FACTORS INFLUENCING PERFORMANCE OF INTERGRATED DISEASE SURVEILLANCE AND RESPONSE SYSTEM IN PUBLIC HEALTH FACILITIES IN NAIROBI COUNTY, KENYA

CATHERINE BRENDA WAKHUTU

SHS/MPH/5838-1/2023

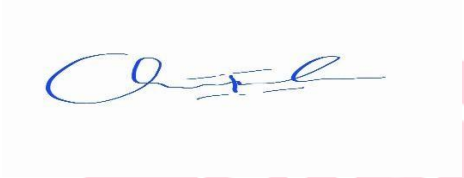
A RESEARCH THESIS SUBMITTED TO THE DEPARTMENT OF COMMUNITY HEALTH, SCHOOL OF PUBLIC HEALTH IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF MASTER OF PUBLIC HEALTH (APPLIED EPIDEMIOLOGY) OF AMREF INTERNATIONAL UNIVERSITY

JULY 2025

DECLARATION AND APPROVAL

Declaration by Candidate:

This thesis is my original work and has not been presented for a degree in any other university or any other award.



Signature: **Date ……29th June, 2025…...**

Catherine Brenda Wakhutu

SHS/MPH/5838-1/2023

Approval by Supervisors:

This thesis has been submitted for review with our approval as University Supervisors:

Signature … **Date ……29th June, 2025**

Dr. Tom Marwa,

BSc, PGDRM, MPH, PhD

Adjunct Faculty - Amref International University, USAID

Signature …… **Date ……29th June, 2025**

Dr. Joseph Sitienei,

MBChB, MPH, PhD, OM, OGW

Adjunct Faculty– Amref International University, Ministry of Health

COPYRIGHT

DEDICATION

This thesis is dedicated to my Dad, Mr. Francis Wakhutu, whose unwavering belief in education has shaped my academic journey. Your encouragement amidst health challenges has inspired me through postgraduate research. Your enduring commitment to learning continues to influence my academic pursuits. With boundless gratitude for instilling the value of education and unwavering support, I dedicate this achievement to you, my source of strength. Keep fighting, Dad. Your resilience prevails by God's Grace. Wishing you the quickest recovery.

ACKNOWLEDGEMENT

I wish to express my profound gratitude to the Almighty God for granting me strength and guidance to embark on this thesis. His divine grace has been fundamental in shaping my determination and providing the wisdom needed to navigate this scholarly pursuit. My sincere gratitude goes to my family for their unwavering support and encouragement. Their belief in my aspirations has been an endless source of inspiration, fueling my drive to excel in this academic endeavor.

I am deeply thankful to my research supervisors Dr. Tom Marwa and Dr. Joseph Sitienei for their unwavering support, guidance and expertise. Their insightful feedback and mentorship have been pivotal in shaping the direction and depth of this research project.

Special thanks to the Head of the Department, Course Coordinator and the Community Health department at large for their continuous support in fostering an environment conducive to academic growth. Their leadership has played a crucial role in facilitating and encouraging this research project.

ABSTRACT

Background: The recent outbreaks of global infectious diseases outbreaks have underscored the importance of fortifying public health systems in addressing health impacts. Effective control of these illnesses requires well-functioning surveillance systems. The study aimed at determining the factors influencing the performance of IDSR System in public health facilities in Nairobi County, Kenya. It focused on identifying and comprehending the diverse health system factors that affect the efficiency of the IDSR System.

Methods: A cross-sectional mixed-methods design was employed, combining structured questionnaires and key informant interviews. The study involved 113 HCWs stratified sampled across PH health facilities in six sub-counties that were purposively sampled. All statistical analysis was implemented using IBM SPSS version 25 software.

Results: Key barriers identified included inadequate policy guidelines, insufficient funding, bureaucratic challenges, and limited workforce capacity. The logistic regression analysis showed that policy-related barriers and workforce capacity had significant effects on the IDSR system's performance, indicating that improving these areas could enhance overall surveillance and response effectiveness.

Conclusion: The performance of the Integrated Disease Surveillance and Response (IDSR) system in Nairobi County is influenced by a combination of policy-related barriers, workforce capacity issues, and the utilization of surveillance data. Addressing these factors can significantly improve the functionality of the IDSR system.

Recommendations: Nairobi County's health facilities focus on addressing policy-related barriers by establishing clear guidelines and ensuring consistent funding for the IDSR system. Strengthening workforce capacity through regular training, mentorship, and improved supervision is essential to enhance data collection and reporting. Furthermore, efforts should be made to improve data utilization by ensuring timely reporting and effective feedback mechanisms.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ABBREVIATIONS AND ACRONYMS

CDC	Centre for Disease Control
CDSC	County Disease Surveillance Coordinator
CHP	Community Health Promoters
DHIS	Data Health Information System
eIDSR	Electronic Integrated Disease Surveillance and Response
EIOS	Epidemic Intelligence from Open Sources
HCW	Health Care Worker
HFs	Health Facilities
IDSR	Integrated Disease Surveillance and Response
IHR	International Health Regulations
IND	Immediately Notifiable Disease
IRT	Immediately Reportable Disease
KNBS	Kenya National Bureau of Statistics
MOH	Ministry of Health
NACOSTI	National Council of Science, Technology, and Innovation
PHEIC	Public Health Emergency of International Concern
SCHMT	Sub County Health Management Team
SDGs	Sustainable Development Goals
SDSC	Sub-County Disease Surveillance Coordinator
SPSS	Statistical Package for Social Sciences
TGs	Technical Guidelines

WHO	World Health Organization
WHO/AFRO	World Health Organization/African Regional Office
WHORC	World Health Organization Regional Committee

DEFINITION OF TERMS

County: A County in Kenya is a geographical and administrative unit entity established within the devolved system of governance introduced by the 2010 constitution.

Data: Information gathered, especially facts or statistics, to be analyzed, considered, and used to aid decision-making.

Disease: A pathological condition affecting the structure or function of all or part of an organism, not caused by external injury, and capable of spreading within a population.

Facility: A building or structure, whether permanent, semi-permanent, or temporary, utilized for the delivery of county health care services.

Implementation: In health, it refers to the process of putting into practice or executing healthcare interventions, strategies, programs, or policies that have been designed to improve health outcomes.

Integrated Disease Surveillance and Response System: A strategy adopted by countries in the WHO African Region for implementing comprehensive public health surveillance and response systems for priority diseases

Integration: Standardizing diverse approaches, data collection forms, criteria, and case descriptions to ensure uniform data collection and enhance efficiency across all disease prevention and control programs.

Outbreak: The incidence of disease cases surpassing the expected number within a defined community, geographic area, or season.

Performance: Refers to the extent to which health systems meet their overall goals.

Prevalence: The proportion of a population affected by a medical condition or an event of public health significance.

Public Health Facilities: Any hospital, institution or facility which offers health services and/or care, which is operated, owned or controlled by an organ of State e.g. county government.

Response: Measures which attempt to minimize the spread of or effects of a disease outbreak.

Sub-County: An administrative division within a county, representing a smaller unit of governance and administration under the devolved system of government established by the 2010 Kenyan Constitution.

Surveillance: The ongoing, systematic gathering, analysis, and interpretation of health-related data essential for planning, executing, and assessing public health interventions.

Utilization: Use of IDSR data for preparation, determining ongoing training requirements, improving outbreak investigation and response, public awareness, and notifiable diseases, informing infrastructure improvements, resource mobilization, and reviewing procedures and policies.

CHAPTER 1: INTRODUCTION

1.1 Overview

The chapter introduces the topic by outlining the background, identifying the research problem, and formulating key research questions. It also presents the study's objectives, justification, and significance, explaining why the research is important and who stands to benefit from it. Additionally, it outlines the study's scope and underlying assumptions, providing clarity on its boundaries and the conditions presumed during the research process. This foundation sets the stage for the subsequent chapters and overall research framework.

1.2 Background Information

There have been growing efforts globally to combat infectious diseases through different surveillance programs. Public health surveillance systems form a critical part of information systems as a key component within the World Health Organization (WHO) health system framework to addresses these health public challenges. Over the last two decades, Sub-Saharan Africa (SSA) has experienced numerous public health emergencies (PHEs). A PHE is defined as a situation where the health impacts are too significant for standard community responses to manage. Between 2001 and 2022, SSA recorded 1,800 PHEs, most of which were emerging infectious diseases (Mboussou et al., 2019). Emerging infectious diseases refer to new or re-emerging diseases in a population, such as cholera, meningitis, Ebola, measles, yellow fever, monkey pox, Zika, Rift Valley fever, and COVID-19 (WHO, 2022). Various factors contribute to the increase in emerging infectious diseases in SSA, including the adaptation of microorganisms to climate and weather changes, changing ecosystems, and human

susceptibility due to immunosuppression, malnutrition, and inadequate immunization. The region has also seen a rise in zoonotic outbreaks, particularly from monkeypox and Ebola viruses. From 2012 to 2022, zoonotic disease outbreaks increased by 63% compared to 2001–2011. Out of all PHEs from 2001 to 2022, 33% were zoonotic disease outbreaks, with nearly 70% resulting from Ebola virus disease (EVD) and other viral hemorrhagic fevers, and the remaining 30% from diseases such as dengue fever, anthrax, plague, and monkeypox (Moyo et al., 2023). A growing population demanding more animal-derived food has been linked to the increase in zoonotic disease outbreaks. Population growth and urbanization have also led to a reduction in wildlife habitats. Furthermore, SSA faces challenges in managing emerging infectious disease outbreaks due to the region's low per-capita health expenditure and limited healthcare worker availability. This opinion piece examines the issues SSA has faced during past and current emerging infectious disease outbreaks, highlights the strengths that have emerged, and provides recommendations to better prepare for future outbreaks.

In Kenya, the overall crude mortality rate is estimated at 550 per 100,000 people. All-cause mortality rates in the country rose from 850 per 100,000 in 1990 to 902 per 100,000 in 2006, then declined to 519 per 100,000 by 2016 (Waruru et al., 2022). Before the mid-2000s, infectious diseases, especially HIV, were the leading cause of death. However, from 2006 to 2016, deaths from infectious diseases, particularly HIV/AIDS, declined, while non-communicable diseases and injuries became more prominent causes of death. Among non-communicable diseases, cancer has emerged as a major underlying cause of death (UCOD) even in rural areas, and approximately 100,000 Kenyans die annually from hypertension related complications. Hypertension also contributes to 50% of hospital admissions and over 40% of deaths in Kenya

(Waruru et al., 2019). This epidemiological shift may be attributed to changes in population dynamics, as well as individual and environmental factors. The leading recertified UCODs in Kenya in 2016 were HIV (11.0%), lower respiratory infections (9.1%), malaria (5.7%), non-HIV-related tuberculosis (4.0%), diarrheal diseases (3.9%), prematurity and low birth weight (3.7%), digestive diseases (3.5%), and anemia (3.3%) (MOH, 2018). In 2017, pneumonia, malaria, and cancer were among the leading causes of morbidity and mortality.

The International Health Regulations (IHR 2005) within the health system are a legally binding agreement providing a framework to coordinate and manage public health threats. The IHR (2005) necessitated all WHO member states to evaluate ability of their national structures, capacities and resources to achieve effective disease surveillance and response. Prior to IHR (2005), the WHO Regional Office for Africa (WHO-AFRO) and its member states adopted the Integrated Disease Surveillance and Response (IDSR) system. IDSR system framework provided a platform to improve national public health surveillance and response capacities. The IDSR system aims to strengthen the public health system at community, health facility, district, and national levels to ensure timely detection, confirmation and response to public health threats to alleviate illness, disability and mortality. The IDSR strategy was introduced by the WHO Africa Regional Office in 1998 to enhance public health surveillance and response. Kenya embraced the IDSR strategy in 1998, following the WHO Resolution in Harare. The country commenced the implementation of the IDSR 1st Edition Technical Guidelines in 2002. Kenya is currently implementing its third edition which was rolled out in February 2023 (MoH, 2023). The 3rd Ed. IDSR TGs saw an addition of ten communicable diseases from the previous thirty-six epidemic-prone diseases (MoH,

2022). The primary objectives of IDSR encompass not only the detection and monitoring of diseases but also the prompt response to emerging threats, the assessment of disease burden, and the strengthening of health systems to effectively manage and control diseases. By integrating various components of surveillance and response, IDSR fosters a more coherent, efficient, and responsive approach to disease management. IDSR's success hinges on the utilization of information generated through routine surveillance systems, complemented by targeted epidemiological investigations and laboratory confirmation.

Surveillance data serves various purposes, including identifying cases for investigation, estimating disease prevalence, detecting outbreaks, assessing the effectiveness of response and prevention strategies, monitoring changes in infectious agents, facilitating research, and measuring the impacts of changes in healthcare practices (Mwatondo et al., 2016). This amalgamation of data sources enables the rapid identification of disease outbreaks, trends, and risk factors, facilitating evidence-based interventions and control measures. This introductory overview underscores the critical role of IDSR in fortifying global health security. As this framework continues to evolve, it remains pivotal in advancing early detection, rapid response, and effective control of diseases, ultimately safeguarding the health and well-being of populations worldwide. Studies evaluating IDSR Systems in Sub-Saharan Africa have demonstrated several successes in their implementation. These include enhanced utilization of surveillance data at the National level and strengthen communication and coordination between districts and other sectors (WHO, 2019b). To summarize, the prompt implementation of Integrated Disease Surveillance and Response (IDSR) leads to enhanced early detection and reporting of critical diseases, conditions, and events, resulting in a swift and efficient

response. When IDSR is implemented comprehensively across the country, it has demonstrated notable improvements in response time, leading to reduced rates of illness, death, and the duration of outbreaks (WHO, 2019b). In 1998, the WHO African region adopted a strategy called Integrated Disease Surveillance and Response (IDSR). Here, we present the current status of IDSR implementation; and provide some future perspectives for enhancing the IDSR strategy in Africa.

The Integrated Disease Surveillance and Response (IDSR) system is pivotal in managing public health emergencies by ensuring early detection, timely response, and effective control of infectious diseases. However, several gaps undermine the system's performance in public health facilities in Nairobi County, Kenya. Identifying these gaps is crucial for strengthening the IDSR system, especially in densely populated urban areas where the risk of disease outbreaks is high due to rapid urbanization, poor living conditions, and limited access to healthcare.

One of the major gaps that affect the performance of the IDSR system is related to policy inconsistencies and inadequacies. While there are national guidelines for disease surveillance and response, there is often a lack of alignment between national policies and their implementation at the county and facility levels. This misalignment leads to variability in IDSR performance across different public health facilities. Additionally, outdated policies or a lack of comprehensive policy frameworks for new and emerging diseases can hinder effective disease surveillance and response. There is also a gap in policy enforcement, where existing policies are not consistently applied, monitored, or evaluated to ensure compliance and effectiveness.

Another significant gap is the shortage of a well-trained health workforce to manage the IDSR system effectively. The IDSR system's performance is heavily dependent on

the competency and availability of healthcare workers (HCWs). In many public health facilities in Nairobi County, there is a critical shortage of HCWs who are adequately trained in disease surveillance and data management. This shortfall affects timely reporting, data analysis, and decision-making processes essential for managing disease outbreaks. The health workforce is also often burdened by heavy workloads, inadequate staffing levels, and limited access to capacity-building opportunities. As a result, the gaps in workforce training and development create challenges in sustaining a functional and responsive IDSR system. Moreover, there are notable gaps in the utilization of IDSR data for controlling and managing notifiable diseases in public health facilities. Despite the availability of data generated through the IDSR system, there is limited use of this data for decision-making at the facility level. This underutilization of data stems from several factors, including a lack of understanding among healthcare workers of the importance of data-driven decisions, inadequate feedback mechanisms to facilities, and technical challenges such as poor infrastructure and lack of data management tools. Consequently, the failure to effectively utilize IDSR data affects the ability of public health facilities to respond swiftly and appropriately to disease outbreaks, compromising public health safety.

Conducting this study in Kenya, specifically in Nairobi County, was imperative for several reasons. First, Nairobi County, as the capital and most populous county in Kenya, faces a unique set of public health challenges due to rapid urbanization and high population density. These factors create a conducive environment for the spread of infectious diseases, making robust disease surveillance and response systems like IDSR crucial. Nairobi's diverse population, which includes both affluent neighborhoods and densely populated informal settlements in the six sub-counties (Kamukunji, Mathare,

Makadara, Embakasi, Starehe and Kibra) such as Kibera and Mukuru, presents distinct challenges and opportunities for disease control efforts. Understanding the specific factors influencing IDSR performance in this context has provided valuable insights for improving public health interventions in other similar urban settings. Secondly, Kenya has a high burden of communicable diseases, which necessitates efficient and effective surveillance systems to detect, prevent, and respond to potential outbreaks. The IDSR system, as a key component of Kenya's public health strategy, needs to function optimally to mitigate the health impacts of these diseases. By identifying gaps in policy, workforce, and data utilization, the study aimed at providing evidence-based recommendations to strengthen the IDSR system, thereby enhancing the country's capacity to manage public health threats. Finally, the study aligned with Kenya's commitments to global health security frameworks such as the International Health Regulations (IHR) and the Global Health Security Agenda (GHSA). Improving the IDSR system's performance is vital to fulfilling these commitments, as well as achieving sustainable development goals related to health and well-being. The findings from this study help policymakers, healthcare managers, and other stakeholders in Kenya to design targeted interventions that address the identified gaps, ultimately contributing to a more resilient health system capable of withstanding future public health emergencies.

1.3 Problem Statement

The performance of the Integrated Disease Surveillance and Response (IDSR) system in public health facilities in Nairobi County is vital to Kenya's capacity to detect, prevent, and respond to public health emergencies. This need has become increasingly urgent given the rising frequency and scale of infectious disease outbreaks globally and

nationally. According to the Ministry of Health (2022), Kenya has experienced multiple outbreaks in recent years, including cholera, measles, and COVID-19, which have exposed gaps in the country's disease surveillance and response mechanisms. In Nairobi County specifically, the 2020 cholera outbreak affected over 1,200 people, with delayed detection and response contributing to the spread of the disease (MoH, 2021). These events highlight the need for a well-functioning IDSR system that can enable timely and evidence-based public health interventions.

Although Kenya has adopted the WHO-endorsed IDSR framework to improve disease surveillance, public health facilities in Nairobi County continue to face persistent performance challenges. Empirical evidence shows delays in disease reporting and inadequate data quality remain significant barriers. A 2021 report by the Ministry of Health revealed that only 64% of disease surveillance reports from Nairobi County were submitted on time, while just 59% met acceptable standards of data completeness and accuracy. Furthermore, a WHO (2022) assessment of IDSR implementation in East African countries cited Kenya's health workforce capacity and inconsistent policy enforcement as key impediments to effective surveillance.

Policy gaps have been identified as a major constraint to IDSR performance. These include outdated or incomplete surveillance guidelines that do not adequately address emerging infectious threats, a lack of harmonization between national and county health policies, and limited enforcement mechanisms. This has led to inconsistencies in how IDSR is implemented across facilities, weakening the system's effectiveness. Similarly, health workforce-related deficiencies - such as inadequate staffing levels, high workloads, and limited training in IDSR protocols - have further compromised timely reporting and disease analysis. In Nairobi County, interviews conducted by the County

Health Department in 2022 revealed that over 45% of health workers lacked adequate training in disease surveillance, contributing to underreporting and poor data interpretation.

Another critical issue is the underutilization of surveillance data in informing disease control decisions at the facility level. Despite the IDSR system's potential to generate actionable information, the absence of structured feedback mechanisms and poor data management practices limit its utility in guiding outbreak response. The WHO (2022) emphasizes that the effective use of surveillance data is a hallmark of functional public health systems, yet Nairobi's health facilities often fail to translate collected data into timely action.

Given these challenges - policy misalignments, health workforce limitations, and poor data use- there is a compelling need to investigate the underlying factors affecting IDSR system performance in Nairobi County. This study seeks to fill this gap by providing empirical insights and actionable recommendations to strengthen disease surveillance and improve Kenya's preparedness and response to future public health emergencies, in line with WHO's International Health Regulations (IHR 2005) and global health security frameworks.

1.4 Research Questions

i. What are the policy barriers that affect the performance of IDSR system in public health facilities in Nairobi County?
ii. What are the health workforce related gaps that affect the performance of IDSR system in public health facilities in Nairobi County?

iii. What is the level of utilization of IDSR data in controlling and managing of notifiable diseases in public health facilities in Nairobi County?

1.5 Study Objectives

1.5.1 Broad Objective

To determine the factors influencing the Performance of IDSR in Public Health facilities in Nairobi County.

1.5.2 Specific Objectives

i. To analyze policy-related barriers that impacts the performance of the Integrated Disease Surveillance and Response (IDSR) system in public health facilities in Nairobi County.

ii. To evaluate the challenges of the health workforce in performance the IDSR system in public health facilities in Nairobi County.

iii. To assess the effectiveness of IDSR data utilization in the control and management of notifiable infectious diseases in public health facilities located in slums in Nairobi County.

1.6 Study Justification

Infectious diseases remain a leading cause of morbidity and mortality in Kenya, particularly in densely populated urban areas such as Kibera and Mukuru informal settlements in Nairobi County. These areas experience frequent outbreaks of diseases like cholera, typhoid, tuberculosis, and more recently, COVID-19, due to inadequate sanitation, overcrowding, and limited access to quality healthcare services. Despite the implementation of the Integrated Disease Surveillance and Response (IDSR) system - a strategy endorsed by the World Health Organization (WHO) to strengthen disease

detection, reporting, and response - disease control efforts in Nairobi County remain suboptimal. This study is justified on the basis of critical gaps that exist in the performance of the IDSR system, which undermine the County's ability to respond effectively to outbreaks.

Addressing Gaps in Disease Control and Policy Implementation: There is a clear gap between existing IDSR policy frameworks and their operationalization at the facility level. Public health facilities in Nairobi County often lack updated surveillance guidelines, and misalignment between national and county-level health policies leads to inconsistent implementation. Moreover, weak enforcement of IDSR protocols has resulted in fragmented surveillance efforts. This study seeks to identify specific policy-related barriers that limit the performance of the IDSR system and provide evidence-based recommendations to inform the development of context-relevant and enforceable surveillance policies. Strengthening these frameworks is essential for improving disease control and preparedness, especially in high-risk urban areas.

Responding to Health Workforce Deficiencies: The success of IDSR relies heavily on a trained, motivated, and adequately staffed health workforce. However, many public health facilities in Nairobi are faced with chronic shortages of healthcare workers, many of whom lack formal training in disease surveillance. These deficiencies contribute to poor data collection, incomplete reporting, and delayed responses to disease outbreaks. This study is therefore critical in assessing health workforce capacity, skills, and practices related to IDSR, thereby highlighting specific areas where interventions such as training, recruitment, and performance support can enhance surveillance efficiency and responsiveness.

Improving Utilization of Surveillance Data: A key goal of the IDSR system is to generate data that can guide timely and informed public health decision-making. However, many facilities in Nairobi County do not fully utilize the surveillance data they collect due to limited analytical capacity, lack of feedback mechanisms, and weak data management systems. This underutilization results in missed opportunities for early intervention, particularly in informal settlements where disease outbreaks can escalate rapidly. By investigating the extent of data use and associated barriers, this study provides practical recommendations to enhance data-driven decision-making in disease control.

Contribution to Strengthening Public Health Surveillance: Overall, this study contributes to improving the IDSR system in Nairobi County by identifying and addressing specific gaps in policy implementation, workforce capacity, and data utilization. The findings provide actionable insights that can guide county health managers, policymakers, and development partners in designing targeted interventions to strengthen disease surveillance. Enhancing the performance of the IDSR system will not only improve the detection and management of infectious diseases but also build resilience against future health emergencies in vulnerable urban populations.

1.7 Significance of the study and Anticipated Output

The findings of this study may be used by the Nairobi County as well as National disease surveillance programs in control of infectious diseases leading to better public health outcomes by enabling timely interventions, reducing disease transmission, and minimizing the impact of outbreaks. Addressing these factors can ultimately bolster the capacity of public health facilities in Nairobi County to effectively monitor, detect, and

respond to diseases, thereby safeguarding community health and well-being. The research contributed valuable insights to the existing body of knowledge who seek to deepen their understanding of the role of IDSR in disease control.

