information about COVID-19 and /or TB, and their responses, simple "yes" of "no" were as depicted in Tables 9 and 10. The level of awareness about COVID-19 in the 4 Counties visited was placed 87%, with the lowest levels of awareness being recorded in Kajiado County (84.68%) and the highest in Nairobi County (90.78%). Awareness levels for COVID-19 was highest among women (59.1%). This conforms with findings from previous studies that women are more likely to identify more COVID-19 symptoms correctly compared to men [4].

TABLE 9: **AWARENESS OF COVID-19 IN THE COMMUNITY**

County	No	Yes	Total
Kajiado	11,394 (15.32%)	62,994 (84.68%)	74,388
Machakos	2,140 (9.99%)	19,277 (90.01%)	21,417
Mombasa	8,368 (12.3%)	59,667 (87.38%)	68,035
Nairobi	2,150 (9.22%)	21,180 (90.78%)	23,330
Total	**24,052 (12.98%)**	**163,118 (87.02%)**	**187,170**

TABLE 10: **AWARENESS OF TB IN THE COMMUNITY**

County	No	Yes	Total
Kajiado	22,232 (29.89%)	52,156 (70.11%)	74,388
Machakos	3,714 (17.34%)	17,703 (82.66%)	21,417
Mombasa	12,278 (18.0%)	55,757 (82%)	68,035
Nairobi	4,710 (20.19%)	18,620 (79.81%)	23,330
Total	**42,934 (22.9%)**	**144,236 (77.1%)**	**187,170**

The level of awareness about TB at the community level was lower than that of COVID-19, despite COVID-19 being novel as compared to TB. The level of awareness of TB stood at 77% on average across the 4 Counties under consideration in this study. Overall awareness of TB was highest among women (59.53%). While there is little difference between the other counties, the knowledge and awareness gap in Kajiado is a bit wide (30%) which should be of great concern considering the fact that TB prevalence in Kajiado County is one of the highest in the Country, with 6,000 (translating to 536.67 per 100,000) people in the County currently infected [2].

The pilot also sought to determine the modes of awareness creation employed by pilot counties for both diseases. Most of the participants had received information from multiple sources including information provided by CHPs, information from mainstream media (radio stations (mostly vernacular), TV stations and newspapers), information from the local health facilities, messages provided during medical campaigns, announcements in places of worship and other public gatherings (weddings and funerals), posters and flyers, local administration offices, social media (mainly WhatsApp, Facebook and other internet sources), community dialogues, information relayed through school going children and information from town criers.

FRAME 1: AWARENESS CREATION FOR COVID-19 AND TB

Based on the feedback from the participants enrolled in the pilot activity, the sources of information were ranked as shown below

Rank	Source	%age
1	Local HF	35.7%
2	CHPs	31.9%
3	Mainstream media	29.4%
4	Medical campaigns	21.8%
5	Posters/ flyers/ brochures	20.6%
6	Local administration	15.3%
7	Places of worship	15%
8	Public gatherings	12.5%
9	Community dialogues	10.2%
10	Social media	7.5%
11	School children	3.6%
12	Town crier	2.8%
13	Others sources	1.5%

TABLE 11: **SOURCES OF INFORMATION REGARDING TB**

Rank	Source	%age
1	CHPs	40.6%
2	Mainstream media	39.2%
3	Local HF	37.67%
4	Medical campaigns	28.4%
5	Places of worship	24.2%
6	Posters/ flyers/ brochures	23.9%
7	Public gatherings	20.7%
8	Local administration	19.6%
9	Social media	18.1%
10	Community dialogues	13%
11	School children	6.8%
12	Town crier	4.5%
13	Others sources	1.6%

TABLE 12: **SOURCES OF INFORMATION REGARDING COVID-19**

The four most common sources of information regarding COVID-19 were information provided by CHPs (40.6%), followed closely by mainstream media (39.2%), then local health facilities (37.6%) followed by messaging during medical campaigns (28.4%). Announcements in places of worship (24.2%), posters and flyers (23.9%), announcements made at funerals and other public gatherings (20.7%) and information provided by local administration in their meetings (19.6%) were also important though they had reached between 20-25% of the population. A smaller section of the population got information from social media (18.1%), community dialogues (13%) school going children (6.8%) and town crier (4.5%) as shown above.

For TB, the most common sources of information was the local health facilities (35.68%) followed by information provided by the CHPs (31.90%). The third is Information from mainstream media (29.4%) followed by medical campaigns (21.8%) and posters and flyers (20.6%). These five media can reach between 20-36% of the population. These are followed by local administration (15.28%), announcements in places of worship (14.98%), public gatherings (12.47%) and community dialogue (10.16%). Social media reached 7.48%, information by school going children was able to reach 3.62%, and town crier only 2.77%. Generally, the populations were more informed about COVID-19 than TB as shown above.

4.5.2 COVID-19 VACCINATION

In one of the workflows, the pilot activities looked at the COVID-19 vaccination status in each county. Participants were asked whether they had ever received any vaccine, whether they had received the full dose of 2 shots for the vaccine types that required 2 shots, whether they had received a booster shot, and in cases where they had not been vaccinated fully or at all, if they were willing to be vaccinated, the study established the preferred place, whether at the link HF or at the community. From the analysis, 63.3% of all the participants had received at least one dose of the COVID-19 vaccine. Distributed by County, 70% of the participants from Machakos, 86% from Kajiado, 65% from Nairobi and 55% from Mombasa had

received at least one dose of the COVID-19 vaccine. 90% of these who had at least received one dose reported to have received the full dose.

4.5.3 SCREENING OF PARTICIPANTS

187,170 people were screened for both COVID-19 and TB, and tested for COVID-19. Out of these, 147,748 (78.9%) were carried out by CHPs. 41.7% (77,962) of the participants identified as suspect for COVID-19 and 15.8% (29,501) as TB presumptive.

This pilot activity implemented a digitized dual screening algorithm (see Table 2) which utilized 13 screening questions for COVID-19 and 6 screening questions for TB. Unintended weight loss was used as a proxy for cases of a BMI below 18.5 since these measurements could not be obtained at household level by the CHPs. All study participants were screened for both COVID-19 and TB. However, regardless of the outcome of the screening for COVID-19, all participants were tested for COVID-19. For TB on the other hand, all the cases identified as presumptive were supposed to be referred to respective HFs for sample collection and testing. Of all those screened, 154,487 (84.4%) participants did not show any symptoms used for TB screening, and 105,591 (58.8%) did not show any symptoms for the COVID-19 screening questions either.

In total, 187,170 COVID-19 Ag-RDT tests were performed, with 147,748 (78.9%) conducted by CHPs and 39,422 conducted at the HFs. Similarly for TB, 187,170 clients were screened, again 147,748 of these by CHPs while 39,422 were screened at various HFs. Out of 187,170 persons screened, 77,962 (41%) had COVID-19 symptoms, 29,501 (15.6%) were TB presumptive while 29,079 (15.4%) had both COVID-19 and TB symptoms. Almost everyone who presented with symptoms for TB was also suspect for COVID-19, though not all who presented with COVID-19 symptoms presented with TB symptoms as well. Table 13 Shows the screening statistics by County and sex.

TABLE 13: **SCREENING STATISTICS**

County		Total screened	TB Presumptive	COVID-19 Suspect	Suspect for both
Kajiado		74,388 (40.7%)	5,129 (18.0%)	25,350 (33.8%)	5,053 (17.9%)
	Female	43,271 (58.2%)	3,309 (64.5%)	15,128 (59.7%)	3,271 (64.7%)
	Male	31,117 (41.8%)	1,820 (35.5%)	10,222 (40.3%)	1,782 (35.3%)
Machakos		21,417 (11.7%)	4,433 (15.6%)	9,578 (12.8%)	4,417 (15.7%)
	Female	13,171 (61.5%)	2,805 (63.3%)	6,197 (64.7%)	2,798 (63.3%)
	Male	8,246 (38.5%)	1,628 (36.7%)	3,381 (35.3%)	1,619 (36.7%)
Mombasa		68,035 (34.9%)	17,174 (56.7%)	33,728 (41.1%)	16,877 (56.7%)
	Female	40,330 (59.1%)	9,940 (57.5%)	19,636 (57.8%)	9,758 (57.5%)
	Male	27,705 (69.2%)	7,231 (73.9%)	14,089 (72.9%)	7,119 (74.0%)
Nairobi		23,330 (12.8%)	2,765 (9.7%)	9,309 (12.4%)	2,732 (9.7%)
	Female	13,803 (59.2%)	1,234 (44.6%)	4,889 (52.5%)	1,221 (44.7%)
	Male	9,527 (40.8%)	1,531 (55.4%)	4,420 (47.5%)	1,511 (55.3%)
Total		**187,170**	**29,501 (15.6%)**	**77,962 (41.0%)**	**29,079 (15.4%)**

4.5.4 SCREENING FOR MALARIA AND COVID-19

For Mombasa county, an extra 4,210 participants were screened for malaria in addition to the COVID-19 and TB screening. The results of the screening process are summarised in Table 14. Out of these, 69% were suspect for COVID-19, 58% had malaria symptoms, and 57% had symptoms for both malaria and COVID-19. The algorithms was not set to screen for both malaria and TB simultaneously.

TABLE 14: **SCREENING STATISTICS INCLUDING MALARIA (MOMBASA)**

Sex	Total screened	COVID-19 Suspect	Malaria Suspect	Suspect for both
Female	2,608 (61.9%)	1,810 (62.4%)	1,541 (64.2%)	1,521 (63.7%)
Male	1,602 (38.1%)	1,092 (37.6%)	881 (35.8%)	865 (36.3%)
Total	4,210	**2,902 (68.9%)**	**2,422 (57.5%)**	**2,386 (56.7%)**

4.5.5 MAIN SYMPTOMS PICKED FROM THE PARTICIPANTS

For the TB presumptive cases that were identified through the screening algorithm, 61.6% reported fever and chills, 59.4% reported having experienced drenching night sweats, 42% reported cough, 40.2% chest pains and 32.41 reported to have experienced recent unintended weight loss. None of the TB presumptive cases identified reported to have been in contact with a confirmed TB case.

Of those who were suspect for COVID-19, 56.6% reported having experienced a headache, 37.9% reported fever or chills, 24% reported a cough. 21.5% reported a sore throat and muscle and body aches. Less than 1% reported having been in contact with a confirmed COVID-19 case.

Similarly for the component of the pilot where screening was also carried out for malaria via the screening algorithm, suspect cases were identified with symptoms such as headache (66.2%), muscle or body aches (42.8%), fatigue (23%), drowsiness (15.6%), nausea or vomiting (12%) and shortness of breathe or breathing difficulty (6.2). Some participants were tested because they were pregnant (3.2%) or had had travelled (3.1%) out of the county in the preceding 14 weeks. These are summarized in the Tables in Frame 2.

FRAME 2: SYMPTOMS FOR DISEASE SUSPECT CASES

Based on the screening algorithm, the following were the symptoms picked for COVID-19 suspect cases, TB presumptive cases and malaria suspect cases.

Rank	Symptom	%age
1	Fever or chills	61.6%
2	Drenching night sweats	59.4%
3	Productive cough of any duration	42.1%
4	Chest pains	40.2%
5	Unintended weight loss	32.4%

TABLE 15: **SYMPTOMS FOR TB PRESUMPTIVE CASES**

Rank	Symptom	%age
1	Headache	66.2%
2	Muscle of body aches	42.8%
3	Fatigue	30.3%
4	Drowsiness	15.6%
5	Nausea and vomiting	12.0%
6	Difficulty in breathing or shortness of breath	6.2%
7	Pregnancy	3.2%
8	History of travel	3.1%

TABLE 16: **SYMPTOMS FOR MALARIA SUSPECT CASES**

Fever and chills was a shared symptom for all three diseases and 42.1% (1,773) out of the 4,212 of those screened for all the three diseases presented with fever. However for the 3 disease algorithm, fever or chills was not used to expressly determine the likelihood of having a disease.

