Report on Mapping of the Infectious Disease Surveillance System in Bangladesh

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Editorial Board

Preface

Bangladesh continues to face a wide range of infectious diseases driven by rapid urbanization, population density, climate change, and increasing human–animal–environment interactions. In this context, a strong, well-coordinated, integrated, and responsive surveillance system is essential for early detection, timely response, and effective control of public health threats. Although numerous surveillance systems operate across the country, they vary widely in terms of structure, coverage, reporting mechanisms, and integration. Mapping these systems is therefore crucial for understanding their status and informing strategies for a more coherent and resilient national disease surveillance architecture. This report aims to support policymakers, researchers, and development partners in strengthening surveillance governance, enhancing interoperability, improving subnational capacity, and promoting sustainable, country-led systems.

This report presents a comprehensive mapping of Bangladesh's infectious disease surveillance landscape. It brings together information from desk reviews, field visits, and key informant interviews across primary, secondary, and tertiary levels of the health system. Guided by the Technical Working Committee (TWC) under the Directorate General of Health Services (DGHS), the mapping provides an evidence-based overview of how surveillance systems function - from data collection and laboratory confirmation to reporting, analysis, and public health action.

The report covers the major infectious disease surveillance systems operating in Bangladesh and outlines the contributions of government agencies, non-governmental and autonomous organizations, and development partners. It includes diarrhoeal surveillance (acute watery diarrhea, national cholera, hospital-based cholera, and Rotavirus and Intussusception surveillance), tuberculosis, leprosy, vaccine-preventable diseases (polio, measles, neonatal tetanus, Japanese encephalitis, and congenital rubella syndrome), HIV/ AIDS, enteric fever, dengue, filariasis, nipah virus, malaria, influenza (national influenza surveillance Bangladesh, hospital-based influenza surveillance, national SARS-CoV-2 genomic variant, national respiratory pathogen genomic, and respiratory event-based surveillance), kala-azar, rabies, and anthrax, including antimicrobial resistance surveillance.

These systems are implemented through collaboration among national institutions such as the Directorate General of Health Services (DGHS); the Institute of Epidemiology, Disease Control and Research (IEDCR); the Disease Control; the Expanded Programme on Immunization (EPI); Institute of Public Health (IPH); medical colleges, and local government bodies, alongside key contributions from non-governmental partners including icddr,b, BRAC, Bangladesh Medical University (BMU), and various specialized organizations. The report also highlights the significant technical and financial support provided by global partners such as the World Health Organization (WHO),

the United States Centers for Disease Control and Prevention (US CDC); the Global Fund; Gavi, the Vaccine Alliance; the Bill & Melinda Gates Foundation; Fleming Fund and others. Together, these multisectoral efforts demonstrate Bangladesh's comprehensive and coordinated approach to strengthening public health surveillance. Additionally, the report briefly incorporates two more surveillance systems—COVID-19 and Leptospirosis surveillance—as well as several complementary systems aligned with infectious disease surveillance, such as web-based disease surveillance, community-based surveillance, mobile phone–based surveillance, event-based surveillance, child health and mortality prevention surveillance, and others.

Despite significant progress, Bangladesh's infectious disease surveillance faces persistent challenges, including fragmented programs, unintegrated siloed national surveillance structures, inadequate workforce capacity, lack of sustainable financing, lack of multisectoral collaboration, limited private sector engagement, and lack of standard health screening at cross border settings. Addressing these challenges requires strengthened system integration, enhanced digital infrastructure, workforce development, sustainable financing, and robust multisectoral coordination. Expanding private sector engagement and improving cross-border collaboration may further enhance resilience. Implementing these priorities can establish a data-driven surveillance system capable of early detection, rapid response, and effective disease control, positioning Bangladesh as an example for resource-constrained countries. As Bangladesh advances toward universal health coverage and global health security commitments, robust infectious disease surveillance will play a pivotal role in ensuring preparedness, protecting communities, and guiding effective public health interventions.

This document is organized into several key sections, beginning with an Executive Summary and Introduction, followed by detailed descriptions of methods, results, and conclusions, along with other relevant information. Together, they provide a foundational understanding of Bangladesh's current surveillance systems and outline a strategic pathway toward a more integrated, responsive, and resilient surveillance framework for the future.

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Acknowledgement

Susanto K. Dobey
Country Lead
Jhpiego Bangladesh

Abbreviations

AES	Acute Encephalitis Syndrome
AFP	Acute Flaccid Paralysis
AHI	Assistant Health Inspector
AI	Artificial Intelligence
ARI	Acute Respiratory Infection
AIDS	Acquired Immunodeficiency Syndrome
AMR	Antimicrobial Resistance
AWD	Acute Watery Diarrhea
AWO	Animal Welfare Organization
BITID	Bangladesh Institute of Tropical and Infectious Disease
BLRI	Bangladesh Livestock Research Institute
BMU	Bangladesh Medical University
BMGF	Bill and Melinda Gates Foundation
CHAMPS	Child Health and Mortality Prevention Surveillance
CC	Community Clinic
CDC	Communicable Disease Control
CEPI	Coalition for Epidemic Preparedness Innovation
CHCP	Community Health Care Provider
CHRF	Child Health Research Foundation
CHW	Community Health Worker
CIPRB	Centre for Injury Prevention and Research Bangladesh
CLC	Central Laboratory Coordinator
CMU	Central Monitoring Unit
CPBS	Cell Phone Based Surveillance
CRS	Congenital Rubella Syndrome
CS	Civil Surgeon
DC	Disease Control
DDS	Diarrheal Disease Surveillance
DGDA	Directorate General of Drug Administration
DGFP	Directorate General of Family Planning
DGHS	Directorate General of Health Services
DHIS2	District Health Information System 2
DLS	Department of Livestock Services
DSFP	Disease Surveillance Focal Person
EBS	Event-Based Surveillance
EPI	Expanded Program on Immunization
ELFP	Elimination of Lymphatic Filariasis Program
EWS	Early Warning System

Abbreviations

FETP	Field Epidemiology Training Program
FSW	Female Sex Worker
FWA	Family Welfare Assistant
GHSA	Global Health Security Agenda
GIS	Geographical Information System
GISRS	Global Influenza Surveillance and Response System
GoB	Government of Bangladesh
GOARN	Global Outbreak Alert and Response Network
HBRIS	Hospital Based Rotavirus and Intussusception Surveillance
HIV	Human Immunodeficiency Virus
HA	Health Assistant
HI	Health Inspector
HMIS	Health Management Information System
HQ	Headquarter
HSO	Hospital Surveillance Officer
IANPHI	International Association of National Public Health Institutes
IBBS	Integrated Biological and Behavioral Surveillance
IDSR	Integrated Disease Surveillance and Response
ICT	Information and Communications Technology
IEDCR	Institute of Epidemiology, Disease Control, and Research
IFRC	International Federation of Red Cross and Red Crescent Societies
IHR	International Health Regulations
ILI	Influenza like Illness
IPC	Infection Prevention and Control
IPH	Institute of Public Health
JE	Japanese Encephalitis
KII	Key Informant Interview
LBM	Live Bird Market
MBDC	Mycobacterial Disease Control
MIS	Management Information System
MOHFW	Ministry of Health and Family Welfare
MSM	Males Having Sex with Male
MSW	Male Sex worker
NASP	National AIDS/STD Program
NCS	Nationwide Cholera Surveillance
NCD	Non-Communicable Disease
ND	Neonatal Death
NGO	Non-Government Organization

Abbreviations

NIPSOM	National Institute of Preventive and Social Medicine
NISB	National Influenza Surveillance Bangladesh
NiV	Nipah Virus
NLEP	National Leprosy Elimination Program
NT	Neonatal Tetanus
NSP	National Strategic Plan
NTP	National Tuberculosis Control Program
OP	Operational Plan
OPD	Outpatient Department
OCV	Oral Cholera Vaccine
PCR	Polymerase Chain Reaction
PHEIC	Public Health Emergency of International Concern
PKDL	Post-Kala-Azar Dermal Leishmaniasis
PPM	Public Private Mix
RMO	Resident Medical Officer
RTI	Respiratory Tract Infection
RT-PCR	Reverse Transcription Polymerase Chain Reaction
SARI	Severe acute respiratory infection
SARS	Severe Acute Respiratory Syndrome
SIMO	Surveillance and Immunization Medical Officer
SOP	Standard Operating Procedure
SSN	Senior Staff Nurses
STD	Sexually Transmitted Disease
STI	Sexually Transmitted Infections
TB	Tuberculosis
TLCA	Tuberculosis and Leprosy Control Assistant
TWC	Technical Working Committee
UH&FPO	Upazila Health and Family Planning Officer
UH&FWC	Union Health and Family Welfare Center
UHC	Upazila Health Complex
UNFPA	United Nations Population Fund
UNICEF	United Nations Children Fund
US CDC	United States Center for Disease Control and Prevention
VA	Verbal Autopsy
VPD	Vaccine Preventable Disease
WBDSS	Web Based Disease Surveillance System
WHO	World Health Organization
WVS	World Veterinary Service

Message

Effective disease surveillance is a foundation of strong public health systems. It ensures early detection of outbreaks, supports rapid response, and guides evidence-based decision-making. Guided by the International Health Regulations (IHR 2005), all WHO member states including Bangladesh are required to maintain surveillance capacities that enable timely reporting, verification, and management of public health threats. Over time, global surveillance has expanded from tracking only high-threat diseases to monitoring a broader spectrum of communicable and non-communicable conditions, strengthened by advances in laboratory science, digital technologies, and real-time data platforms. The COVID-19 pandemic further emphasized the urgent need for robust, interconnected surveillance systems capable of supporting national preparedness and rapid emergency response.

Bangladesh has a long and successful history of infectious disease surveillance. However, despite making considerable progress, opportunities remain for more systematic evaluation of surveillance systems across relevant institutions. The COVID-19 response demonstrated that Bangladesh could operate a rapid, ICT-enabled, and laboratory-supported surveillance network. This provides a solid foundation for future strengthening and for developing an early warning system that empowers the country to better prepare for and respond to emerging health emergencies.

I would like to appreciate the initiative taken by the US CDC and Jhpiego Bangladesh through the Mapping of Infectious Disease Surveillance System in Bangladesh project to develop a report that presents a comprehensive understanding of the country's surveillance landscape. I believe this report will serve as an important platform for strengthening collaboration among stakeholders and enhancing the overall effectiveness of public health initiatives in Bangladesh.

I also extend my heartfelt gratitude to the members of the Technical Working Committee (TWC), the institutions engaged in surveillance activities, and the officials of the Directorate General of Health Services (DGHS), who generously shared their insights, experience, and technical expertise. I am equally thankful to our development partners for their continued support and collaboration. The collective efforts of all involved have been instrumental in making this timely initiative possible and in documenting the infectious disease surveillance landscape of Bangladesh in a meaningful and practical manner.

Prof. Dr. Md. Abu Jafor
Director General (Grade-1)
Directorate General of Health Services (DGHS)
Ministry of Health and Family Welfare, Bangladesh

Message

Bangladesh has made commendable progress in developing and operating multiple infectious disease surveillance initiatives, supported by a growing network of health facilities, laboratories, and trained public health professionals across the country. These efforts have strengthened the nation's capacity to detect, monitor, and respond to public health threats and have played an important role in managing outbreaks and reducing disease burden. As Bangladesh continues to face both new and re-emerging infectious diseases, the importance of timely data, integrated reporting systems, and coordinated administrative processes becomes even more critical.

This mapping provides a data-driven overview of the current surveillance mechanisms in our country. The insights gained from this mapping will inform policymakers, health officials, public health professionals, researchers and will help them to identify gaps and enhance the overall effectiveness of the public health response. Implementing effective surveillance systems can significantly enhance public health responses. By using technology and data analysis, authorities can better track outbreaks and allocate resources effectively. By strengthening these systems, Bangladesh can better protect its population and improve health outcomes in the face of evolving challenges.

I sincerely hope this report on 'Mapping of the Infectious Disease Surveillance System in Bangladesh' initiated by US CDC and Jhpiego Bangladesh will help strategic reforms and policy development, ultimately contributing to a modern, and responsive infectious disease surveillance system that safeguards the health of the people of Bangladesh.

Prof. Dr. Khair Ahmed Choudhury
Additional Director General (Administration)
Directorate General of Health Services (DGHS)
Ministry of Health and Family Welfare, Bangladesh

Message

Bangladesh has made remarkable progress in strengthening its disease surveillance system, evolving since the 1970s to meet the country's growing public health needs. Public health institutions played crucial roles - providing laboratory support, advancing research, producing vaccines, and leading national surveillance and outbreak response.

The country has a proud history of success in controlling communicable diseases, including the eradication of smallpox and getting the polio free status and considerable progress in reducing vaccine-preventable diseases, diarrheal illnesses, ARI, malaria, and filariasis. Legal provisions under the Communicable Diseases Act, 2018, further strengthened national preparedness and response capacity. In recent years, the expansion of web-based reporting and the introduction of disease-specific surveillance systems for influenza, Nipah, dengue, and other emerging infections highlight Bangladesh's readiness to embrace modern, ICT-enabled systems. The COVID-19 pandemic demonstrated the country's resilience and accelerated the transition toward a more responsive, data-driven surveillance approach. Bangladesh has made notable progress in strengthening its disease surveillance capacity; the system is still complex and dispersed among several organizations. To address these challenges, a combined effort is needed to unify the various components of the surveillance system, ensuring better coordination and data sharing among institutions.

I appreciate the Planning and Research team, DGHS, for leading this mapping initiative. My sincere appreciation goes to all the departments of DGHS, national institutions, non-government organizations related to surveillance systems, the U.S. Centers for Disease Control and Prevention (US CDC), Jhpiego, and all stakeholders for their strong commitment, technical expertise, and spontaneous collaboration. Their collective contributions made this initiative possible. I believe this integration could enhance the overall effectiveness of public health responses and improve outcomes for disease prevention and control.

Professor Dr. Sheikh Sayidul Haque
Additional Director General (Planning & Development)
Directorate General of Health Services (DGHS)
Ministry of Health and Family Welfare, Bangladesh

Message

Surveillance is a cornerstone of public health system because it helps find outbreaks, people who are at risk, and support interventions that are based on evidence. Global surveillance has changed over time from simple quarantine measures to modern systems that use technology and are based on international rules like the IHR (2005).

Bangladesh has made great progress in strengthening its disease surveillance infrastructure and system to detect and manage infectious disease outbreaks. However, surveillance activities remain fragmented across multiple programs, emphasizing the need for better coordination and system integration. The "Mapping of Infectious Disease Surveillance Systems in Bangladesh" initiative represents a significant step toward consolidating and enhancing the country's surveillance capacity. This mapping has documented major infectious disease surveillance systems, including history, structure, coverage, data flows, and operational processes. The findings highlighted the status of surveillance across national, district, and upazila levels. Such evidence is vital for informing strategic directions and guiding the development of more integrated and responsive surveillance systems for Bangladesh.

I extend my appreciation on behalf of DGHS to the U.S. Centers for Disease Control and Prevention (US CDC) for their financial support and to Jhpiego for their technical assistance and dedicated coordination throughout this initiative. I also express my gratitude to the contributions of all the national institutes and departments of DGHS involved in infectious disease surveillance. Finally, I thank all divisional, district, and upazila-level health officials and frontline health service providers whose cooperation made this effort possible.

I hope the report will serve as a useful resource for policymakers, health leaders, and development partners working to build a more resilient and integrated infectious disease surveillance system for Bangladesh.
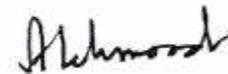
Dr. Afreena Mahmood
Director (Planning & Research)
Directorate General of Health Services (DGHS)
Ministry of Health and Family Welfare, Bangladesh

Message

Infectious diseases remain a persistent and evolving threat to public health, particularly in countries experiencing rapid urbanization, high population density, climate variability, and intensified human–animal–environment interactions. Bangladesh faces these challenges while demonstrating strong national commitment to disease prevention, preparedness, and response. In this context, the Mapping of Infectious Disease Surveillance Systems in Bangladesh represents a timely and important contribution to strengthening national and global health security through evidence-based understanding of surveillance systems.

The United States Centers for Disease Control and Prevention (US CDC) has partnered with the Government of Bangladesh for more than four decades to strengthen public health capacity, with a particular focus on surveillance, epidemiology, laboratory systems, workforce development, and outbreak preparedness. Guided by its mission - to protect health, save lives, and help people thrive - and its vision of a world where people live healthier, safer, and longer lives, US CDC supports country-led systems capable of early detection, timely response, and data-driven decision-making. Robust infectious disease surveillance is central to achieving these goals and ensuring preparedness for emerging and re-emerging public health threats.

This mapping exercise aligns closely with US CDC's mission and vision by systematically documenting the structure, coverage, operations, data flow, reporting systems and challenges of infectious disease surveillance systems across Bangladesh. By integrating findings from desk reviews, field visits, key informant interviews, validation meetings and guided by the Technical Working Committee of the Directorate General of Health Services (DGHS), the report provides a comprehensive overview of surveillance functions from data collection, analysis, reporting mechanisms and public health action at national, district, and sub-district (upazila) levels.

The findings of this report will support policymakers, researchers, and development partners in strengthening surveillance governance, enhancing system integration and interoperability, and improving subnational capacity. US CDC is pleased to have provided technical and financial assistance to this initiative, implemented by Jhpiego in close collaboration with the Research and Planning, DGHS, Ministry of Health and Family Welfare, and with valuable contributions from all participating institutions. As Bangladesh advances toward universal health coverage and global health security commitments, US CDC remains committed to supporting resilient, country-led surveillance systems that protect communities and save lives.

Dimitri Prybylski, PhD, MPH
Acting Country Director, CDC Bangladesh and
Regional Associate Director for Eastern Europe, Central and South Asia
U.S. Centers Disease Control and Prevention (US CDC)

Message

Strong and resilient infectious disease surveillance systems are the foundation of pandemic preparedness and public health security. Effective surveillance enables the early detection of emerging and re-emerging infectious disease threats, supports timely risk assessment, and informs rapid, coordinated response actions. In an increasingly interconnected world—where zoonotic spillover, climate variability, population mobility, and antimicrobial resistance heighten epidemic risk—robust surveillance and data use are essential to protecting population health and minimizing the impact of outbreaks.

The Jhpiego-led Enhancing Global Health Security (EGHS) project has contributed to global efforts to strengthen surveillance, early warning, laboratory and emergency response systems in more than 20 countries worldwide with funding from the U.S. Centers for Disease Control and Prevention (US CDC). Over the past five years, EGHS has supported more than 20 countries across Africa, Asia, and Latin America to strengthen national capacities to prevent, detect, and respond to epidemic threats. This work has focused on strengthening surveillance systems, improving data use for decision-making, enhancing laboratory–surveillance linkages, and supporting coordinated, country-led preparedness and response efforts. Globally, Jhpiego plays a catalytic role in pandemic preparedness and response, coordinating multisectoral stakeholders, governments, and implementing partners to strengthen country-led systems.

Since 2024, the EGHS project has been working in Bangladesh since 2024, recognizing the country's vulnerability to emerging and re-emerging infectious diseases and the critical need to further strengthen its surveillance and early warning capacities. With funding support from the US CDC, Jhpiego implemented the Mapping of the Infectious Disease Surveillance System in Bangladesh to provide a comprehensive understanding of the country's current surveillance landscape. The project mapped system structures, coverage, operational processes, data flows, and tracking mechanisms, and documented key challenges at national, district, and subnational (upazila) levels. The findings generated through this effort provide an evidence base to support system strengthening, improved coordination, and enhanced early warning capacity. This initiative contributes to more effective use of surveillance data, faster identification of public health threats, and stronger, more coordinated response mechanisms. The recommendations presented in this report are intended to inform policy, guide programmatic improvements, and support strategic investments in resilient surveillance systems in Bangladesh.

I would like to sincerely acknowledge the Bangladesh project team for their strong commitment, technical expertise, and collaborative efforts throughout the implementation of this work. I also extend my deep appreciation to the Directorate General of Health Services (DGHS) for its leadership, stewardship, and ownership of the surveillance systems, and for its continued guidance and support in advancing this initiative. Finally, we gratefully acknowledge the US CDC for it's funding support and continued partnership in advancing global health security efforts in Bangladesh.

It is our hope that this report will serve as a practical and strategic resource for policymakers and partners working together to strengthen Bangladesh's infectious disease surveillance system and contribute to global health security.

Aleisha Rozario
Project Director
Global Health Security Agenda Programs
Jhpiego, Baltimore, United States of America

Executive Summary

Surveillance is the continuous observation of people or phenomena to guide public health action. In public health, it involves systematically collecting, analyzing, interpreting, and disseminating disease data to detect outbreaks, identify at-risk populations, and supporting evidence-based interventions. Surveillance occurs in both community and healthcare settings, informing policy, resource allocation, and evaluation of control measures.

Historically, disease surveillance evolved from early case suspicion, quarantine and mortality tracking to modern epidemiology, highlighted by John Snow's cholera mapping and microbiological advances by Pasteur and Koch. International cooperation through the World Health Organization (WHO) and United States Centers for Disease Control and Prevention (US CDC) formalized systematic surveillance, demonstrating the importance of linking data with public health action, as seen in the Global Smallpox Eradication Program. In the 21st century, surveillance has become technology-driven, incorporating digital platforms, genomic tools, and artificial intelligence for epidemic forecasting and response. Global frameworks such as the International Health Regulations (IHR 2005) and the Global Health Security Agenda emphasize timely, accurate, and interoperable data, cross-border coordination, and strengthened national capacities.

In Bangladesh, surveillance has grown in response to urbanization and recurring disease outbreaks. Institutions such as IEDCR and IPH coordinate laboratory-supported surveillance research and monitoring, while the Integrated Disease Surveillance and Response (IDSR) framework tracks diseases including Tuberculosis, vaccine-preventable diseases (VPDs), such as polio, measles, rubella, japanese encephalitis, nipah dengue, cholera, malaria, anthrax and others. Despite the progress, surveillance remains fragmented, highlighting the need for systematic mapping, integration, and strengthening of the country's infectious disease monitoring systems.

Considering the situation, with technical and financial support from the US CDC, Jhpiego has undertaken the Enhancing Global Health Security initiative and, under this program, has been implementing the 'Mapping of Infectious Disease Surveillance Systems in Bangladesh' with the supervision of the DGHS.

The first objective of this project is to map Bangladesh's infectious disease surveillance systems, including their structure, coverage, operational processes, data flow, and tracking mechanisms. The second objective is to identify challenges at national, district, and subdistrict (upazila) levels related to surveillance implementation, workforce capacity, data collection and transformation systems, coordination mechanisms, as well as providing strategic recommendations to enhance system integration, efficiency, and responsiveness.

This mapping exercise followed a phased, collaborative, and mixed-method approach aligned with national priorities. Activities progressed through preparatory work (May–July 2024), desk review (July–September 2024), field preparation (October–December 2024), Key Informant Interviews (March–June 2025), and validation and finalization (July–September 2025).

A focused desk review synthesized policy documents, operational plans, surveillance guidelines, and relevant publications from national agencies, such as Directorate General of Health Services (DGHS), Institute of Epidemiology, Disease Control and Research (IEDCR), Institute of Public Health (IPH)) and development partners such as WHO, US CDC, icddr,b, BRAC, Damien Foundation, CHRF. The review identified existing infectious disease surveillance systems and clarified the legal framework under The Infectious Diseases (Prevention, Control and Elimination) Act, 2018, which defines priority diseases and permits inclusion of newly emergent threats. Using predefined criteria, the Technical

Working Committee (TWC) under DGHS confirmed the list of priority surveillance systems for mapping.

To understand operational realities, 74 Key Informant Interviews (KIIs) were conducted across national, divisional, district, and upazila levels. Participants included policymakers, program managers, civil surgeons, medical college representatives, UH&FPOs, field health workers, and partners from NGOs and academic institutions. Two KII tools were developed—one for national-level respondents and one for subnational levels - guided by US CDC's "Updated Guidelines for Evaluating Public Health Surveillance Systems" (2001). Interviews covered system organization, operational processes, roles and responsibilities, data collection and reporting, laboratory linkages, data management, interoperability, and public health use.

Fieldwork spanned five divisions, nine districts, and eleven upazilas selected purposively to ensure representation of all identified surveillance systems. Interview data were transcribed, translated, and analyzed thematically. A structured, matrix-based framework facilitated comparison across systems, and multi-analyst review ensured accuracy and reduced bias.

Draft findings and case reports were presented in four data validation workshops involving government and non-government surveillance experts. Feedback was incorporated to refine system descriptions, verify gaps and operational realities, and strengthen recommendations. A final triangulation of desk review findings, KII data, and stakeholder validation produced a comprehensive and credible mapping of Bangladesh's infectious disease surveillance landscape.

Ethical requirements were followed throughout. Non-research approval was obtained from Johns Hopkins University, and DGHS provided formal authorization for fieldwork. Verbal informed consent was taken before all interviews, no personal identifiers were collected, and all data were stored securely.

Findings of the surveillance mapping have been organized chronologically, based on the year each surveillance system was initiated. A total of 23 major infectious disease surveillance systems in Bangladesh were mapped, covering diarrhoeal diseases, tuberculosis, leprosy, VPDs such as polio, measles, rubella, japanese encephalitis, congenital rubella syndrome (CRS), neonatal tetanus (NT), post-neonatal tetanus, diphtheria, and pertussis (whooping cough), nipah virus, , HIV/AIDS, enteric fever, dengue, filariasis, , malaria, influenza, kala-azar, human rabies, AMR, and several emerging or complementary systems. The mapping captured the structure, coverage, operational processes, data flow, reporting mechanisms, etc. for each system.

Most surveillance systems operate under the Ministry of Health and Family Welfare (MoHFW), led by DGHS (i.e., disease control, expanded programme on immunization, Mycobacterial Disease Control (MBDC), and others), IEDCR, IPH, etc. with technical support from WHO, US CDC, Global Fund, Gavi, the Vaccine Alliance, Fleming Fund, and other developments partners, national and international institutes and NGOs, such as such as BRAC, CHRF, icddr,b, The Leprosy Mission, Damien Foundation, and others. Systems vary in design - ranging from sentinel and event-based surveillance to integrated digital platforms. Disease-specific programs such as tuberculosis (TB), malaria, leprosy, EPI, HIV/AIDS, and others. have dedicated national control units, while cross-cutting systems included Web-based Disease Surveillance Systems (WBDSS), District Health Information Software 2 (DHIS2), etc. provide broader surveillance functions.

Surveillance coverage in Bangladesh varies across disease programs, reflecting differences in disease burden and program design. Nationwide coverage is available for TB, VPDs, such as Poliomyelitis, Measles, Neonatal Tetanus (NT), CRS, routine HIV reporting, dengue, influenza, antimicrobial resistance (AMR), and the WBDSS. In contrast,

geographically targeted surveillance is implemented for malaria in 13 districts, kala-azar in 26 districts, filariasis in 19 hotspot zones, and Nipah virus through seasonal hospital-based sites. Additionally, several programs, including enteric fever, rotavirus, and child health and mortality prevention surveillance (CHAMPS), operate through facility-based or sentinel sites, resulting in more limited national representation.

Both active and passive surveillance modalities are used across Bangladesh's infectious disease programs. Active surveillance features prominently in malaria through the 1-3-7 strategy, in kala-azar via active case detection, in filariasis through hotspot searches, in seasonal Nipah virus surveillance, and in the integrated biological and behavioral surveillance (IBBS) surveys for HIV. Passive surveillance, conducted through public and private hospitals, is widely implemented for dengue, rabies, diarrheal diseases, influenza, and tuberculosis. For VPDs, surveillance is conducted through both active and passive approaches depending on the disease. For example, polio and post-neonatal tetanus rely on passive surveillance. Measles, CRS, neonatal tetanus, and Japanese encephalitis are monitored through both active and passive surveillance, while pertussis and TB are primarily monitored via passive surveillance. In addition, event-based and community-based surveillance systems are emerging as important mechanisms to strengthen early detection and reporting at the grassroots level.

Data management across surveillance programs ranges from traditional paper-based reporting to fully digital, real-time platforms. DHIS2 of the Management Information System (MIS) of DGHS functions as the primary national reporting system for aggregate data on tuberculosis, as well as for leprosy, dengue, rabies, kala-azar, malaria, vaccine-preventable diseases, and routine health events. Several programs also use case-based digital systems, including e-TB Manager, Centralized Antimicrobial Monitoring System , polio, measles, rubella, etc. case-based tools, and dedicated Nipah surveillance databases. Laboratory information systems support disease-specific reporting for TB, polio, measles, rubella, AMR, enteric fever, influenza, rotavirus, and cholera, while mobile and community-based tools such as community-based surveillance (CBS) and cell phone-based surveillance (CPBS) strengthen early detection and reporting from the community level. Most surveillance systems follow hierarchical data flows from the community or facility level to upazila, district, and central units according to national guidelines and standard operating procedures (SOPs)

Surveillance systems in Bangladesh face multiple challenges at national, district, and upazila (sub-district) levels. At the national level, heavy reliance on external donor funding for programs such as TB, malaria, HIV, AMR, influenza, and Nipah limits long-term sustainability, while inadequate budget allocation constrains laboratory strengthening, specimen transport, digital systems, and workforce development. Fragmented multisectoral coordination, particularly between human health, livestock, and environmental sectors, impedes effective response to zoonotic diseases and AMR, and parallel reporting systems with limited or non-interoperable databases contribute to duplication and inefficiencies. At the district level, major constraints include shortages of trained personnel for surveillance, data entry, laboratory testing, and field investigation; inconsistent use of digital reporting tools such as DHIS2; limited laboratory capacity for confirmatory diagnostics; and inadequate supervision and feedback mechanisms. Subnational challenges are more pronounced, with underreporting from private facilities, inadequate community engagement for early detection of diseases such as Nipah, rabies, and kala-azar, shortages of diagnostics and logistics, weak specimen transport systems in rural and marginal areas, and high workloads on health workers in the absence of dedicated surveillance staff.