1.8 Scope of the Study

While the Integrated Disease Surveillance and Response (IDSR) system is critical for managing infectious diseases in urban settings like Nairobi County, there is limited research focused on identifying the specific factors that impact its performance in public health facilities, particularly in slum areas like Kibera and Mukuru. Existing literature often addresses general challenges in healthcare delivery or focuses on individual diseases without comprehensively exploring the systemic factors influencing IDSR's effectiveness. Policy gaps represent a significant research gap. There is insufficient analysis on how inconsistencies in policy formulation, alignment, and implementation at both national and county levels affect the functionality of IDSR in high-risk areas. Without clear policies and guidelines, the IDSR system may fail to deliver timely and effective responses to outbreaks. Similarly, the health workforce-related gaps have not been adequately studied in the context of IDSR. Research often overlooks specific challenges such as inadequate training, lack of motivation, and understaffing that impede the proper collection, analysis, and reporting of surveillance data, crucial for managing diseases like cholera, tuberculosis, and typhoid. Lastly, there is a gap in understanding the utilization of IDSR data in evidence-based decision-making and its impact on disease control. Studies rarely focus on how data is used to guide interventions and manage notifiable diseases in slum settings.

1.9 Assumptions of the Study

Facility Compliance: all public health facilities in Nairobi County are already implementing the IDSR System

Staff Awareness: All HCWs and CHVs have been trained on the IDSR System these facilities possess a comprehensive understanding of IDSR principles, protocols, and their importance in disease surveillance and response.

Governance Support: there is goodwill to support the implementation of the IDSR System by both the County and National government.

Resource Allocation: Resources such as funding, trained personnel, technological infrastructure, and essential equipment required for effective IDSR implementation are equally accessible and distributed among public health facilities and at community level in Nairobi County.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

Infectious diseases, caused by various microorganisms, continue to pose significant challenges to global public health, economies, and societal stability. These illnesses range from common ailments to life-threatening conditions such as tuberculosis, malaria, HIV/AIDS, and COVID-19, leading to substantial morbidity and mortality worldwide (World Health Organization [WHO], 2020). They place immense strain on healthcare systems, disrupt economies, and contribute to social instability, especially in low- and middle-income countries (Centers for Disease Control and Prevention [CDC], 2021). In response, public health programs employ a variety of strategies, including robust disease surveillance systems, rapid outbreak response mechanisms, equitable access to healthcare, ongoing research, and international collaboration to mitigate disease spread and strengthen global health security (WHO, 2018).

Disease surveillance is particularly critical in the early detection and timely response to public health threats, as demonstrated during the COVID-19 pandemic (Gostic et al., 2020). In this regard, the WHO recommends the adoption of Integrated Disease Surveillance and Response (IDSR) to unify the collection, analysis, and use of data on priority diseases and conditions (WHO, 2021). Despite this, many countries still operate fragmented, disease-specific surveillance systems, which undermine the efficiency, coordination, and timeliness of health interventions (Nsubuga et al., 2006). The IDSR framework is intended to enhance surveillance usability and support evidence-based decision-making by enabling health authorities to identify and respond promptly to emerging and endemic health issues (WHO Regional Office for Africa, 2010).

However, the implementation of IDSR continues to encounter significant challenges. Variations in disease definitions, surveillance strategies, and infrastructure across countries contribute to inconsistent adoption and performance (Phalkey et al., 2013). These discrepancies create uncertainty regarding the global utility of the IDSR strategy and its effectiveness in diverse contexts. To address these issues, a proposed mixed-methods study in selected countries aims to examine how IDSR is conceptualized, identify key implementation challenges and opportunities, and recommend solutions to enhance its effectiveness and sustainability.

2.2 Theoretical Framework

The study's key theory was anchored on the Health Systems Theory (HST) and supported by the Diffusion of Innovations Theory, Resource Dependency Theory and the Health Belief Model (HBM). These theoretical frameworks help shape the study's structure, guiding researchers in understanding, analyzing, and interpreting the factors influencing the implementation and performance of IDSR systems within Nairobi County's public health facilities. The chosen framework(s) can guide the identification of variables, data collection methods, and analysis techniques employed in the study.

2.2.1 Health Systems Theory

This theory involves analyzing healthcare delivery systems comprehensively. It explores factors influencing healthcare, encompassing policies, organizations, healthcare professionals, and resources. Within this framework, researchers may examine Nairobi County's healthcare resource availability, workforce capacity, and policy formulation related to disease surveillance.

2.2.2 Diffusion of Innovations Theory

This theory was relevant, focusing on how new ideas or practices, such as the IDSR system, are adopted and disseminated within healthcare settings. It examines the stages of innovation adoption, factors influencing adoption rates, and the role of communication channels in spreading innovations. In this context, the study will explore how IDSR practices are introduced, adopted, and utilized within public health facilities in Nairobi County.

2.2.3 Resource Dependency Theory

This theory examines how organizations depend on resources to function effectively. In the context of the study, it might analyze how Nairobi County's public health facilities depend on various resources, such as funding, training, technological infrastructure, and skilled personnel, to implement and sustain effective IDSR practices.

2.3 Review of Related Literature

2.3.1 Historical Perspectives of IDSR Technical Guidelines

The IDSR Technical Guidelines, initially introduced in 1998, have undergone significant evolution, adapting to emerging global health challenges. Widely adopted by WHO African region member states by 2002, subsequent updates in 2010 and 2018 were prompted by factors such as the implementation of International Health Regulations (IHR) post-2007, the rise of new diseases, disaster risk management strategies, and the increasing burden of non-communicable diseases. The 2018 revision to the 3rd Edition was a response to contemporary events, aligning with the regional Strategy for Health Security and Emergencies 2016-2020. It also capitalized on

technological advancements such as mobile networks and electronic surveillance systems to enhance disease surveillance and response mechanisms (WHO, 2019a).

Notifiable diseases within the IDSR framework are categorized into three tiers based on their urgency and impact. Immediate notifiable diseases, including cholera, plague, Ebola, Lassa fever, and emerging infectious diseases, demand reporting within 24 hours due to their severe threat. The second tier comprises weekly notifiable diseases like measles, rubella, typhoid fever, hepatitis, meningitis, and tuberculosis, necessitating weekly reporting. Monthly notifiable diseases, reported on a monthly basis, form the lowest tier and include conditions like certain sexually transmitted infections, mild influenza strains, brucellosis, and leprosy, holding significance but not requiring immediate attention like the other groups (WHO, 2020).

2.3.2 IDSR Implementation in Kenya

Since its adoption in 1998, the implementation of the IDSR Strategy in Kenya has greatly improved the nation's ability to detect, report, and respond to disease outbreaks. Kenya has made remarkable progress in implementing IDSR, with appointed individuals responsible for overseeing the program in a majority of sub-counties, and the integration of electronic reporting at the county level.

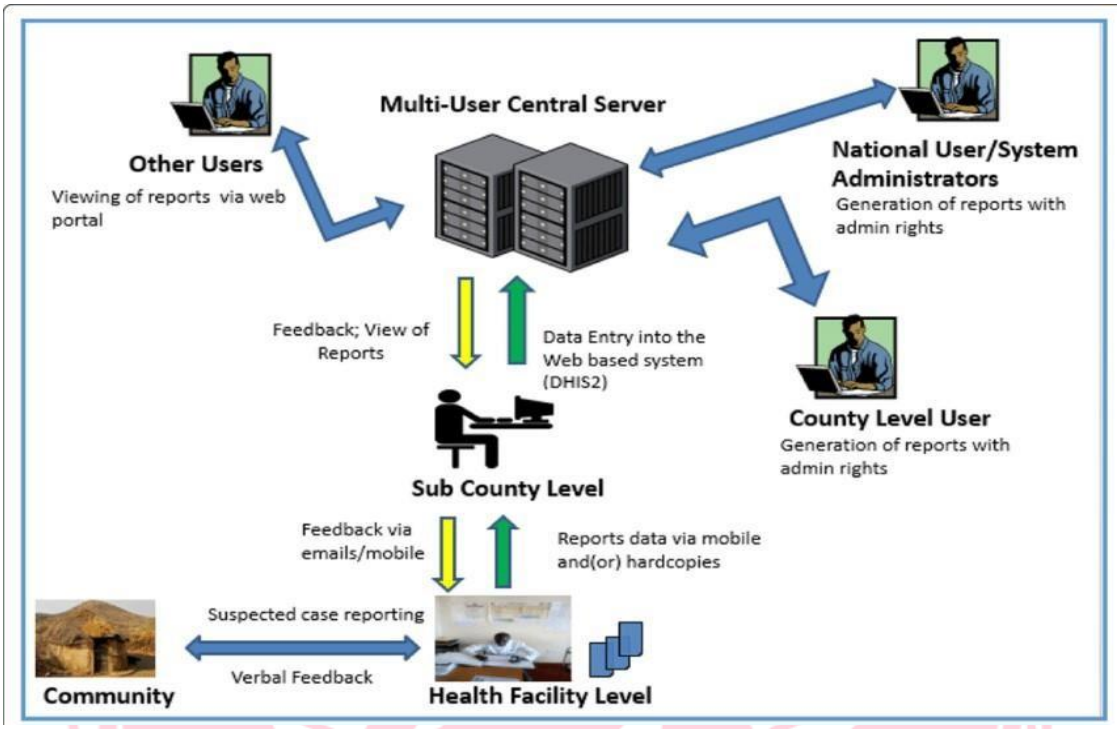


Figure 1: Surveillance data flow in Kenya

***Source**: Figure created by David Kareko using the Microsoft PowerPoint application, and no special licenses or copyrights were required for its use or publication.*

The surveillance data flow in Kenya involves the integration of data from health facilities to the Kenya Health Information System (KHIS) and the District Health Information System version 2 (DHIS 2) providing a comprehensive approach to health information management. Surveillance data from the community collected by community health promoters affiliated to health facilities is sent to health facilities surveillance focal persons. Health facilities collect data on various health indicators using standardized tools and forms such as MOH 502, MOH 505 etc. and sent to sub county surveillance officer/coordinator hardcopies or e platforms such as mails and SMS. Sub-county surveillance focal person then reports this data into the web based DHIS2 which is further transmitted to the Kenya Health Information System (KHIS), a national-level health information platform. The centralized data undergoes analysis and interpretation within both DHIS 2 and KHIS, facilitating the identification of trends,

patterns, and potential public health threats. Users at County, National and other organizations can now access the data in DHIS2 and KHIS using the log-inns credentials. The combined use of DHIS 2 and KHIS enhances the efficiency, accuracy, and accessibility of surveillance data at both district and national levels, supporting effective public health management and response strategies in Kenya.

2.2.3 Electronic Integrated Disease Surveillance and Response (eIDSR)

Electronic IDSR (eIDSR) does not constitute a new surveillance system or software but leverages electronic tools/platforms to facilitate the implementation of IDSR activities. The primary electronic reporting system, Kenya Health Information System (KHIS), streamlines the reporting and monitoring of disease-related data within the IDSR framework. The eIDSR platform sources data from health facility registers and community-based surveillance, ensuring active and prompt collection of priority disease information in real-time and weekly reporting. While many countries have transitioned to electronic IDSR reporting, Kenya adopted a standalone web-based system (e-IDSR) in 2011, integrating it into the District Health Information System (DHIS2) by August 2016 for improved sustainability. Despite these advancements, Kenya has however not fully transitioned to the manual reporting still allows manual data collection through standardized forms. Subsequently, reports from subcounties are sent to the national level through various means, with data entered into the digital desktop platform for analysis. These advancements reflect Kenya's commitment to modernizing surveillance systems, aiming for enhanced efficiency and accessibility in disease surveillance and response (Njeru et al., 2020).

2.3.4 Health System Building Blocks

The WHO recommends bolstering health systems through six essential building blocks: service delivery, health workforce, information, medical products, vaccines and technologies, financing, and leadership/governance, as depicted in Figure 2.3. Studies demonstrate that the WHO health system framework plays a crucial role in strengthening the overall healthcare system and acts as a catalyst in achieving global health objectives, including the Sustainable Development Goals (SDGs) (Manyazewal, 2017).

Efficient delivery of services ensures the provision of high-quality healthcare interventions while minimizing resource wastage. A well-performing healthcare workforce operates responsively and effectively to achieve optimal health outcomes. A functional health information system generates reliable and timely data on factors influencing health, system performance, and health status. An effective healthcare system ensures fair access to superior medical products, vaccines, and technologies. A robust health financing system raises sufficient funds while safeguarding individuals from financial adversity. Leadership and governance encompass policy frameworks, oversight, coalition building, regulation, system design, and accountability. This study focused with two key building blocks discussed as Policy and Human workforce.

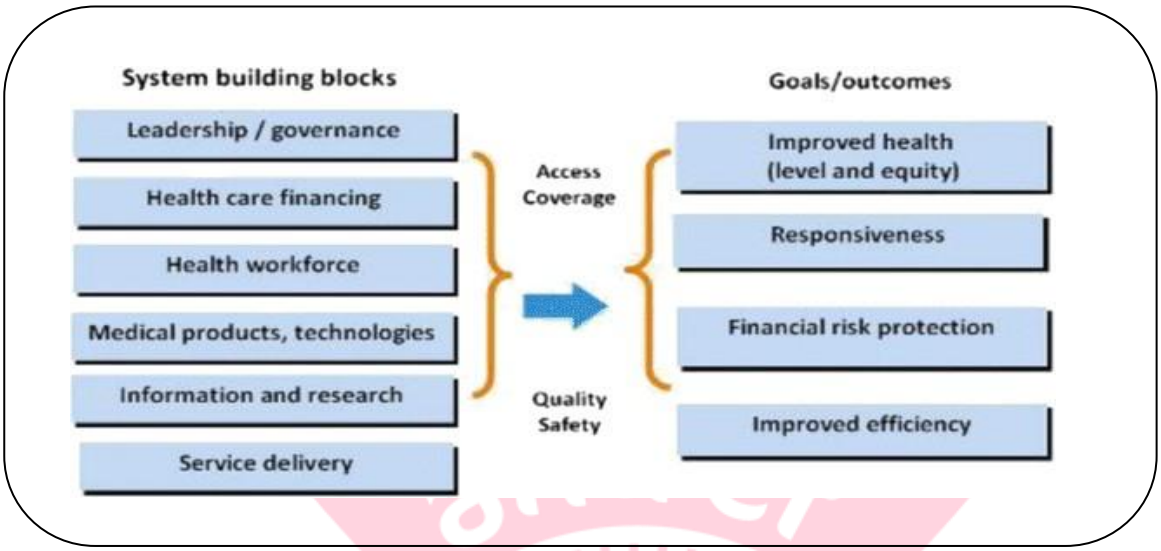


Figure 2: The WHO Health Systems Framework

Source: WHO 2007/Download Scientific Program

2.3.5 Policy-Related Barriers that Impacts the Effective Implementation and Performance of the Integrated Disease Surveillance and Response (IDSR)

The Integrated Disease Surveillance and Response (IDSR) system is designed to enhance the management of infectious diseases through comprehensive surveillance and timely response. However, the effectiveness of the IDSR system is often compromised by various policy related barriers. Phalkey et al. (2015) conducted a systematic review of challenges in implementing the IDSR system and highlighted significant issues with policy frameworks. The study identified that many countries, including those in Africa, struggled with fragmented and inconsistent policy frameworks that hindered the effective deployment of IDSR systems. Specifically, Phalkey et al. (2015) found that lack of alignment between national and local policies often led to inefficiencies in disease surveillance and response. The review emphasized

that policies need to be harmonized across different levels of government to ensure a cohesive approach to disease management.

Wolfe et al. (2021) conducted a systematic review of IDSR implementation in the African region, focusing on policy coherence and integration. The review revealed that many IDSR systems suffered from poorly integrated policies, which affected their overall effectiveness. Wolfe et al. (2021) highlighted that lack of coherence between disease surveillance policies and broader health system policies often led to gaps in data reporting and response efforts. The study emphasized the need for integrated policies that align disease surveillance with broader health strategies and systems.

Fasanmi et al. (2018) provided insights into the enforcement challenges faced by surveillance systems in developing economies. The study focused on the national surveillance and control costs for avian influenza in Nigeria, highlighting issues related to policy enforcement and implementation. Fasanmi et al. (2018) found that inadequate enforcement mechanisms and insufficient resources for implementing surveillance policies were significant barriers to effective disease control. The study suggests that without strong enforcement mechanisms, policies may remain ineffective despite their formulation. Ensuring that IDSR policies are not only well-designed but also properly enforced is essential for their successful implementation. In Nairobi's slum areas, where resources are often limited, effective policy enforcement becomes even more critical. The coherence of IDSR policies with other health initiatives is crucial. Inconsistent or poorly integrated policies can create silos within the health system, impeding the flow of information and coordination between different health entities. This lack of integration can weaken the IDSR system's ability to manage and control outbreaks effectively, especially in high-risk slum areas.

Baraza et al. (2022) examined resilience in digital economies during the COVID-19 pandemic and highlighted the importance of resource allocation in policy implementation. The study noted that inadequate resources for implementing health policies could undermine the effectiveness of disease surveillance systems. Baraza et al. (2022) stressed that successful implementation of health policies requires adequate funding, infrastructure, and human resources. The allocation of resources for the IDSR system is a significant concern. Public health facilities in slum areas may face resource constraints that affect their ability to implement and sustain IDSR policies effectively. Insufficient resources can lead to inadequate surveillance, delayed responses, and ultimately, poorer disease management outcomes. Gresham et al. (2024) discussed modernizing public health surveillance and highlighted the need for policy adaptation and flexibility in response to emerging health threats. The study emphasized that static policies that do not adapt to changing disease dynamics and emerging challenges can hinder effective disease surveillance and response. Gresham et al. (2024) advocated for policies that are adaptable and responsive to new information and evolving disease patterns. The IDSR system must be flexible to address the unique challenges posed by slum environments and rapidly changing disease patterns.

Policies that can adapt to emerging threats and local conditions are crucial for maintaining an effective surveillance and response system. The ability to update and adjust policies based on real-time data and emerging trends is essential for effective disease management in high-risk areas.

The policies governing IDSR in Kenya include the National Health Sector Strategic Plan, Kenya Health Policy 2014-2030, the Kenya Health Sector Integrated Disease Surveillance and Response Strategy (2016-2020), and the Public Health Act (Cap 242).

These policies collectively provide a framework for disease surveillance and response in the country.

Policies influence the utilization of Integrated Disease Surveillance and Response (IDSR) within health systems, as evidenced by recent studies. For instance, a study by Kieny et al. (2017) emphasizes the critical role of supportive policies in bolstering IDSR implementation and performance (Kieny et al., 2017). Effective policies ensure standardized reporting mechanisms, delineate responsibilities, and establish clear governance structures, as highlighted in the WHO's IDSR technical guidelines, thereby enhancing the efficiency and utilization of the surveillance system (MoH, 2022; WHO, 2019b). Recent research underscores that well-defined governance frameworks are crucial for effective coordination, resource allocation, and the establishment of accountability mechanisms, essential aspects for successful IDSR utilization.

Additionally, recent studies like the one conducted by Ihekweazu and Agogo (2020) emphasize the importance of adaptive policy and governance approaches in IDSR performance. Flexible policies that allow for decentralized decision-making empower local health authorities to respond promptly to disease outbreaks. This bottom-up approach fosters local ownership and engagement, improving the utilization of IDSR by enabling swift and tailored responses to specific community needs. These studies highlight the critical role of policy frameworks in shaping the utilization and effectiveness of IDSR within contemporary health systems.

2.3.6 The Capacity and Challenges of the Health Workforce in Implementing the IDSR System in Public Health Facilities

2.3.6.1 Knowledge Gap of Health Workers on IDSR.

The importance of accurately defining standard case descriptions is highlighted as a crucial initial step in effectively implementing disease surveillance strategies and hence its performance. Omondi (2019) conducted a performance evaluation of the IDSR system in many counties, focusing on managing suspected cholera cases. The study highlighted significant gaps in the training and knowledge of health workers, which adversely affected the implementation of the IDSR system. Omondi (2019) found that many health workers lacked adequate training in disease surveillance and response protocols, leading to inconsistent practices in data collection and disease management. This lack of training compromised the effectiveness of the IDSR system, particularly in managing outbreaks such as cholera.

Toda et al. (2018) conducted a pioneering study in Sub-Saharan Africa, revealing notably low levels of knowledge regarding IDSR standard case meanings in Kenya (Toda et al., 2018). Patient registers at health facilities were used as sources to evaluate disease surveillance monitoring activities and overall health systems. The findings indicated potential issues with the authenticity of these source documents. The survey revealed alarmingly limited awareness among health workers and their supervisors regarding dengue fever. Additionally, measles was found to resemble dengue fever but with even more startling implications (Haakonde et al., 2018). Research conducted by Toda et al. (2018) highlighted a concerning lack of knowledge among health workers and supervisors regarding established clinical standards in Kenya, with only a fraction accurately identifying these standards despite clear case descriptions (Toda et al.,

2018). Similar trends were observed in South Sudan, where healthcare workers struggled to correctly identify fundamental criteria, such as for bloody diarrhea (Pond et al., 2011). Toda et al. (2018) delved deeper, revealing that nurses, despite their extensive experience, were more likely to understand standards compared to other healthcare professionals (Toda et al., 2018). Paradoxically, individuals with greater pre-service clinical experience were prone to disregarding these standards. Moreover, the presence of job aids, such as case definition posters in healthcare facilities, significantly correlated with improved awareness (Moshi, 2016).

2.3.6.2 Training of Health Workers on IDSR.

Training gaps are a critical issue for the IDSR system's performance. Effective disease surveillance and response require that health workers are well-versed in the latest protocols and techniques. Omondi (2019) emphasized that targeted training programs are essential to address these gaps and ensure that health workers can effectively contribute to the IDSR system. Providing training to healthcare workers in diverse areas, including surveillance, is essential for the successful performance of health programs. However, African nations encounter difficulties due to a shortage of skilled personnel and significant staff turnover, which pose risks to the stability of national, regional, and international health systems. To illustrate, in 2017, a mere 11% of health workers engaged in surveillance received proper training (Nakiire et al., 2019). Studies in Zambia's Rufunsa District revealed a need for additional and ongoing training in Integrated Disease Surveillance and Response (IDSR), with only 63.6% of respondents having received IDSR training (Haakonde et al., 2018). Similar trends were observed in Nigeria's Anambra State and Enugu State, where training levels among healthcare staff were low, with only 32% and 8% receiving IDSR training, respectively (Adam,

2014; Nnebue et al., 2012). These research findings highlight the utmost significance of continuous training and retraining of healthcare workers in Integrated Disease Surveillance and Response (IDSR) and disease reporting. In a study conducted by the Ethiopian Ministry of Health, focusing on IDSR implementation in Addis Ababa County, training emerged as a crucial element in bridging awareness gaps among healthcare personnel. This training resulted in favorable shifts in their attitudes and practices concerning disease reporting. The study findings indicated that training played a significant role in improving disease reporting through various means. These include enhancing knowledge and skills, cultivating a deeper appreciation for accurate data, promoting comprehension and utilization of IDSR indicators, and increasing the completeness and timeliness of reporting (Iwu et al., 2016). As a result, training emerges as a vital component in the successful implementation of IDSR for effective disease prevention and control.

2.3.6.3 Staffing Issues and Workforce Capacity.

Adokiya et al. (2015) evaluated the IDSR system in northern Ghana, highlighting staffing issues as a major challenge. The study found that inadequate staffing levels and high workload pressures affected the capacity of health workers to effectively implement the IDSR system. In similar settings, staffing issues may hinder the implementation of the IDSR system. Public health facilities in Nairobi, particularly in densely populated areas like slums, often face high patient loads with limited staff. This disparity can result in overwhelmed health workers who may lack the time and resources to perform thorough disease surveillance and response tasks. Addressing staffing issues is crucial for enhancing the capacity of the IDSR system. Their study highlighted that inadequate staffing levels and high workload pressures were major

impediments to the effective implementation of the IDSR system. Health facilities in the study area were reported to be understaffed, which led to overburdened health workers struggling to manage their responsibilities, including data collection, disease reporting, and response activities. These findings are pertinent to similar settings, such as Nairobi County, where public health facilities, particularly in densely populated areas like Kibera and Mukuru slums, often face high patient loads with insufficient staff. The resultant disparity between patient demand and available workforce can lead to overwhelmed health workers who may lack the time and resources necessary to perform thorough disease surveillance and response tasks. This situation can be exacerbated by the high turnover rates and burnout among health workers, further compromising the effectiveness of the IDSR system.