Rank	Symptom	%age
1	Headache	58.7%
2	Fever of chills	39.3%
3	Productive cough of any duration	24.9%
4	Fatigue	23%
5	Sore throat	22.3%
6	Muscle or body aches	21.5%
7	Chest pains	21.3%
8	Congestion or runny nose	16.2%
9	New loss of taste or smell	11.7%
10	Nausea or vomiting	5.6%
11	Shortness of breath or difficulty in breathing	4.1%
12	Diarrhoea	3.7%
13	Recent contact with a cinfirmed COVID-19 case	0.6%

TABLE 17: **SYMPTOMS FOR COVID-19 SUSPECT CASES**

The pilot had seven objectives broken into several sub objectives. For each of the specific objectives of the study, the following indicators will be considered.

4.5.6 OBJECTIVE ONE

To demonstrate the feasibility of decentralization of integrated COVID-19 and TB diagnosis via CHPs and through devolution of rapid COVID-19 testing to lower levels of health facilities.

PROPORTION OF ADDITIONAL TESTS CARRIED OUT, DIS-AGGREGATED BY HF AND CHP LEVELS

This indicator was useful in demonstrating the feasibility of decentralization of TB and COVID-19 screening, and COVID-19 testing via CHP and through devolution of testing.

During the entire pilot period, in the four participating counties, a total of 512,459 people were screened for TB at various HFs (see Tables 18, 19, 20 and 21), not specific to the pilot activity. This information was obtained from *TIBU*, the official system for TB data capture in the country. Kajiado had screened 73,731, Machakos screened 20,230, Mombasa screened 297,588 and Nairobi screened 120,910. For the same period, the study screened a total of 182,959 distributed so that 36,446 was done at various HFs and 143,056 was done at the community level by CHPs. It would be important to note that the screening carried out at the community was not captured in the *TIBU* system. The total TB screening effort for the period ranging from November 2022 to February 2023, was 695,418 persons, and 26.3% was contributed by this project.

TABLE 18: **KAJIADO COUNTY TB STATISTICS FROM TIBU**

Month	Total screened	TB Presumptive	Samples sent to lab	Tests performed	Total Positive	Initiated on treatment
November 2022	16,315	946	317	317	227	227
December 2022	16,079	516	202	202	209	209
January 2023	15,170	932	304	304	111	111
February 2023	26,167	920	243	243	156	156
Total	**73,731**	**3,314**	**1,066**	**1,066**	**703**	**703**

Kajiado screened 73,731 people and this yielded 3,314 (4.5%) presumptive cases. Out of these, 1,066 (32.2%) cases were investigated for TB. From these, 703 (66%) positive cases were confirmed either bacteriologically or clinically. The same number were initiated on TB treatment.

TABLE 19: **MACHAKOS COUNTY TB STATISTICS FROM TIBU**

Month	Total screened	TB Presumptive	Samples sent to lab	Tests performed	Total Positive	Initiated on treatment
November 2022	5,804	532	401	401	183	183
December 2022	4,089	384	307	307	311	311
January 2023	4,150	413	351	351	193	193
February 2023	6,187	641	502	502	176	176
Total	**20,230**	**1,970**	**1,561**	**1,561**	**863**	**863**

Machakos screened 20,230 people and this yielded 1,970 (8.5%) presumptive cases. Out of these, 1,561 (79.2%) cases were investigated for TB. From these, 863 (55.3%) positive cases were confirmed either bacteriologically or clinically. The same number were initiated on TB treatment.

TABLE 20: MOMBASA COUNTY TB STATISTICS FROM TIBU

Month	Total screened	TB Presumptive	Samples sent to lab	Tests performed	Total Positive	Initiated on treatment
November 2022	69,456	2,358	2,289	2,289	292	292
December 2022	61,922	1,696	1,512	1,512	252	252
January 2023	86,411	2,031	1,881	1,881	238	238
February 2023	79,769	2,777	1,814	1,814	174	174
Total	**297,588**	**8,862**	**7,496**	**7,496**	**956**	**956**

Mombasa screened 297,588 people and this yielded 8,862 (3%) presumptive cases. Out of these, 7,496 (84.6%) cases were investigated for TB. From these, 956 (12.8%) positive cases were confirmed either bacteriologically or clinically. The same number were initiated on TB treatment.

TABLE 21: NAIROBI COUNTY TB STATISTICS FROM TIBU

Month	Total screened	TB Presumptive	Samples sent to lab	Tests performed	Total Positive	Initiated on treatment
November 2022	47,609	437	391	391	83	83
December 2022	32,926	361	338	338	432	43
January 2023	24,395	1,664	1,656	1,656	52	51
February 2023	15,980	884	195	195	22	14
Total	**120,910**	**3,346**	**2,580**	**2,580**	**200**	**191**

Nairobi screened 120,910 people and this yielded 3,346 (2.8%) presumptive cases. Out of these, 2,580 (77.1%) cases were investigated for TB. From these, 200 (7.6%) positive cases were confirmed either bacteriologically or clinically, out of which 191 (95.5%) were initiated on TB treatment.

For the community led activities, 22 shows the TB statistics by county. From Table 22, it is important to note that the testing for Nairobi was only attributable to HF activities since in Nairobi, the CHP were only engaged in the outreach activities. This was due to a challenge in implementation in Nairobi, where the only task CHPs undertook was outreach. The County arranged 3 outreach activities where 80 CHPs were involved together with 40 lab technologists and 40 CHAs. This was done in partnership with 40 HFs.

For this particular objective, the following metrics were computed.

1. **Proportion of additional COVID-19 tests, dis-aggregated by HF and CHP**
   The HFs participating in the study conducted a total of 36,010 (20.3% of the total tests done in the study) COVID-19 tests. To compute this indicator for every county, the total number of COVID-19 tests under the pilot activity was considered out of all the COVID-19 tests undertaken in the county during the pilot period. However, since COVID-19 testing has since been gone down, the data wasn't available to compute this indicator.

   Similarly for CHPs, the total number of COVID-19 tests conducted by CHPs was 141,058 (79.7%).

TABLE 22: **TB STATISTICS FROM THE PILOT ACTIVITY**

Indicator	Mombasa	Machakos	Kajiado	Nairobi	Total
Screened	63,824	21,417	74,388	23,330	182,959
TB Presumptive	24,679	6,795	16,040	6,822	54,336
Total referred	371	234	1,121	1,949	3,675
Samples collected	235	141	353	2,196	2,925
Samples tested	225	141	353	2,196	2,925
Positive cases	46	5	68	189	370
Initiated on treatment	44	5	68	189	361
Contacts screened	101	0	43	1,089	1,233

However, the contribution against all testing by the county was not possible since this data was not accessed by the study team since generally, COVID-19 testing has really gone down in the country, and as such, testing statistics were not available.

2. **Proportion of additional COVID-19 cases, dis-aggregated by HF and CHP**

   From the HF track, 128 (0.21%) cases were identified. However, there was no data from the county for comparison. For the CHP track. 494 (79% cases of COVID-19 were identified. Computation of the specific metrics was not possible.

3. **Proportion of additional TB cases identified at the HF**.
   This indicator was not possible to compute because the team had no control of data flow at the HFs. For this reason, the TB cases attributable to the HF testing during the pilot was not possible to compute.

4. **Proportion of additional TB cases identified, by the CHPs**.
   This metric was difficult to compute because of the gaps in data management. The study team was not able to get data from the County attributable to CHPs other than those collected by the pilot study.

5. **Proportion of TB tests contributed by CHPs**.

TABLE 23: **PROPORTION OF TB TESTS CONTRIBUTED BY CHPS**

County	Total TB tests	TB tests via CHP referral	Proportion
Mombasa	7,496	225	3%
Machakos	1,561	141	9%
Kajiado	1,066	353	33%
Total	10,123	719	7.1%

For every county, we considered the total number of TB tests conducted via CHP referral out of the total number of TB tests carried out in the county. 7.1% (719 out of 10,123) of the TB tests carried out in Kajiado, Machakos and Mombasa combined were due to referral by CHPs. In Nairobi, the activity was mainly carried out in the HF and hence this indicator was not computed for CHPs. However, the testing figures had the potential of being much higher than this had effective referral been optimized. The CHPs activities identified 54,336 TB presumptive cases, and out of these, only 3,675 (6.7%) cases were referred effectively to the link HFs. out of these, 2,925 (80%) provided samples for testing at

various HFs. One of the main reasons for this poor referral observed was the lack of MoH 100, one of the data tools key to have in the kit of a CHP.

6. **Proportion of TB cases contributed by CHPs**

TABLE 24: **PROPORTION OF TB CASES CONTRIBUTED BY CHPS**

County	Total TB cases	TB cases by CHPs	Proportion
Mombasa	956	46	4.8%
Machakos	863	5	0.6%
Kajiado	703	68	9.7%
Total	2,522	119	4.7%

For every county, we considered the total number of TB cases identified via CHP referral out of the total number of TB cases in the County. County level statistics were obtained from the Counties directly. Total statistics from the counties are summarized in Table 22, and Mombasa County Statistics are summarized in Table 20. We see that 4.2% of the TB positive cases identified were due to testing that arose from CHP referral. In Mombasa county, one of the TB cases identified by a CHPs in Kisauni sub-county turned out to be multi-drug resistant TB.

4.5.7 OBJECTIVE TWO

To integrate COVID-19 and TB screening at both the HF and community levels.

NUMBER OF CASES SCREENED FOR BOTH COVID-19 AND TB

This indicator on the total number of participants screened showed the value of integration of the screening algorithms for both COVID-19 and TB at community level. A total of 182,959 participants were screened for both COVID-19 and TB as shown in Table 13.

TABLE 25: **HF SCREENING STATISTICS**

County	Total screened	COVID-19 Suspect	TB Presumptive	COVID-19 Suspect and TB presumptive
Kajiado	8,492	5,481 (64.5%)	1,541 (18.1%)	1,530 (18%)
Machakos	2,626	1,837 (70%)	986 (37.5%)	982 (37.4%)
Mombasa	11,385	6,043 (53.1%)	1,182 (10.4%)	1,175 (10.3%)
Nairobi	13,943	6,205 (44.5%)	2,039 (14.6%)	2,024 (14.5%)
Total	**36,446**	**19,566 (53.7%)**	**5,748 (15.8%)**	**5,711 (15.7%)**

TABLE 26: **CHP SCREENING STATISTICS**

County	Total screened	COVID-19 Suspect	TB Presumptive	COVID-19 Suspect and TB presumptive
Kajiado	64,475	19,478 (30.2%)	3,470 (5.4%)	3,406 (5.3%)
Machakos	18,161	7,526 (41.4%)	3,364 (18.5%)	3,352 (18.5%)
Mombasa	51,719	24,554 (47.5%)	14,839 (28.7%)	14,665 (28.4%)
Nairobi	8,701	2,970 (34.1%)	673 (7.7%)	655 (7.5%)
Total	**143,056**	**54,528 (38.1%)**	**22,346 (15.6%)**	**22,078 (15.4%)**

Tables 25 and 26 and show the same statistics dis-aggregated by HCWs and CHPs. 78% of the screening was done at community level by the CHPs who identified 72.6% of the COVID-19 suspect cases and 78.5% of the TB presumptive cases. For this indicator on the level of integration of the screening algorithms for the two diseases, the following metrics were required.

1. **Proportion of confirmed COVID-19 cases tested for TB**

   This was to be calculated using the number of COVID-19 cases with documented TB results out of the number of confirmed COVID-19 cases. Unfortunately, because the *Kenya COVID-19 Tracker app*used for data collection and transmission in this study is not interoperable with *TIBU*, this wasn't possible since the line list for TB tests wasn't available.

2. **Proportion of confirmed TBcases tested for COVID-19**

   This was also to be calculated using the number of TB cases with documented COVID-19 results out of the number of confirmed TB cases. Again because of the lack of interoperability of the two systems, this wasn't possible to compute.