Strengthening infectious disease surveillance in Bangladesh requires strong coordinated action across system levels. Priority areas include increasing domestic investment in laboratory systems, dedicated surveillance workforce, such as medical

technologist, statistician, supply of adequate essential reagents, and digital platforms, along with establishing interoperable national databases that link DHIS2, AMR systems, e-TB Manager, VPD case-based tools, and laboratory networks. Expanding genomic, environmental, and One Health surveillance, particularly for zoonotic diseases and AMR, and scaling up community-based surveillance for priority conditions are also essential. Improving subnational capacity will require enhanced training for relevant health workers on digital reporting, outbreak investigation, and data quality assurance, upgrading district-level laboratories, ensuring a robust specimen transport system, improving engagement with private facilities, and strengthening supervision and routine data quality audits. To ensure long-term sustainability and preparedness, Bangladesh should develop national strategies that reduce donor dependence, implement integrated early warning systems (EBS) and real-time dashboards, promote cross-border collaboration for malaria, filariasis, and emerging diseases, and strengthen public awareness, risk communication, and community participation in surveillance activities.

Bangladesh has a structured infectious disease surveillance system spanning national, district, upazila, and community levels. Platforms include sentinel surveillance, WBDSS, CBS, CPBS, and EBS. Key actors, such as Disease Control and EPI of DGHS, IEDCR, IPH, Divisional Health Office, Civil Sargon Office, District Hospital, Upazila Health Complexes, field health workers, and community volunteers including other national and international organizations, coordinate data collection, laboratory confirmation, and reporting. The system integrates human and animal health data, especially for zoonotic diseases like anthrax, and links with international frameworks such as the IHR. Data flows from community detection to central analysis, supporting outbreak monitoring and response. Mapping highlights the geographic coverage, operational actors, and reporting pathways, providing an overview of Bangladesh's infectious disease surveillance architecture.

Introduction

1.1 Background

The term "surveillance," derived from the French roots *sur* (over) and *veiller* (to watch), is defined as the "close and continuous observation of one or more persons for the purpose of direction, supervision, or control." Surveillance is a set of routine practices and relates to a definite purpose. It is widely used in many disciplines in addition to health such as ecology, forestry, military services and criminology.

> **What is public health surveillance?**
>
> *Public health surveillance is the systematic, ongoing collection, management, analysis, and interpretation of health data, which is then disseminated to stimulate public health action*

In the health sector, surveillance has many names such as (i) Public health surveillance, (ii) Epidemiological surveillance and (iii) Disease surveillance. Disease surveillance has been defined as a continuous and systematic process of collecting, analyzing, interpreting, and disseminating data on the occurrence of diseases within defined populations[1]. This vital public health function enables timely detection of outbreaks and emerging health threats, guiding effective interventions to reduce illness and death[1,2]. Surveillance activities occur both in the community and healthcare settings, where they support infection prevention and control programs including pandemic response[2]. By monitoring disease trends and identifying at-risk groups, disease surveillance informs policy decisions, resource allocation, and the evaluation of control measures. Additionally, it provides essential data for research and fulfills national and international reporting requirements, ultimately strengthening the capacity of health systems to respond to public health emergencies[1,2].

Public health surveillance systems can be passive or active. A passive surveillance system consists of the regular, ongoing reporting of diseases and conditions by all health facilities in country. An active surveillance system is one where health facilities are visited and health care providers and medical records are reviewed to identify a specific disease or condition. Passive surveillance systems are less time-consuming and less expensive to run but risk under-reporting of some diseases. Active surveillance systems are most appropriate for epidemics or where a disease has been targeted for elimination.

1.2 Global History of Infectious Disease Surveillance

The history of infectious disease surveillance reflects humanity's long struggle to detect and control epidemics[1]. Early measures included Venice's maritime quarantine during the 14th-century plague and London's Bills of Mortality in the 1600s, which tracked weekly deaths [3 4 5 6]. In 1854, John Snow's mapping of cholera cases in London marked the birth of modern epidemiology[7].

The 19th century brought breakthroughs in microbiology by Louis Pasteur and Robert Koch, confirming germ theory and enabling targeted detection[8]. National reporting systems soon followed, such as the U.S. National Quarantine Act (1878) and laws mandating nationwide reporting by 1893 [9]. By the early 20th century, surveillance was a core function of public health institutions across Europe and North America [1, 10].

Following the devastation of World War II, global health cooperation became a priority. The formation of the World Health Organization (WHO) in 1948 provided a centralized platform for coordinating international disease control [11]. In 1951, WHO adopted the International Sanitary Regulations, later replaced by the International Health Regulations (IHR) in 2005, to guide member states in reporting and responding to outbreaks. [11] A critical public health achievement, the Global Smallpox Eradication Programme (1955–1980), relied heavily on robust surveillance systems and real-time case reporting. [11]

In 1963, Alexander D. Langmuir defined disease surveillance as "the continued watchfulness over the distribution and trends of incidence through the systematic collection, consolidation and evaluation of morbidity and mortality reports and other relevant data and the regular dissemination of data to all who need to know". [12] In 1965, the Director General of WHO established an Epidemiological Surveillance Unit and the Division Director, Karel Raska, defined surveillance much more broadly than Langmuir and included in it "the epidemiological study of disease as a dynamic process." [13] By the 1980s, US CDC's definition emphasized not just data but also the application of findings to public health action. [14]

Timeline of Infectious Disease Surveillance

- _14th–17th c.: Early quarantine and death records_

- _19th c.: Microbiology breakthroughs and national reporting_

- _20th c.: WHO, International Health Regulations, smallpox eradication_

- _1960s–1980s: Systematic data collection and public health application_

- _Late 20th c.: Digital platforms and early warning systems_

- _21st c.: Real-time, AI-driven, genomic, and One Health surveillance for global threats_

With progression of time, disease surveillance became more refined with improvements in laboratory diagnostics and data communication. [1] The outbreak of Legionnaires' disease in the U.S. in 1976 highlighted the need for responsive detection systems, [15] then in 1995, WHO launched the Global Outbreak Alert and Response Network (GOARN) to facilitate rapid response to emerging threats [16]. Digital platforms such as ProMED-mail (1994) and HealthMap (1999) emerged to provide real-time alerts and monitor news sources for early outbreak warnings. [17,18]

The 21st century has been marked by the increasing complexity and interconnectedness of global health threats. The revised IHR 2005, adopted following the 2003 global Severe acute respiratory syndrome (SARS) outbreak, made it mandatory for countries to report any public health emergency of international concern (PHEIC). [19] The H1N1 influenza pandemic in 2009 and the West Africa Ebola outbreak (2014–2016) exposed gaps in early warning systems and cross-border collaboration. [20,21] In response, initiatives like the Global Health Security Agenda (GHSA) were launched to strengthen national surveillance and response capabilities. [22]

Recent years have seen a dramatic shift toward real-time, technology - driven surveillance system. Digitalization has led to advances in the use of widely generated and open-source data, known as big data, as part of surveillance activities. During the COVID-19 response, open-data initiatives such as 'Google Mobility Trends' and 'Meta's Data for Good' offered insights into population mobility valuable for risk assessment and monitoring of behavioral responses to public health measures. Other evolving technologies – such as Artificial intelligence (AI) and machine-learning algorithms, offer opportunities to use the latest data science advancements to improve understanding of complex factors that drive outbreaks and to better predict and forecast epidemic events. The COVID-19 pandemic accelerated the use of genomic surveillance platforms like GISAID to monitor viral mutations and variants. [23–26] Artificial intelligence and machine learning tools are increasingly used to predict outbreaks based on social media, mobility, and environmental data. [27] The One Health approach, integrating human, animal, and environmental health surveillance, has likewise gained prominence due to the zoonotic origin of many emerging diseases. [28–31] Meanwhile, community-based and event-based surveillance models are being increasingly scaled in humanitarian contexts and low-resource settings to capture early signals. [32–35]

1.3 Global Perspective on Infectious Disease Surveillance

Disease surveillance is recognized as an essential mechanism for ensuring international health security. [36] The IHR 2005 is a legally binding agreement among 196 countries, which mandates the development and maintenance of core public health capacities to detect, assess, report, and respond to PHEIC. [37] These regulations aim to enhance the global community's ability to prevent the international spread of diseases while avoiding unnecessary interference with international traffic and trade. The COVID-19 pandemic has underscored the critical importance of timely, accurate, and transparent surveillance data, as well as the disparities in surveillance capacities across countries. [38,39] In response, initiatives such as GHSA, the WHO Health Emergencies Programme, and regional surveillance networks have emerged as key platforms for strengthening national systems and promoting data interoperability, cross-border coordination, and real-time information exchange. [40–42] As infectious disease threats continue to evolve in scale and complexity, the effectiveness of global surveillance systems increasingly depends on sustained political commitment, equitable investment in digital and laboratory infrastructure, integration of innovative technologies such as genomic and event-based surveillance, and robust international collaboration grounded in transparency and shared accountability. [43]

> *International Health Regulations (IHR 2005)*
>
> *A legally binding agreement among 196 countries to develop and maintain core public health capacities for detecting, assessing, reporting, and responding to international health emergencies (PHEIC).*

1.4 Bangladesh Country Profile

1.4.1 Geography and Demography

Bangladesh, positioned in South Asia along the northern coast of the Bay of Bengal, shares its borders with India and Myanmar.[44] Its landscape is mainly a low-lying delta plain with many rivers, while hilly areas lie in the north and east. The country is highly vulnerable to climate change, facing frequent floods, cyclones, and tidal bores that challenge development and poverty reduction efforts. [45] Bangladesh has a population of about 171 million living in a land area of 148,460 square kilometers, making it one of the most densely populated countries in the world.[46] In 2022, the population density was around 1,171 people per square kilometer, far higher than the global average of 62 people per square kilometer (2023). [46] Approximately 68.3% of the population resides in rural areas and 32% live in urban areas, with rapid urban population growth.[47] Over the past five decades, fertility rates dropped from 6.9 births per woman in the 1970s to 2.1 by 2022, slowing population growth to about 1.1% annually.[47]

> *Bangladesh, home to **171 million** people, has a population density of **1,171 people** per square kilometer, with **68% residing** in rural areas.*

1.4.2 Administrative Structure

Bangladesh is divided into 8 divisions, which are further subdivided into 64 districts (zilas) organized into 495 upazilas (sub-districts) and 4,596 unions, the smallest rural administrative units. At the local level, rural areas are further classified into mauzas (58,846) and villages (98,049). Urban areas are managed by 12 city corporations containing 465 wards, and 328 paurashavas (municipalities) with 3,075 wards. Additionally, there are 105 metropolitan thanas serving as key urban administrative and policing units.

1.4.3 Health System of Bangladesh

Bangladesh's health system is a structured network of service delivery facilities, educational institutions, and administrative units, supported by regulatory and implementing bodies. Health services span from community clinics in rural areas to tertiary-level hospitals in urban areas. Since 2017, Ministry of Health and Family Welfare (MoHFW) has operated through two divisions: the Health Services Division (responsible for health policy, health services delivery, nursing, and financing) and the Medical Education and Family Welfare Division (which manages medical education, family planning, and vital registrations). [47,48]

At the national level, Bangladesh has specialized hospitals and medical education institutions. The Directorate General of Health Services (DGHS), the largest agency under the MOHFW, supports national health programs and interventions. DGHS operates across six levels— national, divisional, district, upazila, union, and ward. The Director General of Health Services is supported by additional director generals for administration and planning, along with directors and deputy directors. Each division is led by a Divisional Director, and divisional headquarters host infectious disease hospitals and medical colleges with hospitals. At the district level, secondary- and primary-care services are managed by the Civil Surgeon, district hospitals are overseen by superintendents, and some districts have medical colleges, medical assistant training schools, and nursing training institutes. At Upazila level, Upazila Health and Family Planning Officers (UHFPOs) ensure "Essential Service Package" (ESP) and other service delivery activities at the Upazila Health Complex, Union Health and Family Welfare Centers / Union Sub-Centers, and Community Clinic levels.

1.4.4 Organization of the Health System

The health system in Bangladesh is organized into multiple tiers, with several key actors playing critical roles in ensuring comprehensive healthcare delivery nationwide. These tiers and actors include:

- **Central Level:** At the top, the MoHFW oversees the overall health system. It formulates health policies, coordinates national health programs, and manages significant health initiatives. Key institutions include the DGHS and the DGFP.

- **Tertiary Healthcare:** There are total 64 tertiary level facilities. Among those facilities, 35 medical college hospitals, 3 specialized health center, 2 specialized hospital and 12 specialty postgraduate institute and hospital.

- **Secondary Healthcare:** A total of 61 districts and general hospitals provide specialized medical care, including diagnostic and surgical services, and serve as referral centers for primary healthcare facilities. There are 5 infectious disease hospitals and 3 leprosy hospitals at district level.

- **Primary Healthcare:** Most people's first point of contact is provided through a network of about 3,900 Union Health and Family Welfare Centers (UHFWCs), nearly 14,272 Community Clinics, 1,312 union sub-centers and 429 Upazila Health Complexes. These centers offer preventive, promotive, and essential curative services.

- **Non-Government / Private Sector:** The private sector complements public healthcare provision with 67 private medical college hospitals, 1,610 NGO-run hospitals and clinics, and 4,172 private hospitals and clinics, primarily concentrated in urban areas. Private healthcare is frequently utilized for more immediate or specialized care. Community health workers and volunteers, including those affiliated with non-governmental organizations (NGOs), play a vital role in delivering health services and providing health education at the grassroots level.

This multi-tiered system aims to provide equitable and accessible healthcare across the country, addressing the diverse needs of its population.

1.4.5 Information and Communication Technology in the Health System

In 1998, Bangladesh initiated its eHealth program under the MoHFW. To improve health data management and decision-making, the Management Information System (MIS) under the DGHS was formally established in 2008. Building on this foundation, DHIS2 was introduced in 2009 within MIS-DGHS to harmonize previously fragmented health information systems, enabling routine collection, analysis, and reporting of health data on a nationwide scale. In parallel, IEDCR used its own DHIS2 platform for reporting dashboard, which it uses for web-based disease surveillance and outbreak reporting, providing timely, real-time information to support rapid public health responses. Since the adoption of the National Health Policy in 2011, ICT, eHealth initiatives, and telemedicine have become key components of Bangladesh's health strategy, contributing to improved health service delivery, disease monitoring, and overall system efficiency.

1.4.6 History of Infectious Disease Surveillance in Bangladesh

Disease surveillance in Bangladesh has gradually evolved since the 1972s, reflecting the country's growing public health needs in the context of rapid population growth, urbanization, and recurring disease outbreaks. The Institute of Public Health (IPH), established in 1952, has long complemented national surveillance efforts by providing laboratory-based diagnostic support and research on infectious agents. The institute has a creditable history of producing smallpox vaccine which helped eradication of the disease from the country. In the early 2000s, Bangladesh adopted the Integrated Disease Surveillance and Response (IDSR) framework, aligned with WHO guidelines, to strengthen systematic data collection and reporting on priority diseases such as tuberculosis, dengue, and cholera. IEDCR, established in 1976, serves as the national focal point for coordinating disease surveillance and outbreak response.

Bangladesh has a long-standing history of managing communicable disease surveillance, contributing significantly to the eradication of smallpox and polio, and the control of vaccine-preventable diseases, diarrhoeal illnesses, acute respiratory infections (ARI), malaria, and filariasis. In the early 1990s, IEDCR introduced the Epidemiological Information Sheet (EIS) to monitor the incidence and prevalence of key public health concerns such as diarrhoeal disease, pneumonia, malaria, measles, tuberculosis, filariasis, and poliomyelitis. The Expanded Programme on Immunization (EPI) has also maintained active surveillance of selected vaccine-preventable diseases since that time. The Communicable Diseases (Prevention, Control and Elimination) Act, 2018 provides the legal framework for preventing, controlling, and eliminating infectious diseases in Bangladesh. [49] The Act establishes the authority of the DGHS to lead preparedness and response efforts, enforce quarantine and isolation measures, regulate public health risks, and coordinate multisectoral actions during outbreaks. It ensures national-level compliance by granting the Act supremacy over other laws in matters related to communicable disease control.[49]

In recent years, IEDCR has expanded its capacity to conduct web-based surveillance, collecting data from upazila health complexes (UHC). Additionally, disease-specific surveillance systems - both routine and ad hoc - have been introduced for several emerging and re-emerging diseases, including influenza, nipah, dengue, and cutaneous anthrax. Surveillance activities are also undertaken by various disease control programs under the Office of Line Director for Disease Control, Tuberculosis, Leprosy, and AIDS/STD programs. The COVID-19 pandemic served as a wake-up call, demonstrating the importance and feasibility of establishing a responsive, ICT-enabled surveillance system supported by laboratory infrastructure. Moving forward, post-pandemic recovery provides an opportunity to modernize and strengthen the overall disease surveillance system in Bangladesh, including the development of an integrated early warning system to enhance preparedness and response to future epidemics and health emergencies.

1.5 Overview of the Infectious Disease Surveillance Systems Structure and Governance

1.5.1 Organizations of infectious disease surveillance

In Bangladesh, the national disease surveillance system operates through a multi-tiered structure involving government agencies, public health institutes, tertiary hospitals, district health offices, secondary and primary-level facilities. At the national level, the Ministry of Health and Family Welfare (MoHFW), directed by the Secretary, oversees overall health governance, formulates surveillance-related policies, and coordinates major national programs for infectious disease surveillances. Under MoHFW, the Directorate General of Health Services (DGHS) plays a central role through specialized departments such as Disease Control, Mycobacterial Disease Control (MBDC), Expanded Programme on Immunization (EPI), AIDS/STD Program and other programs, as well as the Management Information System (MIS). Key government public health institutions, including IEDCR and IPH, provide epidemiological leadership, laboratory support, and technical guidance for infectious disease surveillance systems. Organizations involved in infectious disease surveillance have dedicated teams for outbreak investigation, response, and systematic reporting, ensuring timely data collection, analysis, interpretation and communication to relevant authorities for effective decision-making and rapid response to public health threats.

The Disease Control of DGHS is responsible for disease control, surveillance and serves as the focal point for the International Health Regulations (IHR). It also engages dedicatedly on diarrhoeal, Antimicrobial Resistance (AMR), malaria, dengue, kala-azar, filariasis, rabies, nipah, leptospirosis, and other emerging and re-emerging diseases. The Mycobacterial Disease Control (MBDC) is another directorate under DGHS responsible for managing Tuberculosis (TB) and Leprosy control through the National Tuberculosis Control Program (NTP) and National Leprosy Elimination Program (NLEP). The Expanded Programme on Immunization (EPI) under DGHS is responsible for managing the surveillance system for acute flaccid paralysis (AFP) and vaccine-preventable diseases (VPDs) in Bangladesh. The diseases under surveillance include poliomyelitis, acute flaccid paralysis (AFP), acute encephalitis syndrome, neonatal tetanus, post-neonatal tetanus, measles, congenital rubella syndrome (CRS), diphtheria, pertussis (whooping cough), and childhood tuberculosis. The National AIDS/STD Programme (NASP), under the DGHS, is the primary government body responsible for leading and coordinating the national response to HIV/AIDS and sexually transmitted infections (STIs), including a key role in surveillance. IEDCR functions as the national agency responsible for routine and event-based surveillance, outbreak investigation, and epidemiological research. Its activities include surveillance for acute watery diarrhea, Hospital-Based Rotavirus and Intussusception Surveillance (HBRIS), national influenza, Respiratory Event-Based Surveillance (Respiratory EBS), nipah, anthrax, and Acute Encephalitis Syndrome (AES). IEDCR also manages the Web-Based Disease Surveillance System (WBDSS), Cell Phone–Based Surveillance, Child Health and Mortality Prevention Surveillance (CHAMPS), Antimicrobial Resistance (AMR) surveillance including other surveillance programs. In addition, the institute monitors emerging zoonotic disease threats and conducts behavioral risk characterization in high-risk communities across Bangladesh. IPH complements these functions by serving as the national focal laboratory for vaccine-preventable disease surveillance, offering diagnostic confirmation for polio, measles, rubella, japanese encephalitis, respiratory infections, and emerging pathogens. IPH also contributes to food and water safety surveillance and the quality control of biological products. Together, IEDCR and IPH anchor the national laboratory–epidemiology surveillance framework.

In addition to government entities, several development partners, academic and research institutes and NGOs, such as Gavi, the Vaccine Alliance; US CDC; WHO; the Fleming Fund; Bill & Melinda Gates Foundation (BMGF); Bangladesh Medical University (BMU); icddr,b; BRAC; and Damien Foundation, and others provide technical support to DGHS, IEDCR, and IPH by contributing surveillance data, conducting operational research, supporting outbreak investigations, and strengthening laboratory and epidemiological capacity.

At the subnational level, Bangladesh's disease surveillance system operates through a coordinated network of tertiary, secondary, and primary health facilities. Divisional Director (Health) Offices, supported by statistical and laboratory staff, compile surveillance data from tertiary hospitals, district hospitals and UHCs and relay it to national authorities. Medical colleges, tertiary hospitals, and private facilities, including hospitals, clinics, and diagnostic centers—contribute substantial clinical and laboratory data, conduct sample testing, and report infectious disease trends and antimicrobial resistance, strengthening both routine and event-based surveillance.

At the district level, Civil Surgeon Offices, aided by surveillance officers and medical personnel, oversee data collection from all primary health facilities, ensure timely reporting, and disseminate district-level surveillance reports. At the primary level, Union Sub-Centers and Community Clinics act as the frontline for case detection, where Health Assistants, CHCPs, and Community Health Workers identify suspected cases and report to the Upazila Health Complex (UHC). At the UHC, UH&FPO and RMO/assigned focal person records preliminary information from suspected cases, collects samples, performs tests to confirm diagnoses, and reports data through DHIS2 and other established surveillance channels.
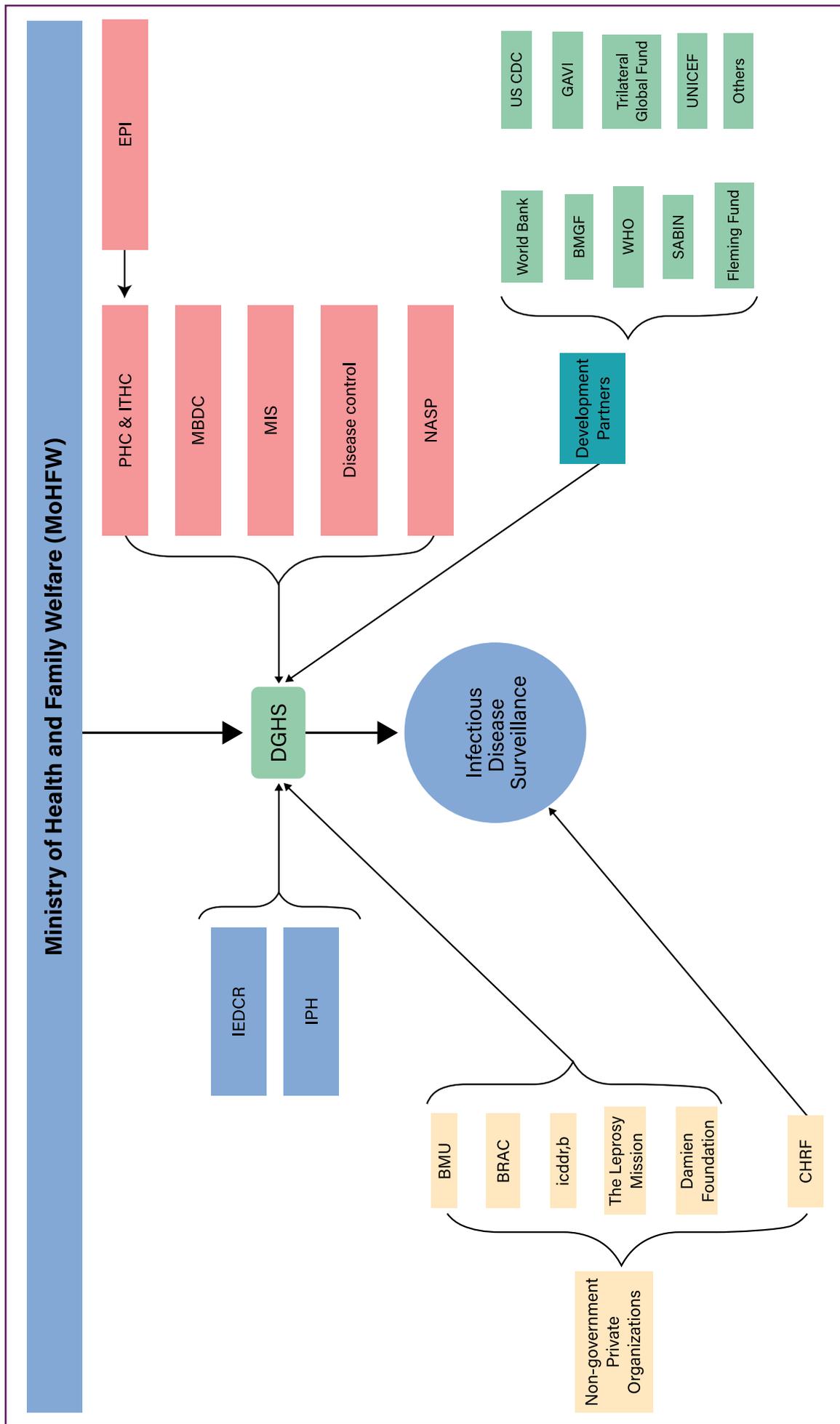
Figure 1. Organizations involved in the Infectious Disease Surveillance system in Bangladesh

1.5.2 Centralized Oversight

The MoHFW and its agencies, such as the DGHS, coordinate the surveillance activities. Under DGHS, the IEDCR has oversight of communicable diseases, outbreak investigation and response, and communicable disease surveillance. The Disease Control under the DGHS focused on prevention and control of specific communicable diseases such as malaria, filaria, kala-azar, tuberculosis, leprosy, and diarrhoeal diseases. IPH is the national focal institute for the laboratory support for detection and surveillance of Poliomyelitis & AFP, Measles and Rubella, Congenital Rubella Syndrome (CRS), Neonatal Tetanus (NT), Post-Neonatal Tetanus, Diphtheria, and Pertussis (Whooping Cough). Other key institutions involved are Bangladesh Medical University (BMU), the National Institute of Preventive and Social Medicine (NIPSOM), the Bangladesh Institute of Trpoical and Infectious Diseases (BITID). Nongovernment organizations, icddr,b, the Child Health Research Foundation (CHRF), and BRAC play significant roles in national disease surveillance.

1.5.3 Decentralized Implementation

At the operational level, surveillance is decentralized. Health facilities at the district and sub-district (upazila) levels are responsible for active disease reporting and case detection. This decentralization allows for timely and localized responses to outbreaks and health events.

Table 1: List of key organizations in the implementation of surveillance in Bangladesh

Levels	Key Organizations	Key Personnel	Role
National Level	MoHFW	Secretary	Oversee the health system, formulates health policies, coordinates national health programs, and manages major health initiatives.
	• DGHS – Disease Control, MBDC, EPI, AIDS/STD, MIS – Public Health Institution: IEDCR, IPH • DGDA	Director General, Additional Director General, Director, Assigned focal personnel, Field Epidemiology Training Program (FETP) fellows, Medical Technologist	Providing technical assistance to the ministry, implementation of disease surveillance, managing data collection systems, data analysis, interpretation, reporting, and dissemination, outbreak response
	NGOs • icddr,b • BRAC • CHRF • Damien Foundation	Executive Director	Provide technical support to DGHS

Levels	Key Organizations	Key Personnel	Role
Tertiary/ Division level	Divisional Director (Health) Offices	Divisional Director Statistical Officer	Data compilation and report to the central level
	Medical Colleges and Hospitals	Director Lab in-charge Assigned focal personnel	Conduct data collection, sample testing, and analysis at hospitals
	Private Sector: Hospitals, Clinics, Diagnostic Centers	Lab in charge Assigned focal personnel for surveillance	Complement the public health system, specific diagnostic centres, laboratories, and hospitals provide data for infectious disease surveillance from positive cases and AMR
Secondary/ District level	Civil Surgeon's Offices	Civil Surgeon Medical Officer Statistical Officer District Surveillance Medical Officer	Surveillance officers support data collection, reporting from primary health facilities and dissemination of surveillance data
	District Hospitals	Superintendent Assigned focal personnel for surveillance	
UHC/ Primary level	Upazila Health Complexes Union Sub Centers Community Clinics	UH&FPO Resident Medical Officer Assigned focal personnel Medical Officer SACMO Health Assistant CHCP, CHWs	Facilitate the reporting of suspected cases and collect preliminary data

1.6 Rationale

Bangladesh has made significant progress in strengthening its disease surveillance infrastructure to detect and manage infectious disease outbreaks. However, the existing surveillance system remains complex and fragmented, with multiple institutions overseeing various aspects of surveillance without a centralized coordination mechanism. The US CDC and Jhpiego have aimed to document the infectious disease surveillance systems in Bangladesh by conducting a comprehensive mapping of existing systems for infectious disease surveillance. This initiative has documented the structure, coverage, operations, data flow, and tracking mechanisms of current surveillance systems, ultimately identifying gaps and providing strategic recommendations.

Objectives

Objectives

1. To map the existing infectious disease surveillance systems in Bangladesh (structure, coverage, operations, data flow, tracking system etc.)