Addressing staffing issues is crucial for enhancing the capacity of the IDSR system. Solutions may include increasing recruitment efforts to fill existing vacancies, improving working conditions to retain staff, and optimizing workforce deployment to balance the workload across facilities. Furthermore, strategic workforce planning and allocation are essential to ensure that health facilities, especially those in high-density areas, are adequately staffed to manage the complexities of disease surveillance and response effectively.

2.3.6.4 Motivation and Job Satisfaction.

Motivation and job satisfaction are critical factors influencing the performance of health workers in implementing the IDSR system. Aniwada and Obionu (2016) conducted a comparative study on disease surveillance and notification practices among health workers in Nigeria. The study revealed that low motivation and job dissatisfaction significantly impacted the effectiveness of disease surveillance systems. Aniwada and

Obionu (2016) found that health workers who were dissatisfied with their jobs or lacked motivation were less likely to engage in thorough data collection and reporting, which affected the overall performance of the surveillance system. Motivation and job satisfaction are likely to influence the performance of health workers implementing the IDSR system. Factors such as inadequate remuneration, lack of career development opportunities, and poor working conditions can lead to low motivation and decreased engagement in disease surveillance activities. Addressing these motivational factors is essential to ensure that health workers remain committed and effective in their roles.

Motivation and job satisfaction can be influenced by various factors, including inadequate remuneration, lack of career development opportunities, and poor working conditions. Health workers who perceive their compensation as inadequate compared to their workload and responsibilities may experience reduced morale and commitment. Similarly, the absence of clear career progression pathways and professional development opportunities can lead to job dissatisfaction and decreased motivation. In Nairobi County, addressing these motivational factors is essential to enhance the effectiveness of the IDSR system. Improving remuneration packages, providing opportunities for career advancement, and creating supportive work environments can significantly boost health workers' motivation and job satisfaction. Regular feedback, recognition programs, and professional development initiatives can also contribute to increased engagement and performance.

2.3.6.5 Data Collection and Reporting Challenges

Effective data collection and reporting are fundamental components of a successful IDSR system. Lakew et al. (2017) assessed the status of surveillance and routine immunization performances in Ethiopia, focusing on data collection and reporting. The

study highlighted several challenges, including issues with data accuracy, timeliness, and completeness. Lakew et al. (2017) found that gaps in data collection practices and reporting protocols hindered the effectiveness of the surveillance system. Inadequate training and inconsistent practices among health workers contributed to these challenges. Similar issues may affect the IDSR system's data collection and reporting. Health workers may face difficulties in collecting accurate and timely data due to inadequate training or lack of resources. These challenges can result in incomplete or inaccurate data, which undermines the effectiveness of disease surveillance and response efforts. Enhancing data collection practices and providing comprehensive training are crucial for improving the performance of the IDSR system.

To address these issues, it is essential to enhance data collection practices and provide comprehensive training to health workers. Implementing standardized data collection protocols, investing in modern data management technologies, and ensuring regular training updates can improve data accuracy and timeliness. Additionally, creating a culture of accountability and continuous improvement in data reporting practices can further enhance the performance of the IDSR system.

2.3.6.6 Response to Notifiable Diseases

Effective response to notifiable diseases is a critical component of the Integrated Disease Surveillance and Response (IDSR) system. Kallay et al. (2023) assessed the implementation of the IDSR system in North Kivu, Democratic Republic of the Congo, following a major Ebola outbreak. The study highlighted the challenges faced by health workers in responding to notifiable diseases, including logistical constraints, inadequate resources, and communication barriers. Kallay et al. (2023) found that these challenges impacted the ability of health workers to effectively manage and control

outbreaks. Similar challenges may affect the response to notifiable diseases. Health workers may encounter logistical constraints and resource limitations that impede their ability to respond promptly and effectively to disease outbreaks. Ensuring that health facilities are well-equipped and that health workers have access to necessary resources is essential for enhancing the response to notifiable diseases. Kallay et al. (2023) also noted that inadequate resources, including insufficient medical supplies, lack of diagnostic tools, and limited personnel, were significant barriers to effective disease management. In the context of Nairobi County, health facilities in densely populated slums like Kibera and Mukuru may face similar resource limitations. Ensuring that health facilities are well-equipped with essential supplies, diagnostic tools, and trained personnel is crucial for enhancing the response to notifiable diseases. Communication barriers between health workers and between different levels of the health system also emerged as a key challenge. Effective communication is vital for coordinating responses, sharing critical information, and implementing timely interventions. Inadequate communication infrastructure can impede the flow of information and delay response efforts, thereby affecting the overall effectiveness of disease control measures.

To address these challenges, it is essential to enhance logistical support, increase resource availability, and improve communication systems. Investments in infrastructure, such as reliable transportation and robust supply chains, are necessary to ensure that health facilities can respond effectively to disease outbreaks. Additionally, strengthening communication networks and establishing clear protocols for information sharing can facilitate better coordination and more timely responses to notifiable diseases.

2.3.6.7 Integration and Coordination.

The integration and coordination of disease surveillance efforts are fundamental for the success of the IDSR system. Adokiya et al. (2015) also emphasized the importance of integration and coordination among health workers for effective disease surveillance. The study found that lack of coordination and communication between different levels of the health system hindered the implementation of the IDSR system. Effective integration and coordination are crucial for ensuring that surveillance data is accurately reported and utilized for timely disease response. Coordination among health facilities and between different levels of the health system is essential for the successful implementation of the IDSR system. Improving communication and collaboration among health workers and health facilities can enhance the overall effectiveness of disease surveillance and response efforts. Effective integration requires seamless communication between various stakeholders within the health system. Adokiya et al. (2015) emphasized that improving communication channels and fostering collaboration among health workers and facilities are crucial for the successful implementation of the IDSR system. Coordination efforts should focus on ensuring that surveillance data is accurately reported, analyzed, and utilized for timely disease response.

To enhance integration and coordination, several strategies can be implemented. Establishing formal mechanisms for regular communication and data sharing between health facilities and different levels of the health system can improve coordination. Creating multidisciplinary teams that include representatives from various health sectors can facilitate better collaboration and information exchange. Additionally, implementing standardized protocols for data reporting and response can streamline efforts and improve overall system effectiveness.

2.4 Identification of Knowledge Gap

The IDSR system is designed to enhance the capacity of public health systems to detect, report, and respond to infectious disease outbreaks. It integrates various disease surveillance activities into a coherent framework that facilitates timely and effective response actions. Mremi et al. (2021) highlighted that the IDSR system has been pivotal in Sub-Saharan Africa for managing infectious disease epidemics. Despite its potential, challenges remain in the effective implementation and utilization of IDSR data. Mremi et al. (2021) conducted a comprehensive review of IDSR implementation in Sub-Saharan Africa, noting that data quality and completeness are significant challenges. Inconsistent data reporting and gaps in data collection affect the reliability of IDSR data. The study found that many health facilities struggle with incomplete or inaccurate data, which hampers effective disease surveillance and response. For example, in areas like Kibera and Mukuru slums, where infrastructure and resources are limited, the accuracy and completeness of data collection can be compromised, affecting the overall effectiveness of the IDSR system.

Adokiya et al. (2015) explored the IDSR system in northern Ghana and identified resource constraints as a major issue impacting data utilization. Limited financial resources, inadequate equipment, and insufficient human resources were cited as factors hindering effective disease surveillance and response. The study emphasized that without adequate resources, health facilities cannot maintain the quality of data collection and reporting, which is crucial for managing notifiable diseases effectively.

Ibrahim et al. (2020) assessed the IDSR system in Northeast Nigeria and highlighted the importance of training and capacity building for health workers. The study revealed that inadequate training of health personnel affects their ability to collect, report, and

utilize IDSR data effectively. Training programs are essential to ensure that health workers understand the importance of accurate data collection and reporting and can use the data to manage and control infectious diseases.

Omondi (2019) evaluated the performance of the IDSR system in Nairobi City County, focusing on managing suspected cholera cases. The study demonstrated that the IDSR system is effective in early detection and surveillance of infectious diseases. By integrating various surveillance activities, the IDSR system enables timely identification of outbreaks, which is crucial for implementing control measures. The early detection capability of IDSR data utilization is particularly important in high-risk areas where the rapid spread of diseases like cholera and typhoid can have severe consequences.

Njuguna et al. (2019) examined the revitalization of the IDSR system in Sierra Leone following the Ebola outbreak. The study highlighted that effective utilization of IDSR data played a critical role in controlling and managing outbreaks. The integration of data from various sources allowed for a comprehensive understanding of disease dynamics, which facilitated targeted response strategies. The study emphasized that data-driven approaches are essential for managing outbreaks and preventing their spread.

Kenya has achieved notable advancements in the implementation of Integrated Disease Surveillance and Response (IDSR), with a specific focus on sub-counties and the adoption of electronic reporting at the county level. Despite these achievements, there is a recurring issue of reporting rates consistently falling below the desired target of 80%. Furthermore, health facilities remain the primary source of disease data in the country (Milliano, 2022; Momanyi, 2016).

Despite advancements in IDSR adoption, there's inadequate utilization of data collected within the healthcare system. Consequently, events-based occurrences prevail in communities without documented public health interventions (Muleme et al., 2017). A study conducted by Omondi et al. (2020) in public health facilities of Nairobi County emphasized the crucial role of regular healthcare data in promoting integration between individual health interventions and public health initiatives (Omondi et al., 2020). However, the study revealed that a significant majority (over 66%) of respondents faced challenges in interpreting IDSR data due to a lack of analytical skills. Only 34% of participants demonstrated the technical capabilities to effectively understand and utilize IDSR data (Omondi et al., 2020). The Centers for Disease Control and Prevention (CDC) highlights the importance of training healthcare workers to improve their knowledge and skills in utilizing surveillance system data, which ultimately enhances the safety of patients and healthcare workers (Edelstein et al., 2018).

2.5 Conceptual Framework

The utilization of the IDSR and reporting approach requires ongoing monitoring of diseases, which is influenced by various health system factors in both public and private sectors (WHO, 2019b).

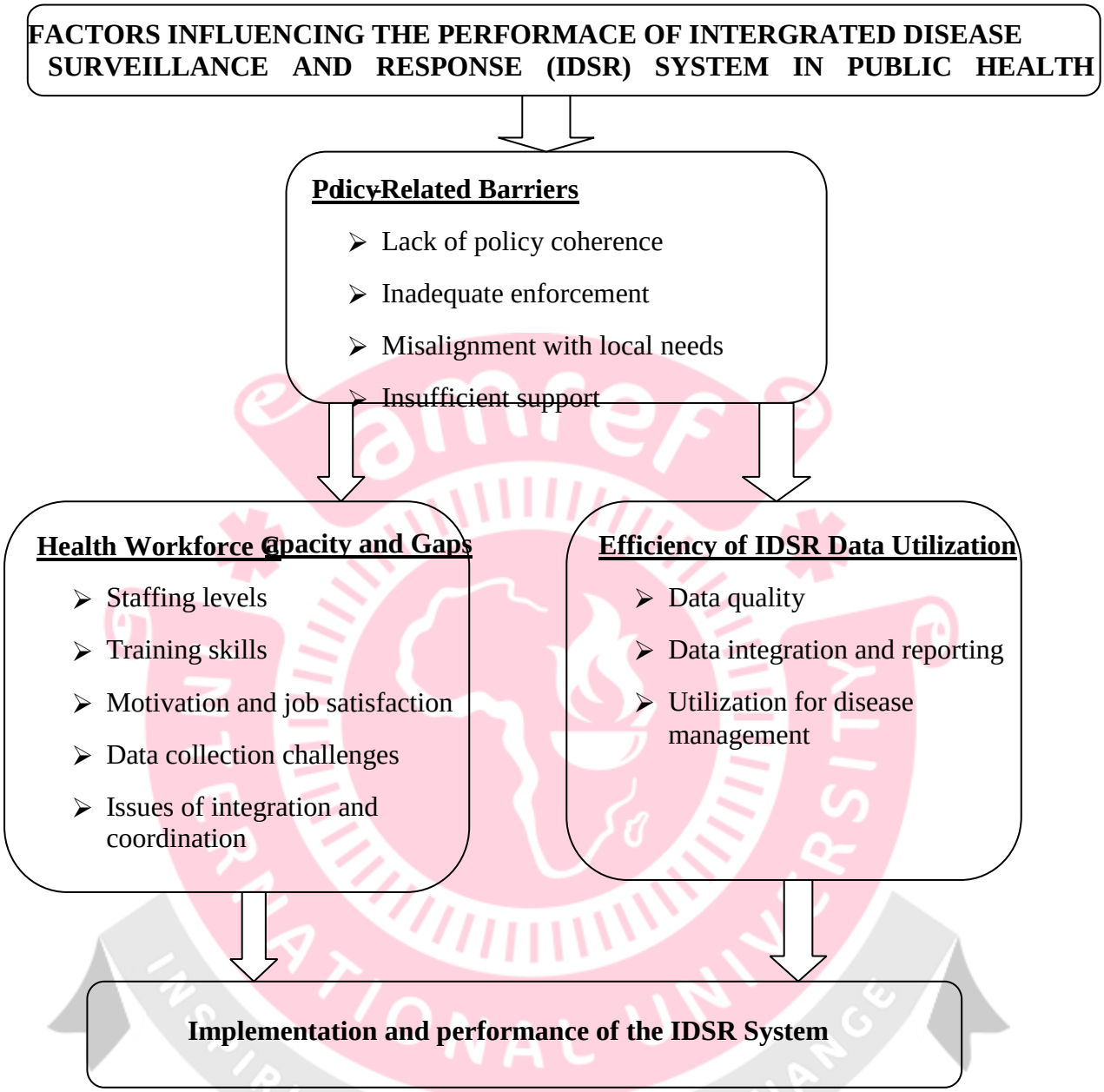


Figure 3: Conceptual Framework

Policy-Related Barriers affect both the Health Workforce Capacity and the Effectiveness of IDSR Data Utilization. These barriers can lead to challenges in staffing, training, and resource allocation.

Health Workforce Capacity and Challenges directly influence the Effectiveness of IDSR Data Utilization. For example, insufficient staffing or poor training can result in inadequate data collection and reporting.

Effectiveness of IDSR Data Utilization impacts the overall Implementation and Performance of the IDSR system. Effective data utilization ensures that the system can respond promptly and accurately to disease outbreaks.

CHAPTER 3: METHODOLOGY

3.1 Introduction

This chapter summarizes the entire research study process with details on how it was carried out. Significant sections of this chapter include the research design or strategy, data collection instruments and methods, sampling techniques, sample size determination, means for data analysis, and ethical considerations in the study.

3.2 Study Design

This study employed a descriptive cross-sectional design, integrating both quantitative and qualitative methods to assess factors influencing the performance of the Integrated Disease Surveillance and Response (IDSR) system in public health facilities in Nairobi County. The descriptive design was appropriate as it allowed the researcher to capture a snapshot of existing conditions, perceptions, and practices related to IDSR implementation at a single point in time without manipulating any variables.

Primary data were collected using structured questionnaires administered to healthcare workers involved in disease surveillance, alongside key informant interviews (KIIs) with stakeholders responsible for IDSR policy and oversight. The quantitative component provided measurable data on the prevalence and distribution of performance-related issues within the IDSR system. The qualitative component complemented these findings by offering in-depth insights and contextual understanding of the systemic and institutional challenges affecting IDSR functionality. The combination of both methods in a descriptive cross-sectional design enabled a comprehensive assessment of the current state of IDSR performance and facilitated evidence-based conclusions and recommendations for strengthening the system. This

approach was justified by the study's objective to identify and describe existing gaps in policy, workforce capacity, and data utilization within the IDSR framework.

3.3 Study Area/Setting

The research concentrated on selected public health facilities, which fall within the Nairobi County government jurisdiction. The study was carried in six sub-counties: Kamukunji, Mathare, Makadara, Embakasi, Starehe and Kibra in Nairobi County. Nairobi

County is Kenya's capital city and a major economic, political, and cultural center. Established in 2013, Nairobi County replaced the Nairobi City Council, which had managed the city since before Kenya's independence. The county is one of the 47 administrative counties in Kenya and is divided into seventeen sub-counties. Kamukunji and Starehe are central sub-counties with a mix of commercial and residential areas, presenting a range of public health issues from both high-density informal settlements and more affluent neighborhoods. Mathare and Kibra are characterized by densely populated informal settlements, providing a focus on high-risk areas with significant public health challenges related to sanitation and access to healthcare services. Makadara and Embakasi offer insights into more suburban and rapidly developing areas, where the expansion of informal settlements and infrastructure development present unique public health issues. The selected sub-counties include both urban and informal settlement areas. This ensured that the study captures a broad spectrum of public health challenges across different living conditions within Nairobi County. Each of the six sub-counties contains a range of public health facilities, from large hospitals to smaller health centers and dispensaries. This variation allowed for a comprehensive assessment of how the IDSR system operates across

different types of health facilities and settings. The selected sub-counties cover different geographic areas of Nairobi County, from central urban zones to more peripheral areas. This geographic diversity helps to capture the varied public health challenges faced by different communities within the county.

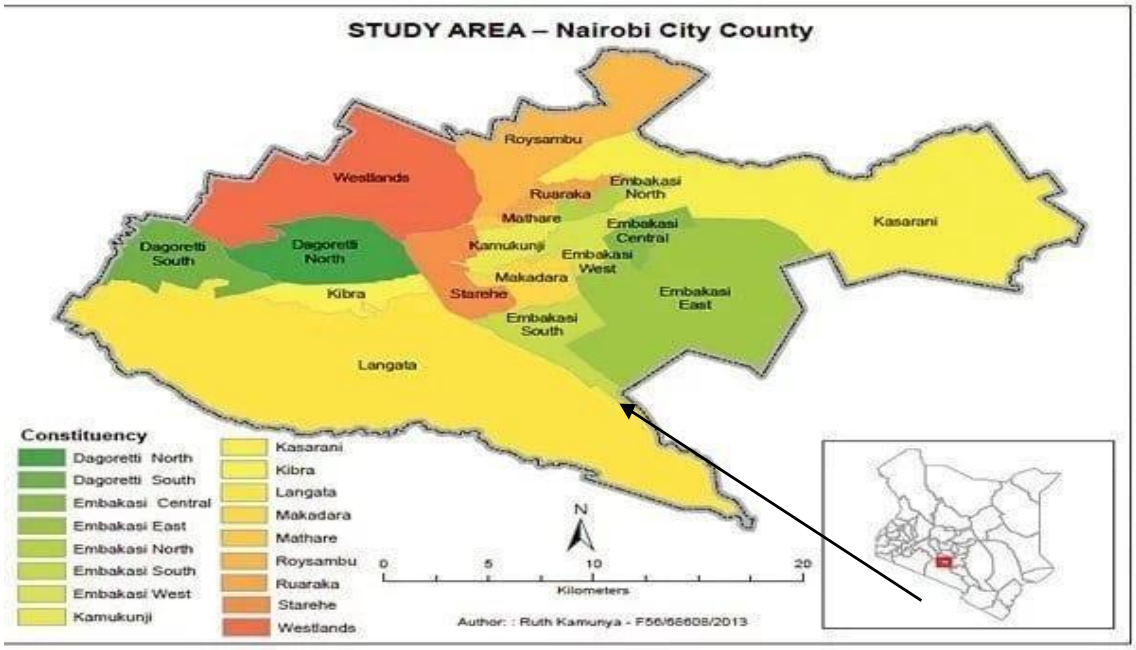


Figure 4: Geographical presentation of Nairobi County in Kenya

Source: https://www.google.com/search/Nairobi maps

3.4 Target Population/Participants

The target population for this study consisted of healthcare workers (HCWs) operating within public health facilities in Nairobi County, as well as disease surveillance focal persons stationed at both the sub-county and county levels. These participants were selected based on their direct involvement in the implementation and coordination of the Integrated Disease Surveillance and Response (IDSR) system.

Healthcare workers included clinicians, nurses, laboratory personnel, and other frontline staff responsible for patient management, data collection, and disease

notification at the facility level. Their insights were crucial in assessing how IDSR guidelines and procedures are applied in daily clinical practice, including challenges in data reporting and response.

In addition, disease surveillance focal persons - designated officers tasked with overseeing IDSR activities - were included in the study. These individuals play a central role in coordinating surveillance efforts, ensuring data quality and timeliness, facilitating training, and liaising between facilities and sub-county or county health offices. Their perspectives provided valuable information on the structural, policy, and operational factors influencing the effectiveness of IDSR across Nairobi County. The focus on public health facility staff was justified by the fact that public health institutions are the primary actors in the national disease surveillance framework. They are mandated to report notifiable conditions, adhere to IDSR protocols, and serve as the frontline response units during outbreaks. As such, they are best positioned to offer informed feedback on system performance and areas requiring improvement.

3.5 Sample and Sampling Procedures

i. Clinicians
ii. Disease Surveillance coordinators/officers

3.5.1 Inclusion and Exclusion Criteria

Inclusion Criteria

i. Clinicians who interact with IDSR System and have served in the facility for at least 6 (six) months
ii. Surveillance officers at sub-county and County level

Exclusion Criteria

i. Health care workers who don't interact with the IDSR System

ii. Health Care workers who have not served in the selected facilities for at least six months

3.5.2 Sampling Method and Sample Size Determination

Stratified sampling was employed to ensure that the sample of health facilities and personnel accurately reflects the diverse characteristics of Nairobi County. This approach helped capture the variability across different sub-counties and types of facilities, providing a comprehensive understanding of the factors influencing the performance of the IDSR system. Six sub-counties were purposively selected by the researcher as the most affected sub-counties based on their risk being the most affected sub-counties in the cholera outbreak in 2023.

Stratification Process:

1. **Define Strata:**

Sub-Counties: Nairobi County was divided into six sub-counties for stratification: Kamukunji, Mathare, Makadara, Embakasi, Starehe, and Kibra.

Type of Health Facilities: Facilities were categorized into three main types: Hospital, Health Centers and Dispensaries

i. **Hospitals:** Large facilities with comprehensive services.

ii. **Health Centers:** Medium-sized facilities providing a range of primary care services.

iii. **Dispensaries:** Smaller facilities focusing on basic healthcare services.

2. **Stratify Health Facilities:**

i. **Listing of Health Facilities:** All health facilities within each of the six sub-counties were identified and listed. The list included a mix of hospitals, health centers, and

dispensaries.

ii. **Stratification by Type:** Within each sub-county, the health facilities were grouped according to their type. This stratification ensured that the sample included a representative number of each type of facility.

3. **Sampling Health Facilities**

i. The proportion of each type of health facility in the total number of facilities within each sub-county was calculated.

ii. These proportions were then applied to determine how many of each type of facility were included in the sample from each sub-county.

4. **Random Selection:**

Within each stratum (sub-county and facility type), random sampling techniques were used to select health facilities. This was done using random number generators to ensure impartiality and reduce selection bias.

5. Sampling Clinicians and Disease Surveillance Coordinators:

1. Identify Target Personnel:

i. **Clinicians:** Healthcare professionals involved in disease management and treatment.

ii. **Disease Surveillance Coordinators:** Personnel responsible for monitoring, reporting, and responding to infectious diseases.

2. Determine Sample Size for Personnel:

Total number of participants to be sampled: 113.

6. **Distribution by Facility Type and Sub-County:**

i. **Hospitals:** Given their size and range of services, hospitals were allocated a larger proportion of the sample.

ii. **Health Centers:** Allocated a moderate proportion of the sample to health centres.

iii. **Dispensaries:** Allocate a smaller proportion due to their typically limited staffing.

7. **Stratify by Role:**

The sample of 113 participants was divided into two main groups:

i. **Clinicians:** Approximately 70% of the sample.

ii. **Disease Surveillance Coordinators:** Approximately 30% of the sample.

8. **Random Selection within Facilities:**

i. Within each selected health facility, stratified random sampling was used to choose participants. Both clinicians and disease surveillance coordinators/officers were represented.

ii. For larger facilities, this involved sampling from different departments or sections to capture a broad perspective.