4.5.8 OBJECTIVE THREE

To determine COVID-19 positivity rates among symptomatic and asymptomatic study participants.
For this objective, only cases where an actual test result was recorded were considered. About 5,000 blanks were removed from the analysis. Table 27 shows the testing statistics.

1. **COVID-19 positivity rate**
   The overall positivity rate for COVID-19 for the tests carried out during this study was 0.4% or 4 people per 1,000 tests. Positivity among asymptomatic participants was 182 out of 108,489 translating to about 0.3% of 3 per 1000. Positivity among the symptomatic participants on the other hand was 342 out of 75,168 translating to 0.45% or 4/5 per 1,000 persons tested.

2. **COVID-19 positivity rate among the asymptomatic cases at HF level testing**
   Of all the cases tested, 75,168 (41%) had symptoms while the remaining 108,409 (59%) participants had no symptoms. Out of the 108,409 asymptomatic cases, 16,885 (15.6%) were tested at HFs and out of these, 17 were positive. This translates to 0.1% or 1 per 1,000 persons tested.

3. **COVID-19 positivity rate among the asymptomatic cases at CHP level testing**
   88,934 of the asymptomatic cases were tested at the community by CHPs. Out of these, 264 were positive, and this translates to 0.3% or 3 out of 1,000 people tested.

4. **COVID-19 positivity rate among the symptomatic cases at HF level testing**
   Symptomatic cases tested at HF level amounted to 19,592 (26%), out of which 111 were positive. This translated to 0.6% of 6 out of 1,000 people tested.

5. **COVID-19 positivity rate among the symptomatic cases at CHP level testing**
   of the 75,168 symptomatic cases, 54,603 (72.6%) were tested at the community by CHPs, and out of these, 231 turned positive. This translates to 0.42% of 4.2 per 1,000 persons tested.

Table 27 presents summary statistics for the test results.

4.5.9 OBJECTIVE FOUR

To create demand for COVID-19 and TB testing among community members.

TABLE 27: COVID-19 TEST STATISTICS

County		Invalid	Negative	Positive	Total
Kajiado		59 (0.08%)	71,145 (99.5%)	265 (0.37%)	71,469
	HF	13 (22%)	8,313 (11.7%)	14(5.3%)	8,340
	HH	46 (78%)	62,832 (88.3%)	251(94.7%)	63,129
Machakos		29 (0.14%)	20,505(99.3%)	115 (0.6%)	20,649
	HF	0 (0%)	2,605 (12.7%)	13 (11.3%)	2,618
	HH	29 (100%)	17,900 (87.3%)	102 (88.7%)	18,031
Mombasa		29 (0.05%)	62,279 (99.7%)	178(0.3%)	62,486
	HF	8 (27.6%)	11,154(17.9%)	49(27.5%)	11,211
	HH	21 (72.4%)	51,125(82.1%)	129(72.5%)	51,275
Nairobi		5 (0.02%)	22,385 (99.7%)	64 (0.3%)	22,464
	HF	3 (60%)	13,786 (61.6%)	52 (81.3%)	13,841
	HH	2 (40.%)	8,6.9 (38.4%)	12 (18.8%)	8,623
Total		**122 (0.07%)**	**176,324 (99.6%)**	**622 (0.4%)**	**177,068**

1. **Population reached with health promotional messages**.
   The proportions were not computed but a total of 183,000 tests were carried out in a period of 4 months which achieved 100% of the targeted workload and hence excellent coverage.

2. **Uptake of testing in communities**
   Since all screened were tested, it can be argued that uptake was almost 100%.

4.5.10 OBJECTIVE FIVE

To facilitate linkage to care for presumptive TB cases referred from the community.

PROPORTION OF TB TESTS PERFORMED OUT OF THE PRESUMPTIVE CASES IDENTIFIED AT THE COMMUNITY

This was the proportion of TB tests performed, with results documented, out of all the cases referred by the CHPs to the link HFs

4.5.11 OBJECTIVE SIX

To measure rates of TB in the community

1. **TB positivity rate out of the presumptive cases identified at the community, dis-aggregated by HF and CHP**
   The dis-aggregation by HF was not possible because of the data gaps. However, positivity rate of presumptive cases identified at the community by the CHP was 119 out of 2,522, translating to 4.7% or 470 cases per 100,000 population.

4.5.12 OBJECTIVE SEVEN

To assess effectiveness of digital tools for data capture and COVID-19 testing triage

1. **Amount of data collected by the *Kenya COVID-19 Tracker app* - This looked at the total amount of data collected during the pilot period that would have been captured using the digital tool.**
   The *Kenya COVID-19 Tracker app* was installed in the phones of all CHPs and HCWs who participated in the devolved testing activity, and in a period of 4 months, the project was able to collect 182,000 records in form of a line list. The data was collected using three forms, namely:

   (a) Household registration form - which was used for registering the households at inception.

   (b) Suspect registration form - which was used to collect registration and demographic information about each participant within various households.

   (c) Case investigation form - which was used to implement the screening algorithms and record test results.

   Information from all these forms was aggregated into one large data frame for analysis and dashboard creation.

2. **Proportion of all positive cases who were identified as high risk by the digital algorithm**

   A total of 13 symptoms were considered in total for screening for COVID-19. Out of the 182,959 cases screened, 75,168 (41%) presented with symptoms. According to the screening algorithm, anybody presenting three or more symptoms was considered high risk. Of those with symptoms, 25,514 (34%) had three and above symptoms and hence considered risky. Of the 182,959 tests conducted for COVID-19, there were 623 (0.34%) positive cases. Out of these, 281 (45.1%) had no symptoms recorded, 36 (5.8%) had only one symptom recorded, 117 (18.8%) had two symptoms and 189 (30.34%) had 3 symptoms and above (see Figure 10.

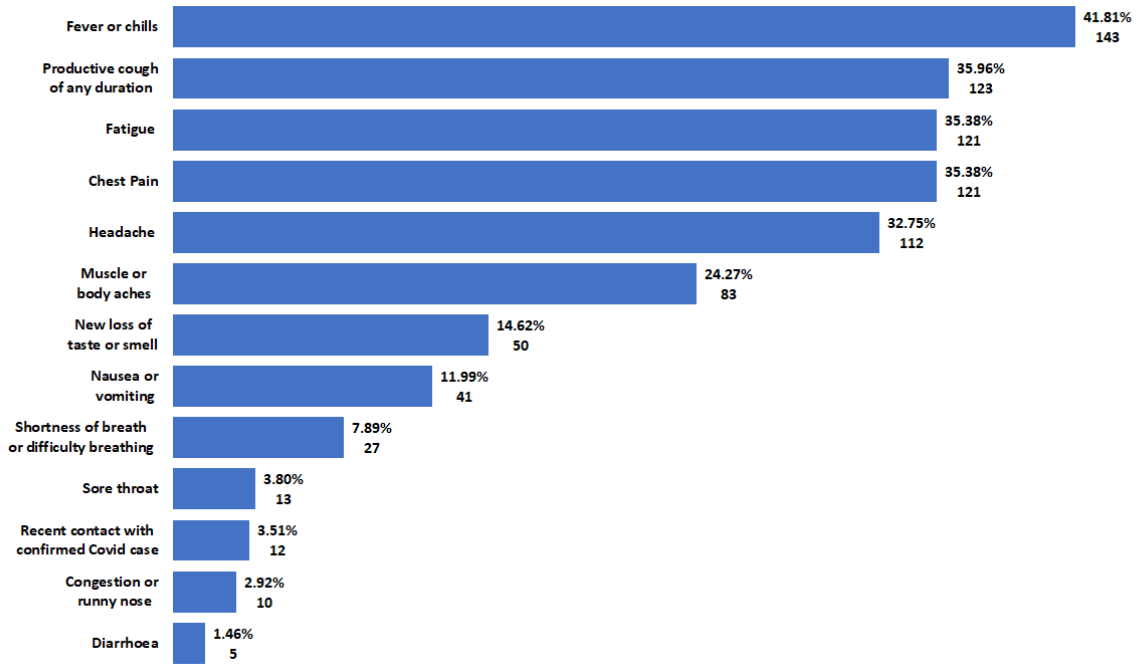

FIGURE 10: **SYMPTOMS FOR POSITIVE CASES**

As per the screening algorithm, **30.34%** of all the positive cases were identified as high risk (see figure 11). If we consider all the cases screened, then the high-risk proportion would be 25,514 (14%) out of 182,959. From the data, 281 cases were asymptomatic, meaning, they were positive despite being low risk. Similarly, 153 cases had two symptoms and below (36 had one symptom, 117 had two symptoms). These can also be classified as low risk. Finally, 189 cases were considered high risk and,

they were positive. From the overall dataset, we also realize that 24,905 participants had three and above symptoms but tested negative for COVID-19. This implies they tested negative despite falling under the high-risk category.

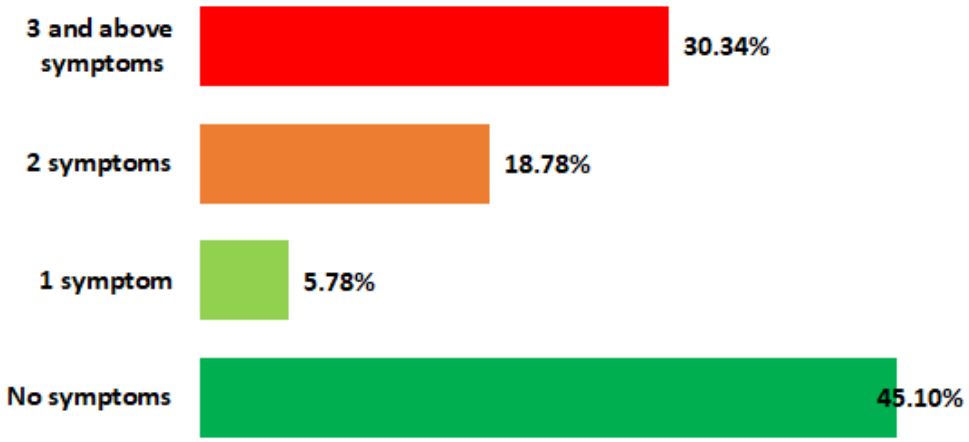

FIGURE 11: **RISK PROFILE FOR POSITIVE CASES**

3. **The infection odds ratio between digitally-assigned high-risk and low-risk cases**
   The 2× 2 table below shows the distribution of the digitally-assigned high-risk and low-risk cases and the testing outcomes.

TABLE 28: **ODDS OF DIGITALLY ASSIGNED RISK LEVELS**

		Outcome	
		Positive	Negative
Exposure	High Risk	189	24,905
	Low risk	434	182,336

$$\text{The Odds Ratio (OR)} = \frac{189 * 182,336}{434 * 24905} = \frac{34,461,504}{10,808,770} = 3.19$$

This means, those who had 3 and more symptoms were 3.19 times more likely to test positive for COVID-19. The confidence interval is calculated as shown below

$$\text{Upper 95\% CI} = \exp\left[\ln(OR) + 1.96 * \sqrt{(1/189 + 1/24,905 + 1/434 + 1/182,336)}\right] = 3.79$$

$$\text{Lower 95\% CI} = \exp\left[\ln(OR) + 1.96 * \sqrt{(1/189 + 1/24,905 + 1/434 + 1/182,336)}\right] = 2.69$$

From these we see that the Odds Ratio is significant.

4.6 RESULTS FROM THE MALARIA COMPONENT OF THE PILOT

A total of 4,211 participants were screened for malaria in addition to COVID-19 and TB. Out of these, 2,181 (52%) were found likely to be having malaria. Of these, 113 (5.2%) turned positive after testing. A total of 168 participants tested were children under 5, and 10 (6%) of the children tested positive for malaria. In addition, 63 participants were tested because they were pregnant, and 3 (5%) of them tested positive for malaria.