2. To document national, district, and sub-district (upazila) level challenges associated with the surveillance systems
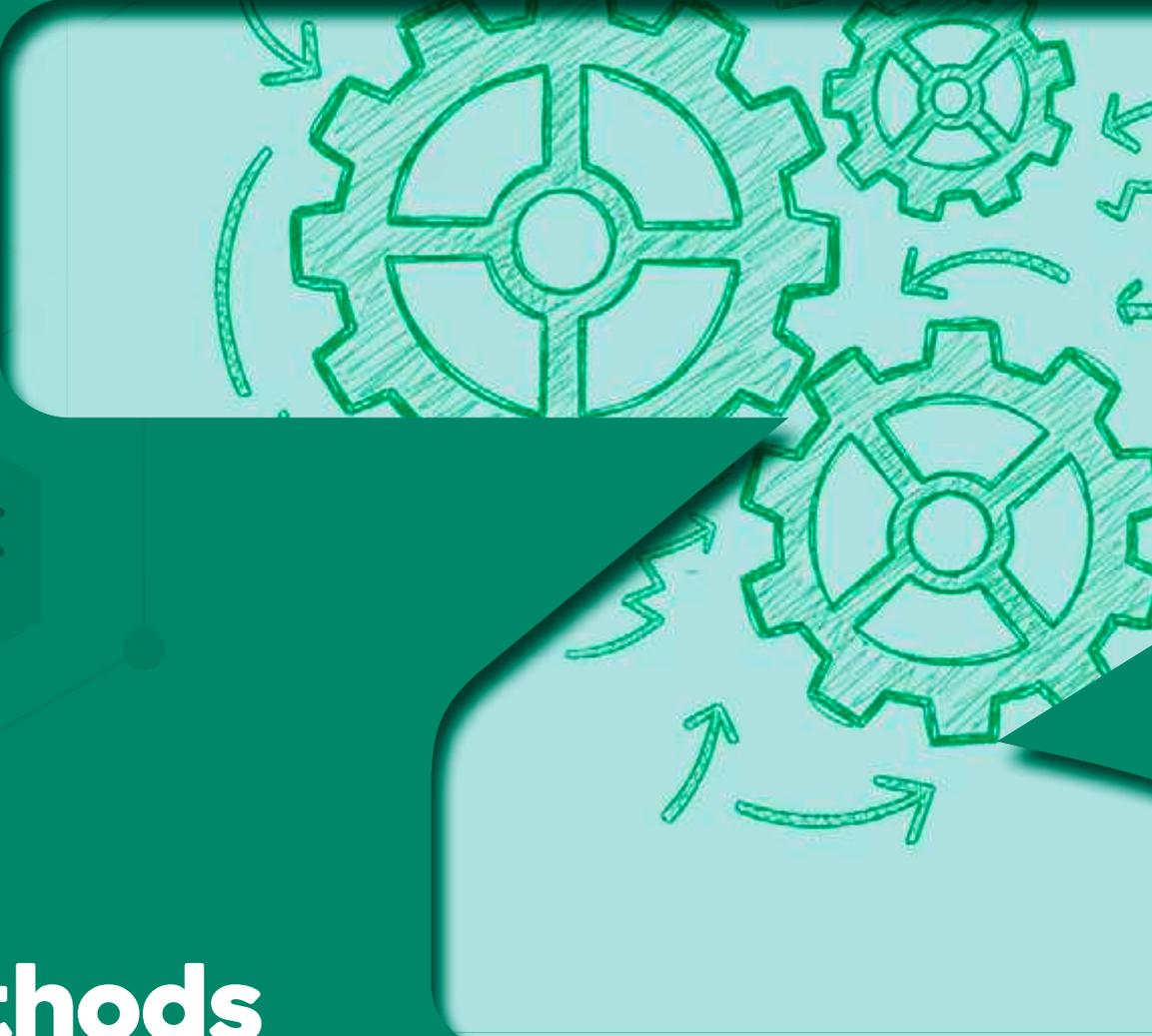
Methods

3.1 Project Timeline

The project was implemented in a phased manner and officially launched on 16 May 2024 at DGHS. Project preparation was conducted from May to July 2024, followed by a desk review from July to September 2024. Field visit preparations took place between October and December 2024. Key Informant Interviews (KIIs) were conducted from March to June 2025. The draft report and validation meeting were completed in July 2025, and the final report review and finalization occurred between August and September 2025.

TWC Formation and Project Preparation	Preparation for Field Visit	Report Drafting & Validation
	Mar. 2025 and	
July-Sep. 2024	June 2025	Aug.-Sep. 2025
Dec. 2023-July 2024	Oct.-Dec. 2024	July 2025
Desk Review	Key Informant Interview (KIIs)	Report Review and Finalization
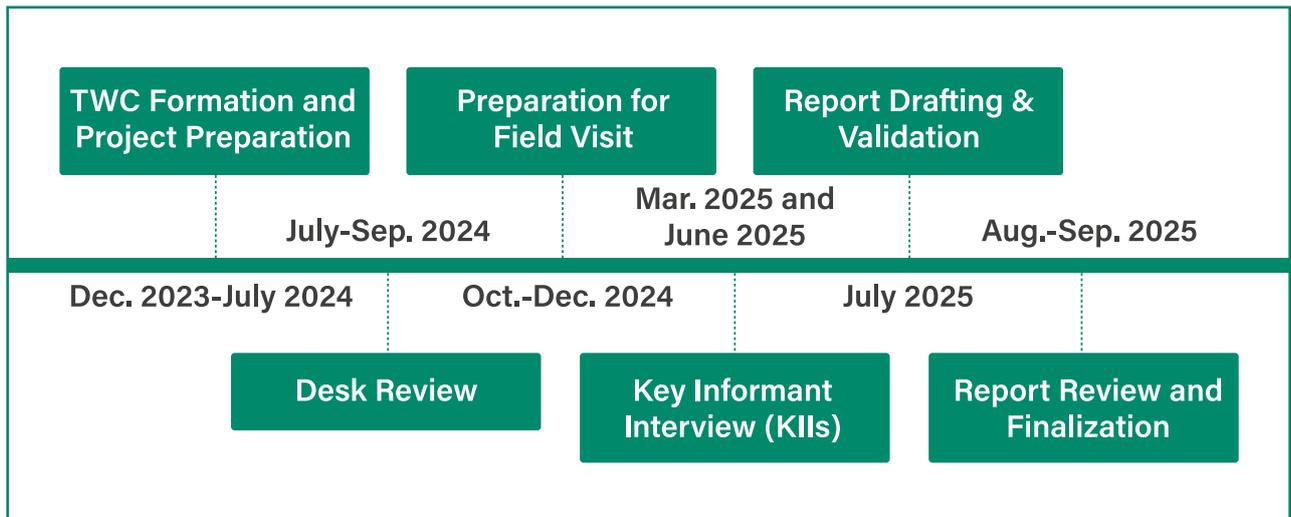
Figure 2. Project timeline

3.2 Technical Working Committee (TWC)

A Technical Working Committee (TWC) was formed in close consultation with the DGHS. Jhpiego developed the project concept note by leveraging its technical expertise to inform the project design and proposed implementation approach. The concept note subsequently underwent a comprehensive review by the TWC to assess the scope of work and implementation plan. Jhpiego facilitated coordination with DGHS and the TWC to convene the review meeting. Following this rigorous review process, the concept note received formal approval from DGHS. The project was officially launched on May 16, 2024, and non-research Institutional Review Board (IRB) approval for the study was obtained from the Johns Hopkins Bloomberg School of Public Health (JHSPH) on June 27, 2024.

3.3 Technical Approach

The technical approach for this project was grounded in understanding the infectious disease surveillance system as a multi-dimensional and collaborative process. It emphasized comprehensive mapping of surveillance structures, data flows, and institutional roles across public and private sectors. In close coordination with the DGHS, IEDCR, IPH, and other relevant implementing partners, a collaborative approach was maintained throughout to ensure effective engagement, data sharing, and alignment with national health priorities.

3.4 Analytical Framework

A qualitative, multi-method exploratory analytical framework was employed mapping the infectious disease surveillances, drawing on desk review, Key Informant Interviews (KIIs), and a validation meeting to ensure triangulation and analytical rigor. It consisted of the following components:

- **Desk Review:** An extensive desk review was undertaken to systematically analyze existing reports, policy documents, research publications, and official records relevant to disease surveillance in the country. This process aimed to provide a comprehensive understanding of the current surveillance systems, including their structure, scope, and operational mechanisms. The review also enabled the identification of key institutional actors and stakeholders involved in surveillance activities, as well as the mapping of reporting pathways, data flows, and coordination arrangements.

- **Key Informant Interviews (KIIs):** To complement the desk-based findings and capture a deeper understanding of real-world practices, primary data were collected through a series of semi-structured interviews with stakeholders and subject matter experts. These participants included government officials, technical specialists, program managers, and field-level implementers with direct experience in surveillance operations. The KIIs explored various aspects of the system, including operational challenges, coordination mechanisms, data sharing, resource constraints, and potential opportunities for improvement.

- **Data Validation Workshop:** Upon completion of the desk review and Key Informant Interviews, a consolidated draft report was developed and presented at the data validation workshops with key stakeholders, technical experts, and institutional representatives. The workshop facilitated critical review, verification of findings, identification of challenges, and integration of field-level insights. Structured feedback and recommendations were systematically incorporated to strengthen the evidence base and ensure the final report reflects operational realities.

3.5 Desk Review

I. Timeframe

The desk review was conducted over a five-month period, from May to September 2024, during which relevant documents, datasets, and institutional publications were systematically collected, reviewed, and analyzed.

II. Data Sources

The review covered a comprehensive range of data sources, including:

- **Official websites:** Webpages of key organizations, such as IEDCR, DGHS, IPH, and icddr,b were visited to gather surveillance-related documents.

- **Reports and publications:** Documents related to infectious disease surveillance from developed and developing nations were reviewed, alongside institutional reports from WHO and CDC Atlanta.

- **Program-specific documents:** Surveillance documents from Bangladesh's DGHS, IEDCR, icddr,b, and other relevant organizations were examined, with a particular focus on the operational plans of key line directors, including CDC, TB-Leprosy-HIV/AIDS, and MIS and e-Health.

- **Institutional and NGO contributions:** Websites and published reports of key autonomous public health institutions and non-governmental organizations—including Bangladesh Medical University (BMU), icddr,b, BRAC, and the Child Health Research Foundation (CHRF) - were systematically reviewed.

A detailed list of the sources used for this review is provided in Annex 3.

III. Selection Criteria

Eight criteria were applied to identify the priority infectious disease surveillance systems, including systematic, ongoing surveillance activities, sample collection, data analysis, data interpretation, dissemination, human health-related data, and links to public health practice. A detailed list of the criteria used for this review is provided in Annex 4.

IV. Review Process

The review followed a systematic process:

- Data collection from official and institutional websites, reports, and program-specific documents.
- Data analysis to map ongoing surveillance activities.
- Identifying key actors, institutions, and priority diseases within the surveillance
- Based on the review of findings, the TWC of DGHS finalized the list of ongoing infectious disease surveillance activities.

V. Scope of the Review

The desk review focused exclusively on disease surveillance systems, excluding laboratory components. It covered Bangladesh's national surveillance systems, mapping key actors and institutions involved in these efforts.

3.6 Key Informant Interviews (KIIs)

Key Informant Interviews were conducted to gather detailed perspectives from a diverse range of stakeholders engaged in surveillance activities, including government officials, health programme managers, and representatives of partner organizations.w

I. Timeframe and Number of KIIs

Between March and June 2025, face-to-face KIIs were conducted with 74 participants representing relevant government institutions and partner organizations.

II. Tool Development and Data Collection Topics

To assess infectious disease surveillance systematically, we developed 2 KII guidelines, one for national level policy maker and another for divisional to upazila health personnel. Project team tailored the tools to different levels of the health system to gather operational insights on surveillance implementation, and data reporting system. The tools were informed by internationally recognized standards, particularly the "Updated Guidelines for Evaluating Public Health Surveillance Systems" (U.S. CDC, 2001), and included components of the system organization involved, personnel involved, data analysis, operation system including data/sample collection and transport, laboratory testing, reporting mechanisms, level of usefulness including data analysis, visualization, interoperability, data sharing, its' public health practices. This report also documents some challenges and recommendations identified during key informant interviews, such as basic information about surveillance systems, objectives,

personnel roles, operational processes, challenges, and recommendations. Stakeholder engagement extended to private sector organizations, NGOs, and academic institutions to ensure a holistic understanding of the surveillance landscape. Data was collected on the topics shown in the figure 3.

III. Selection of Areas and Participants for KII

Areas and participants for the field visit were purposively selected. Eligible participants were approached and invited to voluntarily take part in the interviews. The selection of areas and participants was guided by the 15 identified infectious disease surveillance systems. Care was taken to ensure coverage of all relevant surveillance sites and the designated focal persons for the 23 infectious diseases monitored under these systems in Bangladesh.
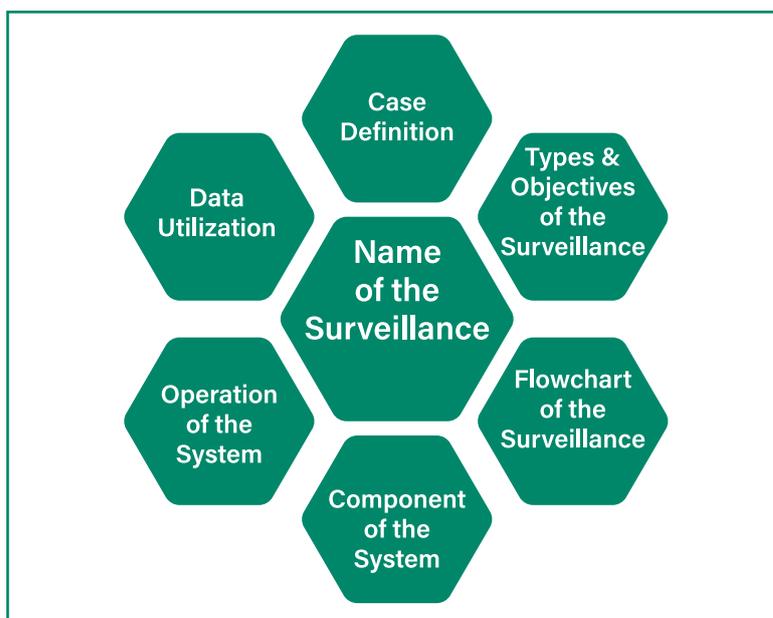
Figure 3. Data Collection Topics
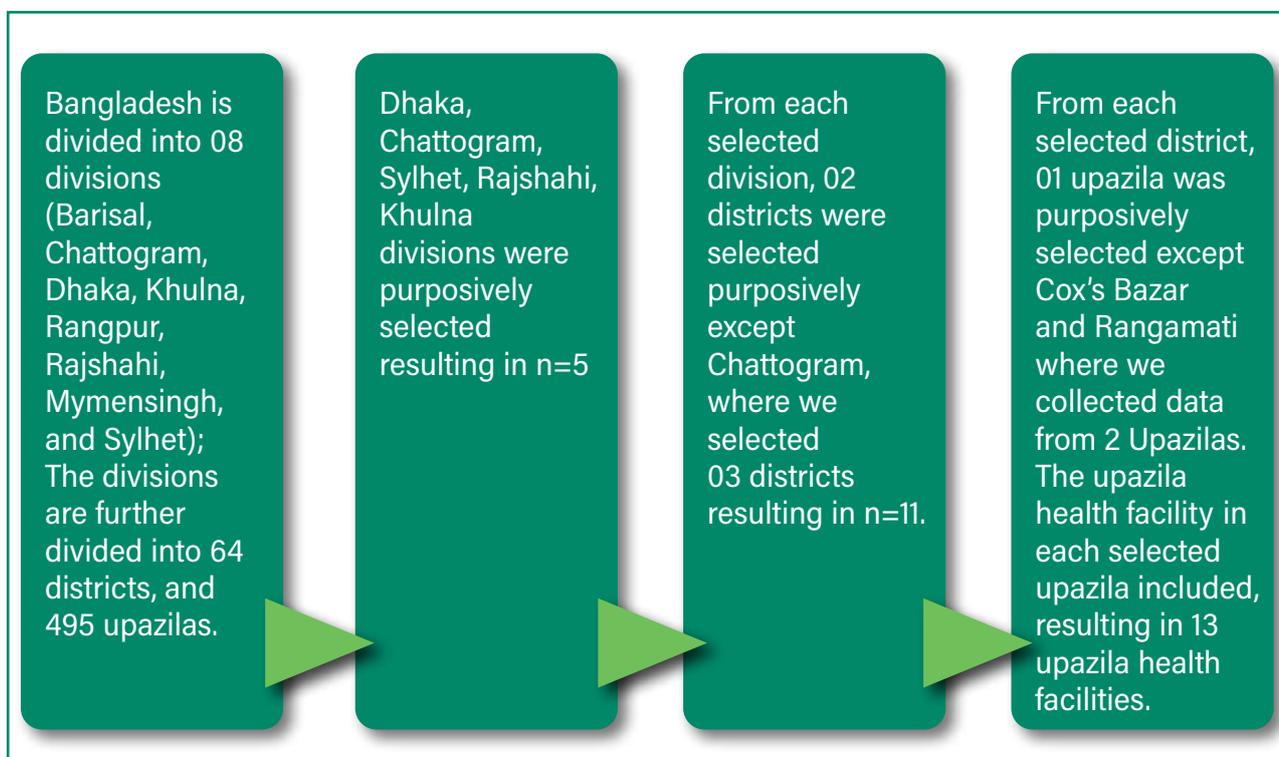
Figure 4. Area selection for field visits in infectious disease surveillance mapping
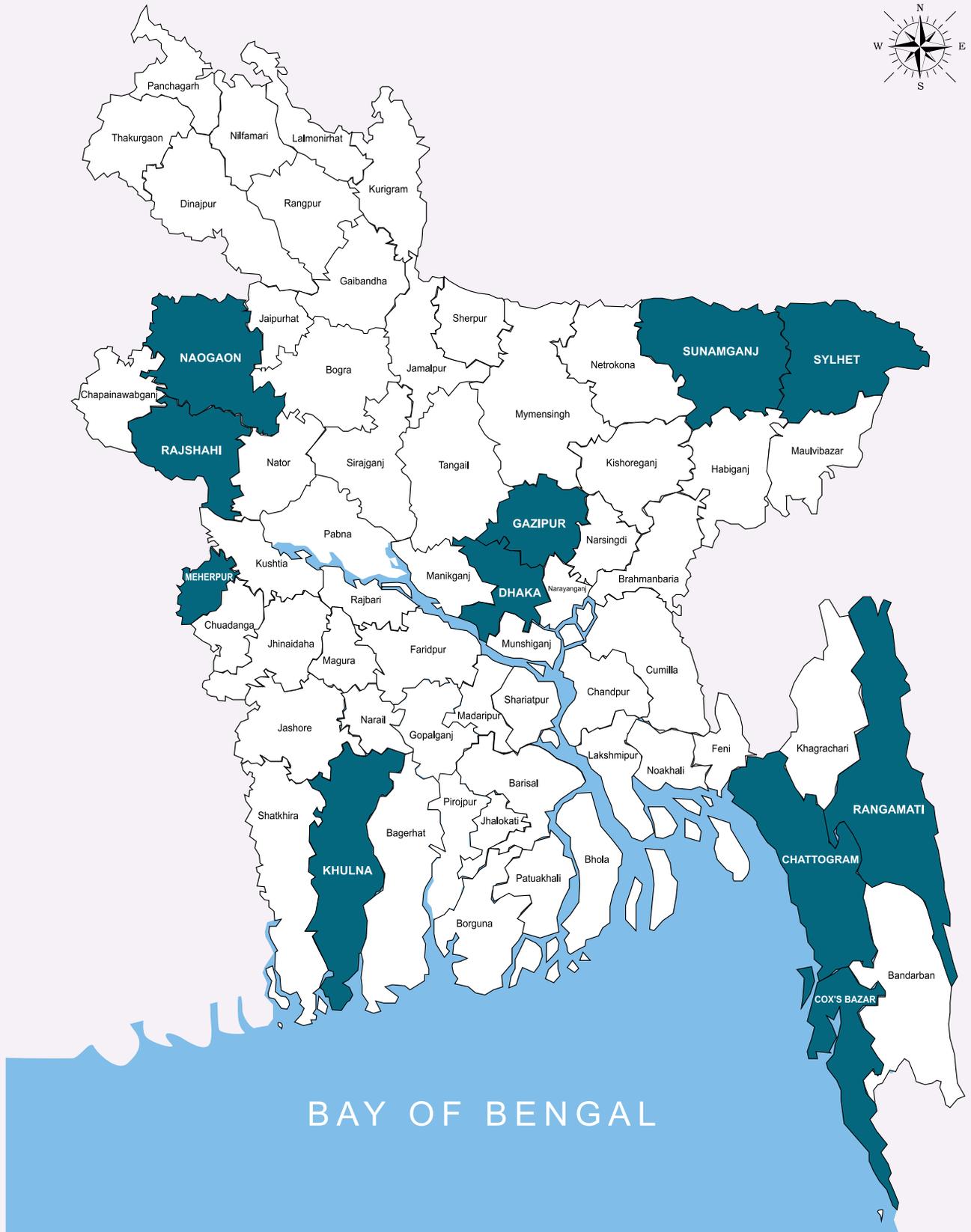
Figure 5. Study sites for the Key Informant Interviews

IV. Study Sites and Data Collection

A total of 74 Key Informant Interviews were conducted across multiple tiers of the health system. To facilitate comprehensive data collection, the project team undertook field visits spanning five divisions—Dhaka, Chattogram, Khulna, Rajshahi, and Sylhet—covering nine strategically selected districts and eleven upazilas. The selected areas were purposively chosen to ensure full representation of the surveillance systems underpinning the identified infectious disease programs, thereby providing a robust mapping of the national surveillance landscape.

At the national level, KIIs included policymakers, program directors, and technical experts from institutions such as MBDC, TBL & ASP, CDC, EPI, MIS under DGHS, IEDCR, IPH, NIPSOM, DGDA, icddr,b, BRAC, CHRF, Damien Foundation, and selected medical college hospitals. Participants held positions ranging from Directors, Line Directors, Program Managers, and Heads of Divisions to focal points for surveillance and disease-specific programs (e.g., TB, Leprosy, AMR, Malaria, etc.). The tool for this level focused on policy, program management, strategic oversight, and coordination of infectious disease surveillance.

Table 2. Number of KIIs conducted across key institutions at the national level for infectious disease surveillance

Institution	No. of KII
Institute of Epidemiology, Disease Control and Research (IEDCR)	9
Management Information System (MIS), DGHS	2
Mycobacterial Disease Control (MBDC) & Tuberculosis-Leprosy and AIDS STD Programme (TBL & ASP), DGHS	3
Disease Control, DGHS	9
Expanded Programme on Immunization (EPI), DGHS	1
National Institute of Preventive and Social Medicine (NIPSOM)	1
Institute of Public Health (IPH)	2
Bangladesh Institute of Tropical and Infectious Diseases (BITID)	1
Directorate General of Drug Administration (DGDA)	1
International Centre for Diarrhoeal Disease Research, Bangladesh (icddr,b)	4
Bangladesh Rural Advancement Committee (BRAC)	2
Child Health Research Foundation (CHRF)	1
Damien Foundation	1
Total	**37**

At the divisional level, interviews were conducted with Directors from the Divisional Director Office (Health) and medical college hospitals to gain insights into local implementation, planning, and coordination of infectious disease surveillance systems.

Table 3. Visited Divisional Director (Health) Offices, Medical College Hospitals & Infectious Disease Hospitals for KIIs

Division	Divisional Office	Medical College Hospital	Infectious Disease Hospital	Number of KIIs
Dhaka		Shaheed Tajuddin Ahmad Medical College Hospital, Gazipur	IDH, Dhaka	2
Chattogram	Divisional Director Office (Health)	Chattogram Medical College Hospital		2
Sylhet	Divisional Director Office (Health)	Sylhet MAG Osmani Medical College Hospital		2
Rajshahi	Divisional Director Office (Health)	Rajshahi Medical College Hospital		2
Khulna	Divisional Director Office (Health)	Khulna Medical College Hospital	IDH, Khulna	3
Total				**11**

At the district and sub-district (upazila) levels, KIIs were conducted with Civil Surgeons to understand local implementation, planning, and coordination of infectious disease programs. Additional interviews were held with Superintendents and Upazila Health & Family Planning Officers (UH&FPOs) at health complexes to examine operational challenges, data reporting, service delivery, and community engagement. The interview tools for both levels emphasized practical aspects of implementation, resource utilization, and the identification of local barriers and facilitators.

Table 4. Visited health facilities for KII at District and Sub-district (Upazila) level.

District	Civil Surgeon Office	General and District Hospital	Upazila Health Complex (UHC)	Number of KIIs
Gazipur	Gazipur		Kaliganj UHC	2
Chattogram	Chattogram	Chattogram General Hospital		2
Rangamati	Rangamati	Rangamati District Hospital	Kaptai UHC	4
			Belaichhari UHC	
Cox's Bazar	Coxs Bazar	Coxs Bazar District Hospital	Ukhiya UHC	4
			Pekua UHC	
Sylhet	Sylhet		Golapganj UHC	2
Sunamganj	Sunamganj		Chhatak UHC	2
Rajshahi	Rajshahi		Paba UHC	2
Naogaon	Naogaon		Manda UHC	2
Khulna	Khulna	Khulna District Hospital	Rupsha UHC	3
Meherpur	Meherpur	Meherpur District Hospital	Gangni UHC	3
Total				**26**

3.7 Data Validation Workshop

Four data validation workshops were conducted. Following the desk review and Key Informant Interviews, draft case reports were prepared for each mapped surveillance system. These drafts were presented in the workshops to key stakeholders and experts from relevant surveillance systems and institutions. The workshops provided a platform to critically review findings, verify accuracy, identify challenges, and discuss actionable way forwards, while integrating practical insights from participants. Feedback from the workshops was systematically documented, and the project team incorporated expert input and addressed comments to revise each surveillance case report. The revised reports were then shared with participants for re-review before finalization.

3.8 Data Triangulation and Analysis

A comprehensive mapping of infectious disease surveillance systems in Bangladesh was developed using a triangulated approach that combined desk review, KIIs, and data validation workshops. First, a desk review was conducted, involving systematic examination of policy documents, research publications, official reports, and other relevant records to outline the structure, operational mechanisms, and key stakeholders of the surveillance systems. Second, semi-structured KIIs were carried out with government officials, technical specialists, program managers, and field-level implementers to provide detailed insights into data flows, coordination mechanisms, and operational challenges, complementing the desk-based mapping.

Further, the team manually reviewed, cleaned, and analyzed the data collected through the desk review and KIIs for each identified surveillance system. Interviews were transcribed and translated into english, using both audio recordings and field notes to accurately capture participants' responses. A predefined set of themes, developed from the initial desk review, guided the analysis. For each interview, a detailed case summary was prepared to highlight key points, contextual information, and illustrative quotes. Data was organized under key themes and subthemes using a structured framework and systematically summarized through a matrix-based approach. To ensure accuracy and minimize bias, multiple team members reviewed the transcripts, translations, and case summaries, resolving discrepancies through discussion. The final findings were grouped to identify common patterns, critical insights, and to preserve participants' original perspectives.

Following the analysis, draft case reports were developed. Case reports were further reviewed by disease surveillance and systems experts from government and non-government organizations during these workshops. Key stakeholders and technical experts verified the accuracy of the findings, addressed gaps, resolved inconsistencies, and provided recommendations. Based on their feedback, each case report was finalized, resulting in a validated mapping of the infectious disease surveillance landscape in Bangladesh. This process involved cross-verifying and integrating findings from multiple data sources to ensure consistency, credibility, and a comprehensive understanding of the current surveillance systems. All collected information was systematically analyzed using this triangulated approach to produce the draft report.
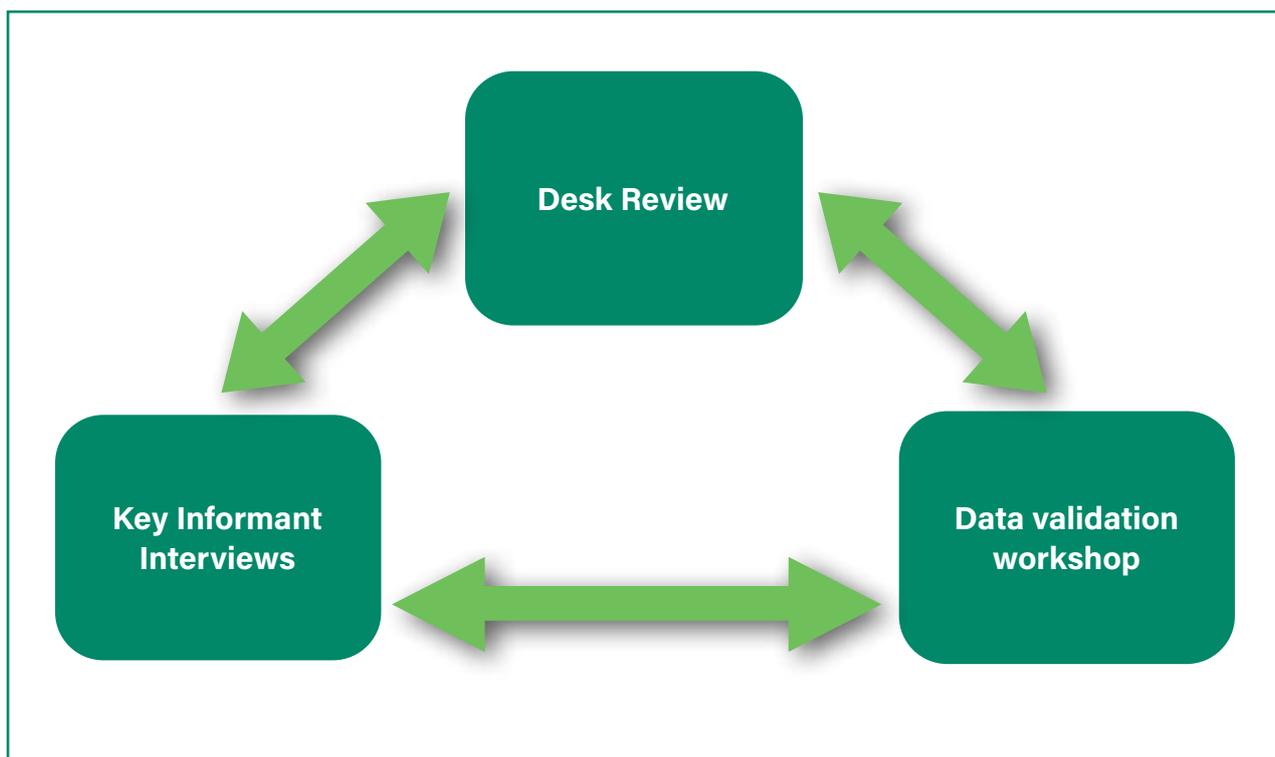
Figure 6. Triangulated approach for mapping infectious disease surveillance systems

3.9 Report Review and Finalization

The drafted report subsequently underwent a thorough review by the TWC and DGHS. During this process, the information, content, and overall structure of the report were carefully examined to ensure accuracy, coherence, and alignment with technical and operational standards. Feedback and recommendations from the review were incorporated, resulting in the finalized report, which presents validated findings and a clear, structured overview of Bangladesh's infectious disease surveillance systems. The report was then officially approved by the DGHS, MoHFW.

3.10 Ethical Consideration

Non-research approval for this mapping was obtained from Johns Hopkins Bloomberg School of Public Health (JHSPH), Baltimore, USA. Since it's a collaborative project, further approval and support for data collection (JHSPH IRB #IRB00029682) were secured in collaboration with the DGHS, and a formal support letter was issued by DGHS. Prior to conducting interviews, the study team obtained verbally informed consent from all participants after clearly explaining the objectives of the study, the voluntary nature of their participation, and the measures taken to ensure confidentiality and anonymity. KIIs were audio-recorded with participant consent. No personal identifiers were collected, and all data were securely stored and used solely for the purposes of this study.