9. **Allocation:**

Since each sub-county had a different number of facilities and personnel, the sample size was distributed as follows:

a. **Kamukunji:**

i. Health Facilities: 8

ii. Sampled Facilities: 3 (1 Hospital, 1 Health Centre, 1 Dispensary)

iii. Total Personnel Sampled: 18 (11 Clinicians, 5 Disease Surveillance Coordinators)

b. **Mathare:**

i. Health Facilities: 8

ii. Sampled Facilities: 3 (1 Hospital, 1 Health Centre, 1 Dispensary)

iii. Total Personnel Sampled: 18 (11 Clinicians, 5 Disease Surveillance Coordinators)

c. **Makadara:**

i. Health Facilities: 9

ii. Sampled Facilities: 3 (1 Hospital, 1 Health Centre, 1 Dispensary)

iii. Total Personnel Sampled: 20 (14 Clinicians, 6 Disease Surveillance Coordinators)

d. **Embakasi:**

i. Health Facilities: 10

ii. Sampled Facilities: 4 (2 Hospitals, 1 Health Center, 1 Dispensary) ○ Total Personnel Sampled: 22 (15 Clinicians, 7 Disease Surveillance Coordinators)

e. **Starehe:**

i. Health Facilities: 8

ii. Sampled Facilities: 4 (2 Hospitals, 1 Health Center, 1 Dispensary)

iii. Total Personnel Sampled: 21 (15 Clinicians, 6 Disease Surveillance Coordinators)

f. **Kibra:**

i. Health Facilities: 10

ii. Sampled Facilities: 3 (1 Hospital, 1 Health Centre, 1 Dispensary)

iii. Total Personnel Sampled: 23 (15 Clinicians, 8 Disease Surveillance Coordinators)

3.5.3 Sample Size Determination

Fisher et al. (1998) proposed a method for calculating the required sample size using the formula:

n = (z^2 * p * q) / d^2

In this formula:

n represents the desired sample size (assuming the population is greater than 10,000).

z is the standard normal deviation, set at 1.96 for a 95% confidence level.

p denotes the unknown proportion in the target population, so a proportion of 50% is used.

q is equal to 1.0 minus p.

d indicates the desired degree of accuracy, set at 0.05 for a 95% confidence level.

Substituting the values, we have:

n = (1.96^2 * 0.5 * (1-0.5)) / 0.05^2 = 384

The chosen sample consisted of approximately 140 health workers who interacted with the IDSR system in the sampled facilities. Since the population was less than 10,000, the sample size was determined using the formula nf = n / (1 + n / N).

Therefore,

nf = n/(1+n/N) nf = 384/ (1+384/140) =**102.67** The sample size was adjusted for individual non-response of 10% (response 90%) New sample size = Sample size /0.9)

= (102.67*110)/ 100

= 112.93

= **113 health care workers**

Adjustment for Non-Response:

To account for potential non-response (estimated at 10%), the sample size is further adjusted:

New sample size = Sample size/1-Response rate

Response rate = 0.90 (90% response expected)

Substituting the adjusted sample size (102.67) into the formula gives:

New sample size = 102.67/0.90

= 113

This final adjustment ensures that the sample size accounts for potential non-responses, leading to a final required sample size of 113 health workers.

3.6 Data Collection Instruments

This study utilized both quantitative and qualitative data collection instruments to gain a comprehensive understanding of the factors influencing the performance of the Integrated Disease Surveillance and Response (IDSR) system in Nairobi County. The mixed-methods approach enabled triangulation of data and enriched the analysis through multiple perspectives.

Quantitative Data Collection: Structured questionnaires were administered to healthcare workers involved in disease surveillance activities, including clinicians and disease surveillance focal persons. Clinicians in this study refer to frontline medical personnel such as medical officers, clinical officers, and nurses who diagnose, treat, and manage patients and are often responsible for initiating disease notification and reporting. Disease surveillance focal persons are designated staff at public health facilities tasked specifically with overseeing disease surveillance activities, including timely reporting, data entry into national surveillance platforms, and coordination with sub-county or county disease surveillance teams.

The questionnaire was designed to collect quantitative data across five key areas:

1. Demographic information (age, cadre, years of experience, facility level)
2. Knowledge and understanding of the IDSR system
3. Implementation challenges encountered
4. Data collection, analysis, and reporting practices
5. Perceived effectiveness of the IDSR system and suggestions for improvement

The instrument included Likert-scale items, multiple-choice questions, and a few open-ended questions to allow for elaboration. The effectiveness of the IDSR system was

measured using predefined indicators, including timeliness of reporting, completeness of surveillance data, frequency of training received, feedback mechanisms, and perception of system responsiveness to public health threats. Respondents rated aspects of IDSR performance using a five-point Likert scale ranging from "Very Poor" to "Very Good."

Qualitative Data Collection: To complement the quantitative data, semi-structured interviews were conducted with disease surveillance officers at the sub-county level and the Nairobi County disease surveillance coordinator. These participants were selected due to their strategic oversight roles and expert knowledge of IDSR operations across multiple health facilities.

1. The interview guide focused on four key themes:
2. Policy-related barriers to IDSR implementation
3. Workforce capacity and training needs
4. Data management and utilization challenges
5. Recommendations for improving IDSR system performance

The interviews were conducted face-to-face and audio-recorded with consent. Notes were also taken to supplement the recordings and ensure accuracy in transcription and analysis.

3.7 Validity and Reliability

3.7.1 Validity on Research Instruments

The researcher plans to share the information collected through the tools with supervisors, who evaluated the content and face validity of the instruments. Any

feedback received before conducting the pre-testing phase was incorporated into the final questionnaire.

3.7.2 Reliability on Research Instruments

The data collections instrument was piloted at the National level using 10 participants (Disease surveillance coordinators). This helped in ensuring that the questions are easily understood and determined the exact time it took to fill the questionnaires. This also identified unforeseen problems and the elements of prototype that may redirected towards revision and to assess the feasibility of the study.

Table 1: Sub-counties against their respective health facilities

S/No	Sub-county	Tier/level	Description	HF to be sampled	No of Respondents
1	Sub-county one (Kamukunji)	Level two	Health Dispensaries	-Biafra Dispensary -Jerusalem Dispensary	8
2	Sub-county two (Mathare)	Level two	Health Dispensaries	-Huruma Estate Dispensary -Huruma Lions Dispensary	8
3	Sub-county three (Makadara)	Level three	Health Centre	-Makadara Health Centre -Jericho Health Centre	16
4	Sub-county four (Starehe)	Level three	Health Centre	-Ngara Health Centre -Ngaira Health Centre	16
5	Sub-county five (Embakasi West)	Level four	Sub-county Hospital	-Mama Lucy Kibaki Hospital	24
6	Sub-county one (Kibra)	Level five	County Referral Hospital	-Mbagathi County Referral Hospital	40
	TOTAL				112

For Key Informant interviews, all six Sub-County Disease Surveillance Coordinators and the County Surveillance Officer was engaged, provided they consent to participate in the study.

3.8 Data Collection Procedures

The data collection process for this study involved both quantitative and qualitative methods to ensure comprehensive insights into the factors influencing the performance

of the Integrated Disease Surveillance and Response (IDSR) system in public health facilities across Nairobi County. The data collection process is detailed as follows:

3.8.1 Quantitative Data Collection

1. Structured Questionnaires:

Purpose: To gather standardized quantitative data from healthcare workers and facility managers across the selected sub-counties.

Design: The structured questionnaires consisted of closed-ended questions, rating scales, and Likert-type items designed to assess various dimensions of IDSR performance, including policy adherence, workforce capacity, and data utilization.

Administration: Questionnaires were distributed to healthcare workers and facility managers in person or electronically, depending on their availability and the facility's resources.

Sampling: A total of 113 healthcare workers were surveyed. The sample was drawn using a stratified sampling method to ensure representation from each of the six selected sub-counties: Kamukunji, Mathare, Makadara, Embakasi, Starehe, and Kibra. The sample included clinicians, disease surveillance officers, and facility managers.

Data Collection Procedure:

Pre-testing: The questionnaires were pre-tested in a pilot study involving a small sample of participants from one sub-county (Kibra) to ensure clarity and reliability.

Training: Research assistants were trained on how to administer the questionnaires and handle data collection procedures.

Distribution: Questionnaires were distributed to the selected participants, with instructions provided to ensure accurate and honest responses.

Collection: Completed questionnaires were collected within a specified timeframe to ensure a high response rate and timely data analysis.

3.8.2 Qualitative Data Collection

Key Informant Interviews: To gain in-depth insights into the implementation challenges, policy-related barriers, and data utilization aspects of the IDSR system from key stakeholders.

Participants: Six (6) sub-county disease surveillance officers from al the selected sub counties. One (1) County disease surveillance coordinator.

Design: Semi-structured interview guides were used to conduct interviews, allowing for flexibility while covering essential topics such as policy barriers, workforce challenges, and data management practices.

Administration: Interviews were scheduled at a time convenient for the participants to ensure maximum availability and detailed responses. Interviews were conducted face-to-face or via teleconference, depending on the participant's location and availability. Each interview was audio-recorded (with participant consent) to ensure accurate transcription and analysis. Each interview is expected to last between 45 to 60 minutes, depending on the depth of discussion.

Data Collection Procedure: The interview guide was pre-tested with a small group of similar stakeholders to refine questions and ensure they elicit useful information. Interviewers were trained on conducting interviews, maintaining neutrality, and handling sensitive information. Interviews were conducted following a structured approach to ensure all relevant topics are covered while allowing for open-ended

responses. Interviews were transcribed verbatim, and thematic analysis were performed to identify key themes and patterns in the responses.

3.9 Data Analysis and Presentation

The data collected from the study were analyzed using both quantitative and qualitative approaches to ensure a comprehensive understanding of the factors influencing the performance of the Integrated Disease Surveillance and Response (IDSR) system in public health facilities in Nairobi County.

Quantitative Data Analysis: Quantitative data were initially entered, coded, and cleaned using Microsoft Excel 2010, then exported to IBM SPSS version 25 for statistical analysis. Descriptive statistics—including frequencies, percentages, means, medians, and standard deviations—were generated to summarize the demographic and other relevant characteristics of the respondents. Cross-tabulations were used to explore variations in IDSR-related practices and perceptions across different variables.

Inferential statistics were applied to test for associations between independent and dependent variables. The Chi-square test was used to assess the statistical significance of associations between categorical variables. Pearson's correlation coefficient was employed to evaluate the strength and direction of relationships between continuous variables. Variables that were found significant ($p < 0.05$) in the bivariate analysis were included in binary logistic regression models to determine their adjusted effects on the dependent variable—IDSR performance. All statistical tests were two-tailed, and a p-value of less than 0.05 was considered statistically significant.

The results of the quantitative analysis were presented using frequency tables, graphs, contingency tables, and figures, with concise interpretations provided in the accompanying text.

Qualitative Data Analysis: Qualitative data obtained through key informant interviews were transcribed verbatim and analyzed thematically using qualitative data analysis software such as NVivo or ATLAS.ti, where available. Transcripts were systematically coded, and emerging codes were grouped into broader thematic categories reflecting key dimensions of the IDSR system's performance—namely, policy-related barriers, health workforce challenges, and data utilization practices.

Themes were developed inductively, allowing for the emergence of new insights while remaining grounded in the study objectives. To enhance validity, findings from the qualitative analysis were triangulated with quantitative results. Illustrative quotes from key informants were included to support and contextualize the findings. This integration of data enhanced the depth and reliability of the conclusions.

Data Security and Storage: To uphold data integrity and confidentiality, all collected data were securely stored in both digital and physical formats. Digital data—including audio recordings and electronic transcripts—were stored on encrypted, password-protected drives and secure cloud storage platforms. Physical data, such as signed consent forms and handwritten field notes, were kept in locked filing cabinets with restricted access. In line with institutional and ethical guidelines, both qualitative and quantitative data were retained for five years to allow for audits, reviews, or follow-up studies. At the end of this retention period, digital files were permanently deleted using certified file deletion software, and hard copies were shredded using a cross-cut shredder to ensure complete data destruction and privacy.

3.9.1 Dissemination Strategy

A multi-pronged dissemination strategy was adopted to ensure the study's findings reached relevant stakeholders and contributed to policy and practice. At the community and sub-county levels, dissemination meetings were organized with disease surveillance focal persons and public health officials to contextualize the findings and discuss practical implications.

Reports and policy briefs were prepared and shared with key institutions, including the Nairobi County Health Department, the Division of Disease Surveillance and Response (DDSR), and Amref Health Africa. These outputs were designed to support evidence-based decision-making and inform ongoing IDSR strengthening efforts.

At the national and regional levels, findings were submitted to peer-reviewed public health and epidemiology journals for publication. Presentations at conferences, workshops, and professional forums further ensured that the research contributed to academic discourse and knowledge sharing. Additionally, virtual webinars and roundtable discussions were conducted to broaden engagement with stakeholders, including researchers, policymakers, and donors, allowing real-time interaction and feedback. This comprehensive dissemination plan aimed not only to enhance the visibility and utility of the research but also to translate evidence into actionable strategies for improving IDSR performance in Kenya's public health sector.

Table 2: Dissemination Strategy

Target Audience	Mode of dissemination
Amref Health Africa	• Presentations done with power point, the senior management team and staff. This were conducted during scheduled Thesis defense meetings. • Final Report
Project Beneficiaries	• Participatory sessions with selected facility surveillance focal persons and sub-county disease surveillance coordinators
Implementing/Government departments (Division of Disease Surveillance and Response)	• Presentations done through stakeholders' meetings • Policy briefs to selected sub-counties
Scientific Community	• Scientific papers

3.10 Ethical Considerations

Approval

To ensure ethical integrity, research approval was obtained from Amref International University, and a research permit were secured from NACOSTI. The Nairobi City County Government, Health Services, provided an approval and introductory letter.

Informed consent

Participants were fully briefed about the study, and all their questions were addressed. Informed consent was sought, and data confidentiality and anonymity were guaranteed.

Data Protection and Confidentiality

All identifiable data collection were stored confidentially and restricted to the researcher and the research team involved during the whole study. Strict confidentiality was observed all through the study duration with the study participants given study identification numbers and no personal identification data recorded.

Risks

No experimental investigations or products were employed in this study. The study posed no risks to participants. They were informed about the voluntary nature of their participation and their right to withdraw at any time if they feel discomfort or have concerns.

3.11 Study Constraints and Limitations

Limited Geographic Scope: The study focuses exclusively on six sub-counties (Kamukunji, Mathare, Makadara, Embakasi, Starehe, and Kibra) out of a total of seventeen in Nairobi County. This restriction may limit the representativeness of the findings for the entire county. The selection of these six sub-counties is based on their performance in recent infectious disease outbreaks and their high-risk status. While this approach provides valuable insights into high-risk areas, it may not fully capture the variation and challenges faced in other sub-counties.

Sampling Bias: Although a stratified sampling method is employed to ensure representation across the selected sub-counties, the exclusion of the remaining eleven sub-counties may introduce bias. The health system dynamics and IDSR system performance in these excluded sub-counties may differ significantly, potentially affecting the generalizability of the study's findings.

Performance-Based Selection: The choice of sub-counties based on recent outbreak performance may lead to selection bias. This approach assumes that high-risk areas provide a more relevant context for studying IDSR system performance, but it may overlook variations in IDSR implementation and challenges in sub-counties with different outbreak histories.

Generalizability of **Findings**: Due to the focus on selected sub-counties and the exclusion of other areas, the study's findings may not be broadly applicable to all public health facilities within Nairobi County or to other counties with different health system contexts. The insights gained may be more specific to the conditions and challenges present in the chosen sub-counties.

Potential for Incomplete Data: The study's reliance on self-reported data from healthcare workers may lead to incomplete or biased responses. There might be variability in how different health workers perceive and report challenges related to the IDSR system, affecting the accuracy of the findings.

Single Study Focus: As the first study of its kind in Nairobi County, it may lack comparative data from similar studies in other regions or countries. This limitation may constrain the ability to draw broader conclusions or make cross-regional comparisons.

3.11 Study Constraints and Limitations

This study faced several constraints and limitations that may have affected its scope and outcomes. First, time and resource limitations restricted the study to only six sub-counties, which may limit the generalizability of findings to the entire Nairobi County. Additionally, some healthcare workers were unavailable or unwilling to participate due to competing clinical responsibilities, potentially leading to non-response bias. The

reliance on self-reported data in questionnaires and interviews also posed a risk of social desirability bias, where participants may have provided responses perceived as favorable rather than accurate. Furthermore, variations in facility-level IDSR implementation made it difficult to uniformly compare all sites. Despite these limitations, triangulation of data sources and the integration of both quantitative and qualitative methods helped enhance the reliability and validity of the findings.

CHAPTER 4: RESULTS

4.1 Introduction

This chapter presents the findings of the study based on the analysis of data collected from 113 healthcare workers (HCWs) across selected public health facilities in Nairobi County. The results are structured around the study objectives and provide insights into key factors influencing the performance of the Integrated Disease Surveillance and Response (IDSR) system. Specifically, the findings cover demographic characteristics of the respondents, policy-related barriers to IDSR implementation, the capacity and challenges of the health workforce, the effectiveness and extent of IDSR data utilization, and the overall performance of the IDSR system.

4.2 Demographic Information

The demographic profile of the respondents was gathered to understand the background of the health care workers (HCWs) involved in the implementation of the IDSR system. The study results were as presented in Table 3.

Table 3: Demographic Information of the Respondents

Demographic Variable	Category	Frequency (n=113)	Percentage (%)
Age	20–29	41	36.3
	30–39	42	37.2
	40–49	20	17.7
	50 and above	10	8.8
Gender	Male	60	53.1
	Female	53	46.9
Level of Education	Diploma	23	20.4
	Bachelor's Degree	65	57.5
	Master's Degree	25	22.1
Current Position	Medical Officer	30	26.5
	Clinical Officer	27	23.9
	Nurse	19	16.8
	Health Records Officer	11	9.7
	Public Health Officer	23	20.4
Years of Experience	Less than 1 year	18	15.9
	1–5 years	39	34.5
	6–10 years	41	36.3
	Over 10 years	15	13.3

The demographic information of the respondents reveals a fairly balanced distribution across different age groups, with the majority of respondents falling within the 30–39 age range (37.2%) and followed closely by the 20–29 age group (36.3%). The gender distribution is also relatively balanced, with 53.1% of respondents identifying as male and 46.9% as female. In terms of educational qualifications, the largest proportion of respondents holds a bachelor's degree (57.5%), while 22.1% have a Master's Degree, and 20.4% have a Diploma. No respondents reported having a Certificate or other qualifications. Regarding current positions, Medical Officers (26.5%) and Clinical Officers (23.9%) make up the largest groups, followed by Public Health Officers (20.4%) and Nurses (16.8%). Health Records Officers represent a smaller proportion (9.7%). The experience levels of the respondents are diverse, with the largest group

having 1–5 years of experience (34.5%) and 6–10 years of experience (36.3%). A smaller percentage (15.9%) have less than one year of experience, while 13.3% have more than 10 years of experience.

4.3 Policy-Related Barriers to IDSR Performance

This section presents findings on the respondents' awareness and perception of IDSR-related policies, including clarity of policy guidelines, sufficiency of support, and key policy-related challenges affecting performance.

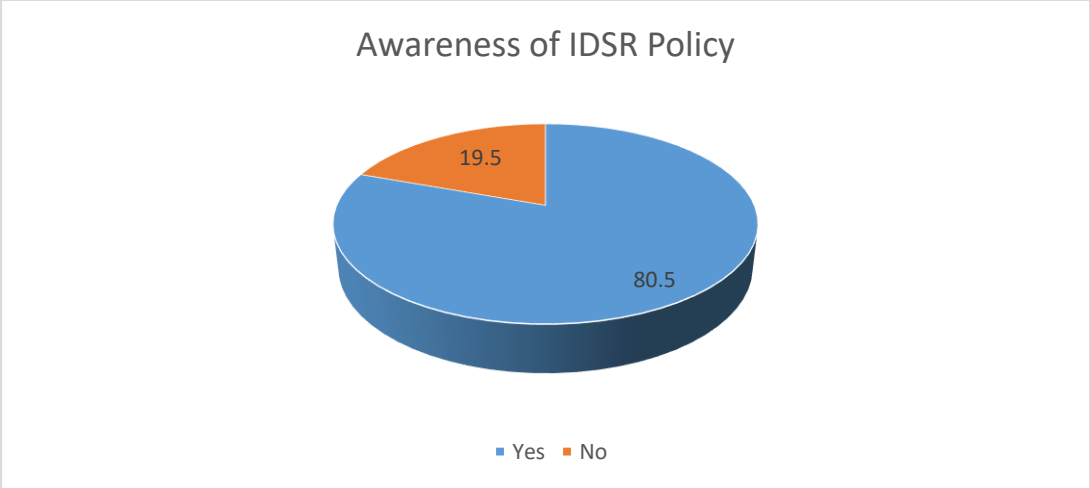


Figure 5: Awareness of IDSR Policy

A majority of respondents (80.5%) are aware of the IDSR policy, while 19.5% were not.

Table 4: Policy-Related Barriers to IDSR Performance

Question	Response	Frequency (n)	Percentage (%)
Clarity of IDSR Guidelines	Very Clear	20	17.7
	Clear	46	40.7
	Neutral	18	15.9
	Unclear	17	15.0
	Very Unclear	12	10.6
Policy-Related Barriers	Lack of regular policy updates	32	37.6
	Poor dissemination of guidelines	28	32.9
	Inadequate training on policy interpretation	25	29.4
	Inconsistency between national and facility-level policies	18	21.2
	Limited stakeholder involvement in policy formulation	10	11.8

Table 4 highlights several key policy-related barriers to the performance of the IDSR system. When it comes to the clarity of the IDSR guidelines, 40.7% of respondents find them "Clear," but a significant portion (17.7%) finds them "Very Clear," and 15.9% are neutral. However, a combined 36.2% feel the guidelines are unclear, with 15.0% rating them as "Unclear" and 10.6% as "Very Unclear." Regarding specific policy-related barriers, the most frequently cited challenges include a "Lack of regular policy updates" (37.6%), "Poor dissemination of guidelines" (32.9%), and "Inadequate training on policy interpretation" (29.4%). Additionally, 21.2% of respondents identified "Inconsistency between national and facility-level policies," while 11.8% pointed out the "Limited stakeholder involvement in policy formulation." These findings underscore the critical need for better communication, policy updates, and training to enhance the effectiveness of the IDSR system.

Table 5: Perceptions on Policy-Related Challenges in IDSR performance (N = 113)

Statement	SA (%)	A (%)	N (%)	D (%)	SD (%)	Mean
Lack of clear policy guidelines affects the performance of the IDSR system.	38 (33.6%)	41 (36.3%)	12 (10.6%)	13 (11.5%)	9 (8.0%)	3.76
Insufficient funding and resources hinder effective performance of the IDSR.	42 (37.2%)	40 (35.4%)	11 (9.7%)	10 (8.8%)	10 (8.8%)	3.84
Bureaucratic procedures impact the timely reporting and response to disease outbreaks.	36 (31.9%)	39 (34.5%)	15 (13.3%)	13 (11.5%)	10 (8.8%)	3.70
There is inadequate support from higher levels of government in IDSR policy performance.	40 (35.4%)	37 (32.7%)	14 (12.4%)	12 (10.6%)	10 (8.8%)	3.75

Table 5 presents the perceptions of respondents regarding policy-related challenges in IDSR performance. The statement “Lack of clear policy guidelines affects the performance of the IDSR system” had the highest mean score of 3.76, with a combined 69.9% of respondents either agreeing (36.3%) or strongly agreeing (33.6%). Similarly, the statement “Insufficient funding and resources hinder effective performance of the IDSR” received a high mean score of 3.84, with 72.6% of respondents agreeing or strongly agreeing. The statement on “Bureaucratic procedures impacting the timely reporting and response to disease outbreaks” scored a mean of 3.70, with 66.4% of respondents agreeing or strongly agreeing. Lastly, the statement about “Inadequate support from higher levels of government in IDSR policy performance” scored a mean of 3.75, with 68.1% agreeing or strongly agreeing.