5 KEY MESSAGES

1. CHPs played a valuable role in creating awareness and encouraging uptake of testing services.
   (a) Higher levels of awareness were noted for COVID-19 ($> 87\%$) where CHPs were the most common source of information reported by participants (41%)
   (b) Awareness of TB was lower (77%, ranging between 82% in Machakos and 70% in Kajiado which has a high prevalence rate), and less than a third of people said they had received information from CHPs increased focus in educating through CHPs could improve levels of awareness.
   (c) Testing offered by CHPs was well received in the community, with all who screened accepting to be tested despite the wider decline in testing rates in the country.
2. CHPs were able to master point of care testing, and use of the digital tool, and expressed interest in expansion of this approach to include other disease areas. From FGDs conducted with the CHPs they expressed the following
   (a) Their desire to have the term volunteers dropped from their title
   (b) Their desire and willingness to take on other responsibilities since they wanted to participate more in enhancing wellness of their communities. they expressed the need for additional training in other disease areas, as well as on the use of digital tools
   (c) They were very motivated by the fact that they got training in newer areas of operation, including conducting point of care tests and using digital tools for data transmission.
   (d) The other big motivation for them in this pilot study was the remuneration. They hopped that moving forward, the government could consider them for more sustained stipend
3. There is value in doing joint screening for TB and COVID-19, with 15% of all screened presenting with both TB and COVID-19 symptoms. Given the large numbers who were symptomatic but negative for both diseases, there is also a need to integrate screening of other disease areas, and appropriate linkage pathways, so as to ensure that further diagnostic services are accessed.
4. A simple digital risk scoring approach, based on symptom count, is helpful for triaging individuals for testing, with an Odds Ratio of 3.19 (2.69 – 3.79) for COVID-19 infection among those flagged as high risk compared to low-risk.
   (a) However, some cases were still diagnosed among asymptomatic (0.1% and 0.3% at HF and CHP levels, respectively), which shows the limitations of a symptom-based approach.
   (b) The end-to-end data captured through this tool could be used to develop more precise symptom screening algorithms through predictive risk modelling to identify the symptoms most associated with infection.
5. Digitization of community-level activities and referral pathways is critical for ensuring linkage to care, especially for TB testing.
   (a) 7% of all TB tests done in the counties during the study period, and 4.7% of all cases, were referred through CHPs. The positive yield is 119/2955 which translates to around 4,000 per 100,000.
   (b) However, high rates were found of attrition were found: only 7% of all presumptive cases identified by CHPs were referred effectively to the link HFs, and of these only 80% provided samples—meaning that around 95% of all presumptive cases identified by CHPs are not recorded as having a test, a lost opportunity to increase case detection.

(c) One of the main reasons for this poor referral observed was the lack of MoH 100, one of the data tools (paper forms) key to have in the kit of CHPs, which hindered effective linkage to care. Ability to digitally refer for testing could help to bridge this gap and support targeted outreach to those who have been LTFU.

5.1 OPPORTUNITIES FOR TASK SHIFTING

1. This pilot showcased the opportunity for capacity building and further engagement of CHPs (78% o this work was done by CHPs)
2. CHPs played a key role in awareness creation and community mobilization, and this was shown by the ability to conduct screening and testing among 143,000 participants in the pilot.
3. Strengthening of health systems through promotion and advocacy - there was great mobilization by CHPs, in addition to the finding that CHPs are one a key source of information at the community.
4. Strengthen preventive and promotive health services

5.2 VALUE FOR USE OF DIGITAL TOOLS

1. The use of the digital tool is a great opportunity both for clinical support to CHPs and for real time data collection and transmission. The learnings can also inform the implementation of eCHIS by MoH
2. Strengthening data collection, transmission, analysis and quality checks in health systems at the lowest level possible level
3. Standardization of CHP procedures by providing a digital algorithm hence reducing subjectivity

6 BEST PRACTICES AND LESSONS LEARNT

1. It is important to integrate TB programs with other work flows moving forward
2. Use of CHPs to enhance access to services at the community level. There was general ease of acceptability of testing since CHPs are trusted members of the community. The potential of CHPs to take up certain roles through task-shifting and the possibility of data collection and transmission *in situ* is an avenue that could be explored to advance the discussion on eCHIS thereby strengthening reporting system units
3. Use of L2 and L3 health facilities to enhance access to testing. Screening of COVID-19 and TB spiked due to the deployment of the project tools at the community level, however contact tracing was noted to be low, and this was worse in Kajiado as a result of nomadism.
4. Capacity building and support to the CHPs increased the possibility of using CHPs to deliver services in new frontiers. However it is important even as these frontiers are expanded, to have continuous training and strict supervision of the CHPs to ensure quality control and assurance. A unique opportunity arises for lab officers and lab technicians to take up roles in continuous training and supervision of CHPs involved in diagnostic testing at the community level for quality control and assurance.
5. Use of a digital tool to collect and transmit data real-time, and display analytics gives a big boost to data demand and information use.

6. Clinical decision support for the HCWs and CHPs during the dual screening via the screening algorithm.
7. Technical support offered by DHARC and CHMT teams for digital tool-utilization by CHPs.
8. Successful commodity supply chain leveraging both the DHARC and county mechanisms. There however needs to be in place, a stock control mechanism for tracking commodities deployed at the point of care and replenished at the link facility.
9. Training challenges arose due to the different types of gadgets with software compatibility barriers presented by the CHPs for the deployment of the digital aspect of the study.
10. Intermittent server downtown caused challenges when using the digital tool. These need to be addressed to mitigate delays in data transmission.
11. Lack of system interoperability hampered further analysis of TB data. It would provide a great opportunity for further insights if data was shareable and analysable across different programmes.

7 KEY ACHIEVEMENTS/ OUTCOMES

Highlight the main achievements (benefits or positive changes during or after activities – compared to baseline if applicable) – e.g. recognition of success by the national government, accreditation in a particular area, etc.

Some of the key achievements are

1. Recognition of the value of this activity by the county governments and hence the request to train more CHP that can provide an opportunity for enhanced access to diagnostic services.
2. Recognition of the value of the activity by the Counties as an opportunity to collect data on the levels of community sensitization on COVID-19 and TB.
3. Recognition of, and utilization of the activity at community level to collect data on COVID-19 vaccination status.
4. Recognition by the County government to utilize this opportunity to measure effective referral as an indicator used to evaluate the CHPs.
5. Recognition by the County governments of the great opportunity for expanded testing of COVID-19 in the community at a time when the country is experiencing a surge in numbers of COVID-19 cases.
6. Recognition of the value of utilization of a digital tool for data collection at the community level.
7. Receipt of a donation of 500 COVID-19 tests, 2,500 malaria RDTs and 10,000 surgical masks from Revital Healthcare (EPZ) Kenya LTD.

8 CHALLENGES

Some of the challenges experienced include.

1. Some level of attrition of the enrolled CHPs due to the CHPs getting other employment engagements, of moving out of the participating Counties, prompting the need to enroll and train additional CHPs
2. Distribution of the activity kits to some hard-to-reach areas in the remote parts of the Counties, especially in Kajiado County.
3. Delays in commencement or disruption of activities whenever a CHP experiences memory size challenges with their mobile phones or whenever they lose their mobile phones.

9 STUDY DURATION

The study was be carried out over an eleven-month period in line the following timelines:

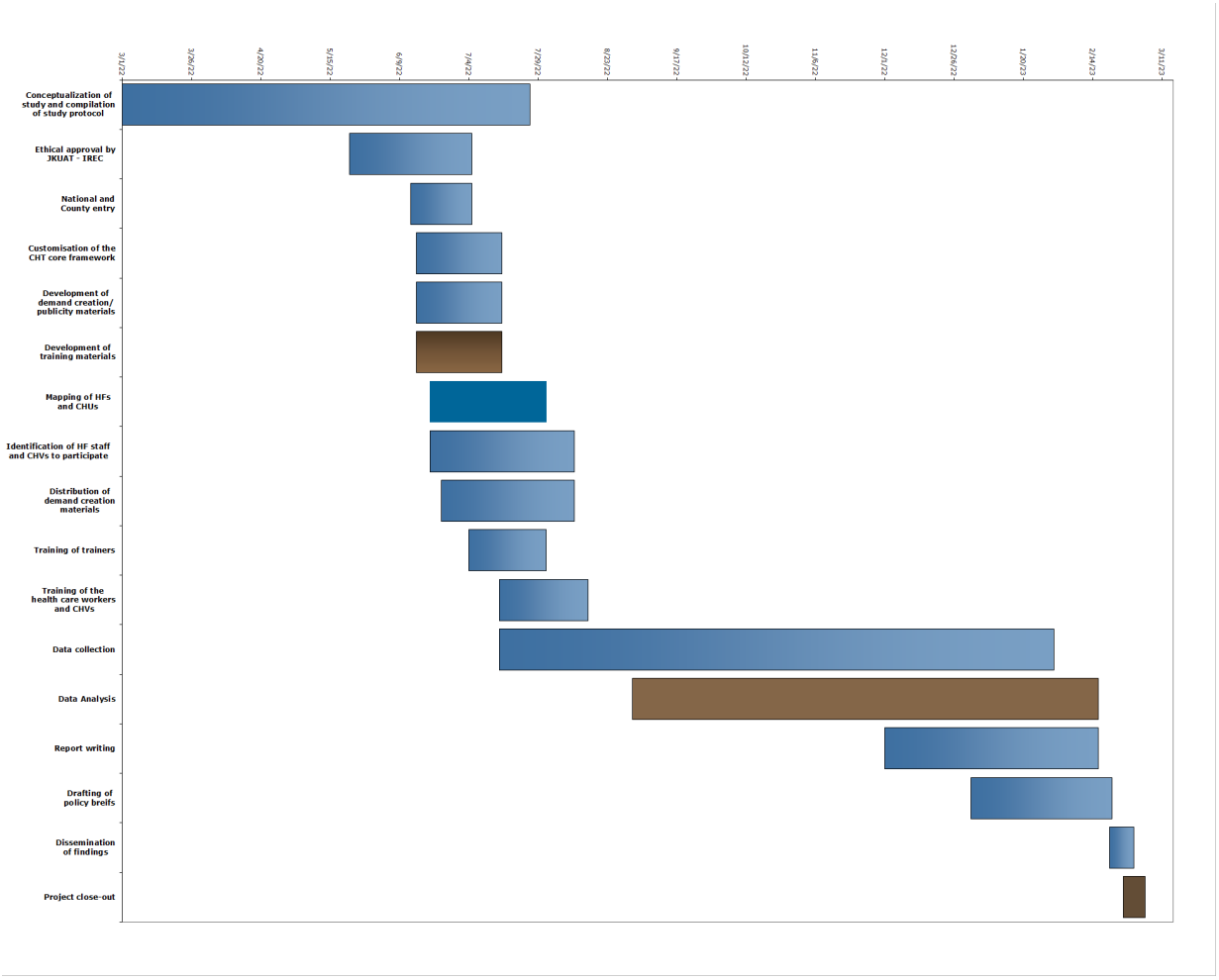

FIGURE 12: **ACTIVITY TIMELINES**

10 ETHICAL CONSIDERATIONS

FRAME 3: ETHICAL REVIEW

The proposal was submitted to JKUAT-Institutional Ethical Review committee (JKUAT-IERC) for ethical clearance and approval. JKUAT-IERC also provided ethical oversight as the study went on. Appendix G shows the JKUAT-IERC letter that provided ethical approval for the study.