Findings
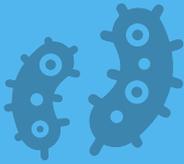
4.1 Findings from Desk Review

4.1.1 Selection of Infectious Disease Surveillance

The review identified priority infectious diseases, related surveillance systems, and sentinel sites. The desk review also identifies public and private organizations involved in the surveillance of sample collection and data sharing from the field to the central level.

According to the Infectious Diseases (Prevention, Control and Elimination) Act, 2018, a total of 32 diseases has been officially recognized as infectious diseases in Bangladesh. These include: Malaria, Kala-azar, Filariasis, Dengue, Influenza, Avian Influenza, Nipah, Anthrax, MERS-CoV, Rabies, Japanese Encephalitis (JE), Diarrhea, Tuberculosis (TB), Respiratory Tract Infections (RTI), HIV, Viral Hepatitis, Acute Flaccid Paralysis (AFP), Measles, Congenital Rubella Syndrome (CRS), Acute Encephalitis Syndrome (AES), Neonatal Tetanus (NT), Diphtheria, Meningitis, Ebola, Zika, Chikungunya, SARS-CoV-2, Leprosy, Cholera, and Enteric Fever. According to US CDC's Updated Guideline for Evaluating Public Health Surveillance Systems, eight key criteria for a range of infectious disease surveillance systems in Bangladesh were identified. The criteria included whether the surveillance system was systematic and ongoing, involved sample collection, incorporated data analysis and interpretation, disseminated findings, focused on human health data, and were directly linked to public health practice. Guided by these standards, and drawing on the review findings, the Technical Working Committee (TWC) of DGHS finalized the list of ongoing infectious disease surveillance activities in Bangladesh for in-depth exploration. Accordingly, we identified the following infectious disease surveillance systems that are currently operational in the country.

Table 5. List of identified infectious disease surveillances by year of establishment

S. N.	Name of Surveillance	Year of surveillance establishment
1	Diarrhoeal Surveillance in Bangladesh	1979
2	Tuberculosis Surveillance System	1993
3	Leprosy Surveillance	1994
4	Vaccine Preventable Disease & AEFI Surveillance System	1995
5	HIV/AIDS Surveillance	1998
6	Enteric Fever Surveillance	1999
7	Dengue Surveillance	2000
8	Filariasis Surveillance	2001
9	Nipah Virus (NiV) Surveillance	2006
10	Epidemiological Surveillance in Malaria Elimination Program	2007
11	Influenza Surveillance Systems in Bangladesh	2007
12	Kala-azar surveillance system	2008
13	Rabies Case Surveillance (Human)	2010
14	Antimicrobial Resistance (AMR) surveillance	2016
15	Anthrax surveillance	2019

Table 6. List of organizations involved in the implementation of the infectious surveillance systems in Bangladesh

S. N.	Name of Surveillance	Government	Non-government/ Autonomous	Development Partner
1	Diarrhoeal Surveillance	Disease Control, CDC Hospitals and Clinics UHC and CBHC DPHE IEDCR IPH City Corporation Municipalities	icddr,b	WHO UNICEF IFRC BMGF
1.1	Acute Watery Diarrhea Surveillance			
1.2	National Cholera Surveillance			
1.3	Hospital-based cholera surveillance			
1.4	Hospital Based Rotavirus and Intussusception surveillance (HBRIS)			
2	Tuberculosis Surveillance System	MBDC Medical College Hospital Civil Surgeon Office Upazila Health Complex	BRAC icddr,b RDRS Damien Foundation Heed Bangladesh	The Global Fund
3	Leprosy Surveillance	MBDC Divisional Director (Health) Office Medical College Hospital Civil Surgeon Office Upazila Health Complex	The Leprosy Mission Lepra Bangladesh Damien Foundation	USAID
4	Vaccine Preventable Disease & AEFI Surveillance System	EPI MIS NPML-IPL IEDCR		WHO
5	Hospital-based surveillance for Japanese Encephalitis	IEDCR EPI	icddr,b	Gavi WHO US CDC CEPI
6	HIV/AIDS Surveillance	IEDCR Several Ministries (e.g., MoHFW and MSW)	BMU icddr,b BRAC Save the Children	WHO
7	Enteric Fever Surveillance	-	CHRF	The Global Fund
8	Dengue Surveillance	DGHS City Corporations Local Government Bodies	icddr,b BRAC	WHO Sabin Vaccine Institute
9	Filariasis Surveillance	CDC, Disease Control IEDCR Filariasis Hospital, Nilphamari	icddr,b CIPRB	WHO The World Bank BDRCS IFRC US CDC

10	Nipah virus (NiV) Surveillance	IEDCR Selected Medical College Hospital	icddr,b	WHO Liverpool School of Tropical Medicine Research Triangle Institute US CDC
11	Epidemiological Surveillance in Malaria Elimination Program	CDC, Disease Control Divisional Director (Health) Office Medical College Hospital (Chattogram, Cox bazar, Sylhet, Mymensingh) Civil Surgeon Office UHC	BRAC Mukti ACLAB N.Z. Ekata Mohila Samiti, etc.	US CDC CEPI
12	Influenza Surveillance Systems in Bangladesh	IEDCR DGHS Sentinel Site Hospitals	icddr,b	The Global Fund WHO
12.1	National Influenza Surveillance Bangladesh (NISB)			
12.2	Hospital Based Influenza Surveillance (HBIS)			
12.3	National SARS-CoV 2 Genomic Variant Surveillance in Bangladesh (NGSB)			
12.4	National Respiratory Pathogen Genomic Surveillance (NRPGS)			
12.5	Respiratory Event-Based Surveillance			
13	Kala-Azar Surveillance System	CDC, Disease Control	BMU icddr,b	WHO
14	Rabies Surveillance (Human)	DLS Local Government	AWO	WHO FAO US CDC WVS
15	Antimicrobial Resistance (AMR) surveillance	DGHS IEDCR DGDA DLS BLRI Selected Health Facilities	Selected Health Facilities and Diagnostic Centers	US CDC WHO Fleming Fund
16	Anthrax surveillance	IEDCR	-	US CDC

4.2 Findings from Data Triangulation

4.2 .1 Diarrhoeal Surveillance

Brief History

In 1979, the International Centre for Diarrhoeal Disease Research, Bangladesh (icddr,b) established the Diarrhoeal Disease Surveillance System (DDSS) at its Dhaka Hospital to systematically monitor the country's diarrhoeal disease burden. Originally sampling 4% of over 100,000 patients treated annually, the system now conducts a 2% systematic surveillance, enrolling every 50th patient and known as icddr,b 2% diarrhoeal disease surveillance [50].

The National Cholera Surveillance system was introduced in 2014 through a collaboration between IEDCR and icddr,b. This sentinel surveillance system was designed to generate laboratory-confirmed data on *Vibrio cholerae*, support cholera burden estimation, and guide cholera control strategies including oral cholera vaccine (OCV) deployment. The system covers 12 sentinel sites under standard surveillance and 4 enhanced surveillance sites, collecting stool samples from patients with acute watery diarrhea, and sending them to IEDCR and icddr,b laboratories under cold chain conditions. The National Cholera Control Plan has been developed by CDC, DGHS under MoHFW with a goal to reduce 90% deaths in cholera by 2030. Among the six strategic approaches, sustainable cholera surveillance system is the first approach. Other strategies are implied to case management, oral cholera vaccination, imported WASH services, community awareness through engagement in the multisectoral approach.

On the other hand, launched in 2016, the Hospital-Based Cholera Surveillance was developed to complement the National Cholera Surveillance system by capturing hospitalized cholera cases in high-burden urban and peri-urban settings. Operated in selected tertiary care facilities, it provides detailed epidemiological and clinical data, contributing to cholera vaccine impact assessments, refinement of disease burden estimates, and spatial mapping of transmission risk. This system also supports research and policy formulation regarding targeted vaccination and outbreak preparedness.

The Acute Watery Diarrhea (AWD) Surveillance system was one of the earliest national surveillance efforts, initiated by icddr,b to monitor diarrhea disease in Dhaka. Implemented across Upazila Health Complexes (UHCs), district hospitals, and medical college hospitals, the system relies on clinical diagnosis mostly without laboratory confirmation (Culture sensitivity). With the advancement of digital health infrastructure, AWD surveillance was integrated into the District Health Information System 2 (DHIS2), facilitating daily reporting and improved outbreak detection at the facility level under the observation of CDC, DGHS. In 2012, IEDCR and icddr,b jointly initiated the Hospital-Based Rotavirus and Intussusception Surveillance (HBRIS) with technical assistance from the US-CDC. In 2019, with support from the WHO, IEDCR fully took over HBRIS, integrating it into the national surveillance system. However, it is important to mention that the rotavirus vaccine is yet to be introduced in Bangladesh.

Type and Structure of Surveillance

icddr,b 2% Diarrhoeal Disease Surveillance System (DDSS)

This is a facility-based sentinel surveillance system conducted at icddr,b Dhaka Hospital. It involves systematic sampling of every 50th diarrhoeal patient (approximately 2%) throughout the year. The surveillance collects clinical, microbiological, and socioeconomic data to monitor pathogen trends, antimicrobial resistance, and disease patterns over time.

Nationwide Cholera Surveillance(NCS)

This is a nationwide sentinel surveillance system implemented through a network of sentinel hospitals across Bangladesh. It is designed to monitor cholera cases, detect potential outbreaks, and generate evidence to inform national cholera control and elimination strategies. Laboratory confirmation of Vibrio cholerae is a key component of this surveillance system, ensuring accurate diagnosis and response planning.

Acute Watery Diarrhoea Surveillance (AWDS)

This is a sentinel-based outbreak detection surveillance system operating in high-risk, cholera-prone regions. It focuses on the early identification of acute watery diarrhea outbreaks, particularly cholera, through rapid case detection, prompt laboratory confirmation, and immediate reporting. Daily reporting is done from all health facilities throughout Bangladesh. Daily monitoring helps to understand the trend. If number of diarrhea patients is increasing in a particular region, there is a possibility of outbreak. Therefore, close monitoring is needed in such areas. This approach enables timely public health responses to control and prevent the spread of outbreaks.

Hospital-Based Rotavirus and Intussusception Surveillance (HBRIS)

This hospital-based sentinel surveillance system is conducted in selected tertiary hospitals and focuses on monitoring rotavirus diarrhoea among children under five years of age. Additionally, it tracks intussusception cases to assess disease severity, inform vaccine policy decisions, and evaluate the impact of related public health interventions.

Web-Based Disease Surveillance System (WBDSS)

This is a web-based real-time surveillance and outbreak alert system operating as a digital platform that facilitates real-time data entry, reporting, and analysis of diarrhoeal disease cases from icddr,b surveillance sites. It is designed to enhance early outbreak detection and response capacity by enabling rapid information sharing among stakeholders.

Surveillance Objectives

Table 7. Objective of the Diarrhoeal surveillance

Surveillance System	Objective
icddr,b 2% Diarrhoeal Disease Surveillance (DDSS)	• Monitor long-term pathogen trends, identify AMR, and analyze socio-economic data related to diarrhoeal illness.
Nationwide Cholera Surveillance	• Surveillance on enteric infections including cholera in 22 sentinel sites of the country jointly by IEDCR & icddr,b covering all administration divisions. • Investigations of reported suspected cholera outbreaks by IEDCR. • Establish a laboratory-based surveillance system to report culture-confirmed cholera cases. Also, epidemiological data are collected to detect early outbreaks. • Document co-morbidities and patterns of healthcare utilization among affected populations. • Estimate the national burden of cholera in Bangladesh. • Develop and expand a nationwide cholera surveillance system across different levels of health facilities, from Upazila to district and tertiary levels.

Hospital-Based Cholera Surveillance	• Conduct systematic clinical surveillance for cholera at sentinel sites covering populations in intervention areas i.e., Hotspots. under the NCCP, as well as high-risk areas with limited surveillance. • Collaborate with Disease control, DGHS to develop a national strategy for the use of rapid diagnostic tests (RDTs) to extend cholera surveillance beyond sentinel sites and support outbreak response. • Utilize surveillance data to help the Government of Bangladesh prioritize the use of oral cholera vaccine (OCV) in both routine and outbreak settings.
Acute Watery Diarrhea (AWD) Surveillance	• Monitor incidence and geographic distribution of AWD cases, including cholera. • Detect outbreaks early to enable timely public health interventions. • Characterize clinical and demographic features of cases. • Support evidence-based planning and response. • Strengthen national capacity for disease surveillance and epidemic preparedness.
Hospital-Based Rotavirus and Intussusception Surveillance (HBRIS)	• Describe the frequency of rotavirus-associated hospitalizations. • Identify the circulating strains among children less than 5 years of age. • Estimate the frequency of intussusception-related hospitalizations among children less than 2 years of age across the country. Currently the intussusception surveillance is running for collecting baseline data.
Web-Based Disease Surveillance System (WBDSS)	• Facilitate real-time data reporting and early outbreak alerts using digital tools.

Population and Geographic Coverage

The Acute Watery Diarrhoea (AWD) Surveillance system captures data from all patients presenting with three or more loose or watery stools within a 24-hour period. This surveillance is operational across all tiers of the public health system, including emergency units (ORT corners), indoors, and outpatient departments. It is implemented at approximately 429 Upazila Health Complexes (UHCs), covering every sub-district in the country, along with 61 district and Sadar hospitals, and several medical college hospitals. This ensures comprehensive nationwide coverage for early detection of AWD outbreaks and routine disease monitoring.

The Hospital-Based Rotavirus and Intussusception Surveillance (HBRIS) focus on children under five years of age presenting with acute gastroenteritis, and children under two years for intussusception surveillance. Currently, it is active in seven tertiary-level hospitals located in different regions:

Table 8. List of HBRIS sentinel sites

Name of Hospitals	District
Rajshahi Medical College Hospital	Rajshahi
Jahurul Islam Medical College Hospital	Kishoreganj
Jalalabad Ragib Rabeya Medical College & Hospital	Sylhet
Jashore General Hospital	Jashore
Sher-e-Bangla Medical College Hospital	Barisal
Rangpur Medical College Hospital	Rangpur
Chattogram Medical College Hospital	Chattogram

This system plays a key role in documenting the burden of rotavirus-related hospitalizations, identifying circulating strains and monitoring intussusception cases.

The Nationwide Cholera Surveillance/ Hospital-Based Cholera Surveillance is a hospital-based sentinel surveillance system initiated in 2014 by icddr,b with collaboration of IEDCR. It expanded to 22 sites by 2016 and, due to funding constraints, has been operating with 16 sites since 2022. This system targets patients attending hospitals with three or more episodes of loose or liquid stools within 24 hours, or fewer than three episodes that result in dehydration. Among the 16 operational sites, four are designated as enhanced surveillance sites, while the remaining 12 function as standard sites. The surveillance is critical for estimating national cholera burden, tracking seasonal and geographic patterns, and informing targeted public health interventions, including the deployment of oral cholera vaccines.

Table 9. List of surveillance sites for nationwide Cholera surveillance

Sl.	Site Name	Sites
1	Dhaka Medical College Hospital (DMCH)	Dhaka
2	Uttara Adhunik Medical College Hospital	Dhaka
3	Narayanganj General (Victoria) Hospital	Narayanganj
4	Cumilla Medical College Hospital	Cumilla
5	Tangail General Hospital	Tangail
6	Bangladesh Institute of Tropical and Infectious Diseases (BITID)	Chattogram
7	Cox's Bazar District Sadar Hospital	Cox's Bazar
8	Habiganj Sadar Hospital	Habiganj
9	Patuakhali General Hospital	Patuakhali
10	Mathbariya Upazila Health Complex	Pirojpur
11	Bakerganj Upazila Health Complex	Barisal
12	Chhatak Upazila Health Complex	Sunamganj
13	Chuadanga Sadar Hospital	Chuadanga
14	Meherpur District Hospital	Meherpur
15	Naogaon District Hospital	Naogaon
16	Satkhira District Sadar Hospital	Satkhira

Funding Agencies (excluding government) and Their Role

Table 10. Funding agencies and their role in Diarrhoeal surveillance

Funding Agency	Surveillance name	Use of fund
WHO	HBRIS, NCS	Technical assistance, training, quality assurance, outbreak support
UNICEF	AWD	Support for WASH promotion, child health components, equipment
IFRC	AWD	Emergency response during outbreaks, community-level awareness
GATES Foundation	HBRIS	Rotavirus surveillance and vaccine introduction preparedness

Multi-sectoral collaboration strengthens diarrhoeal disease surveillance and outbreak control in Bangladesh. The government provides core funding and data integration; WHO offers technical support and training; UNICEF supports WASH and child health; IFRC leads emergency response and community awareness; and the GATES Foundation focuses on rotavirus surveillance and vaccine readiness.

Governance and Stakeholder Role

Table 11. Governance and stakeholder with their role in Diarrhoeal surveillance

Stakeholder name	Name of surveillance	Role of stakeholder
Disease Control & CDC, DGHS	All	Policy oversight, coordination, resource allocation, guideline development
IEDCR, DGHS	NCS, HBRIS, AWDS	National coordination, outbreak investigation, lab testing, data analysis
MIS, DGHS	AWD, DHIS2 reporting	Data storage, system maintenance, dashboard management
Hospitals and Clinics, DGHS	All facility-based	Supervision of surveillance implementation at hospitals
CBHC and UHC, DGHS	AWD	Data entry and early outbreak notification from primary health care facilities
IPH	HBRIS	Technical support, lab infrastructure (if engaged)
icddr,b	NCS, DDSS, HBRIS	Technical support, lab testing, training, data analysis, research
DPHE	AWD (indirectly)	Water quality monitoring and environmental risk linkage
City corporation and municipalities	NCS, AWD	Support outbreak response, public health measures (sanitation, awareness, WASH promotion)

A diverse range of stakeholders contribute to diarrhoeal disease surveillance in Bangladesh. The Disease Control and CDC at DGHS provide policy oversight and coordination, while IEDCR leads national coordination, outbreak investigation, and laboratory testing. The MIS, DGHS manages data storage and reporting systems. Directors of hospitals supervise surveillance implementation at facility level, with CBHC and UHC handling data entry and early notifications from primary care. IPH and icddr,b offers technical support, laboratory services, training, and research. DPHE contributes through water quality monitoring, linking environmental risks to surveillance data. City corporations and municipalities support outbreak responses by promoting sanitation, awareness, and WASH activities. This multi-sectoral collaboration enhances the surveillance system's capacity for timely detection and control of diarrhoeal diseases.

Sample Collection and Testing Protocol

Acute Watery Diarrhea (AWD) Surveillance

- **Sample Collection & Testing**
  - No laboratory samples collected.
  - Diagnosis based on clinical evaluation by doctors at all health facilities.

Hospital-Based Rotavirus and Intussusception Surveillance (HBRIS)

- **Sample Collection**

  At each hospital, Surveillance Field Assistants identified children 5 years of age and younger admitted to pediatric wards with Diarrhoea by reviewing admission logbooks and screened them for acute gastroenteritis (AGE) symptoms. AGE was defined as the occurrence of ≥3 watery or looser-than-normal stools and/ or ≥1 episode of forceful vomiting within a 24-hour period, with symptoms lasting ≤7 days. Surveillance physicians enrolled every 4th child listed who met the surveillance case definition. Field Assistants collect stool specimens (approximately 4 mL) from each child on the day of enrollment and immediately stored specimens in a –70°C liquid nitrogen dry shipper after collection.

- **Sample Transport**

  The study team ships stool samples in these containers to the virology laboratory, IEDCR, Dhaka biweekly.

- **Testing**

  In Virology laboratory, IEDCR, a commercially available enzyme-linked immunoassay (EIA) is used to test Group A Rotavirus antigen. At IEDCR, stool samples were stored at –70°C. Every 3 months, G and P genotyping of ~25% of rotavirus-positive specimens were done using methods described previously. EIA, genotyping and sequencing have been done at IEDCR virology laboratory in Dhaka.

Nationwide Cholera Surveillance/ Hospital-Based Cholera Surveillance

- **Sample Collection**
  - Standard Surveillance: at 12 sentinel sites, per day 4 samples, total 20 stool samples are collected weekly from patients presenting with acute watery diarrhea.
  - Enhanced Surveillance: all potential stool samples from acute watery diarrhea patients are collected at four sentinel sites.
- **Sample Transport**
  - Sample is collected by trained field attendants with the help of nurses.
  - Stored in Cary-Blair transport media.
  - Sample is sent weekly or biweekly to Dhaka, in a cold box, at 2-8° centigrade.
- **Testing**
  - Cholera tests are done only in IEDCR and icddr,b lab.

Data Flow and Reporting Mechanism

Acute watery Diarrhea Surveillance

- UHC: Daily data uploaded to DHIS2 by statistician.
- District Hospital: Daily electronic data input into DHIS2 by statistician and sent to CS office by mail.
- Medical College Hospital: Tertiary Level hospitals similarly provide data on DHIS2 daily.
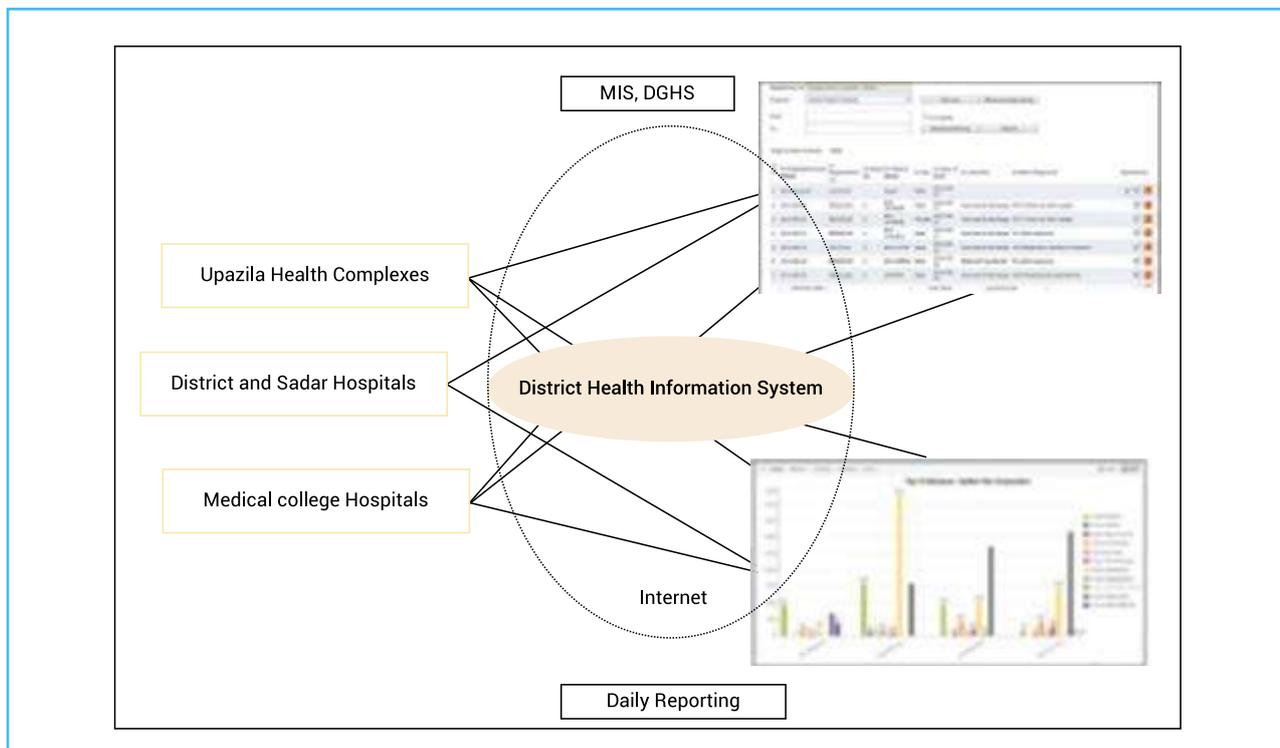
Figure 7. Data flow and reporting in Diarrhea surveillance system

Source: *Diarrhea reporting in Bangladesh, icddr,b, 2020*

Hospital Based Rotavirus and Intussusception Surveillance (HBRIS)

Surveillance physicians collect demographic and clinical information of enrolled children from the parents/guardians and hospital records using a standard questionnaire and assessed the clinical status/ dehydration following clinical criteria in WHO diarrhea treatment guidelines.

Nationwide Cholera Surveillance

Trained field attendants directly enter case data into a designated digital tab at the surveillance sites, ensuring real-time data collection. icddr,b compiles and submits a consolidated surveillance report to IEDCR every three months for national-level analysis. At the medical college hospitals, daily data entry is performed digitally by a senior staff nurse or a statistician.

Data interoperability, Analysis and Visualization

Acute Watery Diarrhea (AWD) Surveillance

Initial data analysis is conducted by statisticians at the Upazila level. Findings are presented through slide-based presentations during monthly review meetings and shared at the Civil Surgeon's (CS) monthly coordination meetings. At the district level, the CS office has a dedicated data analysis team led by the Medical Officer and a statistician. Final data consolidation and analysis are carried out by the MIS, DGHS.

Hospital-Based Rotavirus and Intussusception Surveillance (HBRIS)

Data from HBRIS is processed and visualized through the official website of IEDCR (www.iedcr.gov.bd/surveillance/HBRIS), making it accessible for stakeholders, surveillance site team and the public.

Nationwide Cholera Surveillance

icddr,b compiles monthly reports and disseminates them via email to key stakeholders, including CDC, Disease Control, IEDCR, WHO, and IFRC. Visual representation of the data is also made available on the IEDCR website, facilitating transparency and timely access to information for surveillance and response planning.

Use of Surveillance Data

Data generated through Acute Watery Diarrhea (AWD) Surveillance, Hospital-Based Rotavirus and Intussusception Surveillance (HBRIS), and Nationwide Cholera Surveillance is utilized to inform public health decisions and actions. AWD surveillance data is regularly analyzed and discussed during monthly meetings at both upazila and district levels, guiding local planning, resource allocation and triggered localized outbreak response. HBRIS data supports national immunization strategies by tracking hospitalization patterns and identifying shifts in rotavirus strain diversity following vaccine introduction. Data from this surveillance also supports rotavirus vaccine roadmap. Cholera surveillance data, which is routinely shared with key stakeholders, plays a central role in estimating disease burden, planning outbreak responses, informs OCV campaigns, hotspot identification and guiding the deployment of OCV in high-risk areas. Additionally, the surveillance systems contribute to the development of treatment guidelines, help identify service delivery gaps, and support operational research initiatives led by institutions such as icddr,b. Overall, the data serves as a vital tool for evidence-based planning, timely intervention, and strengthening public health systems at both national and sub-national levels.

Data Protection and Privacy

All diarrhoeal disease surveillance activities adhere to established national and international data protection guidelines to ensure the confidentiality and security of collected information. Personal identifiers are anonymized during data entry and analysis, and all records are stored in secured databases with restricted access. Data access rights are clearly defined—only authorized personnel, such as designated statisticians, surveillance officers, and relevant institutional staff, are permitted to view or use the data for analysis and reporting purposes.

Challenges

- Culture sensitivity testing facility is not available at sub-national level, such as divisional and district levels, hindering the generation of reliable microbiological data critical for surveillance and clinical decision-making.
- Surveillance data entry is often managed by existing staff with multiple responsibilities, leading to delays and potential inaccuracies in data reporting and management.
- Lack of quality surveillance data. For example, gaps in real-time data collection and entry hinder timely, evidence-based decision-making.
- Inadequate human resources, shortage of skilled personnel, and limited availability of essential logistics (e.g., IT infrastructure, specimen transport, data tools) affect the smooth operation of surveillance activities.
- Absence of sustainable budget allocation poses a significant threat to the long-term viability of the system.
- Limited inter-sectoral coordination and stakeholder accountability at the sub-national level, especially between health and WASH authorities.

Way Forward

- Establish public health laboratories at divisional and tertiary levels to strengthen nationwide surveillance capacity.
- Ensure adequate and sustained budget allocation to support long-term surveillance activities.
- Develop and implement a data quality assurance mechanism to enhance the reliability and usability of surveillance data.
- Strengthening community-level reporting via CHWs and local NGOs.
- Developing an integrated national Diarrhoeal disease surveillance dashboard integrating data from DHIS2, WBDSS, and lab networks.
- Strengthening capacity for analysis at decentralized level and regular feedback to the reporting units.

4.2.2 Tuberculosis Surveillance System

Brief History

Tuberculosis (TB), caused by *Mycobacterium Tuberculosis*, remains one of the world's deadliest infectious diseases. Bangladesh ranks 14th among 30 high TB burden countries and 7th for multidrug-resistant TB (MDR-TB), with an estimated incidence of 221 cases and 24 deaths per 100,000 population, according to the WHO Global Tuberculosis Report 2020 [51]. Despite significant progress, such as maintaining over 90% treatment success rates (TSR) for drug-susceptible TB (DS-TB), 81% treatment coverage in 2019, and reduced mortality among TB/HIV-negative patients, an estimated 70,000 TB cases remain undetected each year. Furthermore, only about 40% of drug-resistant TB (DR-TB) cases are enrolled in appropriate treatment programs. To address these gaps, the National TB Control Program (NTP) developed the National Strategic Plan (NSP) 2021–2025, aiming to reduce TB deaths by 75% and incidence by 50% by 2025.

The TB surveillance system, which formally initiated in 1993, with the establishment of the NTP under the DGHS, supports these efforts [51]. Previously reliant on paper-based reporting, the system now uses DHIS2, an electronic platform for quarterly aggregate reporting. Additionally, e-TB Manager, a case-based digital tool, tracks individual patients and facilitates comprehensive monitoring. Currently, Bangladesh has 858 TB reporting units and 1,135 diagnostic centers. Among the TB reporting units, 764 units report data via e-TB Manager, and 378 are linked to the central DHIS2 database through Tuberculosis and Leprosy Control Assistants (TLCAs).