A significant policy barrier identified by the key informants is the lack of harmonized policies between national and county governments. As KII 01 noted, “While the national government provides broad guidelines for IDSR, the county lacks contextualized policies that align with local resource realities,” which leads to gaps in performance at the county level. Another key challenge is the absence of a robust enforcement mechanism for disease reporting, particularly the weekly reporting requirement. One sub-county disease surveillance officer explained, “At the county level, there’s no enforcement mechanism or incentive to ensure compliance,” which leads to inconsistent and often delayed reporting. Additionally, the lack of clear guidelines at the county level, where roles, responsibilities, and mechanisms for outbreak communication often overlap or remain undefined, hinders the effective response to outbreaks. As KII 02 highlighted, “*There’s often duplication or confusion around roles - for example, on who should manage outbreak communication, which delays response times*.”

Furthermore, the lack of prioritization of IDSR in the budgeting process, coupled with minimal funding allocations, exacerbates the system’s inefficiencies. KII 01 pointed out, “Disease surveillance often competes with other priorities like maternal health and immunization,” leading to insufficient resources for surveillance activities. This financial challenge is compounded by bureaucratic delays in the disbursement of funds, which hampers timely surveillance activities. As KII 03 noted, “The budgeting process is long and bureaucratic. By the time funds are disbursed, critical surveillance activities are already delayed.” Finally, weak coordination between different agencies and stakeholders, including NGOs and health partners, is a critical issue. As KII 01 observed, “Coordination is weak, especially during emergencies,” which contributes to

fragmented responses during disease outbreaks. This underlines the need for a more streamlined and cohesive policy environment that fosters better collaboration and resource allocation.

4.4 Challenges of the Health Workforce

This section discusses the adequacy of trained personnel, frequency of training, and perceived challenges faced by HCWs in implementing IDSR. It also includes ratings on training sufficiency and workforce support.

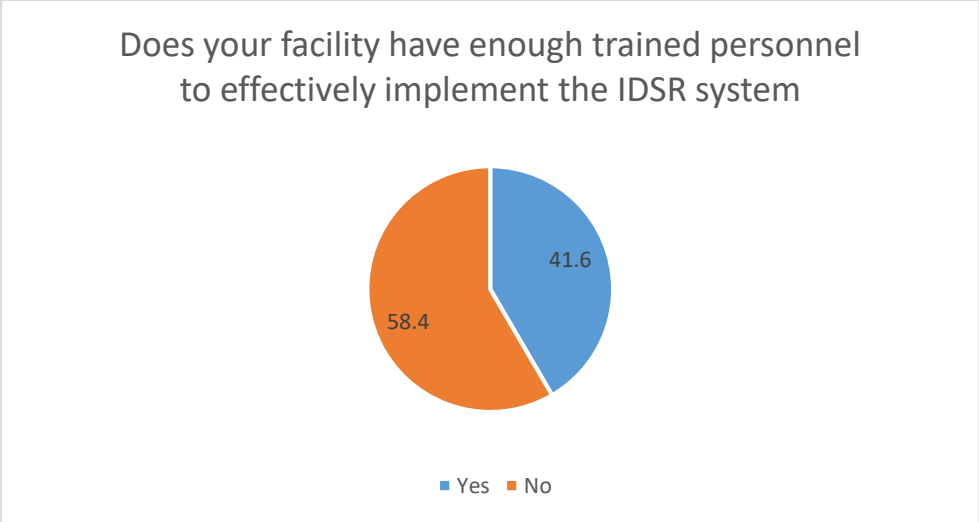


Figure 6: Whether the facility have enough trained personnel for effective performance the IDSR system

A significant 58.4% of respondents reported that their facilities do not have enough trained personnel for effective performance of the IDSR system.

Table 6: Training and Workforce Capacity for IDSR performance

Variables	Response	Frequency (n)	Percentage (%)
Frequency the facility conducts training or refresher courses on IDSR for health workers	Monthly	7	6.2
	Quarterly	18	15.9
	Annually	25	22.1
	Rarely	42	37.2
	Never	21	18.6
The rating on the adequacy of the training provided for IDSR implementation	Very Inadequate	23	20.4
	Inadequate	29	25.7
	Neutral	21	18.6
	Adequate	26	23.0
	Very Adequate	14	12.4
	Mean (Training Adequacy)	—	2.82
	Standard Deviation	—	1.32

Table 6 provides insights into training and workforce capacity for IDSR performance. Regarding the frequency of IDSR training or refresher courses, 37.2% of respondents stated that training is conducted rarely, and 18.6% reported that it never occurs. Only 6.2% of facilities offer monthly training, while 22.1% provide it annually, which may not be frequent enough to maintain an effective workforce. When asked to rate the adequacy of the training provided, the mean score of 2.82 indicates that respondents generally perceive the training as inadequate, with 25.7% rating it as “inadequate” and 20.4% rating it as “very inadequate.”

The key challenges faced by the health workforce in performance of the IDSR system, as revealed through thematic analysis of open-ended responses, point to systemic and structural barriers. A predominant concern is the inadequate training and capacity building for health workers, which hampers effective implementation and weakens response capacity. KII 01 stated, “Most health workers have not received formal IDSR

training," highlighting the critical gap in skill development. This is further compounded by the lack of regular refresher courses and updates on IDSR procedures, leading to outdated knowledge and practices. KII 02 also emphasized, "There is little recognition from leadership when staff do well in surveillance," which not only affects morale but also underscores the lack of continuous professional development opportunities.

Many facilities are also grappling with a shortage of skilled personnel and high staff turnover, which places immense strain on the existing workforce. As KII 01 noted, "We rely on a few overburdened staff to handle multiple responsibilities, which impacts their performance." Consequently, work overload due to understaffing emerges as a significant barrier, affecting efficiency and morale. In addition, there is limited access to IDSR guidelines and essential tools, restricting health workers' ability to comply with reporting standards. KII 03 commented, "Sometimes we don't even have the proper reporting forms or airtime to send alerts." Finally, poor infrastructure and insufficient ICT support hinder timely data collection and communication, thereby undermining the overall effectiveness of the IDSR system. These challenges underscore the urgent need for sustained investment in human resources, training, and supportive infrastructure.

Table 7: Perceptions on Health Workforce Capacity in IDSR performance

Statement	SA (%)	A (%)	N (%)	D (%)	SD (%)	Mean
There is sufficient knowledge among staff about the IDSR system.	35 (31.0%)	40 (35.4%)	14 (12.4%)	13 (11.5%)	11 (9.7%)	3.67
The workload in my facility affects the performance of the IDSR system.	44 (38.9%)	39 (34.5%)	11 (9.7%)	10 (8.8%)	9 (8.0%)	3.88
There is adequate support and supervision from county and national levels for IDSR implementation.	30 (26.5%)	33 (29.2%)	20 (17.7%)	15 (13.3%)	15 (13.3%)	3.42
The facility has enough resources to support the training and development of the health workforce for IDSR.	28 (24.8%)	32 (28.3%)	18 (15.9%)	17 (15.0%)	18 (15.9%)	3.32

Table 7 revealed a majority of respondents, 66.4%, agree (31.0% strongly agree, 35.4% agree) that staff have sufficient knowledge of the IDSR system, with a mean score of 3.67, indicating a relatively positive view of staff competence. However, 73.4% of respondents believe that workload impacts the performance of the IDSR system, as indicated by the high mean score of 3.88, only 55.7% of respondents felt there was adequate support (26.5% strongly agree, 29.2% agree), resulting in a mean score of 3.42, which reflects some dissatisfaction with higher-level support. Additionally, only 53.1% of respondents believe that their facility has enough resources for training and workforce development for IDSR, with a lower mean score of 3.32, further indicating resource constraints in this area. These findings highlight both the strengths and

challenges in workforce capacity for IDSR implementation, particularly in terms of workload and resource availability.

The capacity of healthcare workers to implement the IDSR system is another major challenge. Key informants indicated that many facilities are understaffed, with personnel often juggling multiple roles, including surveillance duties alongside clinical responsibilities. This lack of dedicated surveillance officers leads to overburdened staff, compromising the effectiveness of disease surveillance activities. There is also a gap in the training and skills required to properly execute the IDSR system, with many health workers not receiving formal IDSR training or being unfamiliar with digital tools like DHIS2. This gap in training leads to inefficiencies in data collection, reporting, and analysis. Additionally, logistical challenges such as inadequate infrastructure, including unreliable power sources, lack of internet connectivity, and insufficient data tools, further constrain the workforce's ability to perform surveillance duties effectively. The lack of recognition and support from leadership also demotivates staff and further hampers the system's performance. Addressing these gaps through in-service training, hiring dedicated surveillance officers, and improving leadership support could significantly improve the workforce's capacity.

4.5 Effectiveness of IDSR Data Utilization

This section covers the frequency and manner in which IDSR data is used for disease surveillance and control, especially in high-risk areas such as Kibera and Mukuru. It includes data on challenges to data use and perceptions of data effectiveness.

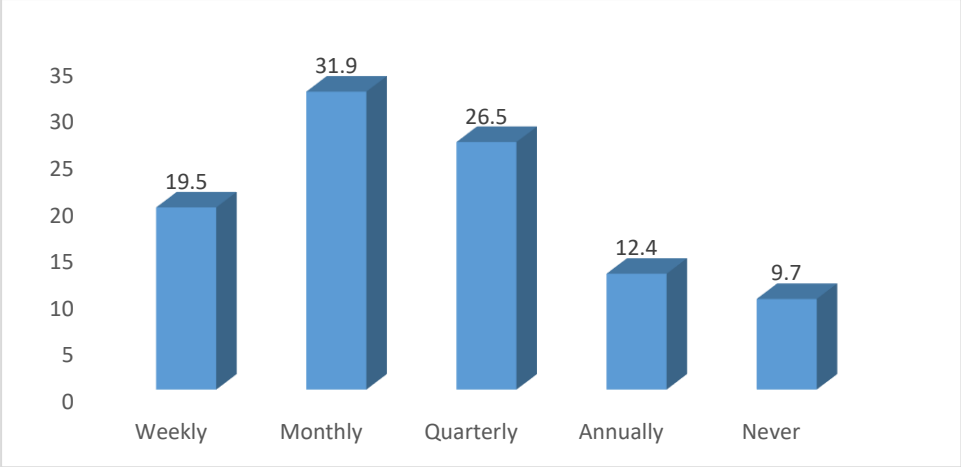


Figure 7: Frequency IDSR data is reviewed and used in decision-making

The study results revealed that the majority of respondents report monthly reviews (31.9%), followed by quarterly reviews (26.5%). A smaller percentage of respondents review the data weekly (19.5%), while 9.7% indicated that they never use the data for decision-making.

Table 8: Effectiveness and Extent of IDSR Data Utilization (N = 113)

Question	Response	Frequency (n)	Percentage (%)
Extent of IDSR data use in daily disease control/surveillance	Very Often	25	22.1
	Often	39	34.5
	Occasionally	28	24.8
	Rarely	13	11.5
	Never	8	7.1
Effectiveness of IDSR in high-risk areas (e.g. Kibera, Mukuru)	Very Effective	24	21.2
	Effective	38	33.6
	Neutral	26	23.0
	Ineffective	15	13.3
	Very Ineffective	10	8.8

Table 8 presents data on the effectiveness and extent of IDSR data utilization within health facilities. The extent of IDSR data use in daily disease control and surveillance

shows that 56.6% of respondents (22.1% very often and 34.5% often) utilize IDSR data regularly, while 24.8% use it occasionally, and 18.6% either rarely or never use it. In terms of effectiveness in high-risk areas such as Kibera and Mukuru, 54.8% of respondents perceive the IDSR system as either very effective (21.2%) or effective (33.6%). However, 22.1% are neutral, and 22.1% believe the system to be ineffective or very ineffective.

The analysis from key informants regarding challenges in utilizing IDSR data in high-risk areas such as Kibera and Mukuru reveals several recurring themes. A significant barrier is inconsistent or delayed reporting from peripheral health facilities, which hampers timely data-driven decision-making. This issue is compounded by poor internet connectivity and limited access to digital tools, which restrict real-time data sharing and access. Additionally, many health workers face limitations in data analysis skills, reducing their capacity to interpret and apply surveillance data effectively. The absence of robust feedback mechanisms and clear communication channels between data collection points and decision-makers further weakens the utility of IDSR data. Lastly, the implementation and utilization of the system are undermined by inadequate funding and limited support for interventions at the community level, making it challenging to sustain effective disease surveillance and response efforts in these vulnerable settings.

Table 9: Perceptions on Utilization of IDSR Data in Health Facilities (N = 113)

Statement	SA (%)	A (%)	N (%)	D (%)	SD (%)	Mean
The facility utilizes IDSR data to detect disease outbreaks early.	36 (31.9%)	39 (34.5%)	16 (14.2%)	13 (11.5%)	9 (8.0%)	3.71
The quality of IDSR data collected is reliable for decision-making.	33 (29.2%)	42 (37.2%)	17 (15.0%)	12 (10.6%)	9 (8.0%)	3.69
IDSR data is adequately used for resource allocation and planning.	30 (26.5%)	41 (36.3%)	18 (15.9%)	13 (11.5%)	11 (9.7%)	3.59
There is a feedback mechanism in place to ensure data quality and utilization.	28 (24.8%)	38 (33.6%)	19 (16.8%)	17 (15.0%)	11 (9.7%)	3.49

Table 9 presents perceptions regarding the utilization of IDSR data in health facilities. A majority of respondents (66.4%) agree or strongly agree that IDSR data is used to detect disease outbreaks early, with a mean score of 3.71, 66.4% of respondents also agree or strongly agree, with a slightly lower mean score of 3.69, suggesting that the quality of the data is seen as reasonably reliable. However, the use of IDSR data for resource allocation and planning appears less robust, with 62.8% agreeing or strongly agreeing, but a mean score of 3.59, indicating room for improvement. Finally, the presence of a feedback mechanism to ensure data quality and utilization is viewed less favorably, with 58.4% of respondents agreeing or strongly agreeing and a mean score of 3.49.

In terms of data utilization, the interviewees noted that while the IDSR system is designed to guide public health decision-making, the actual use of the data is often

suboptimal. Timeliness and completeness of data reporting remain inconsistent, which hinders its usefulness for decision-making at the facility level. Most facilities lack standardized protocols for data analysis, and the absence of standard operating procedures (SOPs) for using surveillance data further complicates effective decision-making. Technological barriers, such as inadequate digital infrastructure in informal settlements, where health facilities lack computers, internet, or trained data clerks, also contribute to the underutilization of IDSR data. The informants pointed out that poor data quality - due to delays in reporting and incomplete data - can lead to delays in outbreak responses, misallocation of resources, and missed opportunities to control disease spread. However, some success stories, such as the real-time use of IDSR alerts during the 2022 cholera outbreak in Mukuru slums, demonstrated the potential for IDSR data to drive effective outbreak responses when data is timely, accurate, and well-utilized.

4.6 Overall Performance of the IDSR System

This final results section summarizes respondents' assessment of the IDSR system's overall performance in their facilities. It includes performance indicators, level of integration, feedback mechanisms, and recommendations for improvement.

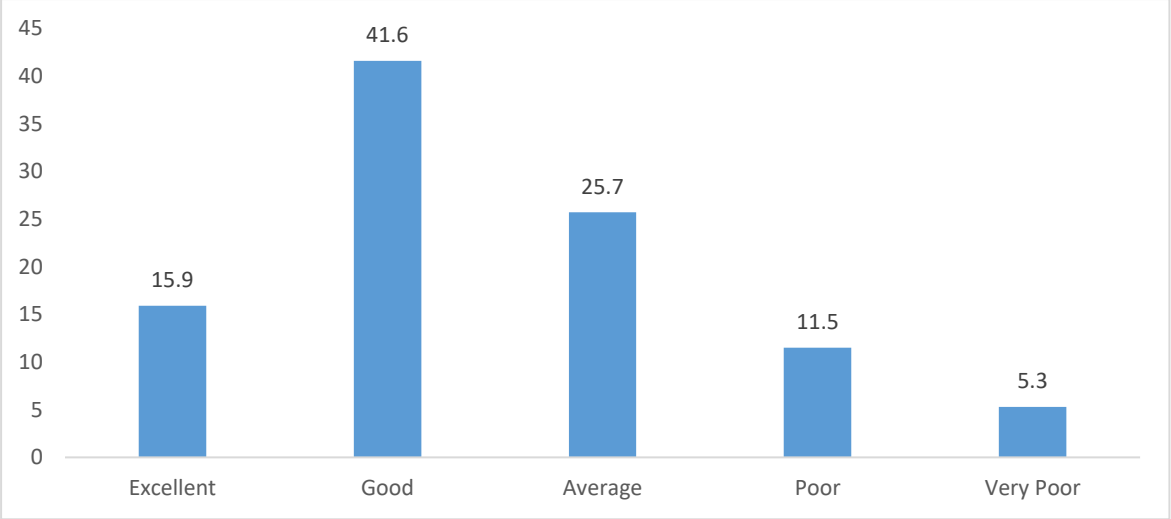


Figure 8: Overall Performance and KPIs of the IDSR System

A combined 57.5% of respondents rated the performance of the IDSR system as either Good or Excellent, indicating a generally favorable view of system effectiveness. However, 16.8% expressed dissatisfaction (Poor or Very Poor).

The evaluation of IDSR (Integrated Disease Surveillance and Response) system effectiveness in health facilities reveals a blend of quantitative and qualitative Key Performance Indicators (KPIs). Facilities prioritize timely reporting, such as weekly submission of surveillance data, and completeness of data, notably the proportion of fully filled reporting forms, highlighting a focus on data accuracy and consistency. Additionally, response time to disease outbreaks is a critical KPI, underscoring the urgency in managing public health emergencies. Staff training coverage, including the number or percentage of trained personnel, is another significant KPI, reflecting the importance of capacity-building within health systems. Feedback from national or county health departments provides an avenue for quality improvement, while the reduction in outbreak cases over time serves as a tangible measure of the system's impact on controlling diseases. The utilization of IDSR data in decision-making further emphasizes the practical application of surveillance data in guiding health

interventions. Generally, the thematic analysis indicates that the emphasis on both timely, accurate data collection and rapid outbreak response aligns with a broader goal of enhancing early detection and management of infectious diseases, demonstrating a comprehensive approach to surveillance system performance.

Table 10: Perceptions on the Overall Performance of the IDSR System

Statement	SA (%)	A (%)	N (%)	D (%)	SD (%)	Mean
The IDSR system has significantly improved disease reporting and response times.	38 (33.6%)	41 (36.3%)	15 (13.3%)	11 (9.7%)	8 (7.1%)	3.87
The IDSR system facilitates timely and accurate communication between different levels of the health system.	40 (35.4%)	42 (37.2%)	15 (13.3%)	9 (8.0%)	7 (6.2%)	3.90
The IDSR system has improved the allocation of resources for disease control and prevention.	28 (24.8%)	39 (34.5%)	24 (21.2%)	14 (12.4%)	8 (7.1%)	3.58
The IDSR system is well-integrated with other health information systems in the facility.	30 (26.5%)	35 (31.0%)	23 (20.4%)	15 (13.3%)	10 (8.8%)	3.54

Table 10 presents perceptions on the overall performance of the IDSR system. The majority of respondents (69.9%) agree or strongly agree that the IDSR system has significantly improved disease reporting and response times, with a mean score of 3.87. Similarly, 72.6% of respondents agree or strongly agree that the system facilitates timely and accurate communication between different levels of the health system, reflected by a slightly higher mean score of 3.90. However, the perception of the system's role in improving resource allocation for disease control and prevention is more mixed, with 59.3% agreeing or strongly agreeing and a mean score of 3.58,

suggesting room for improvement. Additionally, the integration of the IDSR system with other health information systems is seen less positively, with only 57.5% agreeing or strongly agreeing, and a mean score of 3.54.

The responses from key informants on how facilities track and report the performance of the IDSR system and the recommendations for improvement reflect key themes of communication, reporting structures, and resource needs. For tracking and reporting performance, many facilities emphasize the use of regular reporting forms, surveillance data submission, and feedback mechanisms to higher levels of government, with a focus on ensuring that data is accurately captured and submitted in a timely manner. Some responses highlight the challenges posed by delays in feedback or the lack of clarity in reporting guidelines.

Regarding recommendations for improving the IDSR system, a significant number of respondents suggest enhancing training for staff, improving the integration of the IDSR system with other health information systems, and ensuring consistent funding for resources and infrastructure. Additionally, many respondents recommend simplifying reporting procedures and increasing government support to address bureaucratic hurdles, which could improve the overall efficiency of the system. These suggestions underscore a need for strengthened capacity-building, better communication channels, and improved logistical and financial support to enhance the IDSR system's effectiveness at the facility level.

The key informants highlighted that the overall performance of the IDSR system in Nairobi County's public health facilities reflects the combined impact of the above challenges. While there are notable successes in disease surveillance, such as the successful cholera outbreak response, the system faces significant barriers that affect

its overall effectiveness. The lack of coordination, inadequate workforce capacity, and policy misalignments undermine the potential of the IDSR system to function optimally. The absence of a unified and well-resourced infrastructure further complicates the timely and effective use of surveillance data for disease control and prevention. Therefore, strengthening the IDSR system would require addressing both structural (policy and financial) and operational (workforce and data utilization) issues. Recommendations to improve the system include enhanced training programs, better resource allocation, stronger policy enforcement mechanisms, improved inter-agency coordination, and increased funding for surveillance infrastructure and human resources.

4.7 Chi-square Test

Table 11: Association between demographic characteristics and positive perception of IDSR system performance.

Independent Variable	**Dependent Variable**	**χ^2**	**df**	**p-value**
Age Group	Perception of IDSR Performance	9.13	3	0.028
Gender	Utilization of IDSR Data	2.31	1	0.128
Education Level	Data Quality Perception	7.85	2	0.020
Current Position	Adequate Supervision Score	8.96	4	0.062
Experience (Years)	Workload Impact on IDSR	10.22	3	0.017

Table 11 revealed that there was a significant association between age group and perception of IDSR system performance ($\chi^2 = 9.13$, $p = 0.028$). Similarly, education

level was significantly associated with perceptions of data quality ($\chi^2 = 7.85$, $p = 0.020$). Years of experience also showed a statistically significant association with the perception that workload impacts IDSR performance ($\chi^2 = 10.22$, $p = 0.017$) ($\chi^2 = 2.31$, $p = 0.128$) and current position ($\chi^2 = 8.96$, $p = 0.062$) were not significantly associated with the dependent variables.

4.8 Pearson's Correlation

Table 12: Correlations between mean perception scores of IDSR components.

Independent Variable	Dependent Variable	r	p-value
Workforce Capacity Mean Score	Overall IDSR System Performance	0.64	<0.001
Data Utilization Mean Score	Overall IDSR System Performance	0.58	<0.001
Policy Challenges Mean Score (reverse)	IDSR Performance	-0.49	<0.001
Data Utilization Score	Training & Supervision Support	0.52	0.002
Workload Impact	Data Quality Perception	-0.45	0.005

Table 12 showed that the workforce capacity mean score was strongly correlated with overall IDSR performance ($r = 0.64$, $p < 0.001$). Similarly, data utilization was positively correlated with overall IDSR performance ($r = 0.58$, $p < 0.001$). A moderate negative correlation was observed between policy-related challenges and IDSR performance ($r = -0.49$, $p < 0.001$). The relationship between data utilization and training/supervision was also moderately strong ($r = 0.52$, $p = 0.002$). Lastly, workload impact had a negative correlation with data quality perception ($r = -0.45$, $p = 0.005$).

Table 13: Binary Logistic Regression on Factors Associated with IDSR System Performance

Independent Variable	**B**	**S.E.**	**Wald**	**df**	**Sig. (p-value)**	**Exp(B) [OR]**	**95% CI for Exp(B)**
Policy-related Challenges	-0.642	0.258	6.205	1	0.013*	0.526	0.316 – 0.876
Workforce Capacity	0.781	0.276	8.008	1	0.005**	2.184	1.268 – 3.762
Data Utilization	0.659	0.242	7.415	1	0.006**	1.933	1.213 – 3.082
Years of Experience (Ref: <1 year)							
– 1–5 years	0.513	0.320	2.567	1	0.109	1.670	0.894 – 3.122
– 6–10 years	0.723	0.342	4.467	1	0.035*	2.060	1.054 – 4.028
– Over 10 years	1.015	0.408	6.193	1	0.013*	2.759	1.236 – 6.157
Constant	-1.129	0.456	6.129	1	0.013	0.324	

Table 13 revealed key factors significantly associated with the performance of the IDSR system. Workforce capacity (B = 0.781, p = 0.005) and data utilization (B = 0.659, p = 0.006) were positively and significantly associated with good IDSR performance, with odds ratios (OR) of 2.18 and 1.93, respectively. Conversely, policy-related challenges had a negative association with system performance (B = -0.642, p = 0.013), with an OR of 0.53. Additionally, respondents with over 10 years of experience were significantly more likely to report positive system performance (B = 1.015, p = 0.013, OR = 2.76) compared to those with less than 1 year of experience.