10.1 POTENTIAL RISKS AND THEIR MITIGATION

See Table 29

TABLE 29: **POTENTIAL RISKS AND MITIGATION STRATEGIES**

Outcome	Anticipated risk	Probability	Impact	Mitigation measure
Enhanced testing	Inactive CHUs	Medium	High	Avoid inactive CHUs
Ability of CHPs to administer tests and manage data	Inadequate capacity of CHPs to interact with digital tools	Medium	High	1. Targeted training 2. Engage only CHPs who have completed secondary level education
Smooth flow of the testing exercise	Interruption of data collection by National elections	High	High	Schedule data collection to exclude the election week
Tests unlocked	Low uptake of tests by members of community	Medium	Medium	Intensive mobilization through community engagement in places of worship and community gatherings
Achievement of Targets	Some communities in a CHU are geographically dispersed, requiring CHPs to walk long distances from one community to the other	Medium	Medium	CHPs to be given specific targets per day
Training CHPs	Instructions and Job aides in English	Medium	Medium	Recruitment of CHPs who have completed form four (KCSE)
Proper app utilization by CHPs	*Kenya COVID-19 Tracker app*, programmed in English	Medium	Medium	Recruitment of CHPs who have completed form four (KCSE)
Timely onset and conclusion of pilot	National supply and distribution bottlenecks	Medium	High	Ensure all consumables are procured before kick-off of project
Full uptake	Pushback from nurses on additional tasks (medium risk)	Medium	Low	Incentivize through payment of stipends

10.2 BENEFIT TO PARTICIPANTS

FRAME 4: BENEFIT TO PARTICIPANTS

Participants who tested positive for COVID-19 and TB were linked to care. The pilot activity built some Health system capacity since the CHPs and HCW in level 2 and 3 HF gained competencies to carry out COVID-19 Ag-RDTs and TB screening. The project provided data that would guide the National MoH-K in formulating guidelines on involvement of CHPs in COVID-19 testing. In addition, findings from this work can be used to inform the guidelines being developed for bi-directional testing for COVID-19 and TB and changes in the national policy of testing for other diseases by CHPs. Furthermore, the data generated from this pilot will contribute to COVID-19 and TB surveillance and breaking of transmission.

10.3 INFORMED CONSENT

Before commencement of the testing process, all the pilot participants were given adequate information about the study and invited for the testing. Participants were informed of their right to withdraw from the

pilot at any time if they wished to. They were further informed that if they withdrew from the study, their research data would be removed from all the pilot data platforms and would not be included in the analysis. Informed consent was sought from all participants.

10.4 CONFIDENTIALITY/ PRIVACY

All pilot staff underwent ethics training and signed a confidentiality agreement. Data staff were trained to ensure privacy during the data collection and analysis and during the consenting process as well.

11 PUBLICATION POLICY AND DISSEMINATION OF RESULTS

11.1 PUBLICATION POLICY

Authorship will be determined by mutual agreement as described in the contract signed by the parties. Before publication, all study results are considered confidential and shall not be made available to any third party by any member of the investigating team without an appropriate confidentiality agreement and/or written authorization of the sponsor.

11.2 DISSEMINATION OF RESULTS

1. The pilot team will organize to have meetings with the CHMTs and MoH-K, where the findings of the pilot will be shared with them.
2. A detailed report and policy briefs will also be disseminated to the participating CHMTs and MoH-K to guide in the formulation of guidelines on CHPs involvement in COVID-19 testing and TB Screening and sample collection.

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12 CONTRIBUTION OF THE PILOT TO THE COVID-19 RESPONSE IN KENYA

FRAME 5: CONTRIBUTION OF THE PILOT TO THE COVID-19 RESPONSE IN KENYA

1. Showcase value for CHPs in conducting COVID-19 testing using Ag-RDTs and TB screening and sample collection in Kenya thereby expanding access to COVID-19 and TB testing and hence enabling the most accurate estimates of disease burden and targeting of control measures and treatments symptomatic cases. This will lead to change in guidelines that will allow CHPs to conduct COVID-19 testing and other diseases using RDTs.
2. Decentralized testing to level 2 and level 3 facilities will enhance penetration of COVID-19 tests in the communities by bringing testing services to primary healthcare level facilities
3. Use of Ag-RDTs in testing samples from pilot participants will provide additional epidemiological data that will be used to determine the magnitude of COVID-19 spread within the community.
4. Provide evidence for use of Ag-RDTs in Kenya for early detection of asymptomatic and symptomatic cases, which is crucial for slowing community or hospital transmission and strengthening active surveillance
5. Provide evidence for use of a digital screening algorithm for active case finding of TB cases within the community.
6. Showcase value for utilization of digital tools in data transmission to inform management of COVID- 19.

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A MACHAKOS COUNTY FACILITIES FOR DEVOLVED TESTING OF COVID-19

S No	MFL Code	Facility name	Level	ward	sub county
1	25297	Athi River North Dispensary	Level 2	Athiriver	Athiriver
2	22115	Sikia dispensary	Level 2	Kinanie	Athiriver
3	21027	Kyumbi Health Centre	Level 3	Muthuani	Athiriver
4	20197	Kwakalusya Dispensary	Level 2	Kinanie	Athiriver
5	18581	Mlolongo Health Centre	Level 3	Syokimau	Athiriver
6	17844	Mlolongo Wellness Centre	Level 2	Syokimau	Athiriver
7	12321	Kinanie Health centre	Level 3	Kinanie	Athiriver
8	12217	Katani Dispensary	Level 2	Muthuani	Athiriver
9	22381	Kithia Dispensary	Level 2	Upper Kaewa/Iveti	Kathiani
10	20166	Ngiini Dispensary Kathiani	Level 2	Mitamboni	Kathiani
11	12157	Kalunga Dispensary	Level 2	Upper Kaewa/Iveti	Kathiani
12	12118	Kaani Dispensary	Level 2	Lower Kaewa/Kaani	Kathiani
13	12370	Kitunduni Dispensary	Level 2	Lower Kaewa/Kaani	Kathiani
14	12600	Mutitu Dispensary	Level 2	Kathiani Central	Kathiani
15	12096	Ithaeni Dispensary	Level 2	Lower Kaewa/Kaani	Kathiani
16	12653	Ngoleni Dispensary	Level 2	Kathiani Central	Kathiani
17	12257	Kaviani Health Centre	Level 3	Upper Kaewa/Iveti	Kathiani
18	12530	Mitaboni Health Centre	Level 3	Mitamboni	Kathiani
19	12538	Miumbuni Dispensary	Level 2	Kathiani Central	Kathiani
20	12796	Thinu Health Centre	Level 3	Upper Kaewa/Iveti	Kathiani
21	20769	Kikalu Dispensary	Level 2	Kangundo West	Kangundo
22	20182	Kathome Dispensary	Level 2	Kangundo East	Kangundo
23	17616	Kathaana Dispensary	Level 2	Kangundo West	Kangundo
24	17615	Kawauni Dispensary	Level 2	Kangundo North	Kangundo
25	17613	Miu Dispensary	Level 2	Kangundo East	Kangundo
26	17611	Kyevaluki Dispensary	Level 2	Kangundo West	Kangundo
27	16922	Ndunduni Dispensary	Level 2	Kangundo North	Kangundo
28	16433	Kakuyuni Health Centre	Level 3	Kangundo West	Kangundo
29	16435	Mukunike Dispensary	Level 2	Kangundo West	Kangundo
30	12376	Kivaani Health Centre	Level 3	Kangundo East	Kangundo
31	29304	Kwamwenze Dispensary	Level 2	Kangundo East	Kangundo
32	27279	Mbusyani Dispensary-Kangundo	Level 2	Kangundo West	Kangundo
33	27274	Iiaitune Dispensary	Level 2	Kangundo East	Kangundo
34	23625	G.K Prison Dispensary yatta	Level 2	Kithimani	Yatta
35	22945	Kaluluini Dispensary Yatta	Level 2	Matuu	Yatta
36	22944	Kalyambeu Dispensary Yatta	Level 2	Ikombe	Yatta
37	22943	Kiwanza Dispensary Yatta	Level 2	Ndalani	Yatta
38	22942	NYS Athiriver Yatta	Level 2	Kithimani	Yatta
39	22941	Kalukuni Dispensary Yatta	Level 2	Ikombe	Yatta
40	22940	Makila Dispensary Yatta	Level 2	Katangi	Yatta
41	22884	Masewani Dispensary	Level 2	Matuu	Yatta
42	19415	Ngumbulu Dispensary	Level 2	Katangi	Yatta
43	18230	Kauthulini Dispensary	Level 2	Kithimani	Yatta
44	17213	Nthungululu Dispensary	Level 2	Ndalani	Yatta
45	17161	Kyasioni Dispensary	Level 2	Ikombe	Yatta
46	17104	Kwa Mwatu Dispensary	Level 2	Matuu	Yatta
47	12078	Ikombe Dispensary	Level 2	Ikombe	Yatta
48	12215	Katangi Health Centre	Level 3	Katangi	Yatta

B MACHAKOS COUNTY FACILITIES FOR DEVOLVED TESTING OF COVID-19

S No	MFL Code	Facility name	Level	ward	sub county
49	20732	Kalyambeu Dispensary	Level 2	Muthetheni	Mwala
50	17049	Kaiani Dispensary	Level 2	Wamunyu	Mwala
51	12678	Nthwanguu Dispensary	Level 2	Kibauni	Mwala
52	12220	Kathama Dispensary	Level 2	Mbiuni	Mwala
53	12613	Muusini Dispensary	Level 2	Masii	Mwala
54	12412	Kyawango Dispensary	Level 2	Makutano/Mwala	Mwala
55	12807	Tulila Dispensary	Level 2	Kibauni	Mwala
56	12593	Muthetheni Health Centre	Level 3	Muthetheni	Mwala
57	12503	Mbiuni Health Centre	Level 3	Mbiuni	Mwala
58	12475	Masii Health Centre	Level 3	Masii	Mwala
59	12841	Wamunyu Health Centre	Level 3	Wamunyu	Mwala
60	12311	Kilembwa Dispensary	Level 2	Wamunyu	Mwala
61	16650	Kavumbu Dispensary (Mwala)	Level 2	Masii	Mwala
62	12572	Mumbuni Dispensary (Mwala)	Level 2	Mbiuni	Mwala
63	16652	Yathui Dispensary	Level 2	Wamunyu	Mwala
64	18449	Kwa Mutalia Dispensary	Level 2	Matungulu West	Matungulu
65	18442	Mbuni Dispensary	Level 2	Tala	Matungulu
66	18441	Kitambaasye Dispensary	Level 2	Matungulu North	Matungulu
67	17614	Uamani Dispensary	Level 2	Matungulu North	Matungulu
68	16438	Kyeleni Health Centre	Level 3	Kyeleni	Matungulu
69	16439	Matungulu Health Centre	Level 3	Matungulu East	Matungulu
70	16921	Kiliku Dispensary	Level 2	Matungulu North	Matungulu
71	16437	Kituluni Dispensary	Level 2	Matungulu North	Matungulu
72	16432	Donyo Sabuk Dispensary	Level 2	Matungulu North	Matungulu
73	16434	Katheka Dispensary	Level 2	Matungulu East	Matungulu
74	12267	Kayatta Dispensary	Level 2	Matungulu North	Matungulu
75	12163	Kambusu Dispensary	Level 2	Matungulu East	Matungulu
76	16440	Sengani Dispensary	Level 2	Tala	Matungulu
77	12395	Kwa Nguu Dispensary	Level 2	Matungulu North	Matungulu
78	12657	Nguluni Health Centre	Level 3	Matungulu West	Matungulu
79	22435	Uvaini Disp	Level 2	Kivaa	Masinga
80	22026	Musumaa Disp	Level 2	Masinga Central	Masinga
81	21770	Uvaini Dispensary	Level 2	Kivaa	Masinga
82	20932	Kwawanzilu Disp	Level 2	Ekalakala	Masinga
83	19925	Kakuku Dispensary	Level 2	Ekalakala	Masinga
84	19924	Mikuyuni Disp	Level 2	Masinga Central	Masinga
85	19923	Ndelekeni Dispensary	Level 2	Kivaa	Masinga
86	19626	Nzukini Dispensary	Level 2	Ekalakala	Masinga
87	19110	Kiatineni Dispensary	Level 2	Ndithini	Masinga
88	18689	Kikule Dispensary	Level 2	Muthesya	Masinga
89	11995	Ekalakala Health Centre	Level 3	Ekalakala	Masinga
90	12375	Kivaa Health Centre	Level 3	Kivaa	Masinga
91	12466	Mananja Health Centre	Level 3	Ndithini	Masinga
92	12101	Itunduimuni Health Centre	Level 3	Ekalakala	Masinga
93	12136	Kakongo Dispensary	Level 2	Ekalakala	Masinga