NTP launched; DOTS strategy adopted	Nationwide implementation of DOTS began	Standardized paper-based TB recording and reporting formats introduced	Introduction of e-TB Manager for case-based surveillance	DHIS2 adopted for aggregate TB data reporting	Expansion of digital systems; wider integration of e-TB Manager and DHIS2 across reporting units
1993	1996	2002	2011	2015	2025 - Now
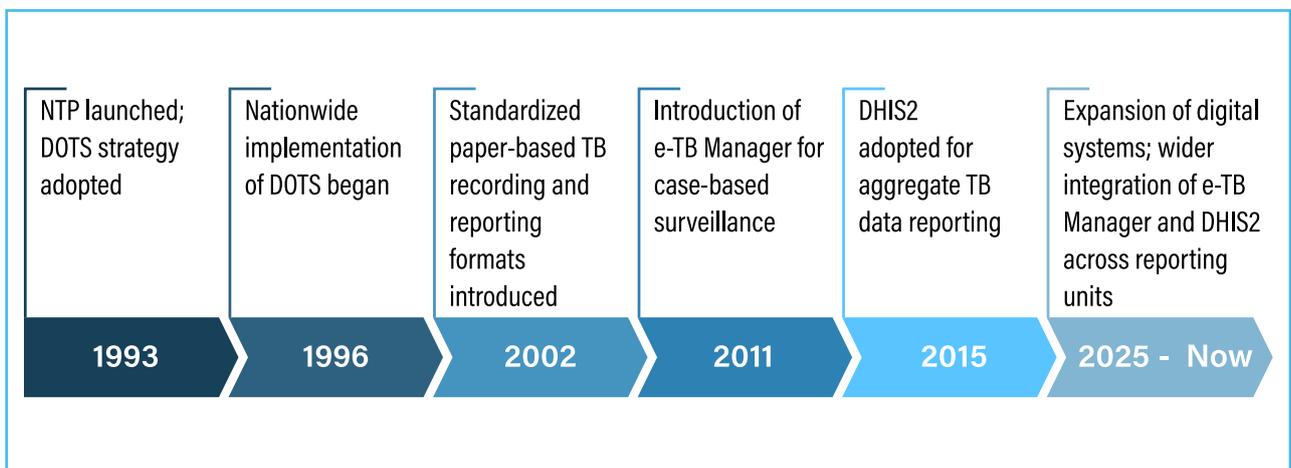
Figure 8. Timeline of TB Surveillance in Bangladesh

Type and Structure of Surveillance

- **Type:** Both active and passive surveillance approaches are employed in the tuberculosis (TB) surveillance system in Bangladesh. Active case finding is conducted through community-based outreach and at the facility level, where health workers proactively screen and identify suspected TB cases, even among individuals who may not seek care themselves. In contrast, passive case finding relies on patients presenting with symptoms at health facilities. A specific form of passive surveillance is the Public–Private Mix (PPM) approach, which includes systematic screening of patients attending outpatient departments (OPDs) in both public and private healthcare settings. This dual surveillance model enhances case detection, ensures early diagnosis, and contributes to timely treatment and improved disease control outcomes.

- **Structure:**
  - The tuberculosis (TB) surveillance system in Bangladesh collects a range of data, primarily focused on both demographic and clinical information. Key demographic details include name, age, sex, and address, while clinical information encompasses symptoms (e.g., history of cough, duration, weight loss), laboratory test results, X-ray findings, and, in some instances, referral source and sample origin (e.g., outdoor, indoor, emergency, or community level). In Bangladesh, tuberculosis surveillance involves multiple levels of care. At the community level, health workers, including those from NGOs like BRAC, identify and refer individuals with TB symptoms to health facilities. Health facilities, such as UHC and district hospitals, diagnose TB using tools like sputum smear microscopy and GeneXpert, and report confirmed cases to the National TB Program (NTP). The private sector is also engaged through initiatives that encourage private providers to report diagnosed cases to the national surveillance system.

  - Data is initially recorded in TB registers and laboratory register books (locally referred to as khata) at health facilities, such as Upazila Health Complexes (UHCs). For confirmed positive cases, data is uploaded to the e-TB Manager system. The primary responsibility for entering individual case data into the e-TB Manager rests with the Tuberculosis Leprosy Control Assistants (TLCAs), who ensure regular updates to the system. In laboratories equipped with GeneXpert machines, the ASPECT software is used for automated data capture and has direct integration with the DHIS-2 platform, allowing test results to be transmitted in real time. In addition, a statistician at the UHC compiles and uploads monthly and quarterly reports to the DHIS-2 system.

  - From the DOTS corners or UHC level, data is entered into the e-TB Manager, and a hard copy of the monthly report, signed by the Upazila Health and Family Planning Officer (UH&FPO), is submitted to the Civil Surgeon's (CS) office.

Surveillance Objectives

- **Overall Objective:** To eliminate TB as a public health problem in Bangladesh by 2035.
- **Specific Objectives:**
  - Ensuring universal access to high-quality TB diagnosis and treatment.
  - Reducing TB incidence, prevalence, and mortality.
  - Strengthening the health system to support sustainable TB control and elimination efforts.
  - Addressing the challenges of multidrug-resistant TB (MDR-TB) and TB-HIV co-infection.

Population and Geographic Coverage

Nationwide, all age groups are included in the surveillance system. For childhood tuberculosis, no separate surveillance done. Information of all age groups are uploaded on eTB manager which is linked to DHIS-2. On DHIS-2, data of different age group can be categorized to perform separate analysis.

Funding Agencies (excluding government) and Their Role

Table 12. Funding agencies and their role in TB surveillance

Funding Agency	Their role
The Global Fund	Providing financial and technical support for infectious disease surveillance. Its contributions include strengthening laboratory infrastructure and capacity, supporting human resources, and offering software assistance to enhance the effectiveness and efficiency of surveillance systems.
USAID	Financial and technical support.

Governance and Stakeholder Role

Table 13. Governance and stockholder with their role in TB surveillance

Stakeholder	Role
MBDC	Lead institution, which supports National Tuberculosis control Program (NTP). Their roles are supervising and monitoring the central surveillance team; Coordination with field team; Attending meetings on a regular basis; Guiding the central surveillance team; Logistics including medicine
Medical College Hospital	a. Diagnosis and management of complicated TB cases b. Multi-specialty support for TB patients with comorbidities c. Maintain TB registers and enter patient data into e-TB Manager
Civil Surgeon Office	a. District-level coordination and supervision b. Conduct coordination meetings c. Monitoring and supervision

Upazila Health Complex	a. Case detection and diagnosis
	  1. Identify presumptive TB cases from outpatient and inpatient departments
	  2. Perform diagnostic tests
	  3. Ensure timely collection and transport of sputum samples
	b. Treatment initiation and monitoring
	  1. Start DOTS (Directly Observed Treatment Short course) for confirmed TB cases
	  2. Monitor treatment adherence and outcomes
	  3. Manage side effect
	c. Data recording and reporting
	  1. Maintain standard TB registers
	  2. Enter and update data in e-TB Manager or send paper-based reports to district
	  3. Submit monthly/quarterly reports to Civil Surgeon and NTP
	d. Coordination with partners
	  1. Work with NGOs (e.g. BRAC), private providers, and labs for case referral and community support
	  2. Participate in joint planning, supervision, and monthly TB review meetings
	e. Contact investigation and preventive therapy
	  1. Conduct contact investigation of infectious TB patients
	  2. Screen household contacts and children for TB and TB Preventive Therapy (TPT) eligibility
	f. Ensure availability of TB drugs, diagnostics kits, and lab supplies
	g. Supervision and quality assurance by conducting field visits and reviewing BRAC and community-based surveillance activities

Roles of NGOs

Table 14. Implementing organizations in TB surveillance

BRAC icddr,b RDRS Damien Foundation Heed Bangladesh	a. Case detection & referral • Conducts community-based TB screening using Shasthya Shebika (SS) and Community Health Worker (CHW) • Identifies presumptive TB cases during household visits • Refers suspected cases to UHC b. Data recording & reporting to UHC c. Coordination with government d. Training & capacity building • Trains Shasthya Shebikas, CHWs, and field staff on TB surveillance, contact investigation, and infection control • Supports government in joint training programs for facility-level staff and lab technicians

Sample Collection and Testing Protocol

- **Types of specimens collected:** Sputum, extrapulmonary specimen
  - Community based: Government (HI, AHI, HA) and NGO staff (e.g., BRAC) help to collect sample from the community
  - Facility based: Samples are collected by MT-Lab

- **Protocols followed:** National SOPs [https://www.ntp.gov.bd/guidelines/]

- **Laboratory testing:** In the tuberculosis surveillance system, specimen collection is primarily conducted at Upazila Health Complexes (UHCs) or on other facility (e.g., medical college hospital). Testing is carried out at the corresponding laboratory facilities. MT-Lab (Medical Technologist–Laboratory) is responsible for collecting, testing the samples and providing laboratory reports.

In cases where TB cases are identified through community-based case finding, sputum is directly collected from patients in the community, often with the assistance of government Health Assistants or staff from supporting NGOs (BRAC). In some instances, suspected individuals are referred to the nearest UHC or healthcare facility for both diagnosis and sample collection.

For diagnostic purposes, abnormal digital CXR followed by molecular testing/ microscopy (where molecular tests are not available). When a case is confirmed positive, contact investigation is conducted around the patient's residence to identify presumptive cases and preventive therapy. This includes screening of all age groups, as well as individuals attending the outpatient departments (OPDs) of hospitals.

Data Flow and Reporting Mechanism

The TB surveillance system in Bangladesh has both the paper- and electronic-based systems for data collection and reporting, depending on the level of service delivery. At the community level, data is collected manually using hard copy registers by five categories of government-employed community health worker groups operate: (i) Community Health Care Providers (CHCPs), (ii) Family Welfare Assistants (FWAs), (iii) Health Assistants (HAs), (iv) Assistant Health Inspectors (AHIs), and (v) Health Inspectors (HIs). In addition, non-governmental organizations (NGOs) engage or support other categories such as Shasthya Shebikas, field workers, and community volunteers to deliver health-related services. Whereas at the facility level, data collection is conducted through app-based systems. Both sources of data are integrated into the e-TB Manager platform, which is linked to the DHIS-2 system. For app-based entries, real-time data input is possible, while hard copy data generally takes 2–3 days to be entered into the system. The Tuberculosis Leprosy Control Assistant (TLCA) is responsible for entering all relevant case information into the e-TB Manager. Additionally, the statistician at the Upazila Health Complex (UHC) compiles and uploads monthly reports into the DHIS-2 platform. The Civil Surgeon's office consolidates the information and submits monthly and quarterly reports to National TB Program (NTP) for central-level monitoring and planning [52].
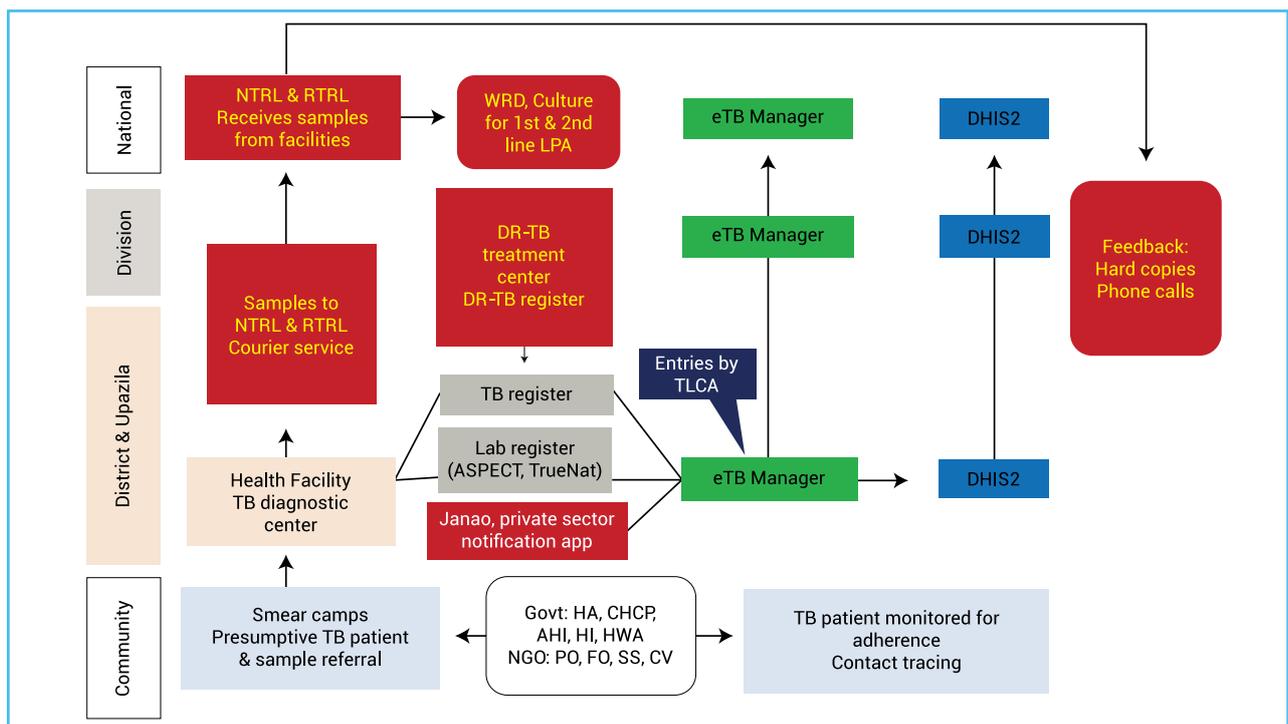
Figure 9. Data flow and reporting system in TB surveillance

Source: National Strategic Plan to END TB in Bangladesh 2024-2030 [https://www.ntp.gov.bd/wp-content/uploads/2022/03/Bangladesh-NSP-TB-to-Eliminate-TB-2024-2030-.pdf]

Data Interoperability, Analysis and Visualization

- **Who conducts analysis:** National Tuberculosis Program (NTP) conducts analysis with the data collected from whole nation.

- **Tools/software used:** the eTB Manager serves as the primary case-based electronic system for tuberculosis surveillance, currently operational across all eight divisions. The system is interoperable with DHIS2, which receives aggregated data from health facilities through eTB Manager. These aggregated datasets are accessible at all administrative levels; however, despite the introduction of DHIS2 in 2018, WHO-recommended standard dashboards have yet to be implemented. In Dhaka, approximately 40% of health facilities continue to use Microsoft Excel for reporting data to the NTP. Full digitization has not yet been achieved. Howcer, data aggregation follows the hierarchy from union to upazila, district, and ultimately the national level. The Janao mobile application is utilized by some private practitioners to notify and refer TB patients, often to public health facilities, but its coverage remains low. In addition, ASPECT software is used to connect molecular diagnostic test results from GeneXpert and TrueNat platforms directly to the eTB Manager, enhancing the integration of laboratory data into the national surveillance system.

- **Frequency and type of analysis:** Monthly and quarterly analysis done with tuberculosis data. It helps to analyze trends and monitor treatment outcome. Also, helpful in case of emergency response and intervention.

  - Trend Analysis: The data collected through the surveillance system is analyzed at district and national levels to identify trends in TB case identification, monitor the effectiveness of treatment programs and detect outbreaks or areas with high transmission.

  - Monitoring Treatment Outcomes: A critical function of the surveillance system is to monitor treatment outcomes, including cure rates and treatment completion rates, for both drug sensitive and drug-resistant TB and rates of drug-resistant TB. This data helps assess the success of TB control measures and identify areas needing improvement.

  - Contact Tracing: The surveillance system supports contact tracing efforts to identify and screen individuals in close contact with TB patients.

  - Response to higher case notification areas: For the areas where case notification is high are analyzed for selecting supervision sites on a quarterly basis, so that programmatic recommendation can be drawn to detect the provision of improvement after supervision. In the event of a TB outbreak or detection of a cluster of cases, the surveillance system triggers a response that includes intensified case finding, community screening, and treatment efforts.

  - Drug-Resistant TB Management: The system tracks cases of multidrug-resistant TB (MDR-TB) and extensively drug-resistant TB (XDR-TB), ensuring that patients receive timely treatment initiation with appropriate regimen.

Use of Surveillance Data

Community level
- Contact investigation is carried out by government and NGO field staff to find exposed individuals.
- Data helps find more presumptive cases for testing in high TB burden areas.
- Health education and prevention measures are implemented in affected communities.
- Regular medicine distribution is organized routinely for treatment initiation.

Upazila level
- Data is used to identify TB cases, monitor notification trends, and application of programmatic action required as per findings of analysis.
- Coordinates upazila level TB control teams for reporting and supply of logistics. Uses information to guide contact tracing efforts of household member of index TB patients.
- Surveillance team works to identify high case load areas and work to minimize TB burden.

District level
- Identifies limitations in current systems for corrective action such as early detection and prompt treatment initiations to minimize diagnosis vs treatment gap.
- Ensure coordinated action required for uninterrupted medicine and commodities.
- Uses data trends to track program performance and improve local TB services.
- Helps estimate total TB case burden for resource allocation and planning.

Divisional level
- Supervision, monitoring and data analysis by divisional TB experts.
- Coordination with district and sub district level and local health authorities.
- Supervision and monitoring of peripheral lab and divisional lab activities by divisional microbiologists.

National level (NTP / DGHS / MoHFW)
- Uses surveillance data to develop treatment guidelines, update SOPs and select sites for required supervision.
- Supports evidence-based policymaking through district-wise and national-level analysis.
- Tracks patterns of drug-resistant TB, child TB, and TB-HIV for planning specialized services.
- Monitors TB program effectiveness using trend analysis, treatment success rates, and case notification data.
- Plans targeted interventions in areas with low case detection or high burden.
- Uses findings to strengthen TB programs, update strategies, and coordinate partner support (e.g. BRAC, WHO along with other partner, icddr,b).

Data Protection and Privacy

The tuberculosis surveillance system ensures strong data privacy and security through strict access control protocols. Each health facility is provided with a specific and unique ID and password to access platforms such as e-TB Manager and DHIS-2. These credentials are confidential and are not shared with unauthorized individuals. Access to data is restricted to designated personnel only. If any external organization or stakeholder requires access to the data, formal permission must be obtained from the appropriate authority. These measures ensure confidentiality, integrity, and controlled use of patient information within the surveillance system.

Challenges

- Surveillance activities heavily rely on donor funding with no guaranteed long term financial support from national resources.
- Key reporting tools (eTB manager, ASPECT, JANAO app, DHIS-2, eLMIS) require regular software upgrades, customization and maintenance which demand sustained technical and financial support.
- Ensuring the continued engagement of skilled HR for surveillance requires dedicated and stable funding for HR, which is currently inadequate.
- Portable X-ray machines are not being used optimally in many areas, limiting early case detection and reducing the effectiveness of active case finding.
- Repair and replacement of essential Logistics such as laptops, data connectivity is challenging, disrupting smooth surveillance operations.

Way Forward

- Ensure sustainable financing for surveillance tools (e- TB Manager, ASPECT, JANAO app, DHIS2), equipment (laptop, portable X-ray machines etc.) and human resources to maintain system performance
- Enhance integration with MIS DGHS to improve interoperability and national level analytics for evidence-based program adjustment.
- Ensure timely software updates and maintenance for uninterrupted data reporting.

4.2.3 Leprosy Surveillance

Brief History

The surveillance of leprosy in Bangladesh has evolved significantly over the past decades. Before the 1980s, leprosy was a largely neglected tropical disease, with minimal government involvement. Services were primarily provided by missionary organizations and non-governmental organizations (NGOs). In 1985, the Government of Bangladesh launched the National Leprosy Control Program (NLCP), marking the beginning of formal leprosy surveillance with support from the WHO. The program initially emphasized passive case detection, but throughout the 1990s, surveillance activities expanded with the nationwide introduction of multidrug therapy (MDT) in 1993 and the integration of leprosy services into the general healthcare system. Bangladesh achieved the WHO leprosy elimination target at the national level in 2000, leading to a shift in surveillance strategies toward sustaining low prevalence, disability prevention, and detecting hidden cases. Currently, leprosy surveillance in Bangladesh operates in high-endemic areas through both passive and active case detection of process. Both online DHIS2 platform and paper-based systems are used for reporting and in collaboration with NGOs. Continuous efforts are being made to strengthen early detection, monitor disability, and move toward the goal of zero leprosy by 2030.
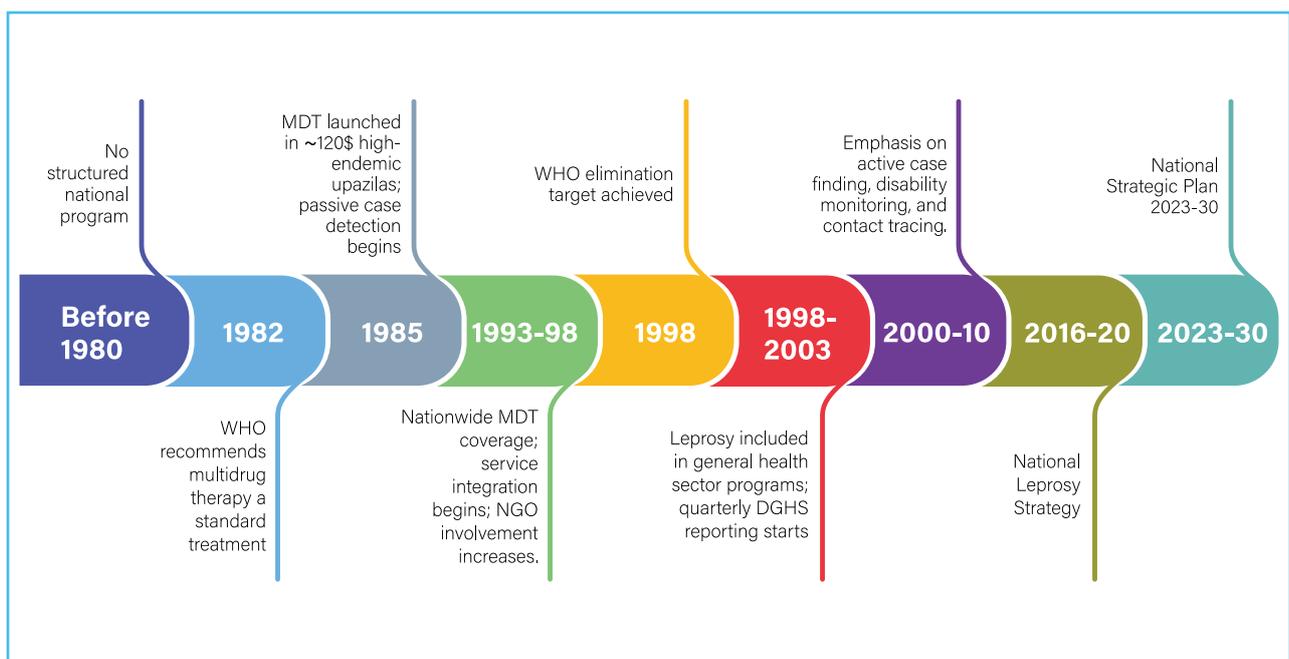
Figure 10. Timeline of Leprosy Surveillance

Type and Structure of Surveillance

- **Type:**
  - Active: Active case search, contact tracing, extended contact survey, community awareness program
  - Passive: Hospital based, Case-based.

- **Structure:**
  - Reporting units: Upazila Health Complex is the reporting unit.
  - Frequency of data collection and reporting: monthly reporting to DHIS2 is done (including zero reporting). Indicators include (1) number of suspected cases, (2) smear positive cases (3) new cases detected (4) cases on treatment, (5) treatment completed, and (6) No. of grade 2 disability (G2D) in new cases. TLCA/MT Lab/Program Officer/Field Officer/Statistician uploads leprosy information in DHIS2. A hard copy sent to CS office monthly with the sign of UH&FPO. Another report is sent by statistician with the help of TLCA (both Government and NGO) to CS Office quarterly. From there report is sent to Director, MBDC/ Line director TBL&ASP.
  - National/international alignment (e.g., WHO, IHR).

Surveillance Objectives

- **Overall Objective:**
  - Active case search
  - Elimination of leprosy by 2030

- **Specific Objectives:**
  - Monitor core indicators
  - Delivering timely surveillance data
  - Enable case-based contact tracing & patient tracking
  - Detect drug resistance
  - Support prophylactic interventions & prevent disability
  - Evaluate program performance and outcomes
  - Inform policy and resource allocation

Population and Geographic Coverage

- **Target population:** The target population of leprosy surveillance in Bangladesh includes all age groups. But special focus given to close contacts of confirmed leprosy patients, children under 15 years (to monitor recent transmission), people living in high-endemic or previously endemic areas, vulnerable and hard-to-reach populations, such as those in remote rural areas, urban slums, and tribal communities.

- **Geographic Coverage:** Surveillance activities cover all 64 districts, with high burden areas identified in 66 Upazilas across 9 Districts. These 9 districts are Nilphamari, Panchagarh, Gaibandha, Rangpur, Thakurgaon, Joypurhat, Dinajpur, Moulvibazar and Meherpur. Now number of districts has increased to 13 including Bagerhat, Rangamati, Khagrachori, Bandarban. Mentioned that it is called high burden if the number of identified cases is more than 5 in per lakh population.
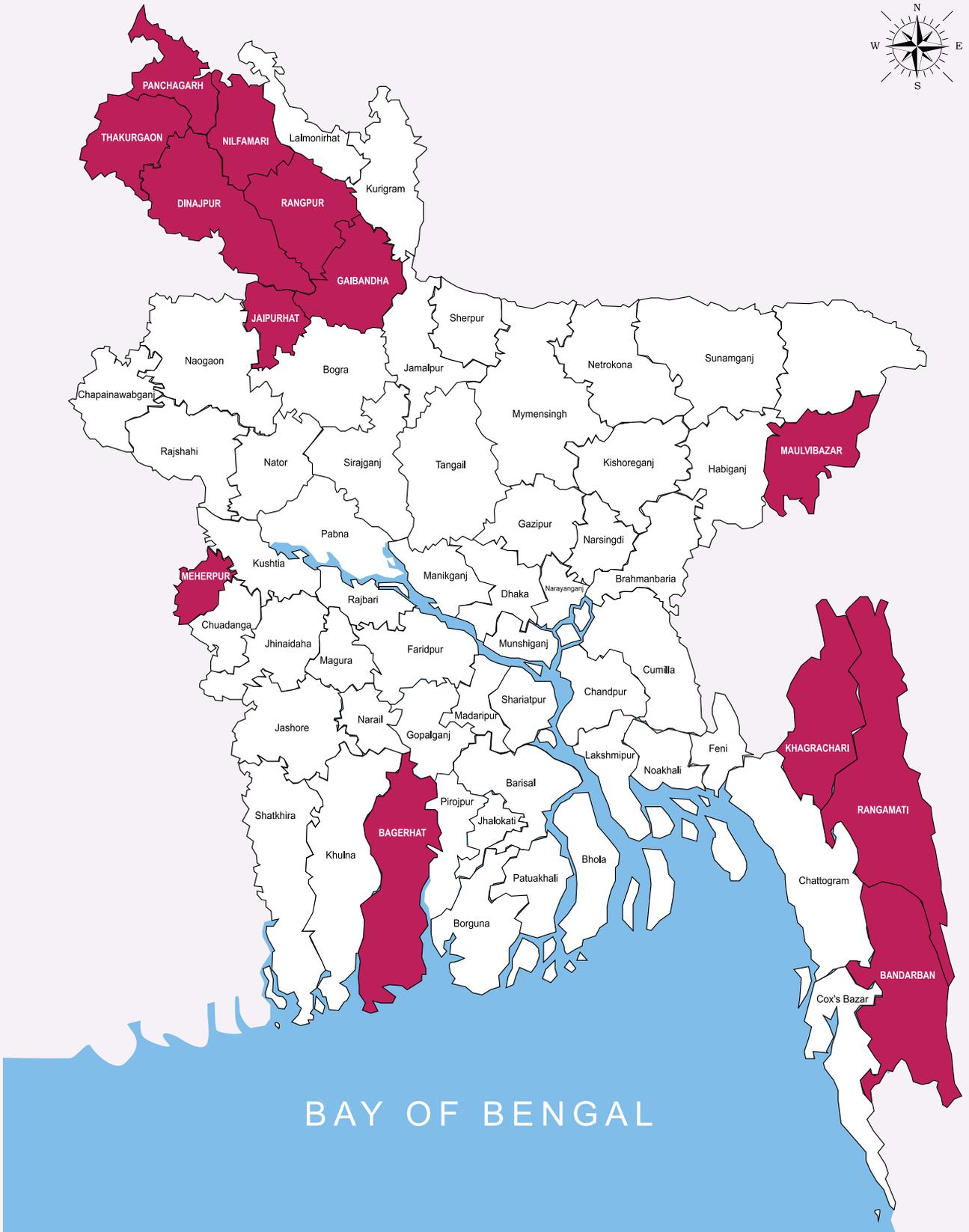
Figure 11. Geographic coverage of Leprosy surveillance

Funding Agencies (excluding government) and Their Role

Table 15. Funding agencies and their role in Leprosy surveillance

Funding organization	Role
The Leprosy Mission (TLM)	Provide support to MoHFW for the leprosy control services, prevention and disability management, specialized care at the DBLM hospital, community-based rehabilitation activities, advocacy and research for policy formulation.
Damien Foundation	Technical support HR support at Government centers (provides health worker).
WHO	Provide technical assistance for strategic development. Also, they trained community providers on how to detect and refer leprosy patients for proper management.
Lepra Bangladesh	Provide support for case detection through human resource assistance and manages the multidrug therapy program.

Governance and Stakeholder Role

Table 16. Governance and stakeholder with their role in Leprosy surveillance

Organization	Role
MBDC	• Oversees the National Leprosy Control Program • Provides policy guidance, planning, and strategic direction • Ensures resource allocation and monitors national targets • Analyzes surveillance data

Supporting entities

Table 17. Supporting organization in Leprosy surveillance

Entity	Role
Divisional Director (Health) Office	• Provides administrative oversight across multiple districts • Coordinates between district and national level
Medical College Hospital	• Provide specialized diagnosis and management of complicated or referred leprosy cases • Serve as referral centers for advanced cases and disability management
Civil Surgeon Office	• Supervises implementation of leprosy activities across upazilas • Compiles monthly reports from all UHCs • Sends consolidated monthly report to (via mail) & director, MBDC (hard copy)
Upazila Health Complex	• Primary reporting unit for leprosy surveillance • Conduct case detection, treatment, and follow-up • Uploads data into DHIS2 (including zero reporting). NGO jointly reports with UHC • Responsible for contact tracing, community awareness, and local coordination

Sample Collection and Testing Protocol

- Types of specimens collected: Skin smear.
- Protocols followed: WHO guideline for clinical diagnosis.
- Laboratory testing:
  - On UHC (now not available), Leprosy hospital or Damien foundation laboratory.
  - Types of tests: Slit-skin smear test.