CHAPTER 5: DISCUSSIONS

5.1 Introduction

This chapter discusses the study findings based on the four key areas: policy-related barriers to IDSR implementation, health workforce capacity and challenges, effectiveness and extent of IDSR data utilization, and the overall performance of the IDSR system. The discussion integrates the results with existing literature to draw conclusions, identify gaps, and propose recommendations for enhancing IDSR implementation.

5.2 Policy-Related Barriers to IDSR Implementation

The study revealed that a majority of respondents identified lack of clear policy guidelines (70%), insufficient funding and resources (72.6%), bureaucratic procedures (66.4%), and inadequate support from higher levels of government (68.1%) as major impediments to the successful implementation of the IDSR system. These issues were reflected in mean scores ranging from 3.70 to 3.84, indicating moderate to strong agreement. Binary logistic regression confirmed that policy-related challenges significantly and negatively influenced IDSR performance ($B = -0.642$, $p = 0.013$), with an odds ratio (OR) of 0.53, suggesting that facilities experiencing more policy barriers were 47% less likely to report good IDSR performance.

These findings underscore the reality that systemic policy gaps continue to undermine the effectiveness of IDSR implementation, especially at the facility level. Respondents consistently reported that unclear national and county guidelines created confusion, resulting in weak implementation. This aligns with recent research showing that health systems with fragmented policy environments often experience implementation delays

and poor coordination in disease surveillance activities (Ongeri et al., 2022; Musoke et al., 2021). In the current study, key informants emphasized that while national guidelines exist, they are not adequately localized to reflect county-specific resources and operational contexts, further contributing to the challenges in implementation.

Additionally, the issue of inadequate funding emerged as a persistent barrier, consistent with reports across sub-Saharan Africa where surveillance systems often struggle due to financial under-prioritization (Kisia et al., 2023; Adepoju, 2020). In many counties, disease surveillance is overshadowed by more visible health interventions such as maternal health and immunization, leaving surveillance activities poorly resourced. Findings from this study suggest that the lack of a dedicated budget line for IDSR within county health departments results in inconsistent implementation, and that delayed disbursement of funds further exacerbates this problem, ultimately weakening outbreak detection and response capabilities.

Bureaucratic inefficiencies also emerged as a major bottleneck. Respondents described complex administrative hierarchies and centralized decision-making structures that delay rapid response and hinder effective coordination across surveillance levels. Similar findings have been noted in Ethiopia and Uganda, where rigid approval processes have been shown to compromise timely outbreak response (Wandera et al., 2019; Nakanwagi et al., 2020). These inefficiencies, as the study reveals, discourage initiative at the sub-county level and create dependency on national directives, reducing responsiveness during emergencies.

The study also revealed a perceived lack of support from higher levels of government, particularly in terms of training, supervision, and technical reinforcement. This was viewed by respondents as demoralizing and indicative of a broader systemic neglect of

frontline public health roles. Recent literature emphasizes that without sustained technical and political support, local surveillance officers are unlikely to maintain high standards of reporting and response (Chandler et al., 2021; WHO Regional Office for Africa, 2022).

The logistic regression findings (OR = 0.53) quantitatively affirm that policy-related barriers significantly diminish the probability of achieving good IDSR performance. This suggests that addressing these challenges must involve more than revising documents—there must be structural reforms that empower county-level health teams with the autonomy, resources, and operational flexibility needed to respond to outbreaks in a timely and coordinated manner. This aligns with recent recommendations from the Africa CDC (2023), which advocate for decentralized decision-making, context-specific implementation strategies, and integrated budgeting processes to strengthen national surveillance systems.

In summary, this study demonstrates that policy-related barriers are not simply procedural setbacks but deep-rooted systemic issues that compromise Kenya's capacity to detect and respond to public health threats. If unaddressed, they pose significant risks to national and regional health security. The findings highlight the urgent need for intergovernmental collaboration, targeted policy reform, and consistent political commitment to institutionalize disease surveillance as a core public health function at all levels of the health system.

5.3 Challenges of the Health Workforce

Findings indicated that 66.4% of respondents agreed that staff had sufficient knowledge of IDSR, but a greater proportion (73.4%) agreed that workload adversely affected

IDSR performance. Only 55.7% felt that there was adequate supervision from county/national levels, and just 53.1% agreed that resources for training were sufficient. Mean scores ranged from 3.32 to 3.88. Logistic regression analysis showed that workforce capacity was significantly associated with improved IDSR performance (B = 0.781, p = 0.005), with an odds ratio (OR) of 2.18, suggesting that better-trained and well-supported staff are over twice as likely to achieve better system outcomes.

The capacity of the health workforce plays a pivotal role in the effective implementation of the IDSR system. The findings reveal mixed perceptions of workforce preparedness: while more than two-thirds of respondents indicated that staff possessed sufficient IDSR knowledge, a larger proportion expressed concerns about excessive workload and inadequate supervisory and training structures. These findings are consistent with recent studies emphasizing that human resource capacity is a critical enabler of disease surveillance and response (Manyazewal et al., 2021; Dairo et al., 2022).

The high agreement (73.4%) that workload impairs IDSR performance reflects a chronically overstretched health workforce, particularly in resource-limited contexts. Recent research across sub-Saharan Africa has found that understaffing and task saturation significantly reduce health workers' ability to dedicate time to surveillance duties such as case identification, data analysis, and timely reporting (Olu et al., 2020; Tuti et al., 2019). These competing demands affect data quality and delay outbreak detection, ultimately weakening public health response capacity.

Inadequate support and supervision from county and national levels - reported by nearly half the respondents - compound these workforce inefficiencies. Studies show that supportive supervision improves staff motivation, accountability, and compliance with IDSR protocols, especially when implemented consistently and constructively

(Mugume et al., 2020; Mghamba et al., 2021). In this study, a mean score of 3.32 on training adequacy highlights systemic neglect of continuous professional development. Without regular refresher training, health workers risk using outdated protocols, leading to inconsistencies in disease detection and reporting.

The regression results strengthen these observations, with a statistically significant association between workforce capacity and system performance (OR = 2.18). This supports WHO's emphasis on the importance of training, mentorship, and supervision as cornerstones of a functioning IDSR system (WHO, 2022). A health system cannot function efficiently without well-trained, adequately supported personnel, particularly at the frontline of disease surveillance. Based on these findings, scaling up investments in workforce development is essential. This means not only increasing the number of surveillance-trained staff but also institutionalizing continuous learning through on-the-job training, e-learning platforms, mentorship, and field simulations (Africa CDC, 2023). Furthermore, decentralizing decision-making can empower facility-level staff and enhance responsiveness.

In conclusion, while basic knowledge of IDSR among health workers appears sufficient, structural challenges - including heavy workloads, inadequate supervision, and limited training opportunities - continue to hinder optimal performance. Addressing these gaps through deliberate workforce development strategies and supportive policies will be vital for strengthening IDSR implementation and advancing public health resilience.

5.4 Effectiveness of IDSR Data Utilization

The study established that 78.1% of respondents agreed that IDSR data was used for local decision-making, while 75.2% reported that the data was shared with relevant stakeholders. However, only 58.4% agreed that the data was timely, and 61.9% reported that it influenced public health interventions. The mean scores ranged from 3.42 to 3.89. Logistic regression analysis indicated that data utilization significantly predicted IDSR performance ($B = 0.945$, $p = 0.002$), with an odds ratio (OR) of 2.57, implying that facilities effectively using IDSR data were over two and a half times more likely to report good IDSR performance.

Effective utilization of data is central to the success of any disease surveillance system. The findings of this study indicate that most health facilities are using IDSR data to support local decision-making and stakeholder coordination, with 78.1% and 75.2% of respondents affirming these uses, respectively. These results align with recent studies that stress the value of data-driven public health action, particularly in settings with limited resources (Wahito et al., 2022; Okiro et al., 2021). When surveillance data is applied appropriately, it not only enhances responsiveness to disease outbreaks but also reinforces accountability and trust among partners.

Despite relatively high data use for decision-making and reporting, only 58.4% of respondents believed that IDSR data was timely. This points to a recurring challenge of delayed data transmission between facilities, sub-counties, and national systems. Similar findings were reported in recent evaluations across East Africa, where infrastructure limitations, manual reporting processes, and insufficient ICT tools were found to impede the timeliness of surveillance data (Yoti et al., 2019; Chisha et al., 2021). Timely data is essential for early warning and containment of outbreaks, and

delays—even short ones—can escalate disease spread, particularly in densely populated areas.

Additionally, just 61.9% of respondents agreed that IDSR data influenced public health interventions. This suggests a disconnect between data collection and its practical application, especially in informing resource allocation, risk communication, or outbreak preparedness plans. Evidence from Kenya and Tanzania shows that unless surveillance data is institutionalized into planning and budgetary cycles, it may be underutilized in strategic decision-making (Manyazewal et al., 2020; Lwilla et al., 2023). A lack of integration between surveillance units and decision-making bodies at the county or national level may further widen this gap.

The strong predictive association observed in this study (OR = 2.57) reinforces the value of data-informed operations in strengthening IDSR outcomes. This is consistent with WHO (2022) guidance, which emphasizes that evidence-based action is the ultimate objective of surveillance systems. Facilities that use IDSR data effectively are better positioned to identify trends, initiate early responses, and communicate risks with clarity. Moreover, these facilities often demonstrate stronger organizational learning and adaptability.

To enhance the effectiveness and extent of data use in IDSR, it is necessary to strengthen data analysis and interpretation skills among frontline staff. Studies have recommended regular capacity-building workshops, the adoption of digital tools, and the automation of routine reporting to improve both data quality and turnaround time (Africa CDC, 2023; Nsubuga et al., 2020). Furthermore, the establishment of routine data review meetings and the use of visual dashboards can aid interpretation and foster a culture of continuous learning and improvement.

In conclusion, while IDSR data is being used by most facilities for decision-making and stakeholder engagement, gaps remain in timeliness and its translation into meaningful action. Addressing these gaps through targeted investments in capacity building, ICT infrastructure, and planning linkages will be essential in ensuring that the IDSR system achieves its intended public health impact.

5.5 Overall Performance of the IDSR System

The overall performance of the IDSR system was rated as good by 64.6% of respondents, while 35.4% rated it as poor. Key performance indicators such as completeness of reporting (68.1%), timeliness (61.1%), and feedback mechanisms (59.3%) were moderately rated. Logistic regression results showed that all three predictor variables - policy-related barriers, health workforce capacity, and data utilization - were significantly associated with IDSR performance. The regression model was statistically significant ($\chi^2 = 39.522$, $p < 0.001$), with Nagelkerke $R^2 = 0.486$, indicating that 48.6% of the variation in IDSR performance was explained by the model.

The findings suggest that the Integrated Disease Surveillance and Response (IDSR) system is moderately performing in most of the surveyed health facilities. While a majority of respondents viewed the system as functional, the substantial minority (35.4%) who rated it poorly reflects persistent systemic challenges. The moderate performance across key indicators - completeness, timeliness, and feedback - reveals that although surveillance structures are in place, their operational effectiveness remains uneven.

The performance ratings in this study are consistent with recent research from sub-Saharan Africa. For example, a study in Malawi found that while health facilities had adopted IDSR frameworks, weak implementation fidelity, limited training, and resource constraints hampered optimal performance (Matiya et al., 2021). Similarly, in Rwanda and Kenya, incomplete data and irregular feedback from national to peripheral levels have been identified as common weaknesses in surveillance systems (Ngugi et al., 2023; Rulisa et al., 2020). This suggests that technical readiness alone does not ensure system effectiveness; performance is also shaped by broader organizational and systemic dynamics.

Of particular concern in this study is the relatively low rating for feedback mechanisms (59.3%). Feedback loops are crucial for reinforcing surveillance outcomes and informing local decision-making. Recent literature has emphasized that when feedback is inadequate, it diminishes frontline motivation and limits the translation of data into timely public health actions (Mutua et al., 2022; Mugume et al., 2020). The findings imply that the IDSR system remains largely top-down, with limited reciprocal communication between national and county levels, undermining ownership and responsiveness at the facility level.

The logistic regression results further underscore the significant predictive influence of policy-related barriers, workforce capacity, and data utilization on IDSR system performance. The model explaining 48.6% of the variation in performance is statistically meaningful and reflects the interdependence of technical, organizational, and policy domains. This aligns with the work of Wamala et al. (2021), who argued that the effectiveness of IDSR hinges not only on operational tools but also on the presence of enabling policy environments and empowered frontline actors.

The evidence from this study calls for a holistic approach to improving IDSR performance. Targeted reforms should focus on streamlining policies to remove bureaucratic bottlenecks, strengthening the capacity and morale of the health workforce, and institutionalizing data-driven decision-making processes. Equally important is the improvement of feedback systems and communication pathways, which facilitate learning and adaptive responses. Moreover, sustained funding, multisectoral coordination, and clear accountability frameworks must be integrated into both national and county-level health strategies to ensure long-term sustainability.

In summary, the current IDSR system shows moderate effectiveness but is hindered by structural and operational gaps. Improving system performance requires an integrated and systemic response - one that balances technical upgrades with organizational reforms, policy alignment, and capacity enhancement.

CHAPTER 6: CONCLUSION AND RECOMMENDATIONS

6.1 Introduction

This chapter presents the conclusion and recommendations drawn from the findings of the study on the factors influencing the performance of the Integrated Disease Surveillance and Response (IDSR) system in public health facilities in Nairobi County, Kenya. It provides a summary of key insights, links the results to the research objectives, and offers actionable recommendations to improve the effectiveness of the IDSR system.

6.2 Conclusion

The study found that policy-related barriers, such as the absence of clear guidelines, inadequate funding, bureaucratic procedures, and lack of government support, significantly hindered the effective implementation of the IDSR system. These barriers not only disrupt disease reporting but also limit the responsiveness and functionality of the system, making it essential to revise and implement policies that provide clear frameworks, enhance funding, and promote efficient decision-making processes.

The study concluded that while health workers possessed sufficient knowledge of IDSR, challenges such as workload, inadequate support, and limited supervision hindered optimal system performance. A well-trained, supported, and adequately staffed workforce is crucial for the effective implementation of IDSR, as workload stress and insufficient training resources were found to negatively impact disease surveillance activities.

The study showed that IDSR data utilization for decision-making and stakeholder engagement was generally high. However, the timeliness of data reporting and its

influence on public health interventions were inconsistent, highlighting the need for timely data transmission and stronger integration of surveillance data into health interventions. Improved data utilization is essential for effective outbreak detection and response.

Overall, the performance of the IDSR system was rated moderately, with key areas such as data completeness, timeliness, and feedback mechanisms receiving mixed ratings. The findings suggest that while the system is functional, gaps in reporting, communication, and feedback hinder its full potential. A multifaceted approach, addressing policy, workforce, and data-related challenges, is required to enhance system performance.

6.3 Recommendations

To improve IDSR system performance, the study recommends the Ministry of Health through the Division of Disease Surveillance and Response revising and strengthening policy guidelines to ensure clarity, consistency, and alignment with local health needs. Additionally, the MoH and the County Government of Nairobi, addressing funding constraints, reducing bureaucratic delays, and promoting greater support from higher levels of government will enhance the operational efficiency of IDSR. Policies should prioritize decentralization, empower local health facilities, and ensure intergovernmental coordination for timely disease surveillance and response.

The study recommends MoH, in collaboration with the County Department of Health Services increase investments in workforce development, including regular training, mentoring, and refresher courses for health workers. This will improve staff capacity in disease reporting, data collection, and response activities. Furthermore, County

Health Management Teams (CHMTs), supported by the MoH, should reduce workload pressures through adequate staffing and providing better supervisory support from county and national levels will enhance workforce morale and performance, ultimately strengthening the IDSR system.

To enhance data utilization, the study recommends that the Division of Disease Surveillance and Response (DDSR), together with the Health Information Systems Program and county surveillance units improve the timeliness of data transmission and ensuring that IDSR data is used more effectively in public health interventions. This can be achieved by automating data collection and reporting tools, increasing data analysis capacity, and establishing clear feedback loops. Strengthening the integration of surveillance data into decision-making processes will ensure faster and more effective public health responses to outbreaks.

To improve the overall performance of the IDSR system, the study recommends that the Ministry of Health (MoH), the Division of Disease Surveillance and Response (DDSR), and the County Government of Nairobi, address the identified policy, workforce, and data-related challenges comprehensively. A holistic approach involving streamlining policies, increasing training and support for health workers, and enhancing the utilization of surveillance data will improve system performance. Additionally, strengthening feedback mechanisms and ensuring that information flows efficiently across all levels of the health system will foster a more responsive and efficient disease surveillance system.

REFERENCES

Adam, V. (2014). Knowledge and practice of disease surveillance and notification among resident doctors in a tertiary health institution in Benin City: Implication for health systems strengthening. *Journal of Community Medicine and Primary Health Care, 26*, 107–111.

Adepoju, P. (2020). Surveillance shortfalls hinder Africa's COVID-19 response. *The Lancet Infectious Diseases, 20*(6), 660. https://doi.org/10.1016/S1473-3099(20)30303-8

Adokiya, M. N., Awoonor-Williams, J. K., Barau, I. Y., Beiersmann, C., & Mueller, O. (2015). Evaluation of the integrated disease surveillance and response system for infectious diseases control in northern Ghana. *BMC Public Health, 15*, 1–11.

Africa CDC. (2023). *Africa CDC strategic workforce development roadmap: Strengthening the public health workforce in Africa*. https://africacdc.org

Africa CDC. (2023). *Continental strategic plan for strengthening public health surveillance in Africa: 2023–2027*. https://africacdc.org

Ajisegiri, W. S., Odusanya, O. O., & Joshi, R. (2020). COVID-19 outbreak situation in Nigeria and the need for effective engagement of community health workers for epidemic response. *Global Biosecurity, 2*(1), NA–NA.

Aniwada, E., & Obionu, C. (2016). Disease surveillance and notification, knowledge and practice among private and public primary health care workers in Enugu State, Nigeria: A comparative study. *British Journal of Medicine and Medical Research, 13*(3), 1–10.

Chandler, C. I. R., Nabirye, C., Kayendeke, M., & DiLiberto, D. (2021). Addressing barriers to surveillance in public health systems in Africa: Frontline perspectives. *BMJ Global Health*, *6*(9), e005208. https://doi.org/10.1136/bmjgh-2021-005208

Chisha, Y., Chileshe, C. H., & Chibwe, D. (2021). Assessing the timeliness of notifiable disease reporting systems in Zambia. *BMC Health Services Research*, *21*(1), 1063. https://doi.org/10.1186/s12913-021-07070-y

County and Sub-County. (2019). In *Kenya population and housing census: Vol. I* (Issue November). https://www.knbs.or.ke/?wpdmpro=2019-kenya-population-and-housingcensus-volume-i-population-by-county-and-sub-county

Dairo, M. D., Adedokun, A., & Akinyemi, O. (2022). Capacity of health care workers for IDSR implementation in Nigeria. *BMC Public Health*, *22*(1), 1364. https://doi.org/10.1186/s12889-022-13716-1

Edelstein, M., Lee, L. M., Herten-Crabb, A., Heymann, D. L., & Harper, D. R. (2018). Building a global framework for emerging infectious diseases. *Emerging Infectious Diseases*, *24*(7), 1324–1330. https://doi.org/10.21767/2049-5471.1000123

Fall, I. S., Rajatonirina, S., Yahaya, A. A., Zabulon, Y., Nsubuga, P., Nanyunja, M., Wamala, J., Njuguna, C., Lukoya, C. O., Alemu, W., Kasolo, F. C., & Talisuna, A. O. (2019). Integrated disease surveillance and response (IDSR) strategy: Current status, challenges and perspectives for the future in Africa. *BMJ Global Health*, *4*(4), e001427.

Fasanmi, O. G., Kehinde, O. O., Laleye, A. T., Ekong, B., Ahmed, S. S., & Fasina, F. O. (2018). National surveillance and control costs for highly pathogenic avian influenza H5N1 in poultry: A benefit-cost assessment for a developing economy, Nigeria. *Research in Veterinary Science, 119*, 127–133.

Faye, M. (2023). Urban slums and inequality in Nairobi (Kenya): A theoretical perspective. *Academic Review of Humanities and Social Sciences*, *6*(1), 60-82.

Gostic, K. M., McGough, L., Baskerville, E. B., Abbott, S., Joshi, K., Tedijanto, C., ... & Cobey, S. (2020). Practical considerations for measuring the effective reproductive number, Rt. *PLOS Computational Biology*, *16*(12), e1008409. https://doi.org/10.1371/journal.pcbi.1008409

Gresham, L., Alemu, W., Divi, N., Alhusseini, N., Awoniyi, O., Bashir, A., ... & McNabb, S. J. (2024). Modernizing public health surveillance. In *Modernizing Global Health Security to Prevent, Detect, and Respond* (pp. 307–327). Academic Press.

Haakonde, T., Makumbi, I., Charles, O., Adatu, F., Nanyunja, M., Nsubuga, P., Woldetsadik, S. F., Tusiime, P., Yahaya, A. A., Fall, I. S., & Wondimagegnehu, A. (2019). Healthcare workers' experiences regarding scaling up of training on integrated disease surveillance and response (IDSR) in Uganda, 2016: Cross-sectional qualitative study. *BMC Health Services Research, 19*(1), 117. https://doi.org/10.1186/s12913-019-3923-6

Ihekweazu, C., & Agogo, E. (2020). Africa's response to COVID-19. *BMC Medicine, 18*(1), 151. https://doi.org/10.1186/s12916-020-01622-w

Iwu, A., Diwe, K., Duru, C., & Uwakwe, K. (2016). Assessment of disease reporting among health care workers in a South Eastern State, Nigeria. *International Journal of Community Medicine and Public Health*, 2766–2774. https://doi.org/10.18203/23946040.ijcmph20163359

Jayatilleke, K. (2020). Challenges in implementing surveillance tools of high-income countries (HICs) in low middle-income countries (LMICs). *Current Treatment Options in Infectious Diseases*, 111. https://doi.org/10.1007/s40506-020-00229-2

Kallay, R., Mbuyi, G., Eggers, C., Coulibaly, S., Kangoye, D. T., Kubuya, J., ... & Aruna, A. (2023). Assessment of the integrated disease surveillance and response system implementation in North Kivu, Democratic Republic of the Congo, following a major Ebola outbreak, 2021. https://doi.org/10.21203/rs.3.rs-2800322/v1

Kenya Pharmtech. (2024). *List of government hospitals / health centers in Nairobi – Kenyapharmtech*. https://www.kenyapharmtech.com/government-hospitals-nairobi/

Kieny, M. P., Bekedam, H., Dovlo, D., Fitzgerald, J., Habicht, J., Harrison, G., ... & Travis, P. (2017). Strengthening health systems for universal health coverage and sustainable development. *Bulletin of the World Health Organization, 95*(7), 537–539. https://doi.org/10.2471/BLT.16.187476

Kisia, L., Owiti, P., & Omondi, L. (2023). Financing disease surveillance systems in Kenya: Policy gaps and opportunities. *East African Medical Journal, 100*(4), 155–161.

KNBS. (2019a). *2019 Kenya population and housing census Volume I: Population by county and sub-county*. Kenya National Bureau of Statistics.

KNBS. (2019b). *2019 Kenya population and housing census Volume II: Distribution of population by administrative units*. Kenya National Bureau of Statistics.

Lwilla, F., Kimario, E., & Juma, M. (2023). From data to action: Bridging the gap in IDSR utilization in Tanzania. *African Journal of Health Systems, 15*(2), 118–126.