C MACHAKOS COUNTY FACILITIES FOR DEVOLVED TESTING OF COVID-19

S No	MFL Code	Facility name	Level	ward	sub county
94	11931	Apdk Dispensary (Machakos)	Level 2	Machakos Central	Machakos
95	21939	Kyanzasu Dispensary	Level 2	Muvuti/Kiima-Kimwe	Machakos
96	21938	KITANGA DISPENSARY	Level 2	Mua	Machakos
97	12048	GK Prison Dispensary (Machakos)	Level 2	Machakos Central	Machakos
98	21677	Mikuyu Dispensary	Level 2	Mua	Machakos
99	12167	Kamuthanga Dispensary	Level 2	Mutituni	Machakos
100	21672	Ikulu Dispensary	Level 2	Muvuti/Kiima-Kimwe	Machakos
101	12548	Mua Hills Dispensary	Level 2	Mua	Machakos
102	18873	Wondeni Dispensary	Level 2	Muvuti/Kiima-Kimwe	Machakos
103	18586	Iluvya Dispensary	Level 2	Muvuti/Kiima-Kimwe	Machakos
104	18397	Makyau Dispensary	Level 2	Mua	Machakos
105	12616	Muvuti Dispensary	Level 2	Muvuti/Kiima-Kimwe	Machakos
106	12728	School For The Deaf (Machakos)	Level 2	Muvuti/Kiima-Kimwe	Machakos
107	11932	Approved School Dispensary (Machakos)	Level 2	Muvuti/Kiima-Kimwe	Machakos
108	24794	Machakos Peoples Park Dispensary	Level 2	Machakos Central	Machakos
109	17643	Kititu Dispensary	Level 2	Kola	Kalama
110	12687	Nzaini Dispensary	Level 2	Kola	Kalama
111	12612	Muumandu Health Center	Level 3	Kola	Kalama
112	12247	Katumani Dispensary	Level 2	Kalama	Kalama
113	12381	Kola Health Centre	Level 3	Kola	Kalama
114	12304	Kiitini Dispensary	Level 2	Kalama	Kalama
115	12317	Kimutwa Dispensary	Level 2	Kalama	Kalama
116	21675	Mutuyu Dispensary	Level 2	Kalama	Kalama
117	24062	Mbuani Dispensary	Level 2	Kola	Kalama
118	21440	Ivutini Dispensary	Level 2	Kalama	Kalama
119	12411	Kyawalia Dispensary	Level 2	Kalama	Kalama
120	21440	Ivutini Dispensary	Level 2	Kalama	Kalama

D MOMBASA COUNTY FACILITIES FOR DEVOLVED TESTING OF COVID-19

S No.	MFL code	Facility name	Level	Ward	sub county
1	20742	Portreitz Youth Friendly Centre	Level 2	Airport	Changamwe
2	11640	Moi Airport Dispensary	Level 2	Airport	Changamwe
3	11741	Port Reitz MTC Dispensary	Level 2	Airport	Changamwe
4	11254	Bokole CDF Dispensary	Level 2	Airport	Changamwe
5	11538	Magongo (MCM) Dispensary	Level 2	Changamwe	Changamwe
6	11274	Chaani (MCM) Dispensary	Level 2	Chaani	Changamwe
7	17822	Miritini (MCM) Dispensary	Level 2	Miritini	Jomvu
8	11613	Mikindani (MCM) Dispensary	Level 2	Mikindani	Jomvu
9	11437	Jomvu Kuu (MCM) Dispensary	Level 2	Jomvu Kuu	Jomvu
10	11620	Miritini CDF Dispensary	Level 2	Miritini	Jomvu
11	11436	Jomvu Model Health Centre	Level 3	Jomvu Kuu	Jomvu
12	20491	Junda Dispensary	Level 2	Junda	Kisauni
13	18431	Marimani CDF Dispensary	Level 2	Mwakirunge	Kisauni
14	11683	Mwakirunge Dispensary	Level 2	Mwakirunge	Kisauni
15	11397	Shimo Borstal Dispensary (GK Prison)	Level 2	Shanzu	Kisauni
16	11393	Shimo La Tewa Annex Dispensary (GK Prison)	Level 2	Shanzu	Kisauni
17	11873	Utange Dispensary	Level 2	Shanzu	Kisauni
18	11582	Maunguja Dispensary	Level 2	Mwakirunge	Kisauni
19	11395	Shimo-La Tewa Health Centre (GK Prison)	Level 3	Shanzu	Kisauni
20	11785	Shika Adabu (MCM) Dispensary	Level 2	Shika Adabu	Likoni
21	11669	Mtongwe (MCM) Dispensary	Level 2	Mtongwe	Likoni
22	11723	Nys Dispensary (Likoni)	Level 2	Mtongwe	Likoni
23	19606	Mrima CDF Health Cenre	Level 3	Timbwani	Likoni
24	11592	Mbuta Model Health Centre	Level 3	Mtongwe	Likoni
25	22989	Mombasa Huduma Center VCT Site	Level 2	Mji Wa Kale/Makadara	Mvita
26	20741	Regional Blood Transfusion Center (Coast)	Level 2	Tudor	Mvita
27	19653	Alms House Dispensary (Tudor)	Level 2	Tudor	Mvita
28	18450	KWS VCT	Level 2	Mji Wa Kale/Makadara	Mvita
29	18427	University of Nairobi Staff Students Clinic	Level 2	Shimanzi/Ganjoni	Mvita
30	18212	Kenya Ports Authority Staff Clinic	Level 2	Shimanzi/Ganjoni	Mvita
31	18211	Railway Dispensary	Level 2	Shimanzi/Ganjoni	Mvita
32	17627	Technical University of Mombasa Clinic	Level 2	Tudor	Mvita
33	17622	Mbaraki Police VCT	Level 2	Shimanzi/Ganjoni	Mvita
34	17534	Kenyatta University Health Unit Mombasa Campus	Level 2	Mji Wa Kale/Makadara	Mvita
35	11541	Majengo Dispensary (Mombasa)	Level 2	Majengo	Mvita
36	11831	State House Dispensary (Mombasa)	Level 2	Mji Wa Kale/Makadara	Mvita
37	11273	Cdc Ganjoni Dispensary	Level 2	Shimanzi/Ganjoni	Mvita
38	11697	Mwembe Tayari Dispensary	Level 2	Tononoka	Mvita
39	11303	King'orani Prison Dispensary	Level 2	Majengo	Mvita
40	11679	Mvita Dispensary	Level 2	Majengo	Mvita
41	11854	Tononoka Administration Police Dispensary & VCT	Level 2	Tononoka	Mvita
42	17233	Maweni CDF Dispensary (Kongowea)	Level 2	Mkomani	Nyali
43	11722	Nyali Barracks Dispensary	Level 2	Mkomani	Nyali
44	11239	Bamburi Dispensary	Level 2	Kadzandani	Nyali
45	22086	Ziwa la ngo'mbe Health centre	Level 3	Ziwa La Ng'ombe	Nyali
46	18210	Mlaleo Health Centre (MOH)	Level 3	Frere Town	Nyali
47	17911	Kisauni Health Centre	Level 3	Frere Town	Nyali
48	11499	Kongowea Health Centre	Level 3	Kongowea	Nyali

E KAJIADO COUNTY FACILITIES FOR DEVOLVED TESTING OF COVID-19

Code	Name	Keph level	Facility type	Sub county	Ward	HCWs	CHVs
26934	Ilpartimaro Dispensary	Level 2	Dispensary	Kajiado Central	Matapato North	2	2
22654	Nentonai Dispensary	Level 2	Dispensary	Kajiado Central	Matapato North	2	2
22518	Maili Tisa Dispensary	Level 2	Dispensary	Kajiado Central	Matapato South	2	2
22517	Kumpa Dispensary	Level 2	Dispensary	Kajiado Central	Purko	2	2
21950	Eluanata Dispensary	Level 2	Dispensary	Kajiado Central	Matapato South	2	2
21430	Irmarba Dispensary	Level 2	Dispensary	Kajiado Central	Matapato North	2	2
14259	Bissil Health Centre	Level 3	Basic Health Centre	Kajiado Central	Matapato North	2	5
14463	Enkorika Health Centre	Level 3	Basic Health Centre	Kajiado Central	Dalalekutuk	2	5
14451	Emurua Dikir Dispensary	Level 2	Dispensary	Kajiado Central	Matapato North	2	2
15087	Lorngoswa Dispensary	Level 2	Dispensary	Kajiado Central	Matapato North	2	2
15122	Maparasha Dispensary	Level 2	Dispensary	Kajiado Central	Matapato North	2	2
15294	Namanga Health Centre	Level 3	Basic Health Centre	Kajiado Central	Matapato South	2	5
15515	Sajiloni Dispensary	Level 2	Dispensary	Kajiado Central	Dalalekutuk	2	2
16426	Pelewa Dispensary	Level 2	Dispensary	Kajiado Central	Dalalekutuk	2	2
16429	Meto Dispensary	Level 2	Dispensary	Kajiado Central	Matapato South	2	2
15109	Mailwa Dispensary	Level 2	Dispensary	Kajiado Central	Matapato South	2	2
15340	Ngatataek Health Centre	Level 3	Basic Health Centre	Kajiado Central	Matapato North	2	5
21472	Kima Dispensary	Level 2	Dispensary	Kajiado East	Imaroro	2	2
21473	Kiloh Dispensary	Level 2	Dispensary	Kajiado East	Imaroro	2	2
24893	Samuli Dispensary	Level 2	Dispensary	Kajiado East	Kenyawa-poka	2	2
21904	Osarai Dispensary	Level 2	Dispensary	Kajiado East	Imaroro	2	2
18511	Olturoto Dispensary	Level 2	Dispensary	Kajiado East	Kaputiei North	2	2
18284	Ngatu CDF	Level 2	Dispensary	Kajiado East	Imaroro	2	2
18088	Oloosirkon Dispensary	Level 2	Dispensary	Kajiado East	Oloosirkon/Sholinke	2	2
15150	Mashuru Health Centre	Level 3	Basic Health Centre	Kajiado East	Imaroro	2	5
14475	Ereteti Dispensary	Level 2	Dispensary	Kajiado East	Kaputiei North	2	2
14441	Emaroro Dispensary	Level 2	Dispensary	Kajiado East	Imaroro	2	2
14517	GK Prison Dispensary (Athi Riv	Level 2	Dispensary	Kajiado East	Oloosirkon/Sholinke	2	2
14565	Ilkilinyet Dispensary	Level 2	Dispensary	Kajiado East	Kenyawa-poka	2	2
15041	Ilpolosat Dispensary	Level 2	Dispensary	Kajiado East	Kaputiei North	2	2
14460	Enkirgir Dispensary	Level 2	Dispensary	Kajiado East	Kaputiei North	2	2
14582	Isinya Health Centre	Level 3	Basic Health Centre	Kajiado East	Kaputiei North	2	5
15574	Simba Health Centre	Level 3	Basic Health Centre	Kajiado East	Kenyawa-poka	2	5
25961	Gataka Dispensary	Level 2	Dispensary	Kajiado North	Nkaimurunya	2	5
25184	Olekasasi Health Centre	Level 3	Basic Health Centre	Kajiado North	Ongata Rongai	2	5
22612	Matasia Health Centre	Level 3	Basic Health Centre	Kajiado North	Olkeri	2	5
17799	Ololua Dispensary	Level 2	Dispensary	Kajiado North	Oloolua	2	5
19724	Ilparakuo Dispensary	Level 2	Dispensary	Kajiado West	Magadi	2	2
15419	Oloiyangalani Dispensary	Level 2	Dispensary	Kajiado West	Keekonyokie	2	2
14469	Entasopia Health Centre	Level 3	Basic Health Centre	Kajiado West	Magadi	2	5
15185	Mile 46 Health Centre	Level 3	Basic Health Centre	Kajiado West	Iloodokilani	2	5
14486	Ewuaso Kedong Health Centre	Level 3	Basic Health Centre	Kajiado West	Ewuaso Oo Nkidong'i	2	5
16427	Esonorua Dispensary	Level 2	Dispensary	Kajiado West	Keekonyokie	2	2
15393	Oldonyo Nyokie Dispensary	Level 2	Dispensary	Kajiado West	Magadi	2	2
15418	Oloika Dispensary	Level 2	Dispensary	Kajiado West	Magadi	2	2
15425	Olooseos Dispensary	Level 2	Dispensary	Kajiado West	Keekonyokie	2	2
15513	Saikeri Dispensary	Level 2	Dispensary	Kajiado West	Ewuaso Oo Nkidong'i	2	2
15582	Singiraine Dispensary	Level 2	Dispensary	Kajiado West	Iloodokilani	2	2
16428	Kilonito Dispensary	Level 2	Dispensary	Kajiado West	Iloodokilani	2	2
14541	Olooltepes Dispensary	Level 2	Dispensary	Kajiado West	Keekonyokie	2	2
14957	Kmq Dispensary	Level 2	Dispensary	Kajiado West	Iloodokilani	2	2
15046	Loodoariak Dispensary	Level 2	Dispensary	Kajiado West	Keekonyokie	2	2
15429	Olosho-Oibor Dispensary	Level 2	Dispensary	Kajiado West	Ewuaso Oo Nkidong'i	2	2
15434	Oltepesi Dispensary	Level 2	Dispensary	Kajiado West	Keekonyokie	2	2