Data Flow and Reporting Mechanism
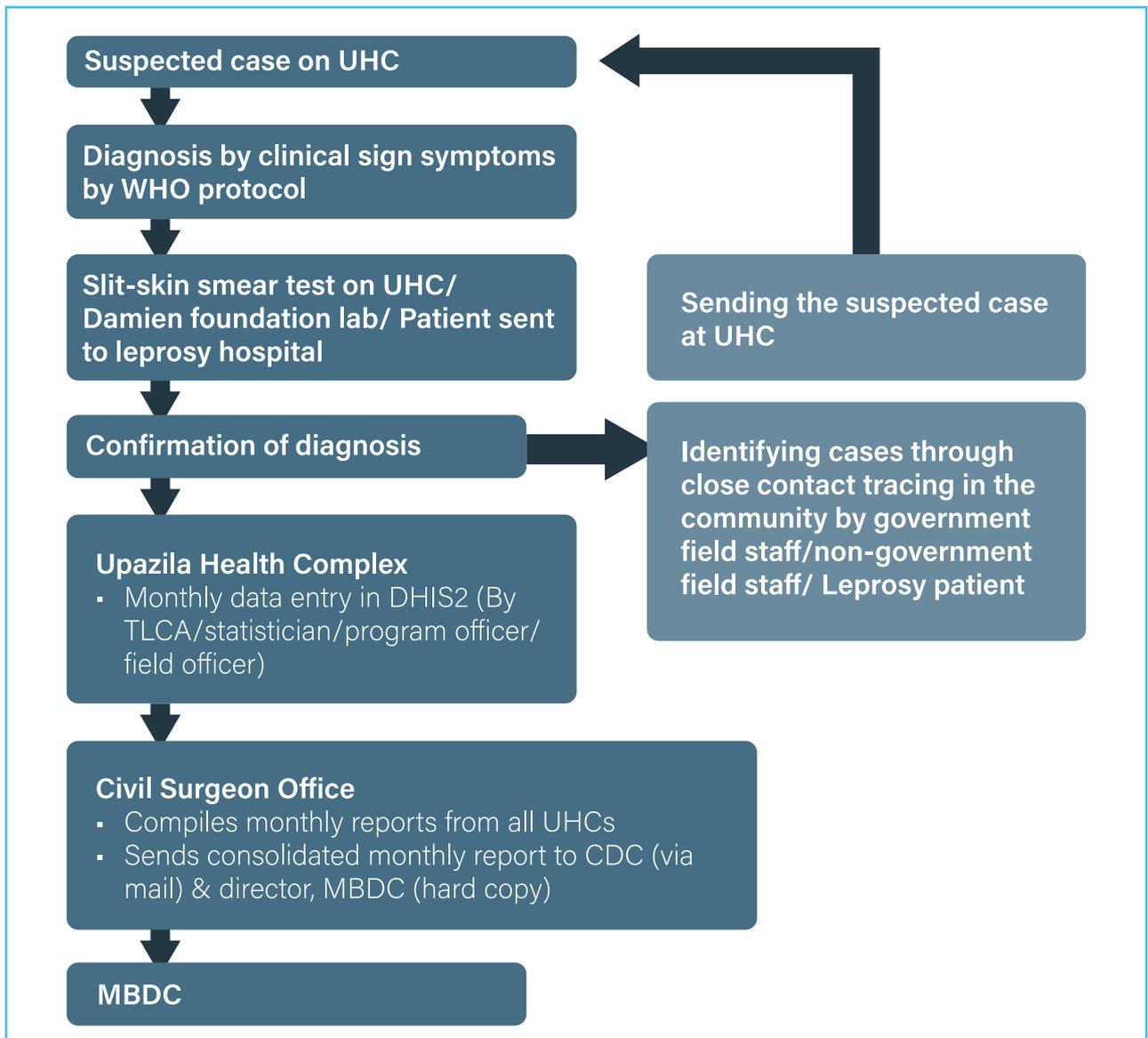
Figure 12. Data flow and reporting systems in Leprosy surveillance

Suspected leprosy cases typically present at the Upazila Health Complex (UHC), where they are diagnosed based on clinical signs and symptoms following WHO protocols. According to the guidelines, diagnosis is made upon identifying at least one of the three cardinal signs: (i) definite loss of sensation in a pale or reddish skin patch, (ii) thickened or enlarged peripheral nerve with associated sensory or motor impairment, or (iii) presence of acid-fast bacilli in a slit-skin smear. If a diagnosis cannot be confirmed clinically, a slit-skin smear test is required. It is no longer commonly performed there due to a reduction in patient numbers. In such cases, patients are referred to a leprosy hospital for confirmation. The TLCA at the UHC coordinates with the leprosy hospital to obtain the diagnostic result. Once confirmed, the patient receives treatment from the UHC. In some areas, Damien Foundation provides support in diagnosis. Their field staff or the TLCA collect skin smear samples and send them to the Damien Foundation laboratory for testing. Positive cases are reported to the UH&FPO, and treatment is provided at the UHC. Upon confirmation of a leprosy case, close contact tracing is conducted within the community to identify additional suspected cases. If any suspected case is identified, the individual is referred to the Upazila Health Complex (UHC) for confirmation of diagnosis and initiation of treatment. Each patient has UHC provided leprosy card, details of the patients are noted on the card.

Data Reporting

At the Upazila Health Complex (UHC), monthly reporting of leprosy cases, including zero reporting - is conducted through the DHIS2 platform. TLCA, MT-Lab, Program Officer, Field Officer, or Statistician are responsible for uploading the relevant data into the system. Additionally, a hard copy of the monthly report, signed by the UHFPO, is sent to the Civil Surgeon (CS) office. A separate quarterly report is also submitted by the TLCA to the CS office. At the district level, the CS office compiles all reports received from upazilas and sends a consolidated monthly report to Director, MBDC, Dhaka via email. A hard copy is also forwarded to the Line Director of TBL&ASP. The quarterly report submitted by the TLCA to the CS office (in Excel format) is subsequently sent to the Line Director, MBDC.

Feedback mechanisms (back to districts, hospitals): If any discrepancy is identified in the data, feedback is sent to the respective reporting site, and necessary corrections are made accordingly.

Data Interoperability, Analysis and Visualization

- Who conducts analysis: NLP

- Tools/software used (e.g., Excel, DHIS2)

- Frequency and type of analysis: Data analysis is not conducted at the peripheral level, primarily due to a significant number of vacant statistician positions across many field offices. Consequently, all data analysis activities are centralized and managed at the national level. The Central Monitoring Unit (CMU) plays a key role in facilitating regular data analysis, which is carried out on a monthly and quarterly basis.

Use of Surveillance Data

At the Civil Surgeon Office and Upazila Health Complex levels, surveillance data is used to support various functions including policy formulation, taking necessary actions, implementing or strengthening existing programs, and planning next steps. Additionally, the data serves research purposes, helping to generate evidence for decision-making and improve program effectiveness.

Data Protection and Privacy

- Data is anonymized and stored securely to ensure confidentiality.
- The system follows all national and international data protection guidelines.
- DHIS2 access is protected with unique IDs and passwords for each health facility. These login credentials are restricted and not shared with everyone. Register books are also kept confidential and can only be used by designated UHC staff with prior permission from the authority.

Challenges

- Lack of standardized Case Reporting Form (CRF)
- Current system only allows aggregated reporting via DHIS2
- Shortage of trained human resources
- Some funding streams have been discontinued, reportedly due to a decline in case numbers. However, sustainable financial support remains critical to maintaining essential surveillance activities.
- Challenges in systematically monitoring treatment progression and ensuring regular follow-up of diagnosed patients, affecting continuity of care.
- Barriers to Effective Prophylaxis Implementation: The current system requires patients to visit designated centers such as UHCs; monthly to receive supervised doses of medication. Patients who are unable or unwilling to attend miss these critical doses, as there is no alternative arrangement for drug distribution in the community.

Way Forward

- Develop a dedicated digital platform for the National Leprosy Program (NLP), including integration of case-based reporting in DHIS2.
- Introducing case-based mapping using GIS tools (e.g., QGIS).
- Create and implement a specific app/ tool for leprosy case reporting, including CRF features.
- Assign dedicated focal person for leprosy surveillance at each health facility.
- Train all health managers and frontline health workers in leprosy case detection, surveillance, and data use.
- Address statistician vacancies at peripheral levels to ensure data quality and analysis at local level.
- Move from aggregated data to case-based data collection across all reporting sites.
- Ensure all NGOs working on leprosy submit data regularly to MBDC/ NLP.
- Advocate for continued donor funding and government allocation to maintain surveillance, patient care and prophylaxis implementation.

4.2.4 Vaccine Preventable Disease & AEFI Surveillance System

Brief History

The Expanded Programme on Immunization (EPI) was introduced in Bangladesh in 1979, approximately five years after its global launch by the WHO. The programme began as a pilot initiative in eight thanas [53]. In 1985, the Government of Bangladesh endorsed the Global Universal Child Immunization (UCI) initiative and undertook a phase-wise expansion of EPI activities between 1985 and 1990. At its inception, Bangladesh targeted six vaccine-preventable diseases (VPDs): Diphtheria, Pertussis, Tetanus, Poliomyelitis, Tuberculosis, and Measles. Over the years, the immunization programme has expanded substantially, with several new vaccines introduced in recent decades, including Hepatitis B (2003), *Haemophilus Influenzae* type b (Hib) (2009), Rubella (2012), Pneumococcal Conjugate Vaccine (PCV) and Inactivated Polio Vaccine (IPV) (2015), the second dose of Measles-Rubella (MR) vaccine (2015), and fractional IPV (fIPV) (2017). Through these sustained efforts, Bangladesh has achieved remarkable progress in expanding immunization coverage and in the elimination and control of VPDs, establishing immunization as one of the country's most notable public health successes. However, the achievement of disease elimination and mortality reduction requires a robust surveillance system alongside routine immunization.

Table 18. Vaccine-Preventable Diseases covered under Bangladesh's EPI

Disease	Vaccine	Year of Introduction
Poliomyelitis (Polio)	OPV	1979
Measles	Measles	1979
Tetanus	DTP / TT	1979
Diphtheria	DTP	1979
Pertussis (Whooping Cough)	DTP	1979
Tuberculosis	BCG	1979
Hepatitis B	HepB	2003
Haemophilus influenzae type b	Hib	2009
Rubella	MR / standalone rubella	2012
Pneumococcal disease	PCV	2015
Measles & Rubella	MR second dose	2015
Poliomyelitis (Polio)	IPV	2015
Poliomyelitis (Polio)	fIPV	2017

Note: Inactivated Polio Vaccine (IPV) and fractional IPV (fIPV) are included to support Polio eradication. Measles-Rubella (MR) second dose strengthens measles and rubella control.

Source: National Guideline for AFP and Vaccine Preventable Diseases Surveillance Bangladesh, EPI, DGHS, 2024

The surveillance of vaccine-preventable diseases (VPDs) in Bangladesh has evolved progressively over the past three decades. Formal surveillance activities under the Expanded Programme on Immunization (EPI) were first initiated in 1995 with the introduction of case-based Acute Flaccid Paralysis (AFP) surveillance, established as part of the Global Polio Eradication Initiative. This marked the beginning of systematic efforts to detect, investigate, and respond to VPD cases in the country. Over time, the scope of surveillance was expanded to include other priority diseases targeted for elimination and control. Neonatal Tetanus (NT) surveillance was integrated to support the global maternal and neonatal tetanus elimination initiative, while measles surveillance was strengthened in line with regional and national elimination goals. Subsequently, surveillance for Congenital Rubella Syndrome (CRS) and Acute Encephalitis Syndrome (AES) was incorporated, reflecting broader efforts to monitor and control diseases with significant public health impact. In parallel, a routine reporting system was established whereby other VPDs under the national EPI are reported on a weekly basis from all government health facilities and major private facilities.

T**able 19.** Vaccine-Preventable Diseases (VPDs) surveillance in Bangladesh

Name of Disease Surveillance	Years of initiation of the surveillance
Poliomyelitis & AFP Surveillance	1995
Measles and Rubella surveillance (Fever and Rash Surveillance)	2003 (outbreak Surveillance and 2008 (case-based surveillance)
Surveillance for Japanese Encephalitis (Acute Encephalitis Syndrome Surveillance (AES))	2007
Congenital Rubella Syndrome (CRS)	2012 (integrated with AFP and VPDs surveillance)
Neonatal Tetanus (NT) Surveillance	1995 (part of AFP & VPD surveillance)
Post-Neonatal Tetanus Surveillance	1995 (part of AFP & VPD surveillance)
Diphtheria Surveillance	1995 (part of AFP & VPD surveillance)
Pertussis (Whooping Cough) surveillance	1995 (part of AFP & VPD surveillance)
Childhood Tuberculosis Surveillance	1995 (part of AFP & VPD surveillance)

Surveillance Objectives

1. Characterize epidemiology and measure burden of vaccine preventable diseases.

2. Continuous nationwide real-time monitoring.

3. Detect and investigate outbreak and take immediate actions for preventing additional cases or deaths during outbreaks of any vaccine preventable diseases.

4. Help health officials at the upazila, district, municipality, city corporation, division, and national level to develop more effective strategies to prevent diseases.

5. Measure the impact of vaccination program.

6. Identify high risk population and areas.

7. Identify problems in service delivery (e.g., sub-potent vaccine, adverse event).

8. Measure the impact of specific health interventions and determine if a particular disease prevention strategy is effective (e.g., supplementary vaccination campaigns).

Type and Structure of Surveillance

VPD surveillance in Bangladesh is conducted through both passive and active surveillance systems [54]. The Disease Surveillance Focal Person (DSFP) oversees all VPD surveillance activities within their assigned area. At the district level, the DSFP is the Civil Surgeon (CS); for City Corporations, the Chief Health Officer (CHO); for upazila, UH&FPO; and for municipalities, the Municipal Medical Officer (MMO), or UH&FPO if the MMO position is vacant. The DSFP ensures weekly passive and active surveillance for AFP, Measles/Rubella, CRS, Neonatal Tetanus, AES, Tetanus after neonatal period, Diphtheria, Pertussis, Tuberculosis under 5 years, oversees timely investigation and response to suspected cases or outbreaks, and ensures that all surveillance data are collected, analyzed, and forwarded promptly to the EPI Headquarters through proper channel. Mentioned that a Local Surveillance Officer (LSO), such as Medical Officer-CS (MOCS), Health Officer/ Assistant Health Officers/ Zonal Medical Officer, MO-DC/MO-MCH, Municipal Medical Officer, and MO-DC/MO-MCH, supports the DSFP in their respective tier to carry out surveillance activities and reporting. To facilitate and coordinate passive reporting of AFP & VPD cases, carry out investigation and other surveillance activities in Hospitals, Hospital Surveillance Officer (HSO) are designated by the Director/ Superintendent of the Hospital. HSO is responsible for managing surveillance system within the hospital and for preparing and submitting 'AFP and EPI Diseases Weekly Line Listing Form for Hospitals and Upazila Health Complexes' (Annexure 02) to DSFP. For case-based surveillance HSO is responsible for notification, initiating case investigation, ensure sample collection, storage and sending of specimen to the designated National Laboratory, specimens of AFP, suspected Measles, suspected/clinically confirmed CRS case to National Polio and Measles Laboratory (NPML) and specimens of AES case to IEDCR. A Hospital Surveillance Officer (HSO), appointed by the hospital Director or Superintendent, coordinates passive reporting of AFP and VPD cases, manages hospital surveillance, and submits weekly reports to the DSFP. The HSO also ensures case notification, investigation, specimen collection, and transport to designated national laboratories specimens of AFP, suspected Measles, suspected/clinically confirmed CRS case to NPML and specimens of AES case to IEDCR.

WHO Bangladesh has designated Surveillance & Immunization Medical Officers (SIMOs) at the district level and Divisional Coordinators (NPO EPI DC) at the division level to support field-level VPD surveillance in close collaboration with government counterparts. SIMOs assist local health authorities in coordinating AFP and VPD surveillance, ensuring timely and complete reporting, and facilitating case and outbreak investigations, including laboratory confirmation and community-level response. They also oversee capacity building for relevant personnel, streamline specimen collection and transport, guide outbreak response operations, and conduct data analysis with timely feedback.

All physicians at health facilities immediately notify any suspected cases of AFP, Measles, CRS, NT, or AES to the HSO, DSFP, or SIMO. Suspected Measles, CRS, NT, and AES cases presenting at hospitals must be promptly investigated by the attending physicians. The HSO is tasked with facilitating case investigations and coordinating specimen collection for AFP, Measles, CRS, and AES. Additionally, all cases of Diphtheria, Pertussis, Tetanus (beyond the neonatal period), and Tuberculosis in children under five are reported daily to the HSO using the 'AFP & EPI Disease Report Form', ensuring timely and accurate surveillance data.

Field workers from Government of Bangladesh (GoB), NGOs, and the private sector are responsible for promptly reporting suspected AFP, Measles, and CRS cases to the DSFP, while suspected Neonatal Tetanus (NT) and Neonatal Death (ND) cases are first notified to their supervisors. Verified NT cases meeting the operational definition are immediately reported to the DSFP. Other suspected vaccine-preventable diseases are reported weekly through supervisors to their managers. Furthermore, healthcare providers (e.g., private

practitioners, village doctors, traditional healers) and community informants (e.g., imams, teachers, local leaders) are encouraged to notify suspected AFP, Measles, CRS, NT, and ND cases to the nearest health facility or field worker. Diseases are included using the case definition outlined in below Table.

Table 20. WHO Case definitions adopted by EPI for the diseases under VPD surveillance

Disease	Case definition	Surveillance Type
Polio	A suspected case is any case presenting with AFP. An AFP case is defined as a child <15 years of age presenting with recent or sudden onset of floppy paralysis or muscle weakness due to any cause (including Guillain-Barré syndrome), or any person of any age with paralytic illness if poliomyelitis is suspected by a clinician (paralysis is not present since birth or not a result of an injury).	Passive
Acute Flaccid Paralysis (AFP)	An AFP case is defined as a child <15 years of age presenting with recent or sudden onset of floppy paralysis or muscle weakness due to any cause (including Guillain-Barré syndrome), or any person of any age with paralytic illness if poliomyelitis is suspected by a clinician (paralysis is not present since birth or not a result of an injury).	Both active and passive
Measles	A patient with fever and maculopapular (non-vesicular) rash or a patient whom a clinician suspects measles or rubella irrespective of age.	Both active and passive
CRS	Any infant less than one year of age in whom a health worker suspects CRS. A health worker should suspect CRS: – when there is a maternal history of suspected or confirmed rubella during pregnancy, even when no signs of CRS – the infant presents with heart disease and/or suspicion of deafness, and /or one or more of the following eye signs: white pupil (cataract); diminished vision; pendular movement of the eyes (nystagmus); squint; smaller eyeball (microphthalmos); larger eyeball (Glaucoma).	Both active and passive
Neonatal Tetanus	A suspected case for NT is a case that meets either of these two criteria: any neonate who could suck and cry normally during the first two days of life and developed tetanus - like illness or death between 3 and 28 days of age or any neonate who died of an unknown cause during the first month of life.	Both active and passive
Post-Neonatal Tetanus Surveillance	– Acute onset of hypertonia and/or painful muscular contractions of the jaw or neck and Generalized muscle spasms. – Without other apparent medical causes determined by a physician.	Passive

Disease	Case definition	Surveillance Type
Japanese Encephalitis/ Acute Encephalitis Syndrome (AES)	Because JE cannot be distinguished from encephalitis due to other causes on clinical grounds alone, a syndromic approach is used in identifying cases. A suspected JE case is a person meeting the definition of AES. The AES clinical case definition is a person of any age at any time of year with the acute onset of fever and at least one of the following: A change in mental status (including symptoms such as confusion, disorientation, coma or inability to talk) OR New onset of seizures (excluding simple febrile seizures). A simple febrile seizure is defined as a seizure that occurs in a child aged 6 months to <6 years old, whose only finding is fever and a single generalized convulsion lasting less than 15 minutes, and who recovers consciousness within 60 minutes of the seizure. AES might have reduced sensitivity for JE among children in some settings. In a study in Vietnam, some children with laboratory-confirmed JE presented with signs of meningitis only (like neck stiffness) or acute limb paralysis only. Overall, the AES case definition captured two-thirds of children with JE; sensitivity among adults was 100%, though the numbers were small. Dengue virus (DENV) infections may be captured in AES surveillance due to the low specificity of the AES case definition, and case presentations can overlap.	Both active and passive
Diphtheria	An illness of the upper respiratory tract characterized by the following: pharyngitis, nasopharyngitis, tonsillitis or laryngitis (Sore throat) and fever and adherent pseudomembrane of the pharynx, tonsils, larynx and/or nose and without other apparent cause determined by the physician A diphtheria pseudomembrane is an exudate that is greyish, thick, firmly adherent and patchy to confluent. Dislodging the pseudomembrane is likely to cause profuse bleeding.	Passive
Pertussis (Whooping Cough)	A person with a cough lasting at least 2 weeks with at least one of the following: • paroxysms (i.e. fits) of coughing • inspiratory whooping • post-tussive vomiting (i.e. vomiting immediately after coughing) • without other apparent causes OR Apnea (with or without cyanosis) in infants (age <1-year old) with cough of any duration OR If a physician suspects pertussis in a patient with cough of any duration. *Note: Pertussis in immunized or previously infected individuals can present without the classic signs of pertussis and therefore might not be captured by the above case definition.*	Passive

Disease	Case definition	Surveillance Type
Tuberculosis	A probable case of TB in a child will be defined as a child with: • close contact with a case of tuberculosis, • and an illness lasting >4 weeks, and • unexplained fever, night sweats and failure to thrive (or weight loss), and • for pulmonary tuberculosis: radiographic abnormalities consistent with pulmonary TB for tuberculous pleurisy: chest pain and radiographic findings showing a unilateral pleural effusion • for tuberculous lymphadenitis: one or more large lymph nodes • for tuberculous meningitis: mental status changes, headache and abnormal cerebrospinal fluid laboratory results • for spinal tuberculosis: angle deformity of the spine • for tuberculosis of the bone or joint: joint or bone swelling and pain • for tuberculous peritonitis: signs of peritonitis and a palpable abdominal mass • and/or ascites • for miliary tuberculosis: characteristic "millet seed" appearance on chest radiograph or tuberculosis in more than one site as determined by a physician A confirmed case of TB in a child will be defined as any probable case with a Acid Fast Bacillus identified from clinical specimens or any child in which Mycobacterium tuberculosis is isolated from cultures of clinical specimens Cases of tuberculosis in anyone should be reported immediately to public health authorities so that necessary measures may be taken in accordance with the National Tuberculosis Control Programme of Mycobacterial Disease Control (MBDC) unit of Directorate-General of Health Services (DGHS), Bangladesh.	Passive

Population and Geographics Coverage

Table 21. Population and geographic coverage by disease specific surveillance under VPD

Disease	Population	Coverage
Polio	Any age	If no cases of Acute Flaccid Paralysis (AFP) or vaccine-preventable diseases (VPD) are detected, a report indicating "ZERO" cases is submitted. At present, 792 health facilities are under passive surveillance. In addition to passive reporting, weekly active surveillance is conducted for AFP, Acute Encephalitis Syndrome (AES), Measles, Neonatal Tetanus, and Congenital Rubella Syndrome (CRS) in major hospitals. Currently, 167 major hospitals are included under active surveillance.
Acute Flaccid Paralysis (AFP)	<15 years	
Measles	Any age	
CRS	Any infant less than 1 year of age	
Neonatal Tetanus	<28 days	
Post-Neonatal Tetanus Surveillance	Any age after neonatal period (after 28 days)	
Japanese Encephalitis/ Acute Encephalitis Syndrome (AES)	Any age	
Diphtheria	Any age	
Pertussis (Whooping Cough)	Any age	
Tuberculosis	< 5 years	

Source: EPI. National Guideline for AFP and Vaccine Preventable Diseases Surveillance Bangladesh. 2024 (4th edition).

Funding Agencies (excluding government) and Their Role

Table 22. Funding agencies and their role in VPD surveillance

Funding organization	Roles
GAVI	• Provides funds to WHO
WHO	• Supplies testing kits, reagents, and consumables for laboratories • Supports sample transportation costs • Deployment of human resources, i.e., SIMO) for technical support, case investigation, sample collection, and validation • Conducts data quality reviews, surveillance performance monitoring, and capacity building workshops • Assists with quality assurance, laboratory accreditation, and outbreak investigation processes
US CDC	• Provides molecular kits (through International Reagent Resource - IRR) for laboratory investigation of outbreaks and surveillance response • Supports proficiency panels for External Quality Assurance (EQA) in laboratories
Global Polio Eradication Initiative (GPEI)	• Primary funder of the Acute Flaccid Paralysis (AFP) surveillance system, including staffing, transportation, laboratory testing, and environmental surveillance • Supports stool sample logistics and viral sequencing for poliovirus detection at NPML-IPH • Provides strategic guidance for surveillance performance indicators and global certification

Governance and Stakeholder Roles

The EPI and IPH are responsible for overall coordination of the VPD surveillance system. MIS, DGHS supervises data reporting and coordination between field units and central health authorities. WHO and US CDC provide ongoing technical and advisory support ensuring proper patient enrollment, data, and sample collection, sample testing and report dissemination.

Table 23. Governance and stakeholder with their role in VPD surveillance

Name of the organization	Role in surveillance
DGHS, MoHFW ▪ EPI ▪ MIS	Policy, strategy, technical, financial and administrative support. VPD surveillance implementation, data management and reporting Data management of passive and case-based surveillance data
NPML- IPH	Laboratory support to EPI for laboratory based VPD surveillance (AFP, measles, CRS specimens)
IEDCR	Laboratory support for AES case (JE Lab support)
WHO	Technical support to laboratory (NPML- IPH) and VPD Surveillance system of EPI
US CDC	Molecular kit support and EQA support to NPML- IPH

Sample Collection and Testing Protocol

The standard WHO protocol is maintained for sample collection and testing of all VPDs. This process is carried out by local health providers and workers, with laboratory support from the NPML and IEDCR. Using this system, VPD surveillance reports are generated weekly from 792 health facilities nationwide under passive surveillance, while 167 major hospitals conduct weekly visits for active surveillance. This continuous surveillance process is organized according to the epidemiological week, which runs from Sunday to Saturday.

Data Flow and Reporting Mechanism

Cases can be identified at both the community and facility levels. Suspected cases are identified by health workers during routine fieldwork or through community-based reports. Upon detection, health workers promptly inform the Assistant Health Inspector (AHI) or Health Inspector (HI), who facilitates referral of the case to the nearest Upazila Health Complex (UHC) for clinical evaluation and sample collection, if applicable. At the UHC, the Medical Technologist for EPI (MT EPI) is responsible for recording the details of the suspected case using the "AFP and EPI Diseases Weekly Line Listing Form for Hospitals and Upazila Health Complexes." This form captures key epidemiological and clinical data for each reportable case. The completed weekly line listing forms are submitted to the Civil Surgeon's Office, where they are reviewed and compiled. These data are then shared with the EPI. In parallel, aggregated weekly surveillance data on VPDs are entered into the DHIS2 platform by the Upazila-level Statistician or MT EPI and weekly aggregated data from the upazilas are uploaded in DHIS 2 by statistician of the CS office. In addition individual cases and samples are validated by SIMO from WHO. Sample transport cost is paid by WHO through EPI. For the JE cases, transport cost is paid by EPI. If no cases are detected, a "ZERO" report is usually submitted.
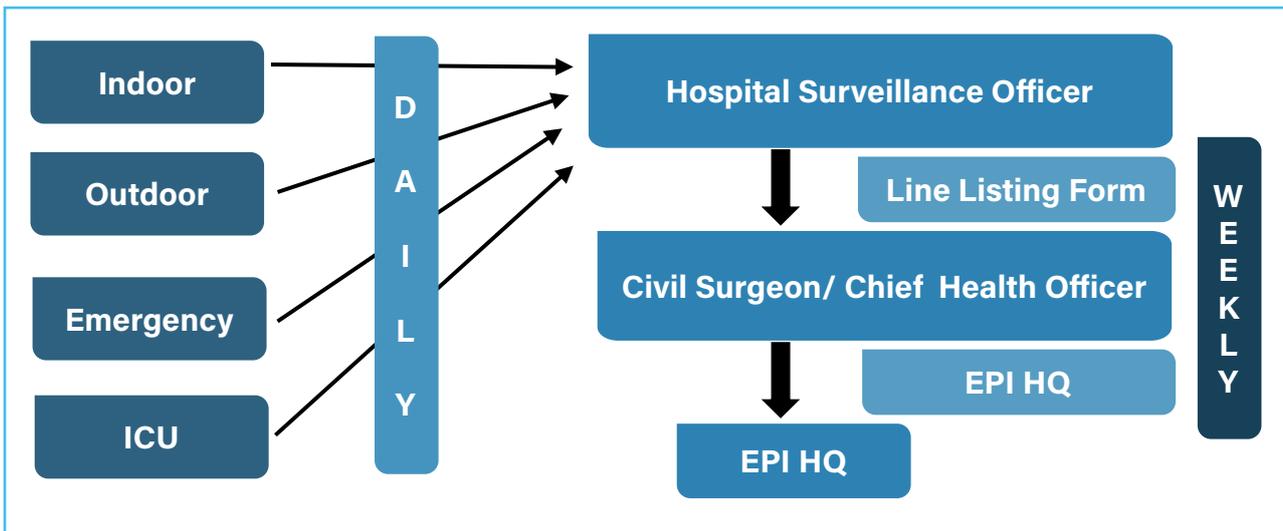
Figure 13. Data flow and reporting system in VPD (passive) surveillance

At the district level, the EPI Superintendent is responsible for collecting and compiling data from all upazilas within the district. Using this information, a consolidated report is prepared in the "AFP & EPI Diseases Weekly Compilation Form for Districts/City Corporations" and submitted to the EPI Headquarters in Mohakhali, Dhaka. Additionally, a monthly compilation report is shared with the Divisional Director's office via email. The district statistician is tasked with uploading the aggregated monthly data from all upazilas into the DHIS2 system.

No data entry is performed at the divisional and district level. The EPI is solely responsible for monitoring and ensuring the quality of the data uploaded by the district level into the DHIS2 system. The hard copies of the weekly compilation reports are archived at the CS office. The sample testing reports from NPML - IPH are sent to EPI and WHO HQ. The District Surveillance and Immunization Officer (SIMO) of WHO works as the conveyer of the report to the district and upazila level.