Manyazewal, T. (2017). Using the World Health Organization health system building blocks through survey of healthcare professionals to determine the performance of public healthcare facilities. *Archives of Public Health, 75*, Article 50. https://doi.org/10.1186/s13690-017-0221-9

Manyazewal, T., Matlakala, M. C., & Mekonnen, A. B. (2020). Strengthening public health surveillance and response: Lessons from implementing IDSR in East Africa. *Global Health Action, 13*(1), 1816276. https://doi.org/10.1080/16549716.2020.1816276

Manyazewal, T., Matlakala, M. C., & Mekonnen, A. B. (2021). Strengthening health systems in sub-Saharan Africa: Lessons from implementing disease surveillance programs. *Global Health Action, 14*(1), 1868796. https://doi.org/10.1080/16549716.2020.1868796

Matiya, D. J., Gondwe, T. M., & Mwagomba, B. (2021). Evaluation of the implementation of Integrated Disease Surveillance and Response (IDSR) in Malawi: A health system perspective. *BMC Public Health, 21*, 1589. https://doi.org/10.1186/s12889-021-11648-4

Mboussou, F., Ndumbi, P., Ngom, R., Kassamali, Z., Ogundiran, O., Van Beek, J., Williams, G., Okot, C., Hamblion, E. L., & Impouma, B. (2019). Infectious disease outbreaks in the African region: Overview of events reported to the World Health Organization in 2018 – Erratum. *Epidemiology and Infection*, *147*, e307. https://doi.org/10.1017/S0950268819002061

Mghamba, J. M., Temba, H., & Mohamed, A. A. (2021). Evaluation of supportive supervision and its role in improving IDSR in Tanzania. *Pan African Medical Journal*, *40*, 85. https://doi.org/10.11604/pamj.2021.40.85.27621

Ministry of Health Kenya. (2018). *Mortality trends in Kenya 2012–2016: Cause of death, trends, and data quality*. Ministry of Health.

MoH. (2022). *Technical guidelines for integrated disease surveillance and response*.

MoH. (2023). *Government launches National Guidelines on workplace mental health*. https://www.health.go.ke/node/716#:~:text=Kenya's%20government%20has%20long%20recognized%2C%20economic%20and%20sustainable%20development%20goals

Momanyi, K. (2016). *Reporting systems for disease surveillance in Kenya | Knowledge that you deserve*. https://www.momanyink.com/reporting-systems-for-disease-surveillancein-kenya/

Moshi, S. F. (2016). *Assessing factors influencing reporting of weekly diseases data from regions to ministry of health and social welfare in Tanzania mainland* [Master's thesis, COSTECH Integrated Repository]. http://repository.costech.or.tz//handle/11192/1026

Moyo, E., Mhango, M., Moyo, P., Dzinamarira, T., Chitungo, I., & Murewanhema, G. (2023). Emerging infectious disease outbreaks in Sub-Saharan Africa: Learning from the past and present to be better prepared for future outbreaks. *Frontiers in Public Health, 11*, 1049986.

Mremi, I. R., George, J., Rumisha, S. F., Sindato, C., Kimera, S. I., & Mboera, L. E. (2021). Twenty years of integrated disease surveillance and response in Sub-Saharan Africa: Challenges and opportunities for effective management of infectious disease epidemics. *One Health Outlook, 3*, 1–15.

Mugume, S. N., Kabwama, S. N., & Masiira, B. (2020). The role of feedback in enhancing disease surveillance in Uganda. *Health Security, 18*(2), 99–104. https://doi.org/10.1089/hs.2019.0102

Mugume, S. N., Mbonye, A. K., & Kabwama, S. (2020). Improving public health surveillance through training and mentorship in Uganda. *Health Security, 18*(3), 215–221. https://doi.org/10.1089/hs.2019.0126

Muleme, M., Nguna, J., Mafigiri, R., Birungi, D., & Baligwamunsi, J. (2017). Assessment of human disease surveillance systems in the East-Central Africa infectious disease hotspot: A case study of Uganda. *Pan African Medical Journal, 27*(4), 25.

Musoke, D., Boynton, P., Butler, C., & Musoke, M. B. (2021). Health system challenges in Uganda and the potential role of public health surveillance. *BMC Public Health, 21*, 741. https://doi.org/10.1186/s12889-021-10647-w

Mutua, C., Otieno, G., & Wambugu, J. (2022). Evaluating feedback mechanisms within Kenya's public health surveillance systems. *East African Health Research Journal*, *6*(1), 22–28. https://doi.org/10.24248/eahrj.v6i1.639

Mwatondo, A. J., Ng'ang'a, Z., Maina, C., Makayotto, L., Mwangi, M., Njeru, I., & Arvelo, W. (2016). Factors associated with adequate weekly reporting for disease surveillance data among health facilities in Nairobi County, Kenya, 2013. *Pan African Medical Journal, 23*. https://doi.org/10.11604/pamj.2016.23.165.8758

Nakanwagi, M., Etajak, S., & Ssali, A. (2020). Bureaucratic challenges in implementing IDSR in Uganda: A case study. *African Health Sciences, 20*(3), 1307–1314. https://doi.org/10.4314/ahs.v20i3.17

Ngugi, P., Musyoka, P., & Wambua, M. (2023). Barriers and enablers to effective IDSR implementation in Kenya's devolved health system. *International Journal of Health Planning and Management, 38*(1), 44–57. https://doi.org/10.1002/hpm.3581

Njeru, I., Kareko, D., Kisangau, N., Langat, D., Liku, N., Owiso, G., ... & Widdowson, M. A. (2020). Use of technology for public health surveillance reporting: opportunities, challenges and lessons learnt from Kenya. *BMC Public Health*, *20*(1), 1101.

Njuguna, C., Jambai, A., Chimbaru, A., Nordstrom, A., Conteh, R., Latt, A., ... & Fall, I. S. (2019). Revitalization of integrated disease surveillance and response in Sierra Leone post Ebola virus disease outbreak. *BMC Public Health, 19*, 1–11.

Nnebue, C. C., Onwasigwe, C. N., Adogu, P. O., & Onyeonoro, U. U. (2012). Awareness and knowledge of disease surveillance and notification by health-care workers and availability of facility records in Anambra state, Nigeria. *Nigerian Medical Journal, 53*(4), 220-225.

Nsubuga, P., Williams, D., & Ndayimirije, N. (2020). Enhancing IDSR data quality through training and integration in Africa. *Pan African Medical Journal, 37*(Suppl 1), 7. https://doi.org/10.11604/pamj.supp.2020.37.1.23718

Ocom, F., Ario, A. R., Sartaj, M., Wilson, A., Siddiqua, A., Nadon, C., … Pyone, T. (2023). The state of integrated disease surveillance in seven countries: A synthesis report. *Public Health, 225*, 141–146. https://doi.org/10.1016/j.puhe.2023.10.008

Okiro, E. A., Mutinda, C., & Wambua, J. (2021). Data use and decision-making in Kenya's health system: Evidence from routine health information systems. *International Journal of Health Planning and Management, 36*(S1), 86–98. https://doi.org/10.1002/hpm.3093

Olu, O., Usman, A., & Ameh, C. (2020). Strengthening public health workforce for effective IDSR implementation in Africa. *Frontiers in Public Health, 8*, 156. https://doi.org/10.3389/fpubh.2020.00156

Omondi, A. J., Ochienga, O. G., Khayo, E., Yoos, A., & Kavilo, M. R. (2020). Assessment of integrated disease surveillance data uptake in community health systems within Nairobi County, Kenya. *East African Health Research Journal*, *4*(2), 194-199.

Ongeri, J., Wamalwa, D., & Karanja, S. (2022). Barriers to effective integrated disease surveillance and response system in Kenya: A qualitative study. *Pan African Medical Journal*, *41*, 109. https://doi.org/10.11604/pamj.2022.41.109.29477

Phalkey, R. K., Yamamoto, S., Awate, P., & Marx, M. (2015). Challenges with the implementation of an Integrated Disease Surveillance and Response (IDSR) system: Systematic review of the lessons learned. *Health Policy and Planning*, *30*(1), 131–143.

Pond, B., El Sakka, H., Wamala, J., & Lukwago, L. (2011). *Mid-term evaluation of the Integrated Disease Surveillance and Response Project*. United States Agency for International Development.

Rudo, C. (2015). Evaluation of the Notifiable Diseases Surveillance System in Beitbridge District, Zimbabwe 2015. *Open Journal of Epidemiology*, *5*(3), 197–203. https://doi.org/10.4236/ojepi.2015.53024

Rulisa, S., Mukankomeje, A., & Uwizeye, J. (2020). Strengthening IDSR in Rwanda: Achievements, challenges, and opportunities. *Rwanda Journal of Health Sciences*, *9*(2), 54–62.

Sasie, S. D., Ayano, G., Mamo, F., Azage, M., & Spigt, M. (2024). Assessing the performance of the integrated disease surveillance and response systems: A systematic review of global evidence. *Public Health, 231*, 71–79.

Ssendagire, S., Karanja, M. J., Abdi, A., Lubogo, M., Azad Al, A., Mzava, K., ... & Malik, S. M. M. R. (2023). Progress and experiences of implementing an integrated disease surveillance and response system in Somalia; 2016–2023. *Frontiers in Public Health*, *11*, 1204165.

Toda, M., Zurovac, D., Njeru, I., Kareko, D., Mwau, M., & Morita, K. (2018). Health worker knowledge of Integrated Disease Surveillance and Response standard case definitions: A cross-sectional survey at rural health facilities in Kenya. *BMC Public Health, 18*(1), 146. https://doi.org/10.1186/s12889-018-5028-2

Tuti, T., Bitok, M., & Malla, L. (2019). Challenges in data use among healthcare workers in Kenya: A mixed methods study. *Journal of Global Health, 9*(2), 020418. https://doi.org/10.7189/jogh.09.020418

Wahito, B., Kimathi, M., & Gichuki, R. (2022). Utilization of surveillance data for outbreak response in Kenya: Are we closing the loop? *East African Health Research Journal*, *6*(2), 112–118. https://doi.org/10.24248/eahrj.v6i2.745

Wamala, J. F., Lukwago, L., & Malimbo, M. (2021). Integrated Disease Surveillance and Response in Africa: A decade of progress and challenges. *Journal of Public Health in Africa, 12*(1), 1541. https://doi.org/10.4081/jphia.2021.1541

Wandera, R., Makumbi, F., & Serwadda, D. (2019). Delays in public health surveillance responses in Ethiopia: A qualitative exploration. *Health Policy and Planning, 34*(10), 735–741. https://doi.org/10.1093/heapol/czz095

Waruru, A., Achia, T., Maina, J. K., & Ngugi, H. (2019). Patterns and trends in causes of hospital admissions and mortality in Kenya: A 10-year retrospective study. *BMC Health Services Research, 19*(1), 875. https://doi.org/10.1186/s12913-019-4683-5

Waruru, A., Gachara, M., Maina, J., & Wambugu, R. (2022). Mortality trends in Kenya: Analysis of all-cause mortality from 1990 to 2016. *Global Health Action, 15*(1), 2090674. https://doi.org/10.1080/16549716.2022.2090674

WHO Regional Office for Africa. (2022). *Evaluation of IDSR performance in the African Region: 2021 synthesis report*. https://www.afro.who.int

World Health Organization. (2019a). *Integrated Disease Surveillance and Response Technical Guidelines, Booklet One: Introduction Section* (3rd ed.).

World Health Organization. (2019b). *Integrated Disease Surveillance and Response Technical Guidelines: Booklet Four: Sections 3, 4, 5, 6, and 7*.

World Health Organization. (2020). *Strategic framework for prevention and control of emerging and epidemic-prone infectious diseases in the Eastern Mediterranean Region 2020–2024*. http://apps.who.int/bookorders

World Health Organization. (2022a). *Annual report of the Regional Director on the work of WHO in the African Region*. http://apps.who.int/bookorders

World Health Organization. (2022b). *Integrated Disease Surveillance and Response: Technical Guidelines for the African Region* (3rd ed.). https://www.afro.who.int

Wolfe, C. M., Hamblion, E. L., Dzotsi, E. K., Mboussou, F., Eckerle, I., Flahault, A., Codeço, C. T., Corvin, J., Zgibor, J. C., Keiser, O., & Impouma, B. (2021). Systematic review of Integrated Disease Surveillance and Response (IDSR) implementation in the African region. *PLOS ONE, 16*(2), e0245457. https://doi.org/10.1371/journal.pone.0245457

Wu, T. S., Kagoli, M., Kaasbøll, J. J., & Bjune, G. A. (2018). Integrated Disease Surveillance and Response (IDSR) in Malawi: Implementation gaps and challenges for timely alert. *PLOS ONE, 13*(11), e0200858. https://doi.org/10.1371/journal.pone.0200858

Yoti, Z., Musenero, M., & Ogola, J. (2019). Improving timeliness and completeness of IDSR reporting through digitization in Uganda. *Frontiers in Public Health, 7*, 318. https://doi.org/10.3389/fpubh.2019.00318

Zain, K. A., Atroosh, W. M., Alshabi, A., Khadashi, H. A., Darraj, M. A., & Eisa, Z. M. (2021). Residual malaria in Jazan region, southwestern Saudi Arabia: The situation, challenges and climatic drivers of autochthonous malaria. *Malaria Journal*, *20*(1), 315.

APPENDICES

Appendix A: Informed Consent Form

INFORMED CONSENT FORM

Title of the Study: Factors Influencing Performance of Integrated Disease Surveillance and

Response (IDSR) System in Public Health Facilities in Nairobi County

Principal Investigator (PI):

Name: [Insert PI Name]

Institution: [Insert PI's Institution]

Contact Information: [Insert PI's Phone Number and Email Address]

Amref Ethics and Scientific Review Committee (ESRC) Contact Information:

Amref Health Africa

Amref Ethics and Scientific Review Committee (ESRC)

P.O. Box 30125-00100, Nairobi, Kenya

Phone: +254 (0) 20 699 3000

Email: esrc@amref.org

Introduction:

You are being invited to participate in a research study conducted by [PI Name] from [Institution]. Before you decide whether to participate, it is important for you to understand why the research is being done and what it will involve. This information is provided to help you decide if you would like to participate in the study. Please take time to read it carefully. Feel free to ask questions if there is anything that is not clear or if you need more information.

Purpose of the Study:

The study aims to understand the factors influencing the performance of the Integrated Disease Surveillance and Response (IDSR) system in public health facilities in Nairobi County. This includes identifying policy-related barriers, evaluating the capacity and challenges of the health workforce, and assessing the effectiveness of IDSR data utilization in high-risk areas.

Procedures:

If you agree to participate in this study, you was asked to engage in a survey and possibly a follow-up interview. The survey will take approximately 30 minutes to complete, and the interview may take up to 60 minutes. Participation is voluntary, and you can withdraw from the study at any time without any penalty.

Risks and Benefits:

There are minimal risks associated with this study. However, should you experience any discomfort or have any concerns, you are free to withdraw at any time. The benefits of participating in this study include contributing to the understanding of the IDSR system's performance, which can lead to improvements in public health policy and practices.

Confidentiality:

All information collected in this study was kept confidential. The data was stored securely and will only be accessible to the research team. No personal identifying information was used in any reports or publications resulting from this study.

Voluntary Participation:

Participation in this study is voluntary. You may refuse to participate or withdraw from the study at any time without any consequences.

Contact Information:

If you have any questions or concerns about this study, you may contact the Principal Investigator, [PI Name], at [PI's Phone Number] or [PI's Email Address]. If you have any questions regarding your rights as a research participant, you may contact the Amref Ethics and Scientific Review Committee (ESRC) at +254 (0) 20 699 3000 or via email at esrc@amref.org.

Participant Statement:

I have read the information provided above, or it has been read to me. I have had the opportunity to ask questions and have them answered to my satisfaction. I voluntarily agree to participate in this study.

Participant's Signature: _____

Date: _____

Researcher's Signature: _____

Date: _____

Appendix B: Study Questionnaire

Introduction to the Questionnaire

This questionnaire is part of a master's research study titled "Factors Influencing Performance of Integrated Disease Surveillance and Response (IDSR) System in Public Health Facilities in Nairobi County." The study aims to analyze the policy-related barriers affecting the implementation of the IDSR system, evaluate the capacity and challenges of the health workforce, and assess the effectiveness and extent of IDSR data utilization for surveillance, control, and management of notifiable infectious diseases in public health facilities located in high-risk areas like Kibera and Mukuru slums.

Instructions for Respondents:

Please answer all questions honestly and to the best of your knowledge. The information provided was kept confidential and used solely for academic purposes. This questionnaire is divided into five sections, with a mix of open-ended, closed-ended, and Likert scale questions to cover all aspects of the research.

Section A: Demographic Information

1. **Age**:
   - o 20-29
   - o 30-39
   - o 40-49
   - o 50 and above
2. **Gender**:
   - o Male
   - o Female
   - o Other (please specify): _____
3. **Level of Education**:
   - o Certificate
   - o Diploma
   - o Bachelor's Degree
   - o Master's Degree
   - o Other (please specify): _____
4. **Current Position in the Health Facility**:
   - o Medical Officer
   - o Clinical Officer
   - o Nurse
   - o Health Records Officer

o Public Health Officer
o Other (please specify): _____

5. **Years of Experience in Public Health**:
   o Less than 1 year
   o 1-5 years
   o 6-10 years
   o Over 10 years

Section B: Policy-Related Barriers to IDSR Implementation

6. **Are you aware of the policies guiding the implementation of the IDSR system in your facility?**
   o Yes
   o No
7. **How would you rate the clarity and comprehensiveness of the IDSR policy guidelines provided by the Ministry of Health?**
   o Very Clear
   o Clear
   o Neutral
   o Unclear
   o Very Unclear
8. **Please describe any policy-related barriers that you think impact the effective implementation of the IDSR system in your facility.**

9. **To what extent do you agree with the following statements regarding policy-related challenges in the IDSR system?**
   (Use a Likert scale where 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree)

   a) Lack of clear policy guidelines affects the implementation of the IDSR system.

   o 1 o 2 o 3 o 4 o 5

   b) Insufficient funding and resources hinder effective implementation of the IDSR.

   o 1 o 2 o 3 o 4 o 5

c) Bureaucratic procedures impact the timely reporting and response to disease outbreaks.

o 1 o 2 o 3 o 4 o 5

d) There is inadequate support from higher levels of government in IDSR policy implementation.

o 1 o 2 o 3 o 4 o 5

Section C: Capacity and Challenges of the Health Workforce

10. **Does your facility have enough trained personnel to effectively implement the IDSR system?**
    o Yes
    o No
11. **How often does your facility conduct training or refresher courses on IDSR for health workers?**
    o Monthly
    o Quarterly
    o Annually
    o Rarely
    o Never
12. **What are the key challenges faced by the health workforce in implementing the IDSR system?**

    _____

    _____

13. **On a scale of 1 to 5, how would you rate the adequacy of the training provided for IDSR implementation?**
    o 1 - Very Inadequate
    o 2 - Inadequate
    o 3 - Neutral
    o 4 - Adequate
    o 5 - Very Adequate
14. **To what extent do you agree with the following statements regarding the health workforce capacity in implementing the IDSR system?**
    (Likert Scale: 1 = Strongly Disagree, 5 = Strongly Agree)

a) There is sufficient knowledge among staff about the IDSR system.

o 1 o 2 o 3 o 4 o 5

b) The workload in my facility affects the performance of the IDSR system.

o 1 o 2 o 3 o 4 o 5

c) There is adequate support and supervision from county and national levels for IDSR implementation.

o 1 o 2 o 3 o 4 o 5

d) The facility has enough resources to support the training and development of the health workforce for IDSR.

o 1 o 2 o 3 o 4 o 5

Section D: Effectiveness and Extent of IDSR Data Utilization

15. **How frequently is IDSR data reviewed and utilized for decision-making in your facility?**
    o Weekly
    o Monthly
    o Quarterly
    o Annually
    o Never
16. **To what extent do you use IDSR data in your daily activities for disease surveillance, control, and management?**
    o Very Often
    o Often
    o Occasionally
    o Rarely
    o Never
17. **What are the key challenges encountered in utilizing IDSR data for decision-making in high-risk areas such as Kibera and Mukuru slums?**

---

18. **Rate the effectiveness of the IDSR system in the surveillance, control, and management of notifiable infectious diseases in high-risk areas such as Kibera and Mukuru slums.**
    o Very Effective
    o Effective
    o Neutral
    o Ineffective
    o Very Ineffective
19. **To what extent do you agree with the following statements about the utilization of IDSR data in your facility?**
    (Likert Scale: 1 = Strongly Disagree, 5 = Strongly Agree)

a) The facility utilizes IDSR data to detect disease outbreaks early.

o 1 o 2 o 3 o 4 o 5

b) The quality of IDSR data collected is reliable for decision-making.

o 1 o 2 o 3 o 4 o 5

c) IDSR data is adequately used for resource allocation and planning.

o 1 o 2 o 3 o 4 o 5

d) There is a feedback mechanism in place to ensure data quality and utilization.

o 1 o 2 o 3 o 4 o 5

Section E: Overall Performance of the IDSR System

20. **How would you rate the overall performance of the IDSR system in your facility?**
    o Excellent
    o Good
    o Average
    o Poor
    o Very Poor
21. **What key performance indicators (KPIs) does your facility use to measure the effectiveness of the IDSR system?**

---

22. **To what extent do you agree with the following statements regarding the overall performance of the IDSR system in your facility?**
(Likert Scale: 1 = Strongly Disagree, 5 = Strongly Agree)

a) The IDSR system has significantly improved disease reporting and response times.

o 1 o 2 o 3 o 4 o 5

b) The IDSR system facilitates timely and accurate communication between different levels of the health system.

o 1 o 2 o 3 o 4 o 5

c) The IDSR system has improved the allocation of resources for disease control and prevention.

o 1 o 2 o 3 o 4 o 5

d) The IDSR system is well-integrated with other health information systems in the facility.

o 1 o 2 o 3 o 4 o 5

23. **How does your facility track and report the performance of the IDSR system to higher levels of government?**

---

24. **What recommendations would you suggest for improving the performance of the IDSR system in your facility?**

Thank you for your participation!

Appendix C: Key Informant Interview

Key Informant Interview Questions

1. Identifying Policy-Related Barriers to Effective Implementation of the IDSR System

Objective: To explore and analyze policy-related barriers that impact the implementation and performance of the IDSR system in public health facilities.

- **Question:** What are the key policy barriers that affect the effective implementation of the IDSR system in Nairobi County's public health facilities?
    - *Probe:* Can you provide specific examples of national or county policies that hinder disease surveillance activities?
    - *Probe:* Are there conflicting policies at different administrative levels (national vs. county) that affect the IDSR's implementation?
- **Question:** How do current funding policies and financial regulations influence the IDSR system's effectiveness?
    - *Probe:* Is there adequate funding allocation for disease surveillance and response activities?
    - *Probe:* How does the budgeting process at the county and national levels impact resource availability for the IDSR system?
- **Question:** What role does inter-agency coordination play in the policy environment for IDSR implementation?
    - *Probe:* Are there challenges related to coordination among different agencies and sectors involved in disease surveillance?
    - *Probe:* How can these coordination challenges be addressed to strengthen the IDSR system?

2. **Evaluating the Capacity and Challenges of the Health Workforce in Implementing the IDSR System**

Objective: To assess the capacity of the health workforce and the challenges they face in implementing the IDSR system in Nairobi County.

- **Question:** How would you describe the current capacity of healthcare workers in implementing the IDSR system in Nairobi County's public health facilities?
    - *Probe:* Are there sufficient personnel dedicated to disease surveillance and response activities?
    - *Probe:* What are the gaps in training, skills, or knowledge among healthcare workers that affect the IDSR system's implementation?
- **Question:** What challenges do healthcare workers face in executing their roles under the IDSR system?
    - *Probe:* Are there specific operational or logistical challenges that limit their ability to collect, analyze, and report data?
    - *Probe:* How do factors such as workload, availability of resources, and support from leadership affect their performance?
- **Question:** What measures do you think could be taken to build the capacity of the health workforce for better implementation of the IDSR system?
    - *Probe:* Are there specific areas where additional training or resources are most needed?
    - *Probe:* What role do you think continuous professional development programs could play in enhancing the capacity of the health workforce?

3. **Assessing the Effectiveness and Extent of IDSR Data Utilization in High-Risk Areas**

Objective: To assess the effectiveness and extent of IDSR data utilization in the surveillance, control, and management of notifiable infectious diseases in high-risk public health facilities.