F KAJIADO COUNTY FACILITIES FOR DEVOLVED TESTING OF COVID-19

15560	Shompole Health Centre	Level 3	Basic Health Centre	Kajiado West	Magadi	2	5
28398	Impiron Dispensary	Level 2	Dispensary	Loitokitok	Kimana	2	2
22605	Inkariak Ronkena Dispensary	Level 2	Dispensary	Loitokitok	Kimana	2	2
22602	Enkongu Narok Dispensary	Level 2	Dispensary	Loitokitok	Entonet/Lenkism	2	2
21435	Olchorro Dispensary	Level 2	Dispensary	Loitokitok	Entonet/Lenkism	2	2
20762	Kuku Dispensary	Level 2	Dispensary	Loitokitok	Kuku	2	2
20761	Oloirien Dispensary	Level 2	Dispensary	Loitokitok	Rombo	2	2
20372	Illasit Health Centre	Level 3	Basic Health Centre	Loitokitok	Rombo	2	5
19108	Imbirikani Dispensary	Level 2	Dispensary	Loitokitok	Imbrikani/Eselelnkei	2	2
17671	Oldoinyo Oibor Dispensary	Level 2	Dispensary	Loitokitok	Kimana	2	2
17053	Ilchalai Dispensary	Level 2	Dispensary	Loitokitok	Imbrikani/Eselelnkei	2	2
14467	Entarara Health Centre	Level 3	Basic Health Centre	Loitokitok	Rombo	2	5
14569	Iltilal Health Centre	Level 3	Basic Health Centre	Loitokitok	Kuku	2	5
14573	Immurtot Health Centre	Level 3	Basic Health Centre	Loitokitok	Entonet/Lenkism	2	5
14581	Isinet Health Centre	Level 3	Basic Health Centre	Loitokitok	Imbrikani/Eselelnkei	2	5
14868	Kimana Health Centre	Level 3	Basic Health Centre	Loitokitok	Kimana	2	5
15359	Njukini Health Centre	Level 3	Basic Health Centre	Loitokitok	Rombo	2	5
15012	Langata Enkima Dispensary	Level 2	Dispensary	Loitokitok	Kuku	2	2
15361	Nkama Dispensary	Level 2	Dispensary	Loitokitok	Kuku	2	2
15296	Namelok Health Centre	Level 3	Basic Health Centre	Loitokitok	Kimana	2	5
15426	Olorika Dispensary	Level 2	Dispensary	Loitokitok	Kuku	2	2
14200	Amboseli Dispensary	Level 2	Dispensary	Loitokitok	Entonet/Lenkism	2	2
15402	Olgulului Health Centre	Level 3	Basic Health Centre	Loitokitok	Entonet/Lenkism	2	5

G ETHICAL APPROVAL FOR THE DEVOLVED TESTING PROJECT

JOMO KENYATTA UNIVERSITY OF AGRICULTURE AND TECHNOLOGY
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(Office of the Deputy Vice Chancellor, Research Production and Extension Division)

JKUAT INSTITUTIONAL SCIENTIFIC AND ETHICAL REVIEW COMMITTEE

REF: JKU/2/4/896B **Date: 13th December 2022**

PROF. SIMON KARANJA
SCHOOL OF PUBLIC HEALTH, JKUAT

Dear Prof. Karanja,

RE: ENHANCEMENT OF ACCESS TO COVID-19 & TB SIMULTANEOUS SCREENING, COVID-19 TESTING USING AG-RDTS AND LINKAGE TO CARE IN SELECTED COUNTIES IN KENYA VIA CHV LED DOOR-TO-DOOR TESTING AND HEALTH FACILITY TESTING AT LEVELS 2 AND 3

This is to inform you that JKUAT Institutional Scientific and Ethical Review Committee has reviewed and approved your above research proposal. Your application approval number is **JKU/ISERC/02316/0798.** The approval period is **13th December 2022** to **12th December 2023.**

This approval is subject to compliance with the following requirements;

i. Only approved documents including (informed consents, study instruments, MTA) will be used
ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by JKUAT ISERC.
iii. Death and life threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to JKUAT ISERC within 72 hours of notification
iv. Any changes, anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to JKUAT ISERC within 72 hours
v. Clearance for export of biological specimens must be obtained from relevant institutions.
vi. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal.
vii. Submission of an executive summary report within 90 days upon completion of the study to JKUAT ISERC.

Prior to commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology and Innovation (NACOSTI) https://oris.nacosti.go.ke and also obtain other clearances needed.

Yours sincerely

Dr Patrick Mburugu
CHAIR, JKUAT ISERC

JKUAT is ISO 9001:2015 and ISO 14001:*2015 certified*
Setting Trends in Higher Education, Research, Innovation and Entrepreneurship

H COMMUNITY REFERRAL FORM

Annex 7

MOH 100: COMMUNITY REFERRAL FORM

REPUBLIC OF KENYA
MINISTRY OF HEALTH

Community Health Services
"Afya Yetu, Jukumu Letu"

MOH 100: COMMUNITY REFERRAL FORM

SECTION A: Patient /Client Data	
Date:	Time of referral:
Name of the patient:	
Sex: Male ☐ Female ☐	Age:
Name of Community Health Unit:	
Name of Link Health Facility:	
Reason(s) for Referral	
Main problem(s):	
Treatment given:	
Comments:	
CHV Referring the Patient:	
Name:	Mobile No:
Village/Estate:	Sub Location:
Location:	
Name of the community unit:	
Receiving Officer:	
Date:	Time:
Name of the officer:	
Profession:	
Name of the Health facility:	
Action taken:	
SECTION B : Referral back to the Community	
Name of the officer:	Mobile No:
Name of CHV:	Mobile No:
Name of the community unit:	
Call made by referring officer: Yes: ☐ No: ☐	
Kindly do the following to the patient: 1. 2. 3.	

Official Rubber Stamp & Signature _____

I HOUSEHOLD REGISTER

Annex 2
HOUSEHOLD REGISTER
MOH 513

REPUBLIC OF KENYA – MINISTRY OF HEALTH

HOUSEHOLD REGISTER
MOH 513

NAME OF CHU:	
MCHUL CODE:	
LINK FACILITY:	
NAME OF CHV:	
NAME OF VILLAGE:	
START DATE:	
COUNTY:	
SUB COUNTY:	
DIVISION:	
LOCATION:	
SUB LOCATION:	
END DATE:	

INSTRUCTIONS ABOUT THE USE OF THE TOOL	
DESCRIPTION	The household register is a record where we write major household events or services at the household registration and after every six months. The Head of the Household should be able to respond and give detailed information about the household.
What type of information is collected?	The basic information collected is factual data on what was identified in the household. Basically the tool collects information for individual members as well as collective information for the entire household.
Who should fill?	The CHVs
When and to whom it should be submitted?	The Household register should be updated with information from the household at the beginning and after every SIX (6) Months. It should be submitted to the CHEW immediately after completion of household registration.

J SERVICE DELIVERY LOGBOOK

Annex 3
SERVICE DELIVERY LOG BOOK
MOH 514

REPUBLIC OF KENYA – MINISTRY OF HEALTH

SERVICE DELIVERY LOG BOOK
MOH 514

NAME OF CHU:	
MCHUL CODE:	
LINK FACILITY:	
NAME OF CHV:	
NUMBER OF HH:	
START DATE:	
COUNTY:	
SUB COUNTY:	
DIVISION:	
LOCATION:	
SUB LOCATION:	
END DATE:	

INSTRUCTIONS ABOUT THE USE OF THE TOOL	
DESCRIPTION	The Service Delivery Log Book is a diary that is used to collect information from the household during the period of offering a health service, health messages or defaulter traced. The Service Delivery Log Book gives the numerator for measuring the effort of the CHV.
What type of information is collected?	The basic information collected is factual data based on what was done or identified in the community, among households and/or individual (s) served. The Service Delivery Log Book measures the actual CHV's effort and should be written or filled during the household visitation.
Who should fill?	CHVs
When and to whom it should be submitted?	The Service Delivery Log Book should be submitted to the CHEW for summarization by 2nd of the following month.

K COMMUNITY HEALTH EXTENSION WORKER SUMMARY

Annex 5
COMMUNITY HEALTH EXTENSION WORKERS SUMMARY MOH 515

REPUBLIC OF KENYA – MINISTRY OF HEALTH

COMMUNITY HEALTH EXTENSION WORKERS SUMMARY MOH 515

NAME OF CHU:	
MCHUL CODE:	
LINK FACILITY:	
NAME OF CHEW:	
NUMBER OF HH:	
COUNTY:	
SUB COUNTY:	
DIVISION:	
LOCATION:	
SUB LOCATION:	
START DATE:	
END DATE:	

INSTRUCTIONS ABOUT THE USE OF THE TOOL	
DESCRIPTION	This tool is the monthly summary of the CHVs efforts and services offered at the household levels. "
What type of information collected?	The information collected measures the CHV's efforts and services offered at the household level. It shows the Community Health Unit (CHU) Outputs.
Who should fill?	The tool is filled by the CHEW using the information from the Community Service Log Book, Treatment and Tracking Register and Commodity Register (at the end of every Month) and from the Household Register (after six months)."
When and to whom it should be submitted?	The tool is to be filled monthly. The information is submitted to the sub-county community health focal person by 5th of the following month. The information captured on the CHEW summary is used to fill the Chalk Board (MOH 516) for dialogue."