Data Interoperability, Analysis, and Visualization

Data analysis is carried out by the EPI, with technical support from the WHO. The findings are compiled into a report and submitted to MIS, DGHS at the end of each year and shared with SIMO network at divisional and district level.

Use of Surveillance Data

Vaccine-Preventable Disease (VPD) surveillance data is essential for monitoring disease trends, detecting outbreaks, and assessing the effectiveness of immunization programs. It helps the Government, and the collaborating organizations identify high-risk areas, prioritize interventions, and allocate resources efficiently. Additionally, the data supports evidence-based policymaking, guides vaccine planning and introduction, and ensures timely public health responses to emerging threats.

Data Protection and Privacy

The data system is designed to maintain full anonymity, always ensuring patient confidentiality. DHIS2 operates on a secure, password-protected server for safe data storage. Additionally, hardcopy reports are securely stored in compliance with national data protection standards. Reports are shared through the SIMO network; however, they are responsible for the patient-level reporting system. Reports are provided by IEDCR and NPML, downloaded, and documented, with consistency checks conducted across EPI HQ, district, and Upazila-level data according to international standards. Dissemination of results is the responsibility of the Government.
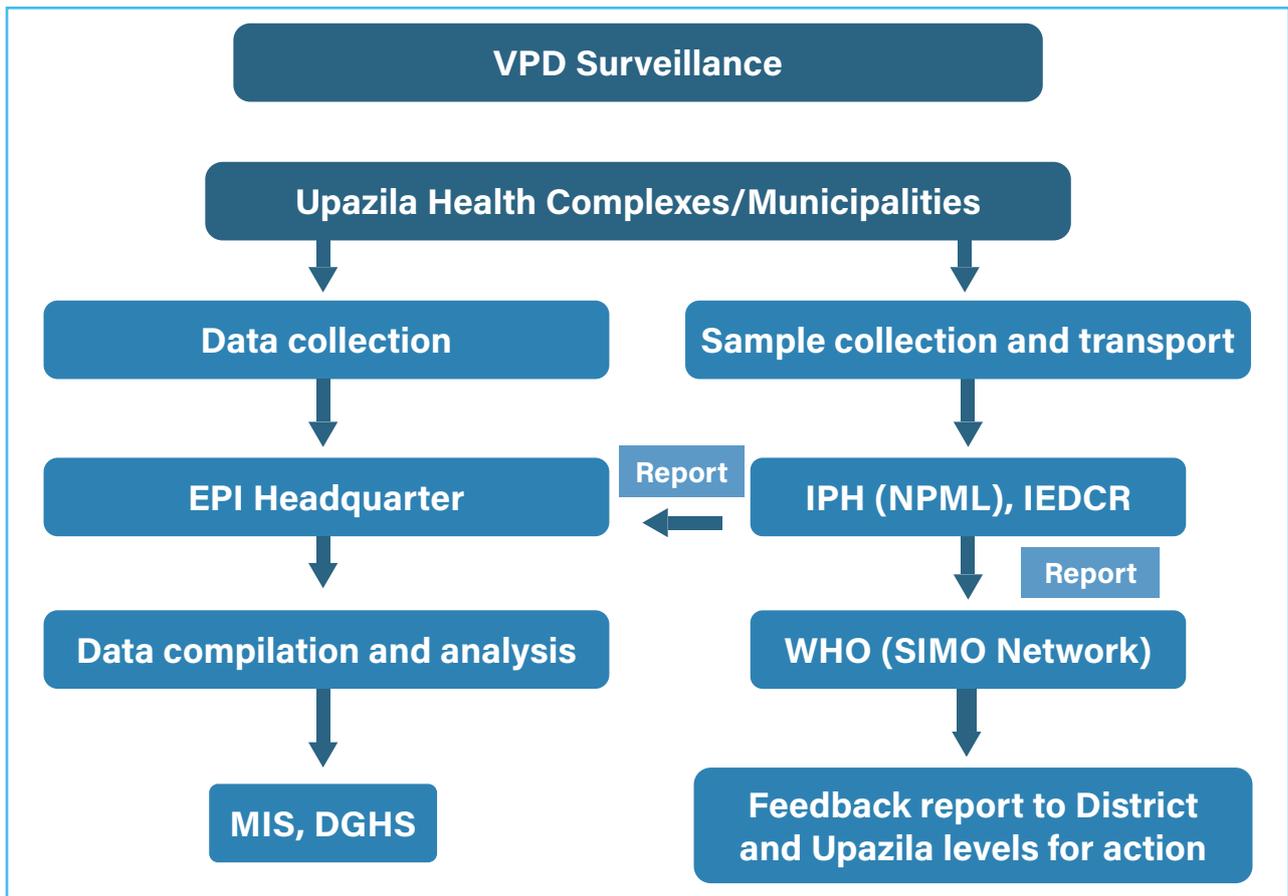
Figure 14. Data Interoperability, Analysis, and Visualization

Challenges

- The system is not fully automated still there is some manual reporting mechanism on the reporting channel.
- Individual case reporting to DHIS2 is yet to be decided.
- The updated polio transition plan is needed to ensure government officials' involvement; without it, continuous data reporting for VPDs may be challenging.

Way Forward

- Advocacy and policy level decision making for the implementation of national polio transition plan.
- Fully automated the VPD surveillance system by phasing out remaining manual reporting mechanisms to improve data accuracy and timeliness.
- Develop or upgrade the individual case reporting for VPD in DHIS2 to enable real time case-based data capture and analysis.
- Develop a comprehensive transition and sustainability plan for VPD surveillance by 2026, aligned with the phase-out of development partner support, clearly defining the roles and responsibilities of government officials
- Build technical capacity within the EPI program teams to manage VPD surveillance independently, ensuring long-term government ownership and sustainability.
- Report including detailed information about patients, such as patient name, ID, laboratory code, and address, can be sent to all concerns for patient level reporting.

4.2.4.1 Poliomyelitis & AFP Surveillance

Brief History

Bangladesh committed to poliomyelitis eradication as a co-signatory of the 1988 WHA resolution for global polio eradication. The country initiated its first National Immunization Days (NIDs) on 16 and 26 March 1995, supported by Rotary International, BASICS, USAID, SIDA, the Government of Japan, CDC, UNICEF, and WHO. Between 1995 and 2004, Bangladesh conducted 12 NIDs and 1 Sub-National Immunization Day (SNID). In 1999, 29 polio cases were reported from 18 districts across six divisions. The last indigenous polio case before importation occurred on 22 August 2000 in Dhaka City Corporation, after which Bangladesh remained polio-free for over five years. In January 2006, poliovirus P1 serotype was imported from Uttar Pradesh, India. The first reported case was a 10-year-old girl, Rahima, from Sadar Upazila, Chandpur District, with paralysis onset on 23 January 2006. Epidemiological investigation identified a 12-year-old girl, Nesfatun, from Panchbibi Upazila, Joypurhat District, with onset on 8 January 2006, as the actual first epidemiological case following the halt of indigenous transmission in 2000. In 2006, following poliovirus importation, Bangladesh conducted rapid response campaigns with four rounds of mOPV in the 13th Special NIDs and two rounds of tOPV in the 14th NIDs for children under five. The last polio case was reported on 22 November 2006 in Chhatak, Sunamganj, with a total of 18 cases in 12 districts. High coverage across all NID rounds, a strong routine EPI program, and targeted efforts to reach unreached populations successfully interrupted virus circulation. AFP surveillance has since remained a critical tool for early detection, outbreak response, and sustaining Bangladesh's polio-free status.
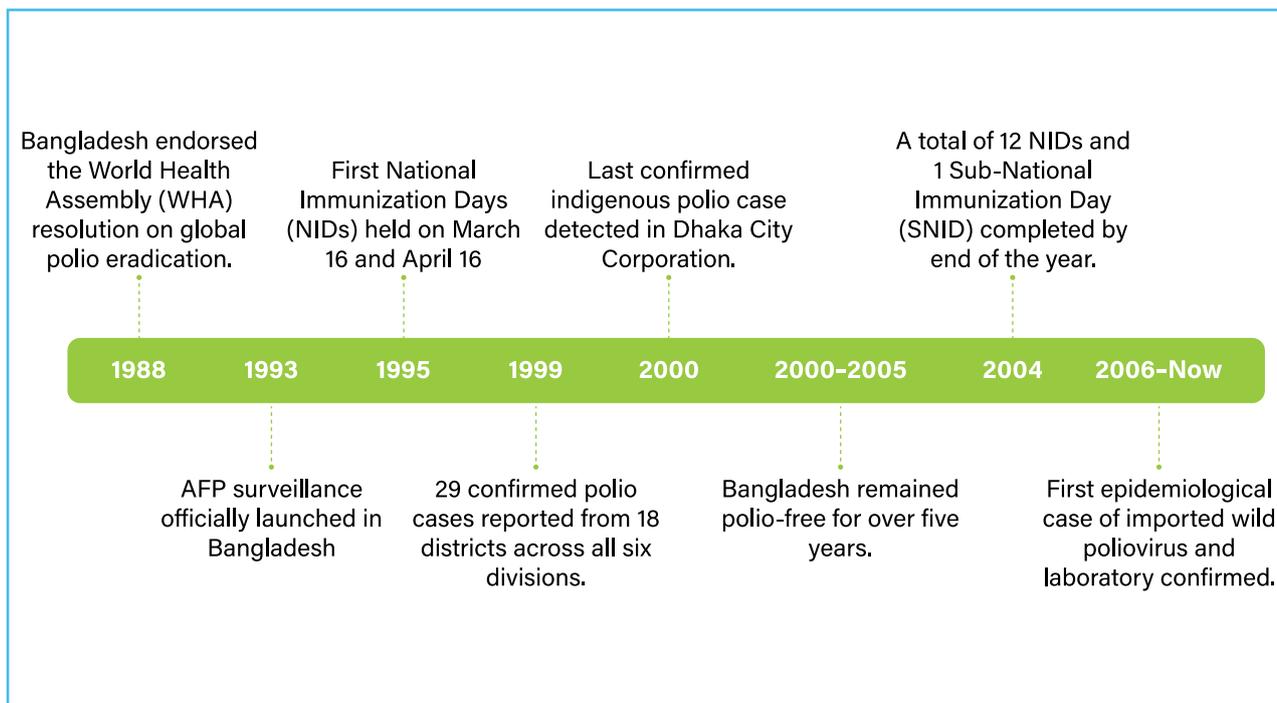
Figure 15. Timeline of AFP/ Polio surveillance and progress toward its elimination

Type and Structure of Surveillance

1. **Active Surveillance:** It involves surveillance officers visiting prioritized health facilities to identify and investigate unreported AFP cases through record reviews, staff interviews, and ward visits. High-priority sites, such as district, tertiary, and major private facilities, are visited weekly, while lower-priority sites are visited fortnightly or monthly. All visits are scheduled, tracked, and documented in patient registers. A total of 167 health facilities is included under this system.

2. **Passive Surveillance:** Relies on health facilities or designated individuals to regularly submit weekly reports on AFP cases as part of routine reporting. Reports are submitted even if no cases are found (zero reporting). A total of 792 sites is included under this system.

3. **Community-Based Surveillance:** Utilizes community members such as pharmacists, traditional healers, religious figures, or local leaders to report suspected cases of paralysis in children.

Case Definition

Nationwide AFP surveillance is the gold standard for detecting cases of polio, using the following recommended standard case definition: A suspected case is any case presenting with AFP. An AFP case is defined as a child <15 years of age presenting with recent or sudden onset of floppy paralysis or muscle weakness due to any cause (including Guillain-Barré syndrome), or any person of any age with paralytic illness if poliomyelitis is suspected by a clinician (paralysis is not present since birth or not a result of an injury).

Key Steps of AFP surveillance

- Identification and reporting of AFP cases in children under 15 years
- Collection and transport of stool samples for laboratory analysis
- Isolation and identification of poliovirus in the laboratory

Case Detection

Active Case Search

Non-polio AFP targets ≥2 per 100,000 children under 15, increasing to 3 per 100,000 during and 12 months after a polio outbreak. Health officials actively identify cases by engaging community leaders, teachers, social workers, traditional healers, and mothers, especially in silent or high-risk districts. Detected cases are investigated within 48 hours, with two stool specimens collected 24–48 hours apart for cases with recent paralysis onset.

Retrospective Record Review

It is conducted over a minimum one-year period in both active and passive surveillance facilities, including rehabilitation centers, to identify children under 15 with signs of AFP. Identified cases are documented using a standard case investigation form, followed up, and submitted to the Expert Review Committee for classification. The reviews aim to detect missed cases, assess the sensitivity of the AFP surveillance system, identify gaps in surveillance, raise local awareness, and provide recommendations to strengthen AFP surveillance policies and procedures.

Case Investigation

The DSFP and LSO investigate the case by using case investigation form after receiving notification following steps mentioned below:

- **Step 1:** Assign a case identification number (ID) to the AFP case
- **Step 2:** Mobilize all members of the investigation team and prepare for the investigation; contact SIMO by phone or via Civil Surgeons' office or through Municipal Medical Officer or Chief Health Officers office
- **Step 3:** Investigate the suspected AFP case within 48 hours of report and fill up the Acute Flaccid Paralysis (AFP) Case Investigation Form
- **Step 4:** Collect two stool specimens and send to the National Polio and Measles Laboratory (NPML) at the Institute of Public health (IPH) in Dhaka together with filled up Investigation Form for Acute Flaccid Paralysis
- **Step 5:** Record the required information in the AFP Line Listing Form
- **Step 6:** Search for additional cases which may have occurred during the previous 6 months and conduct Outbreak Response Immunization (ORI) near the site where the case was believed to have been infected
- **Step 7:** For cases without adequate stool sample, or cases with stool report of polio or vaccine derived or vaccine virus, conduct follow-up examination 60-90 days after paralysis onset and submit completed 60+ Day Follow Up Examination Form to EPI Headquarter
- **Step 8:** For cases without adequate stool sample and 60+ days follow-up with residual paralysis or follow-up not done due to death or lost to follow-up - additional information form along with all medical records to be sent to EPI HQ for Expert Review Committee (ERC) to classify the case

Sample Collection

For AFP surveillance, two stool samples are collected 24–48 hours apart from children under 15 years presenting with sudden onset of flaccid paralysis. The initial collection is done at the community level by Health Assistants (HAs) and stored at +2°C to +8°C at the UHC or other sample collection/ storage centers. Samples are transported within 72 hours of the first collection to NPML- IPH, Mohakhali, Dhaka.

Data Flow and Reporting Mechanism

Cases can be identified at both the community and facility levels. Suspected cases are identified by health workers during routine fieldwork or through community-based reports. Upon detection, health workers promptly inform the Assistant Health Inspector (AHI) or Health Inspector (HI), who facilitates referral of the case to the nearest Upazila Health Complex (UHC) for clinical evaluation and sample collection, if applicable. At the UHC, the Medical Technologist for EPI (MT EPI) is responsible for recording the details of the suspected case using the "AFP and EPI Diseases Weekly Line Listing Form for Hospitals and Upazila Health Complexes." This form captures key epidemiological and clinical data for each reportable case. The completed weekly line listing forms are submitted to the Civil Surgeon's office, where they are reviewed and compiled. These data are then shared with the EPI. In parallel, aggregated weekly surveillance data on VPDs are entered into the DHIS2 platform by the Upazila-level statistician or MT EPI and weekly aggregated data from the upazilas are uploaded in DHIS 2 by statistician of the CS office. In addition individual case and samples are validated by SIMO from WHO. Sample transport cost is paid by WHO through EPI. For the JE cases, transport costs are paid by EPI. If no cases are detected, a "ZERO" report is submitted.

## Data Interoperability, Analysis, and Visualization

Divisional and district offices do not perform data entry. The EPI is solely responsible for monitoring and ensuring the quality of the data uploaded at the district level to the DHIS2 system. The printed copies of the weekly compilation reports are archived at the CS office. The sample testing reports from NPML-IPH are sent to EPI and WHO HQ. The District Surveillance and Immunization Officer (SIMO) of WHO serves as the conduit for the report to the district and upazila levels. EPI conducts data analysis with technical support from the WHO. Each year, EPI compiles the findings into a report and submits it to MIS, DGHS.

Use of Surveillance Data

AFP data is essential for monitoring disease trends, detecting outbreaks, and assessing the effectiveness of immunization programs including evidence generation. It helps the Government, and the collaborating organizations to identify high-risk areas, prioritize interventions, and allocate resources efficiently. Additionally, the data supports evidence-based policymaking, guides vaccine planning and introduction, and ensures timely public health responses to emerging threats.

Data Protection and Privacy

The data system is designed to maintain full anonymity, always ensuring patients' confidentiality. DHIS2 operates on a secure, password-protected server for safe data storage. Additionally, hardcopy reports are securely stored in compliance with national data protection standards. Test reports are not provided to patients like other general diagnostic tests, except in the case of a positive result.

4.2.4.2 Measles

Brief History

Bangladesh initiated measles outbreak surveillance in 2003 and expanded to case-based surveillance in 2008 to improve the detection, investigation, and response to suspected measles cases. Currently, the country employs fever and rash surveillance, conducting simultaneous testing for both measles and rubella to enhance case confirmation and monitoring. These surveillance efforts support Bangladesh's commitment to the Global Vaccine Action Plan, endorsed by the World Health Assembly in 2012, which aims to eliminate measles and rubella globally. Aligning with the WHO South-East Asia Region's revised elimination target of 2023, Bangladesh continues to strengthen its surveillance system as a critical component of its measles elimination strategy.

Type and Structure of Surveillance

Bangladesh operates an active, case-based measles surveillance system aimed at the rapid detection and response to suspected cases. Surveillance Medical Officers (SMOs) and Surveillance and Immunization Officers (SIMOs) regularly visit health facilities to identify unreported cases and oversee timely investigations. The system integrates fever and rash surveillance, where all suspected cases undergo parallel laboratory testing for both measles and rubella. Data collection starts at the community level through Health Assistants and Health Inspectors, or other trained personnel who report suspected cases to the Upazila Health Complexes (UHCs). At the UHC level, cases are recorded, and data are compiled before being forwarded to district health offices. SIMOs consolidate reports from all upazilas and submit aggregated data to national surveillance units. This hierarchical and coordinated reporting structure ensures effective case tracking, early outbreak detection, and timely public health responses aligned with Bangladesh's measles elimination goals.

Objectives

1. Characterize epidemiology and measure burden of measles and rubella.

2. Detect and investigate outbreaks and take immediate actions to prevent additional cases or deaths during outbreaks.

3. Help public health officials at the upazila, district, municipality, city corporation, division and national level to develop more effective strategies to prevent measles.

4. Measure the impact of vaccination program.

5. Identify high risk population and areas Identify problems in service delivery (e.g. Cold chain problem, adverse event)

6. Measure the impact of specific health interventions and determine if a particular disease prevention strategy is effective (e.g. supplementary vaccination campaigns).

Case Definitions and Classification

Suspected case of measles: A patient with fever and maculopapular (non-vesicular) rash or a patient whom a clinician suspects measles or rubella irrespective of age.

Suspected Measles Outbreak: Occurrence of 3 or more cases in a rural ward or urban mahalla (approximately 10,000 population) in a period of 30 days. A single laboratory confirmed case of measles or rubella should be treated as an outbreak and public health response should be initiated accordingly.

Laboratory criteria for diagnosis: Presence of measles/rubella specific IgM antibodies Laboratory-confirmed case. A suspected case of measles or rubella that has been confirmed positive by testing in a proficient laboratory, and vaccine-associated illness has been ruled out.

Epidemiologically linked case: A suspected case of measles, or rubella, that has not been confirmed by a laboratory but was geographically and temporally related, with dates of rash onset occurring 7-21 days apart for measles (or 12-23 days for rubella) to a laboratoryconfirmed case or, in the event of a chain of transmission, to another epidemiologically confirmed measles or rubella case.

Clinically compatible measles case: A suspect case with fever and maculopapular (nonvesicular) rash, for which no adequate clinical specimen was taken, and which has not been linked epidemiologically to a laboratory-confirmed case of measles, rubella or another laboratory-confirmed communicable disease.

Population and Geographic Coverage

Measles surveillance in Bangladesh monitors suspected cases in people of all ages across the entire country. It covers both urban and rural areas through 792 passive surveillance sites, including 167 sites that also conduct active surveillance. This nationwide system helps ensure early detection and a timely response to measles cases.

Sample Collection and Testing Protocol

Blood and nasopharyngeal swab samples are collected from suspected cases who meet the case definition from 792 sites across the country including Upazila Health Complexes (UHCs), District General Hospitals, City Corporations, Medical College Hospitals etc. typically by the Medical Technologist (Lab)/ MT EPI/ designated sample collector. 3 to 5 ml blood sample is collected within 28 days of rash onset - preferably within the first 14 days and swab sample is collected within 7 days of rash onset. After collecting, the specimens are immediately sent to the National Polio Measles Rubella Laboratory (NPML- IPH), located at Mohakhali, Dhaka via designated porters/ messengers. At NPML-IPH, sample testing is conducted using both IgM antibody ELISA and both real time and Genotyping RT-PCR (Real-time Reverse Transcriptase Polymerase Chain Reaction) for confirmation and genotyping. It is mentioned that under measles surveillance, all "fever and rash" samples are tested for both measles and rubella through parallel testing. The laboratory test reports are delivered to PM, EPI and WHO HQ. From EPI the positive test results are notified to the authorized focal person of the site from where the sample is provided.

Data Flow and Reporting Mechanism

Cases can be identified at both the community and facility levels. Suspected cases are identified by Health Assistants during routine fieldwork or through community-based reports. Upon detection, Health Assistants promptly inform the Assistant Health Inspector (AHI) or Health Inspector (HI), who facilitates referral of the case to the nearest Upazila Health Complex (UHC) for clinical evaluation and sample collection, if applicable. At the UHC, the Medical Technologist for EPI (MT EPI) is responsible for recording the details of the suspected case using the "AFP and EPI Diseases Weekly Line Listing Form for Hospitals and Upazila Health Complexes." This form captures key epidemiological and clinical data for each reportable case. The completed weekly line listing forms are submitted to the Civil Surgeon's Office, where they are reviewed and compiled. These data are then shared with the EPI. In parallel, aggregated weekly surveillance data on VPDs are entered into the DHIS2 platform by the Upazila-level statistician or MT EPI and weekly aggregated data from the upazilas are uploaded in DHIS 2 by statistician of the CS office. On addition individual case and samples

are validated by SIMO from WHO. Sample transport cost is paid by WHO through EPI. If no cases are detected, a "ZERO" report is submitted.

Data Interoperability, Analysis, and Visualization

Divisional and district offices do not perform data entry. The EPI is solely responsible for monitoring and ensuring the quality of the data uploaded at the district level to the DHIS2 system. The printed copies of the weekly compilation reports are archived at the CS office. The sample testing reports from NPML-IPH are sent to EPI and WHO HQ. The District Surveillance and Immunization Officer (SIMO) of WHO serves as the conduit for the report to the district and upazila levels. EPI conducts data analysis with technical support from the WHO. Each year, EPI compiles the findings into a report and submits it to MIS, DGHS.

Use of Surveillance Data

Measles surveillance data is essential for monitoring disease trends, detecting outbreaks, and assessing the effectiveness of immunization programs. It helps the Government, and the collaborating organizations identify high-risk areas, prioritize interventions, and allocate resources efficiently. Additionally, the data supports evidence-based policymaking, guides vaccine planning and introduction, and ensures timely public health responses to emerging threats.

Data Protection and Privacy

The data system is designed to maintain full anonymity, always ensuring patient confidentiality. DHIS2 operates on a secure, password-protected server for safe data storage. Additionally, hardcopy reports are securely stored in compliance with national data protection standards. Test reports are not provided to patients like other general diagnostic tests, except in the case of a positive result.

4.2.4.3 Neonatal Tetanus (NT) Surveillance

Brief History

Neonatal Tetanus (NT) has been included in the Expanded Program on Immunization (EPI) since its establishment in Bangladesh in 1979. Globally, 2,076 NT cases were reported in 2022, while WHO estimates indicate 34,019 newborn deaths in 2015, an 85% reduction since 2000. In Bangladesh, 21 NT cases were identified through passive hospital-based surveillance in 2022. Each case highlights gaps in the health system. NT surveillance, integrated into the AFP surveillance system, aims to detect cases, monitor elimination progress, identify high-risk populations, and guide targeted public health interventions.

Case Definitions and Classifications

Suspected case: A suspected case for NT is a case that meets either of these two criteria:

Any neonate who could suck and cry normally during the first two days of life and developed tetanus-like illness or death between 3 and 28 days of age

OR
Any neonate who died of an unknown cause during the first month of life.

Confirmed case: A confirmed case is any suspected NT case found during case investigation to have all three of the following:

Normal ability to suck and cry during the first two days of life

AND
could not suck normally between 3 and 28 days of age

AND
developed muscle stiffness and/or spasms (jerking).

The basis for case classification is entirely clinical and does not depend on laboratory confirmation. NT cases reported by physicians are considered to be confirmed.

Discarded case: A discarded case is one that has been investigated and does not satisfy the clinical criteria for confirmation or has an alternate diagnosis.

Not investigated: Any suspected case not investigated, or without information available on age and symptoms to confirm the case, should receive the final classification of not being investigated.

Case Notification

All neonatal tetanus (NT) cases must be immediately reported to the DSFP. Health facilities, private practitioners, and other healthcare providers are required to report any NT case, whether they live or die, to the respective DSFP. Upon diagnosis, the mother should be vaccinated with Tetanus Toxoid Containing Vaccine (TTCV) as soon as possible, regardless of her prior immunization status. The DSFP will assign the LSO to investigate the case and implement appropriate actions. If the mother resides in a different upazila, municipality, or city corporation, the local DSFP will notify the relevant DSFP to carry out additional case-finding and response immunization activities. SIMO will provide technical assistance as needed.

Case Investigation and Response

1. Interview and examine the mother and infant (if living); complete the NT Case Investigation Form.

2. Vaccinate the mother with TTCV, repeating doses as needed per the national schedule.

3. Deploy the investigation team with forms, vaccines, and logistics to the community.

4. Screen the community through local health workers, leaders, and practitioners for additional NT cases or neonatal deaths in infants aged 3–28 days over the past six months.

5. Investigate additional cases and vaccinate the mothers.

6. Conduct house-to-house visits in the sub-block/mahalla of the index case to identify eligible women of childbearing age (CBA) and vaccinate them within a week; advise unvaccinated women to attend the next EPI outreach session and complete follow-up doses.

7. Vaccinate all eligible CBA women in remaining sub-blocks/mahallas of the ward within a month, documenting doses in the TTCV Registration Book.

8. Anticipate increased TTCV needs for the next EPI session.

As tetanus is not contagious, contact tracing is not required; however, completed investigation forms and immunization records must be submitted to EPI headquarters. As part of the AFP surveillance system, NT follows the same procedures for data collection, sample testing, analysis, and reporting.

4.4.4 Surveillance for Japanese Encephalitis

Brief History

In 2007, Bangladesh initiated sentinel surveillance for Japanese Encephalitis (JE) at three major tertiary hospitals: Rajshahi Medical College Hospital, Khulna Medical College Hospital, and Chattogram Medical College Hospital. Early data indicated that northern regions reported the highest number of cases. However, these figures likely underestimated the true national JE burden due to limited access to specialized laboratory testing and underreporting from other areas. To enhance surveillance coverage, the system was expanded in 2017 by integrating JE monitoring into the broader Acute Encephalitis Syndrome (AES) surveillance platform, which also covers Acute Flaccid Paralysis (AFP) and other vaccine-preventable diseases. This expansion brought all government medical colleges, district hospitals, and several prominent private hospitals under the AES network, facilitating a more comprehensive assessment of JE incidence and distribution nationwide. As a result, JE virus circulation was confirmed across all administrative divisions and most districts. The surveillance program is coordinated by IEDCR, EPI, and DGHS with technical support from WHO. For some sites, icddr,b supports in sample collection as these sites are common with Nipah Surveillance Sites. Between 2017 and 2022, a total of 420 JE cases were identified nationwide, underscoring the importance of sustained surveillance and prevention efforts.

Type and Structure of Surveillance

1. **Sentinel surveillance:** It is conducted in medical college hospitals where CSF and serum samples are collected and tested using ELISA.

2. **Event-based surveillance:** Monitoring any unusual health events or outbreaks reported by media, hotlines, and informal networks is under event-based surveillance.

This surveillance is conducted from December to March, the peak season of JE transmission. During this period the reporting frequency is bi-weekly. It is focused on testing samples from suspected JE cases for confirmatory diagnosis.

Case Definition:

A person of any age at any time of year with the acute onset of fever and at least one of the following: a change in mental status (including symptoms such as confusion, disorientation, coma, or inability to talk, neck rigidity) or new onset of seizures (excluding simple febrile seizures, Typhoid).

Goal: To define the disease burden and provide information to guide programmatic interventions.

Surveillance Objectives

1. To characterize the epidemiology
2. To detect early warning signals for an impending outbreak
3. To strengthening laboratory services for serum and CSF diagnostic assessment
4. To assess impact of vaccination as well as to guide future strategies
5. To identify high risk geographic areas and populations
6. To document the impact of control measures
7. To monitor mortality and morbidity
8. To conduct research regarding JE.

Population and Geographic Coverage

Suspected cases from medicine and pediatrics departments are the targeted population of JE surveillance. The surveillance is distributed in 103 sites including medical colleges hospitals, district hospitals, and private hospitals. The surveillance sites are listed in below Table.