- **Question:** How effectively is the IDSR data being utilized for disease surveillance and management in high-risk areas of Nairobi County?
    - *Probe:* Are there standardized protocols for data analysis and decision-making at the facility level?
    - *Probe:* How timely and accurate is the data reported, and how does it influence public health interventions?
- **Question:** What are the key challenges in utilizing IDSR data for decision-making in high-risk areas?
    - *Probe:* Are there technological, infrastructural, or human resource barriers that limit effective data utilization?
    - *Probe:* How does the quality, completeness, and timeliness of data affect disease control measures?
- **Question:** Can you share examples of how IDSR data has been used successfully to manage infectious disease outbreaks in high-risk areas?
    - *Probe:* What were the key factors that contributed to the success in these cases?
    - *Probe:* Are there lessons learned that could be applied to other facilities or regions?

Appendix D: MOH 502 Case Based Epidemic Monitoring Form

Section 1: General Information

1. **Health Facility Name:**
2. **Sub-County:**
3. **Date of Report:**
4. **Name of Reporting Officer:**
5. **Position/Title:**
6. **Contact Information:**

Section 2: Policy-Related Barriers to IDSR Implementation

1. **Are there specific national or county policies that hinder the implementation of the IDSR system at this facility?**
   - ○ Yes / No ○ If yes, specify the policies:

     _____
2. **How do funding and resource allocation policies affect the facility's ability to implement the IDSR system effectively?** ○ Description:

   _____
3. **What level of inter-agency collaboration exists in supporting IDSR activities?**
   - ○ Good / Fair / Poor ○ Comments:

     _____
4. **What policy changes or improvements would you recommend to enhance IDSR implementation?**

- Recommendations:

  _____

Section 3: Health Workforce Capacity and Challenges in Implementing the IDSR

System

1. **How would you rate the capacity of the health workforce at this facility in terms of training and skills related to the IDSR system?**

   - Excellent / Good / Fair / Poor ○ Comments:

     _____

2. **What are the main challenges faced by the health workforce in implementing the IDSR system at this facility?**

   - Staff shortage ○ Lack of training ○ High workload ○ Insufficient support and supervision ○ Others (specify):

     _____

3. **Are there specific capacity-building initiatives currently in place to support the health workforce in IDSR activities?**

   - Yes / No ○ If yes, provide details:

     _____

4. **What additional support or resources are needed to enhance the capacity of the health workforce for IDSR activities?**

   - Recommendations:

     _____

Section 4: Effectiveness and Extent of IDSR Data Utilization

1. **How effectively is IDSR data collected, analyzed, and used at this facility for disease surveillance and response?**
    - Very Effective / Effective / Moderately Effective / Not Effective
    - Comments: _____

2. **What challenges are faced in utilizing IDSR data for decision-making in disease surveillance, control, and management?**
    - Data quality issues ○ Delays in data reporting ○ Lack of trained personnel ○ Inadequate data management systems ○ Others (specify): _____

3. **Are there any best practices in IDSR data utilization that this facility has implemented successfully?**
    - Yes / No ○ If yes, describe: _____

4. **What improvements could be made to enhance the effectiveness of IDSR data utilization for public health decision-making?**
    - Recommendations: _____

Section 5: Additional Comments and Recommendations

1. **Any additional comments or observations about the factors influencing the performance of the IDSR system at this facility?**
    - _____

2. **Further recommendations for enhancing the performance of the IDSR system:**

- ○ _____

Section 6: Signature and Date

- **Signature of Reporting Officer: _____**
- **Date: _____**

Appendix E : MOH 505 Weekly Epidemic Form

Section 1: General Information

1. **Health Facility Name:**
2. **Sub-County:**
3. **County:**
4. **Date of Report:**
5. **Week Number:**
6. **Name of Reporting Officer:**
7. **Position/Title:**
8. **Contact Information:**

Section 2: Disease Surveillance Data

1. **Total Number of Cases Reported This Week:**
    - **Disease A:** _____
    - **Disease B:** _____
    - **Disease C:** _____
    - **Other (Specify):** _____
2. **Total Number of Cases by Age Group and Gender:**

Age Group Male Female Total

0-4

5-14

15-24

Age Group Male Female Total

25-64

65+

Total

3. **Number of Deaths Reported This Week:**
   - **Disease A:**

     _____ ○

     Disease B:

     _____ ○

     Disease C:

     _____ ○

     Other

     (Specify):

     _____

4. **New or Unusual Outbreaks Detected:**
    - **Disease:** ○
    Location:
    - **Description:**

Section 3: Policy-Related Barriers

1. **Are there any policy-related barriers affecting disease surveillance and response at this facility?**
    - Yes / No ○ If yes, please specify:
    _____
2. **How do current funding policies impact the facility's ability to report and manage epidemic data?** ○ Description:
_____
3. **Any policy changes recommended to improve IDSR performance?**
    - Recommendations:
    _____

Section 4: Workforce Capacity and Challenges

1. **Number of Staff Available for Disease Surveillance This Week:**
    - **Medical Officers: _____** ○ **Nurses:**
    _____ ○ **Data Clerks: _____** ○ **Other**
    (Specify): _____
2. **What are the main challenges faced by the health workforce in managing epidemic data?**

- Insufficient staff ○ Lack of training ○ High workload ○ Inadequate resources ○ Other (Specify):

  _____

3. **Additional support or resources needed by the health workforce:**
   - Recommendations:

     _____

Section 5: Data Utilization and Effectiveness

1. **How effectively is the data collected this week being utilized for disease management?**
   - Very Effective / Effective / Moderately Effective / Not Effective ○

     Comments:

     _____

2. **Challenges in using IDSR data for decision-making:**
   - Data quality issues ○ Delays in data reporting ○ Lack of trained personnel ○ Inadequate data management systems ○ Other (Specify):

     _____

3. **Examples of successful use of IDSR data this week:**
   - Description:

     _____

4. **Improvements needed in data utilization for better epidemic management:**

- Recommendations:
  _____

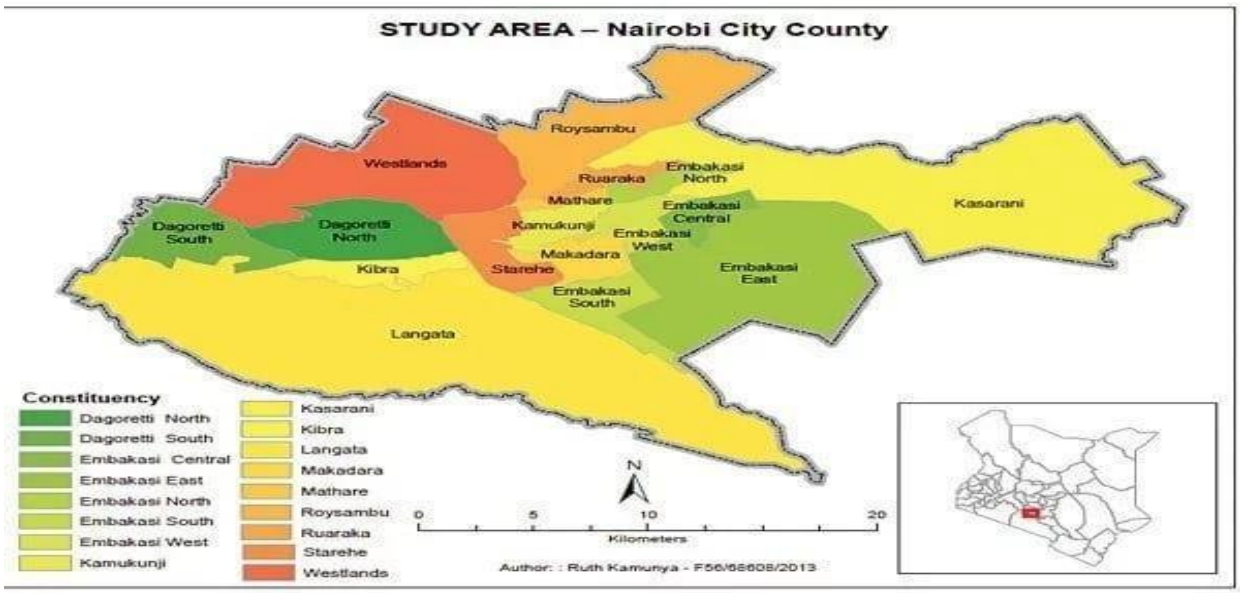
Section 6: Additional Comments and Recommendations

1. **Additional observations about IDSR performance this week:**
   - _____
2. **Recommendations for improving IDSR system performance:**
   - _____

Section 7: Signature and Date

- **Signature of Reporting Officer: _____**
- **Date: _____**

Appendix F: Study Area Map



Appendix G: Introduction to NACOSTI

AMREF INTERNATIONAL UNIVERSITY

GRADUATE SCHOOL

Email: amiu.deangraduatestudies@amref.ac.ke

P.O Box 27691-00506
Nairobi, Kenya
Tel. 0206993236

Website: https://amref.ac.ke/

REF: AMIU/ARP/5838-1/2023 **DATE**:17th September 2024

The Director General
National Commission for Science Technology and Innovation,
Off Waiyaki Way, Upper Kabete,
P. O. Box 30623, 00100,
Nairobi, Kenya.

Dear Sir/Madam,

RE: RESEARCH AUTHORIZATION FOR CATHERINE BRENDA WAKHUTU SHS/MPH/5838-1/2023

This is to introduce Catherine Brenda Wakhutu, a student at Amref International University currently enrolled in the Master of Public Health (MPH) degree program within the Department of Community Health.

Catherine is preparing to conduct research for her MPH thesis, titled "***Factors Influencing the Performance of the Integrated Disease Surveillance and Response System in Public Health Facilities in Nairobi County***."

Any assistance accorded to her will be highly appreciated.

Sincerely,

Dr. Duncan Irungu
Dean, Graduate School & Director Health Entrepreneurship

Appendix H: ERC Letter

amref health africa

Amref Health Africa in Kenya

REF: AMREF – ESRC P1697/2024 **September 13, 2024**

Catherine Wakhutu
Amref International University
P.O Box 27691 – 00506
Nairobi, Kenya
Tel: +254 701 273 795
Email: catebrenda@gmail.com

Dear Catherine Wakhutu,

RESEARCH PROTOCOL: FACTORS INFLUENCING PERFORMANCE OF INTERGRATED DISEASE SURVEILLANCE AND RESPONSE SYSTEM IN PUBLIC HEALTH FACILITIES IN NAIROBI COUNTY.

Thank you for submitting your protocol to the Amref Ethics and Scientific Review Committee (ESRC).

This is to inform you that the ESRC has reviewed and approved your protocol. Your application approval number is ESRC P1697/2024. The approval period is from September 13, 2024, to September 12, 2025, and is subject to compliance with the following requirements:

a) Only approved documents (including informed consents, study instruments, advertising materials, material transfer agreements, etc.) will be used.
b) All changes including (amendments, deviations, violations, etc.) are submitted for review and approval by Amref ESRC before implementation.
c) Death and life-threatening problems and serious adverse events (SAEs) or unexpected adverse events whether related or unrelated to the study must be reported to the Amref ESRC within 72 hours of notification.
d) Any changes, anticipated or otherwise that may increase the risks or affect safety or welfare of study participants and others or affect the integrity of the research must be reported to Amref ESRC within 72 hours.
e) Clearance for export of biological specimen must be obtained from the relevant government authorities for each batch of shipment/export.
f) 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.
g) In case of late renewal, the Amref ESRC shall not be held responsible for any serious adverse events (SAEs) that may occur as a result of research activities that were carried out after the expiry of approval.
h) Submission of an executive summary report within 90 days upon completion of the study to the Amref ESRC.
i) All government regulations for prevention and control of the spread of COVID-19 including social distancing, provision of personal protective equipment for participants and research assistants should be adhered to during data collection. All research assistants should be monitored for COVID 19 symptoms and referred for testing in case they present with symptoms.

amref health africa

Amref Health Africa in Kenya

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

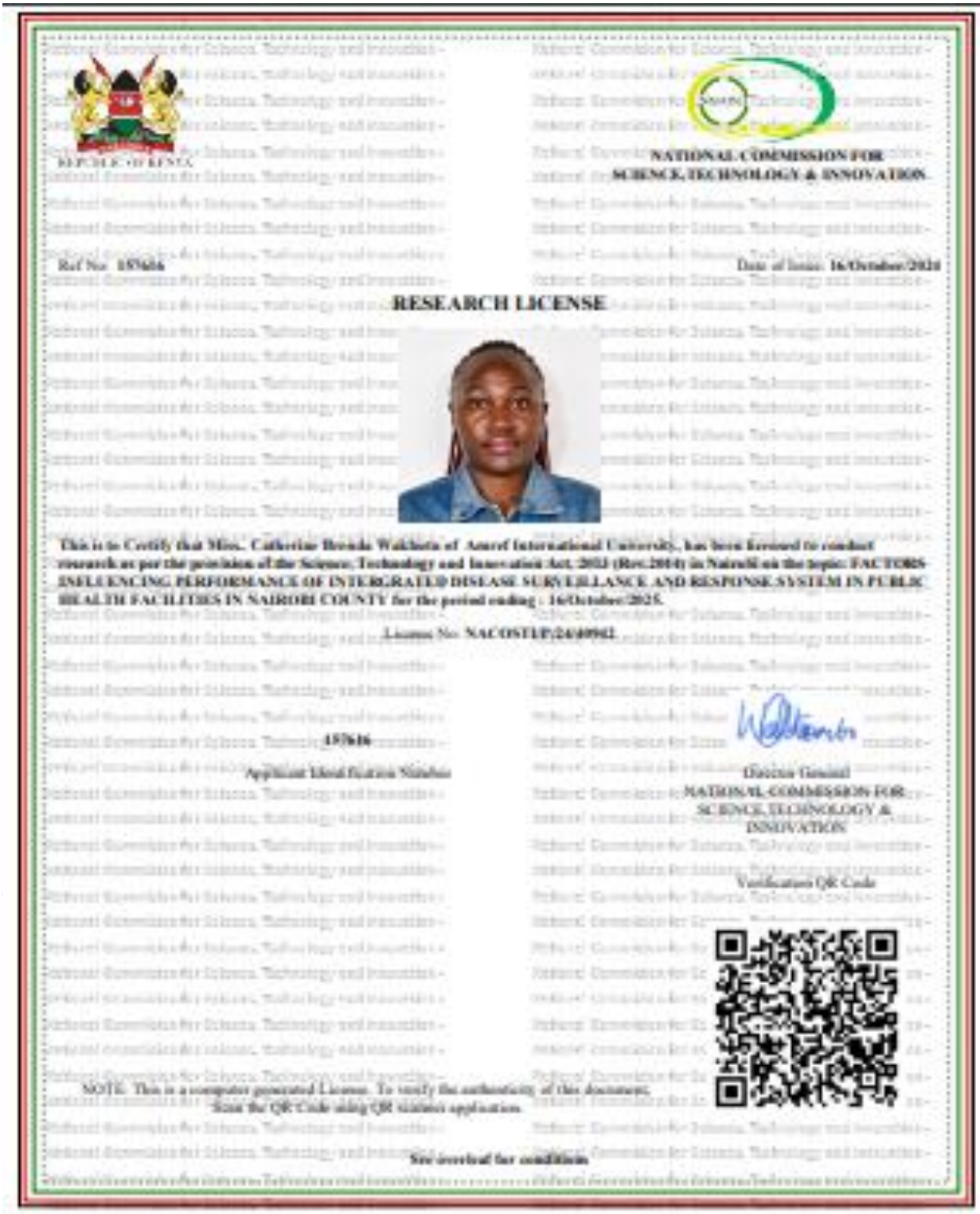
Please do not hesitate to contact the ESRC Secretariat (esrc.kenya@amref.org) for any clarification or query.

Yours sincerely,

AMREF - ESRC
13 SEP 2024
P.O. Box 30125 - 00100 NAIROBI

Prof. Mohamed Karama
Chair, Amref ESRC
CC: [illegible], Senior Manager, Learning and Impact Amref Health Africa.

Annex IV: NACOSTI Permit



REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION

Ref No: 157616

Date of Issue: 16/October/2020

RESEARCH LICENSE

This is to Certify that Miss. Catherine Brenda Wakhata of Amref International University, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Nairobi on the topic: FACTORS INFLUENCING PERFORMANCE OF INTEGRATED DISEASE SURVEILLANCE AND RESPONSE SYSTEM IN PUBLIC HEALTH FACILITIES IN NAIROBI COUNTY for the period ending : 16/October/2025.

License No: NACOSTI/P/20/8982

157616

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION

Verification QR Code

NOTE: This is a computer generated License. To verify the authenticity of this document, Scan the QR Code using QR scanner application.

Site arrowhead for conditions

THE SCIENCE, TECHNOLOGY AND INNOVATION ACT, 2013 (Rev. 2014)
Legal Notice No. 108: The Science, Technology and Innovation (Research Licensing) Regulations, 2014

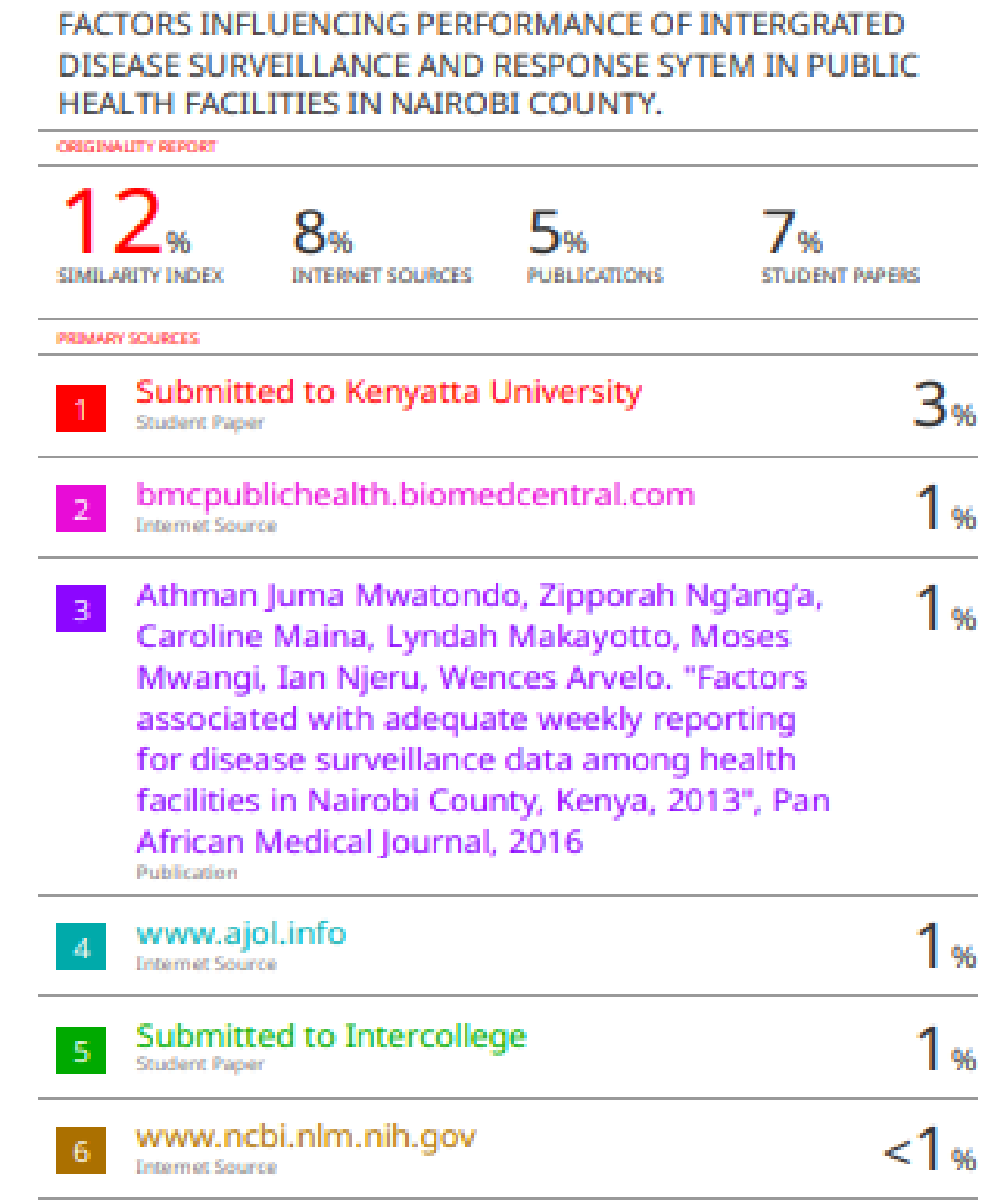
The National Commission for Science, Technology and Innovation, hereafter referred to as the Commission, was the established under the Science, Technology and Innovation Act 2013 (Revised 2014) herein after referred to as the Act. The objective of the Commission shall be to regulate and assure quality in the science, technology and innovation sector and advise the Government in matters related thereto.

CONDITIONS OF THE RESEARCH LICENSE

1. The License is granted subject to provisions of the Constitution of Kenya, the Science, Technology and Innovation Act, and other relevant laws, policies and regulations. Accordingly, the licensee shall adhere to such procedures, standards, code of ethics and guidelines as may be prescribed by regulations made under the Act, or prescribed by provisions of International treaties of which Kenya is a signatory to
2. The research and its related activities as well as outcomes shall be beneficial to the country and shall not in any way;
   i. Endanger national security
   ii. Adversely affect the lives of Kenyans
   iii. Be in contravention of Kenya's international obligations including Biological Weapons Convention (BWC), Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO), Chemical, Biological, Radiological and Nuclear (CBRN).
   iv. Result in exploitation of intellectual property rights of communities in Kenya
   v. Adversely affect the environment
   vi. Adversely affect the rights of communities
   vii. Endanger public safety and national cohesion
   viii. Plagiarize someone else's work
3. The License is valid for the proposed research, location and specified period.
4. The license any rights thereunder are non-transferable
5. The Commission reserves the right to cancel the research at any time during the research period if in the opinion of the Commission the research is not implemented in conformity with the provisions of the Act or any other written law.
6. The Licensee shall inform the relevant County Director of Education, County Commissioner and County Governor before commencement of the research.
7. Excavation, filming, movement, and collection of specimens are subject to further necessary clearance from relevant Government Agencies.
8. The License does not give authority to transfer research materials.
9. The Commission may monitor and evaluate the licensed research project for the purpose of assessing and evaluating compliance with the conditions of the License.
10. The Licensee shall submit one hard copy, and upload a soft copy of their final report (thesis) onto a platform designated by the Commission within one year of completion of the research.
11. The Commission reserves the right to modify the conditions of the License including cancellation without prior notice.
12. Research, findings and information regarding research systems shall be stored or disseminated, utilized or applied in such a manner as may be prescribed by the Commission from time to time.
13. The Licensee shall disclose to the Commission, the relevant Institutional Scientific and Ethical Review Committee, and the relevant national agencies any inventions and discoveries that are of National strategic importance.
14. The Commission shall have powers to acquire from any person the right in, or to, any scientific innovation, invention or patent of strategic importance to the country.
15. Relevant Institutional Scientific and Ethical Review Committee shall monitor and evaluate the research periodically, and make a report of its findings to the Commission for necessary action.

National Commission for Science, Technology and
Innovation(NACOSTI),
Off Waiyaki Way, Upper Kabete,
P. O. Box 30623 - 00100 Nairobi, KENYA
Telephone: 020 4007000, 0713788787, 0735 600 645
E-mail: dg@nacosti.go.ke
Website: www.nacosti.go.ke

Appendix I: Plagiarism Report



FACTORS INFLUENCING PERFORMANCE OF INTERGRATED DISEASE SURVEILLANCE AND RESPONSE SYTEM IN PUBLIC HEALTH FACILITIES IN NAIROBI COUNTY.

ORIGINALITY REPORT

12%	8%	5%	7%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	Submitted to Kenyatta University Student Paper	3%
2	bmcpublichealth.biomedcentral.com Internet Source	1%
3	Athman Juma Mwatondo, Zipporah Ng'ang'a, Caroline Maina, Lyndah Makayotto, Moses Mwangi, Ian Njeru, Wences Arvelo. "Factors associated with adequate weekly reporting for disease surveillance data among health facilities in Nairobi County, Kenya, 2013", Pan African Medical Journal, 2016 Publication	1%
4	www.ajol.info Internet Source	1%
5	Submitted to Intercollege Student Paper	1%
6	www.ncbi.nlm.nih.gov Internet Source	<1%