L TB SCREENING BY CHPS IN MOMBASA COUNTY

S.No	Sub-county	Ward	Health facility	Referrals made (MoH 100)	Samples collected	Samples tested	Positive cases	Enrolled into care	Contacts screened
1	CHANGAMWE	AIRPORT	BOKOLE CDF	15	9	7	0	0	0
2		CHAANI	CGTRH CHAANI	10	3	2	0	0	0
3		CHANGAMWE	MAGONGO MCM	13	5	2	1	1	1
4		PORTREIZT	PORTREIZT SCH	11	2	2	0	0	0
5	JOMVU	MIRITINI	MIRITINI CDF	108	108	108	20	20	17
6		MIKINDANI	MIKINDANI MCM	40	40	40	2	2	3
7		JOMVU KUU	JOMVU MODEL	2	2	2	1	1	2
8		JOMVU KUU	JOMVU KUU DISP	2	2	2	0	0	0
9	KISAUNI	SHANZU	SHIMO MAIN	13	6	6	0	0	0
10		BAMBURI	SHIMO ANNEX	11	0	0	0	0	0
11		MTOPANGA	VIKWATANI	16	3	3	0	0	0
12		JUNDA	JUNDA DISPENSARY	5	0	0	0	0	0
13		SHANZU	SHIMO BORSTAL	6	3	3	1	1	0
14		MAGOGONI/MJAMBERE	MLALEO	47	8	8	7	6	0
15		MWAKIRUNGE	MWAKIRUNGE	0	0	0	0	0	0
16	LIKONI	TIMBWANI /BOFU	LIKONI SCH	8	2	2	0	0	12
17		MTONGWE	MTONGWE/MBUTA	28	18	16	6	6	34
18		MTONGWE	NYS	3	2	2	1	1	8
19		TIMBWANI/LIKONI	MRIMA	4	2	2	0	0	9
20		SHIKA ADABU	SHIKAADABU	0	0	0	0	0	0
21	MVITA	TONONOKA	AP TONONOKA DISP	1	1	1	1	1	0
22		MAJENGO	MVITA HC	1	1	1	2	2	2
23		MAJENGO	MAJENGO DISP	8	8	8	1	0	0
24	NYALI	KONGOWEA	KONGOWEA HC	5	2	2	0	0	0
25		ZIWA LA NG'OMBE	ZIWA LA NG'OMBE HC	3	2	2	0	0	0
26		MAWENI	MAWENI DISP	3	3	3	2	2	9
27		FRERETOWN	KISAUNI DISP	4	2	0	0	0	0
28		KADZANDANI	BAMBURI DISP	4	1	1	1	1	4
			TOTALS	**371**	**235**	**225**	**46**	**44**	**101**

M TB SCREENING BY CHPS IN MACHAKOS COUNTY

S.No	Sub-county	Ward	Health facility	Referrals made (MoH 100)	Samples collected	Samples tested	Positive cases	Enrolled into care	Contacts screened
1	KALAMA	KOLA	MUUMANDU HC	15	15	15	0	0	0
2		KOLA	KOLA HC	4	4	4	0	0	0
3		KOLA	KYAWALIA DISP	8	8	8	0	0	0
4		KALAMA	KALAMA HC	15	15	15	0	0	0
5		KALAMA	KIMUTWA HC	12	12	12	0	0	0
6	KANGUNDO	CENTRAL	KANGUNDO LEVEL 4 HOSP	3	2	2	1	1	0
7		NORTH	NDUNDUNI DISP	2	2	2	0	0	0
8		WEST	MUKUNIKE HC	2	2	2	0	0	0
9	MASINGA	EKALAKALA	EKALAKALA HC	3	3	3	0	0	0
10		KIVAA	KITHYOKO HC	2	2	2	0	0	0
11		MASINGA CENTRAL	KANG'ONDE DISP	2	2	2	0	0	0
12		MUTHESYA	KATHUKINI DISP	3	3	3	0	0	0
13		NDITHINI	NDELA DISP	2	2	2	0	0	0
14	KATHIANI	MITABONI	MITABONI HC	42	42	42	3	3	0
15		LOWER KAEWA	KAANI DISP	20	20	20	1	1	0
16		KATHIANI CENTRAL	MUTITU DISP	0	0	0	0	0	0
17		UPPER KAEWA	KAVIANI HC	0	0	0	0	0	0
18		MITABONI	THINU HC	0	0	0	0	0	0
19		LOWER KAEWA	ITHAENI DISP	5	5	5	0	0	0
20	MACHAKOS	MUTITUNI	MUTITU LEVEL 4 HOSP	8	0	0	0	0	0
21		KIIMA KIMWE	APPROVED SCHOOL DISP	0	0	0	0	0	0
22		CENTRAL	G.K PRISON DISP	0	0	0	0	0	0
23		CENTRAL	MACHAKOS LEVEL 5 HOSP	0	0	0	0	0	0
24	MATUNGULU	MATUNGULU WEST	NGULUNI HC	86	2	2			0
			TOTAL	234	141	141	5	5	0

N TB SCREENING BY CHPS IN KAJIADO COUNTY

S.No	Sub-county	Ward	Health facility	Referrals made (MoH 100)	Samples collected	Samples tested	Positive cases	Enrolled into care	Contacts screened
1	KAJIADO CENTRAL	MATAPATO SOUTH	ELUANATA	11	11	11	5	5	27
2		MATAPATO NORTH	MAILUA	4	4	4	0	0	0
3		DALALEKUTUK	ENKORIKA	0	0	0	0	0	0
4		MATAPATO SOUTH	MAILI TISA	1	0	0	0	0	0
5		MATAPATO SOUTH	METO	0	0	0	0	0	0
6		MATAPATO NORTH	BISSIL	6	6	6	5	5	16
7		PURKO	KUMPA	0	0	0	0	0	0
8		MATAPATO NORTH	MAPARASHA	0	0	0	0	0	0
9		DALALEKUTUK	SAJILONI	0	0	0	0	0	0
10		MATAPATO SOUTH	NAMANGA	0	0	0	0	0	0
11		DALALEKUTUK	PELEWA	3	3	3	2	2	
12		MATAPATO NORTH	NENTONAI	0	0	0	0	0	0
13		MATAPATO NORTH	ILPATMARO	0	0	0	0	0	0
14		MATAPATO NORTH	NGATATAEK	3	0	0	0	0	0
15		MATAPATO NORTH	EMURUA DIKIRR	0	0	0	0	0	0
16		MATAPATO NORTH	IMARBA	0	0	0	0	0	0
17		MATAPATO NORTH	LONGOSUA	0	0	0	0	0	0
18	KAJIADO NORTH	OLKERI	MATASIA	5	5	5	2	2	0
19		ONGATA RONGAI	OLEKASASI	10	10	10	1	1	0
20		OLOOLUA	OLOOLUA DISP	6	6	6	2	2	0
21	KAJIADO WEST	KEEKONYOKIE	OLTEPESI DISPENSARY	196	31	31	3	3	0
22		LOODOKILANI	MILE 46 HC	6	37	37	2	2	0
23		EWASO KEDONG	EWASO KEDONG HC	5	42	42	5	5	0
24		MAGADI	SHMPOLE DISPENSARY	2	4	4	0	0	0
25		MAGADI	ENTASOPIA HC	10	22	22	7		0
26	KAJIADO EAST	OLOOSIRKON/SHOLINKE	GK PRISON	310	56	56	34	34	0
27		KAPUTIEI NORTH	ISINYA	132	32	32	19	19	0
28		KAPUTIEI NORTH	OLTUROTO	8	5	5	3	3	0
29		IMARORO	MASHURU	36	8	8	5	5	0
30		IMARORO	IMARORO	21	6	6	2	2	0
31		OLOOSIRKON/SHOLINKE	OLOOSIRKON	28	15	15	7	7	0
32		KITENGELA	GK PRISON	287	41	41	21	21	0
33		MASIMBA	KENYAWA POKA	31	9	9	5	5	0
			TOTAL	**1121**	**353**	**353**	**130**	**123**	**43**

O TB SCREENING BY CHPS IN NAIROBI COUNTY

S.No	Sub-county	Ward	Health facility	Referrals made (MoH 100)	Samples collected	Samples tested	Positive cases	Enrolled into care	Contacts screened
1	DAGORETTI SOUTH	GATINA	GATINA DISP	75	75	75	2	2	10
2		KAWANGWARE	RIRUTA HC	250	250	250	33	33	92
3		RUTHIMITU	CHANDARIA HC	54	54	54	1	1	5
4		WAITHAKA	WAITHAKA HC	34	55	55	1	1	0
5	EMBAKASI EAST	EMBAKASI	EMBAKASI HC	50	50	50	1	1	0
6		MIHANGO	KAYOLE SOWETO	20	5	5	0	0	0
7	EMBAKASI NORTH	DANDORA PHASE 3	DANDORA II HC	0	0	0	0	0	0
8		KARIOBANGI	KARIBANGI NORTH HC	20	20	20	4	4	25
9	EMBAKASI SOUTH	IMARA	MUKURU HC	250	179	179	27	27	0
10		KWA NJENGA	NJENGA HOSP	107	63	63	2	2	3
11	EMBAKASI WEST	KAYOLE NORTH	KAYOLE I HC	22	4	4	0	0	0
12		KAYOLE SOUTH	KAYOLE II HOSP	12	12	12	0	0	0
13		MOWLEM	KARIOBANGI SOUTH	15	4	4	0	0	0
14		UMOJA	UMOJA HC	3	3	3	0	0	0
15	KAMUKUNJI	AIRBASE	EASTLEIGH HC	14	14	14	0	0	34
16		PUMWANI	PUMWANI MAJENJO DISP	20	20	20	0	0	0
17		CALIFONIA	BIAFRA LIONS	2	2	2	0	0	0
18	KASARANI	CLAY CITY	MAJI MAZURI DISP	25	25	25	9	9	67
19		NJIRU	NJIRU HOSP	0	0	0	0	0	0
20		RUAI	RUAI HC	5	5	5	1	1	5
21	KIBRA	MAKINA	KIBERA DO HC	24	24	24	0	0	0
22	LANGATA	HIGHRISE	SILANGA DISP	49	49	49	3	3	0
23		KAREN	KAREN HC	22	20	20	3	3	0
24		LAINI SABA	KIBERA AMREF	75	75	75	6	6	12
25		MUGUMOINI	LANGATA SUBCOUNTY HOSP	66	66	66	6	6	0
26		MUGUMOINI	LANGATA WOMEN PRISON	88	3	3	1	1	0
27		NAROBI WEST	NAIROBI WEST PRISON	156	0	0	0	0	0
28	RUARAKA	BABADOGO	BABADOGO HC	24	117	117	13	13	66
29		KAHAWA WEST	KAHAWA WEST HC	14	300	300	14	14	50
30		KOROGOCHO	KOROGOCHO HC	30	18	18	0	0	0
31		MATHARE NORTH	MATHARE NORTH HC	9	9	9	1	1	0
32	STAREHE	KIAMAIKO	KIAMAIKO DISP	20	20	20	0	0	0
33		LANDMAWE	LOCO HC	10	10	10	0	0	0
34		NAIROBI SOUTH B	NAIROBI SOUTH B DISP	3	3	3	0	0	0
35		NAIROBI SOUTH B	SOUTH B POLICE BAND DISP	10	10	10	0	0	0
36		NGEI	HURUMA LIONS DISP	103	303	303	44	44	712
37		PARK ROAD	NGARA HC	11	11	11	0	0	0
38	WESTLANDS	GICHAGI	GICHAGI DISP	18	75	75	3	3	4
39		KARURA	KARURA HC	0	5	5	1	1	0
40		LOWER KABETE	LOWER KABETE DISP.	37	37	37	1	1	4
41		WESTLANDS	WESTLANDS HC	130	130	130	10	10	0
42	MAKADARA	VIWANDANI	LUNGALUNGA HC	26	26	26	0	0	0
43		HAMZA/MARINGO	BAHATI HOSP	8	8	8	0	0	0
44		MAKONGENI	KALOLENI DISP	25	25	25	2	2	0
45		HAMZA/MARINGO	MAKADARA HOSP	9	9	9	0	0	0
46		HAMZA	JERICHO HC	4	3	3	0	0	0
			TOTAL	**1,949**	**2,196**	**2,196**	**189**	**189**	**1,089**