Table 24: Surveillance sites of JE surveillance

Divisions	Govt. Health Facilities	Private Hospitals	Total
Barishal	7	0	7
Chattogram	15	1	16
Dhaka	26	12	38
Khulna	11	2	13
Rajshahi	9	2	11
Rangpur	10	0	10
Sylhet	4	4	8
Total	**82**	**21**	**103**
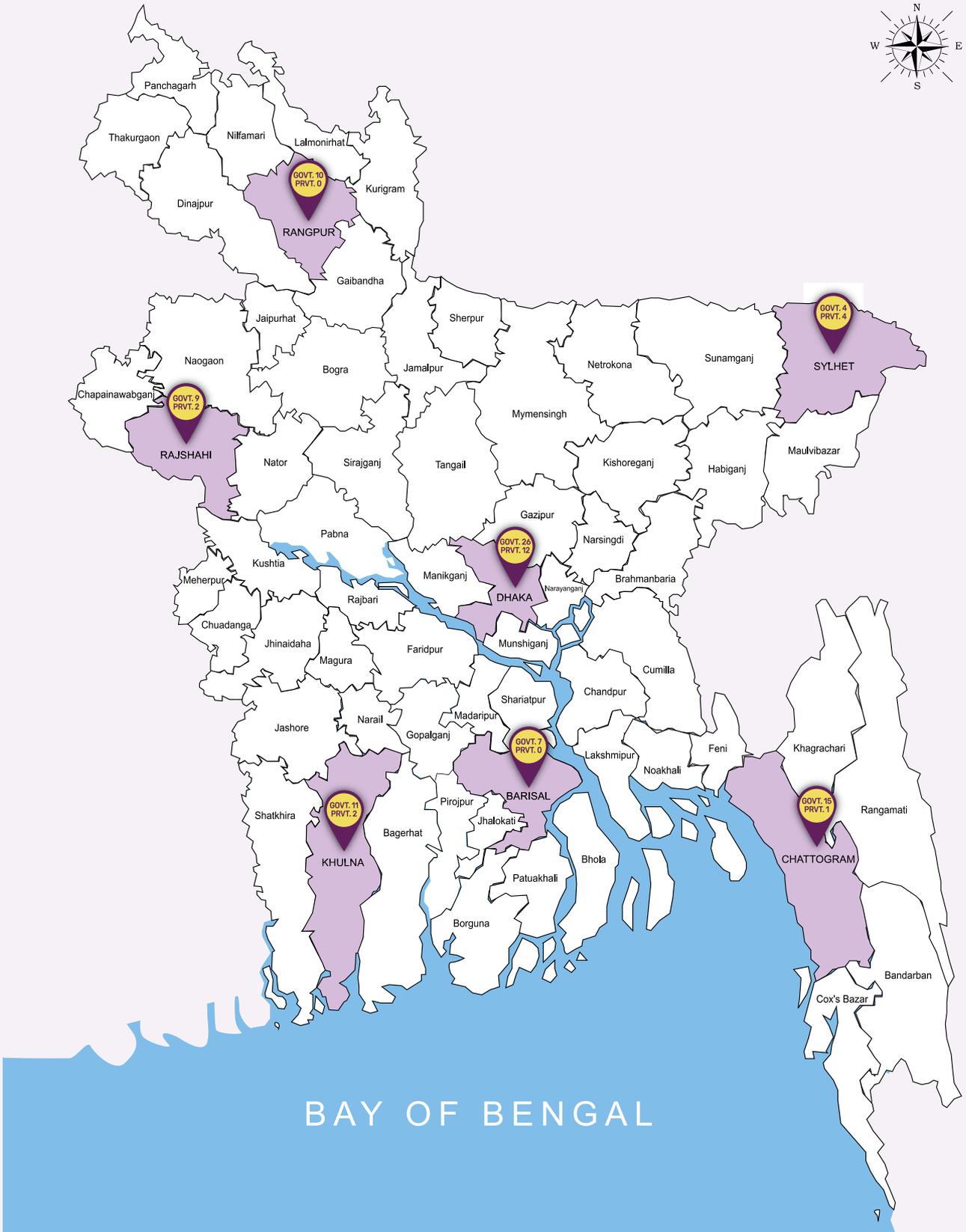
Figure 16. Sites of JE surveillance

Funding Agencies (excluding government) and Their Role

Table 25: Funding agencies and their role in JE surveillance

Funding Agency	Role and Support Provided
WHO	Offers technical and financial support, including laboratory infrastructure, equipment, reagents, capacity building, and training.

Governance and Stakeholder Role

Table 26: Governance and stakeholder with their role in JE surveillance

Stakeholder	Role in Japanese Encephalitis Surveillance
EPI, DGHS	Supervises data reporting and coordination between field units and central authorities, Leads governance.
IEDCR	Coordinates overall activities, laboratory testing, data analysis, and dissemination.
icddr,b	Supports sample collection.
Sentinel Hospitals	Manage patient enrollment, data collection, and sample transportation.
WHO	Provides technical and advisory support, ensuring alignment with global best practices.

Sample Collection and Testing Protocol

For JE testing serum and CSF are collected from the surveillance site hospitals by registered Medical or Surveillance Physicians. The samples are transported via porters to IEDCR every week. ELISA of the samples is done in One Health lab at IEDCR, and reports are sent to the sentinel sites bi-weekly during peak seasons.

Data Flow and Reporting Mechanism

Epidemiological information from suspected cases is collected from the surveillance site hospitals by surveillance physicians. The data is sent to IEDCR along with sample. The JE test is done at IEDCR and result incorporated in the data sheet by WHO. Patient test result sent to sentinel sites via email. Also, this data sheet is shared with EPI, DGHS and SEARO, WHO monthly via email.
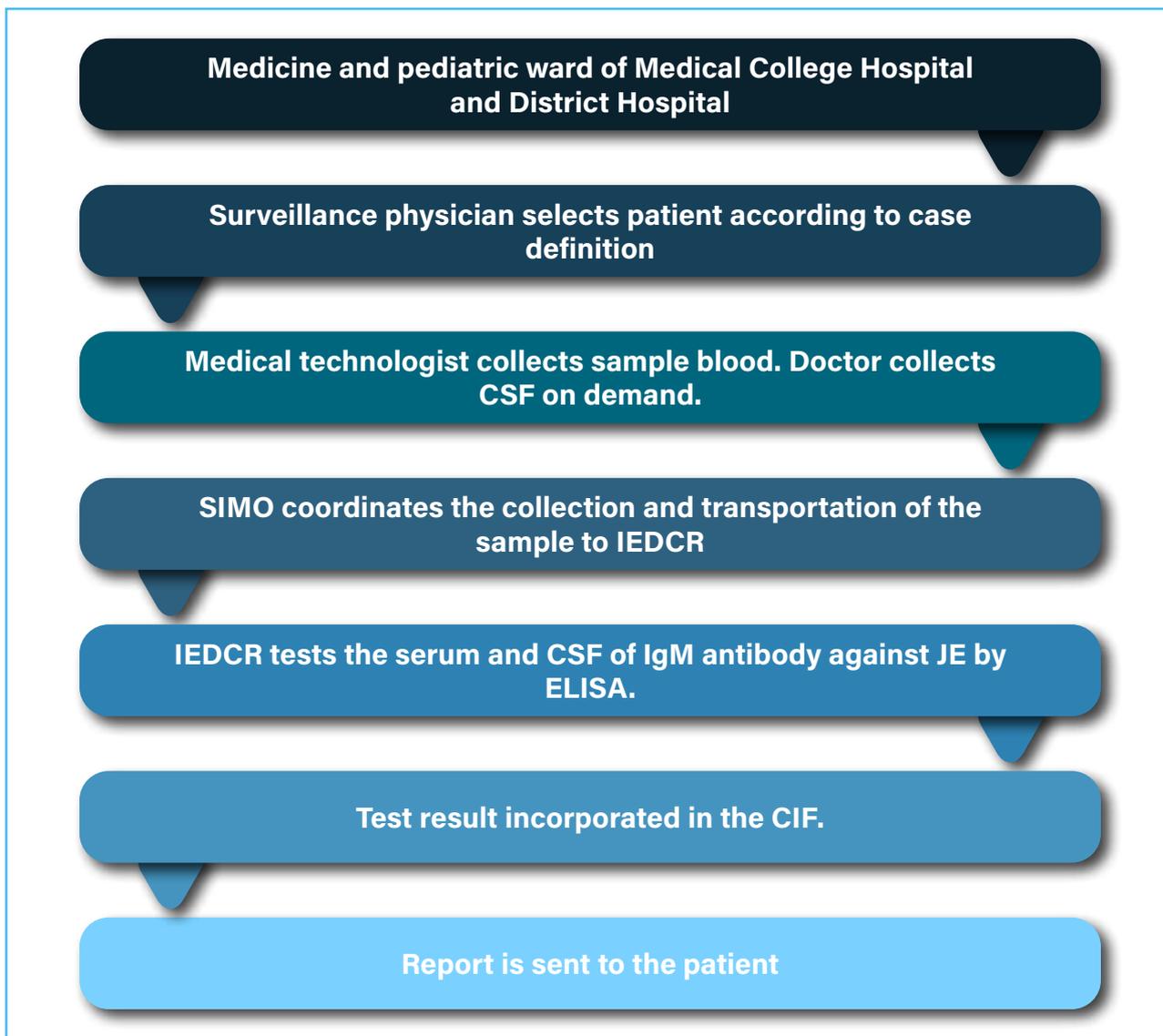
Figure 17. Flow chart of data collection and reporting for JE.

Data Interoperability, Analysis, and Visualization

The surveillance data is distributed to National Immunization Technical Advisory Group (NITAG), Southeast Asian Regional Office of WHO (SEARO), MOHFW biannually. Data analysis is carried out by IEDCR with technical support from WHO's statistician and EPI.

Use of Surveillance Data

Data from the Japanese Encephalitis surveillance system is extensively used by the DGHS, MoHFW, and its technical wing, the IEDCR, as well as by WHO and icddr,b. This data supports evidence-based policymaking, program planning, and research efforts focused on monitoring disease trends, evaluating intervention effectiveness, and strengthening JE control and prevention strategies.

Data Protection and Privacy

The surveillance data is stored in a password protected server in IEDCR and EPI.

4.2.4.5 Congenital Rubella Syndrome (CRS) Surveillance

Brief History

Congenital Rubella Syndrome (CRS) surveillance enables the early detection of infants with clinical manifestations, standardizing reporting for regional and global comparison. Early identification is critical for testing, inclusion in the surveillance system, and timely intervention, as infants with CRS may shed rubella virus for up to a year or longer. CRS carries significant morbidity and mortality, particularly in infants with cardiac defects, with estimated mortality ranging from 20–33%. The South-East Asia Region (SEAR) bears the highest burden, with an estimated incidence of 136 per 100,000 live births and approximately 46,621 annual cases. Globally, an estimated 103,000 CRS cases were born in 2010, 46% of which were in SEAR. Bangladesh integrated CRS surveillance into the AFP and VPD surveillance system in 2012. Since then, reporting has improved steadily: 20 clinically confirmed cases were reported in 2012 (2 laboratory-confirmed), rising to 175 clinical and 6 laboratory-confirmed cases in 2020, and 218 clinical with 10 laboratory-confirmed cases in 2021. CRS surveillance complements rubella surveillance, as CRS represents the most severe outcome of rubella and its prevention is the primary objective of rubella vaccination.

Surveillance Objective

The objectives for CRS surveillance are to:

- To document the burden of CRS prior to rubella vaccine introduction
- To monitor the impact of rubella vaccine introduction in reducing the incidence of CRS
- To detect and isolate affected infants rapidly
- To mitigate the consequences of the disease for infants and their families through early provision of appropriate medical care
- To demonstrate the elimination of CRS

The key global objective of CRS surveillance was to provide data in support of rubella elimination in five of six WHO regions by 2020.

Case Definition

Suspected CRS case: Any infant less than one year of age in whom a health worker suspects CRS.

A health worker should suspect CRS when

- There is a maternal history of suspected or confirmed rubella during pregnancy, even when there are no signs of CRS
- The infant presents with heart disease and/or suspicion of deafness, and /or one or more of the following eye signs:
    - white pupil (cataract);
    - diminished vision;
    - pendular movement of the eyes (nystagmus);
    - squint;
    - smaller eyeball (microphthalmos);
    - larger eyeball (Glaucoma).

Final case classification

Final classification of CRS cases depends, in part, on identifying Group A or Group 8 clinical signs of CRS.

- **Group A:** Cataract(s), congenital glaucoma, pigmentary retinopathy, congenital heart disease (most commonly peripheral pulmonary artery stenosis, patent ductus arteriosus or ventricular septal defects), hearing impairment.
- **Group B:** Purpura, splenomegaly, microcephaly, developmental delay, meningoencephalitis, radiolucent bone disease, jaundice that begins within the first 24 hours after birth.

Using these clinical signs, one of the final classifications listed below:

Laboratory-confirmed CRS: A suspected CRS case with at least one sign from group A and meets the laboratory criteria for confirmation of CRS

Clinically compatible CRS: A suspected CRS case without an adequate specimen in whom qualified clinician detects at least two of the complications from group A OR one from group A and one from group B.

Congenital rubella infection (CRI): An infant who has none of the clinical signs of CRS from group A, but who meets the laboratory criteria for CRS.

Discarded: A suspected CRS case with an adequate specimen not meeting the laboratory confirmed case definition, or a suspected case without an adequate laboratory specimen and not meeting the clinically compatible case definition.

Other Definitions (Based on Source of infection)

Endemic CRI/ CRS: A confirmed case whose mother was exposed to endemic rubella transmission during gestation, as supported by epidemiological or genotyping evidence. A chain of rubella virus transmission that is continuous for $\geq$ 12 months within a country is defined as an endemic transmission.

Imported CRI/ CRS: A confirmed case whose mother was exposed to rubella outside of the country during gestation, as supported by epidemiological or genotyping evidence.

Unknown source of CRI/ CRS: A confirmed case not meeting the above endemic or imported CRI/CRS case definitions.

Case Detection

Detecting the burden of rubella and CRS requires a comprehensive system to identify and report suspected CRS cases in infants promptly. Rubella cases and outbreaks should be confirmed serologically, fully investigated, and monitored to assess any increase in CRS incidence. Sentinel surveillance should be conducted at neonatology, eye, cardiology, ENT, and obstetric units, where infants with common CRS-related defects—cataracts, heart defects, or deafness—or with a maternal history of rubella during pregnancy are likely to be seen. Secondary and tertiary care facilities, where these defects are evaluated and treated, should be included as reporting or sentinel sites at the outset of CRS surveillance.

CRS surveillance in health facilities

Hospital based surveillance focuses on:

- Identifying infants 0-11 months of age with suspected CRS
- Investigation of all suspected CRS cases by a clinician for clinical confirmation and laboratory testing.
- In implementing CRS surveillance, all active surveillance facilities for AFP and VPD surveillance are to be sensitized to report and investigate any suspected CRS case. The facilities include all district level general hospitals, government and non-government medical college hospitals and some large private hospitals/clinics, specialized hospitals like NICVD, NIO, Bangladesh Medical University (BMU) etc.

All rubella cases meeting the surveillance case definition should be identified by clinicians, documented on the AFP & EPI Disease Report Form, and submitted to the HSO. The SIMO provides technical support and assigns EPID numbers as needed. HSOs ensure timely reporting of all CRS cases to the DSFP, and Case Investigation Forms, with or without specimens, are sent to the National Laboratory for verification and feedback.

Sample Collection and Transportation Process

For serological diagnostics, 1 ml of blood should be collected, centrifuged to separate serum, and stored at 2–8°C. Serum samples must be transported to the laboratory under cold chain conditions. Throat swabs should also be collected for virus isolation or detection.

Laboratory Confirmation Criteria for Suspected CRS Cases
- Detection of rubella IgM antibody above the cut-off.
- Sustained rubella IgG antibody on at least two occasions ($\geq$1 month apart) between 6–12 months of age, without prior rubella vaccination.
- Rubella virus detection via RT-PCR or virus isolation from appropriate clinical samples (throat swab, nasal swab, blood, urine, or cerebrospinal fluid).

Data Interoperability, Analysis, and Visualization

CRS surveillance data is analyzed at least monthly, or more often if needed. The analysis includes the number of cases reported, case classification status, and the geographic location of CRS cases. It also looks at whether cases are clustered or linked to rubella outbreaks, and considers maternal characteristics such as age, ethnicity, country of birth, vaccination status, and the location of maternal rubella exposure. The reporting mechanism for CRS follows the same system as AFP surveillance, using the established channels for case notification, documentation, and submission to the relevant health authorities.

4.2.5 HIV/AIDS Surveillance

Brief History

There are two types of HIV/AIDS surveillance in Bangladesh. National Integrated Behavioural and Biological survey (IBBS) is done at intervals to find out positive HIV/AIDS cases among key populations. While there is another surveillance system which is passive in nature that detects the positive cases (general population) and tracks the treatment course of positive patients over the year from the ART centers at district hospitals[55]. The HIV surveillance system in Bangladesh was formally established in 1998, following UNAIDS/WHO recommendations for second-generation surveillance. It focuses on key populations at higher risk, such as female sex workers, people who inject drugs, men who have sex with men, and transgender individuals (Hijra community), to monitor HIV prevalence and associated risk behaviors. Prior to 1998, from 1989 to 1996, surveillance was limited and fragmented, targeting groups like blood donors, STD patients, and pregnant women. With the structured system in place, Bangladesh introduced sentinel surveillance for regular HIV prevalence monitoring, behavioral surveillance for assessing high-risk practices, and the use of surrogate markers like syphilis and hepatitis C to track unsafe sexual and injecting behaviors. These surveillance efforts have been essential in shaping the country's HIV response strategy and ensuring evidence-based policymaking. However, there have been notable interruptions in surveillance activities. The most recent round of the Behavioral Surveillance Survey (BSS) was conducted in 2020, marking continued efforts to monitor trends despite challenges. Before that, Behavioural Surveillance Surveys (BSS) were conducted in 2006–07 and 2011. An exception to this gap was observed among men who have sex with men (MSM), male sex workers (MSWs), and transgender individuals (hijra), for whom both BSS and serological surveillance were carried out by icddr,b in 2013 and again in 2015 but the data were unpublished.
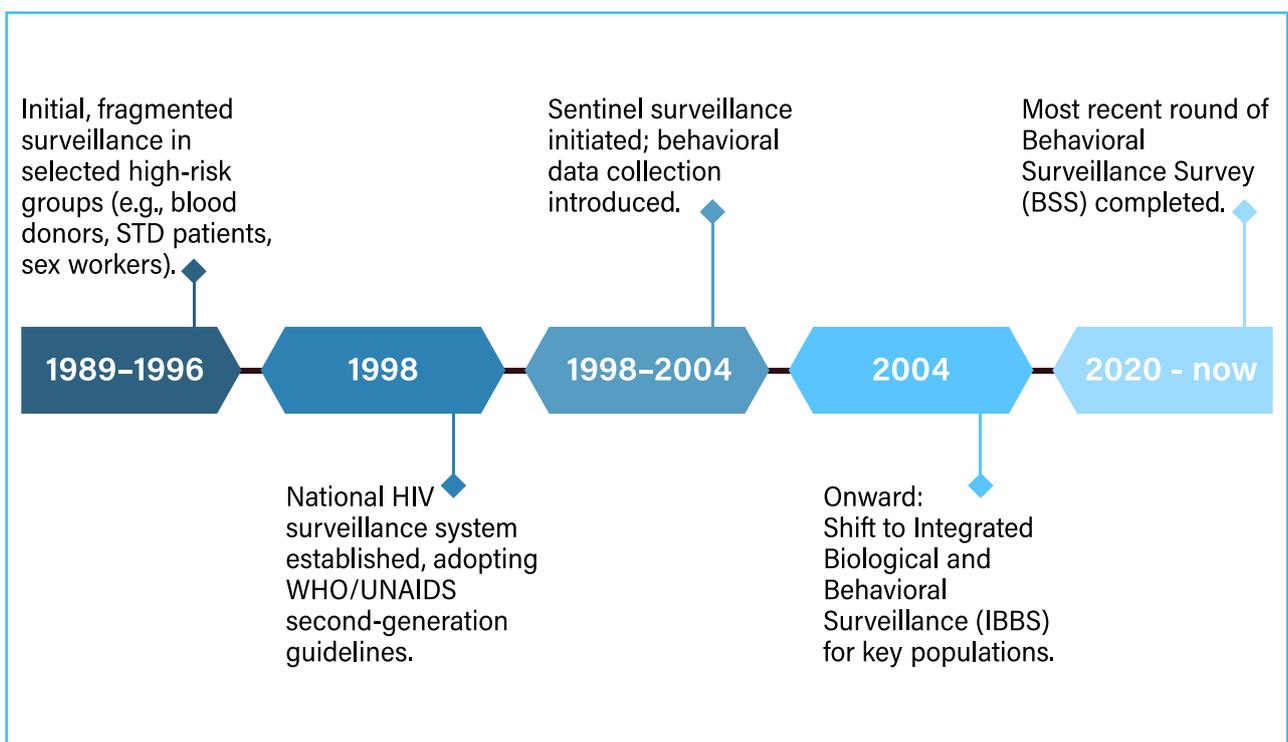
Figure 18. Timeline of the HIV Surveillance

Type and Structure of Surveillance

Type: IBBS is active surveillance, regular HIV/AIDS surveillance is passive in nature (ART center based).

Structure: Bangladesh employs a mixed surveillance system combining routine case-based reporting with periodic Integrated Biological and Behavioral Surveillance (IBBS) surveys. Routine surveillance involves continuous data collection from HIV testing centers, antenatal clinics, and ART treatment sites, monitored through the national Health Management Information System (DHIS2). IBBS surveys are conducted periodically among key populations at higher risk, such as people who inject drugs, female sex workers, and men who have sex with men, to assess infection prevalence and risk behaviors. Surveillance is coordinated by the National AIDS/STD Programme (ASP), which oversees data collection, analysis, and reporting through a network of district-level officers and health facilities.

IBBS Surveillance Objectives

The specific objectives of IBBS 2020 were to:

1. To assess the levels of HIV-related risk behaviors
2. To determine the access to and use of HIV and STI prevention and treatment service
3. To determine the level of HIV and STI-related knowledge among the Key Populations (KPs)
4. To determine experience of stigma, discrimination and violence
5. To estimate the prevalence of HIV, HCV and active syphilis in FSW, MSM, TG (Hijras) and PWID in selected districts in Bangladesh

Population and Geographic Coverage

Target population: The study populations of the latest IBBS in 2020 were the following four KPs and were defined as:

1. Female sex workers (FSW): Women who sold sex for money or goods in the past 12 months and included the street, hotel and residence based female sex workers.
2. People who inject drugs (PWID): Persons who injected drugs for non-medical purposes in the past one month, including both males and females.
3. Men who have sex with men (MSM): Biological males who reported having had anal sex with a male partner in the past six months
4. Transgender Women (TGW): Self-identifies as belonging to a traditional hijra sub-culture and had anal sex with a man or a hijra in the past six months.

Eligibility criteria of the study participants: The eligibility of the KPs includes the following:
1. FSW: Women who sold sex for money or goods in the past 12 months
2. PWID: Persons who injected drugs for non-medical purposes in the past one month
3. MSM: Biological males who reported having had anal sex with a male partner in the past six months
4. TG (Hijras): Self-identifies as belonging to a traditional hijra sub-culture and had anal sex with another man or a hijra in the past 6 months
5. Other inclusion criteria: Age ≥ 18 years; Lived in the survey area for at least 3 months before the survey; Capable and willing to provide informed consent to participate

Geographic spread of IBBS

In 2020, the Key Populations (KPs) were selected following the criteria used in the previous IBBS survey. Although KPs are distributed across Bangladesh, due to resource constraints, time limitations, and operational feasibility, the survey focused on 10 intervention districts - where services are provided by Save the Children International, icddr,b, and Sub Recipients (SR)/ SSRs; and two non-intervention districts.

Table 27: Intervention and non-intervention areas of Integrated Biological and Behavioral Surveillance (IBBS) survey

Division	District	Selected Key Population
Intervention Areas		
Dhaka	Dhaka	FSW, PWID, MSM, TG
Dhaka	Gazipur	FSW, PWID, MSM and TG
Dhaka	Narayanganj	FSW, PWID and MSM
Chattogram	Cumilla	FSW, PWID and MSM
Chattogram	Chattogram	FSW, MSM and TG
Chattogram	Cox's Bazar	FSW
Rajshahi	Rajshahi	PWID and TG
Rajshahi	Chapainawabganj	PWID and TG
Khulna	Khulna	FSW, MSM and TG
Sylhet	Sylhet	MSM and TG
Non-Intervention Areas		
Mymensingh	Mymensingh	FSW and PWID
Barishal	Barishal	FSW and PWID

Note: FSW - Female Sex Workers; PWID - People Who Inject Drugs; MSM - Men Who Have Sex with Men; TG - Transgender individuals

Location of ART Centers: There are 14 ART centres for HIV surveillance, which are listed below [56].

1. Bangladesh Medical University (BMU)
2. Infectious Diseases Hospital, Dhaka
3. MAG Osmani Medical College Hospital, Sylhet
4. Moulvibazar 250 bed District Sadar Hospital
5. Khulna Medical College Hospital
6. Chattogram Medical College Hospital
7. 250 Bed District Sadar Hospital, Cox's Bazar
8. Cumilla Medical College Hospital
9. Shaheed Ziaur Rahman Medical College Hospital, Bogra
10. Sher-e- Bangla Medical College Hospital, Barisal
11. Ukhia Upazila Health Complex, Cox's Bazar
12. Sirajganj 250 Bed General Hospital
13. Jashore 250 Bed General Hospital
14. Mymensingh Medical College Hospital

HIV INTERVENTION AREAS

HIV NON-INTERVENTION AREAS
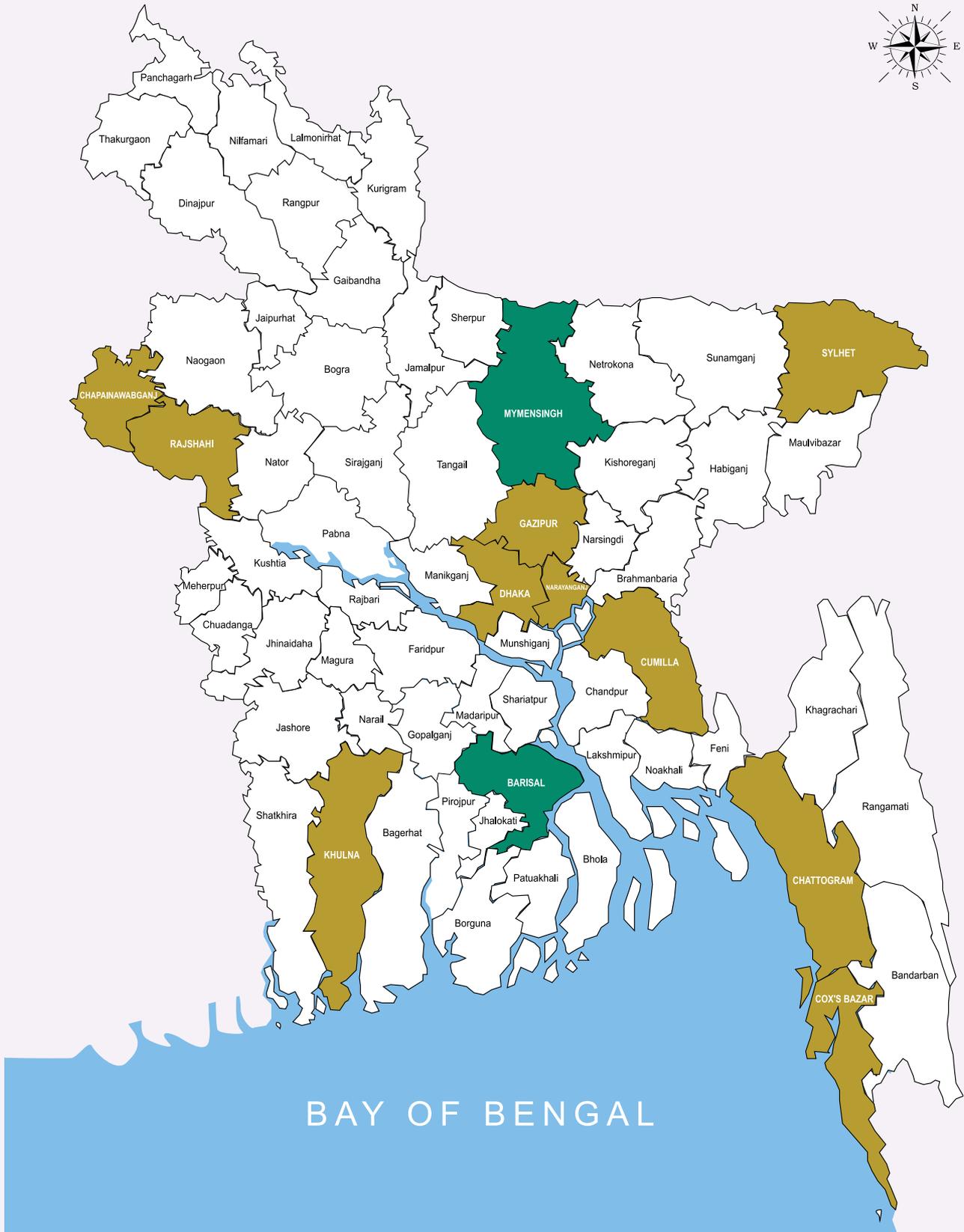
Figure 19. Location of ART Centers of HIV/AIDS Surveillance

Funding Agencies (excluding government) and Their Role

Table 28. Funding agencies and their role in HIV surveillance

Funding Agency	Role in HIV Surveillance
The Global Fund	Provides key financing for HIV prevention services targeting high-risk populations. Areas of the fund expense are as follows: Prevention of HIV spread, HIV testing, Antiretro viral therapy, capacity building, monitoring and evaluation of HIV/AIDS programmes, supporting services like advocacy and community awareness etc.

Governance and Stakeholder Role

Table 29. Governance and stakeholder with their role in HIV surveillance

Stakeholder	Role
icddr,b & IEDCR	Conducted eight initial surveillance surveys
Virology Department, BMU	Conducted the 2020 HIV surveillance survey
Several Ministries & Departments	Support surveillance and program coordination (Prisons, Youth & Sports, Police, Narcotics Control, Women & Children, Social Services)
NGOs (icddr,b, BRAC, Save the Children)	Provide technical support, advocacy, and program implementation

Different ministries and Departments (IG prisons, Ministry of youth and sports, Bangladesh Police, Ministry of Narcotics Control, Ministry of Women and Children, Ministry of Social Services)

icddr,b, BRAC, Save the children play important roles as implementing partners and sometimes as Principal Recipients (PRs) or Sub-Recipients (SRs) of Global Fund grants.

- icddr,b: Conducted serological and behavioural surveillance (BSS) among key populations like PWID, MSM, FSWs, and hijra along with IEDCR. They try to gather scientific evidence and epidemiological data which is utilized to prepare national HIV strategy. They have implemented harm reduction programs for people who inject drugs (PWID). Also, they refer patient to the DIC (Drop-in Centers) for ART.
- Save the Children: Principal Recipient (PR) for HIV Global Fund grants. They work for HIV prevention among Key Population
- BRAC: HIV testing among TB patients, referral of positive cases to ART centers.

Methodology

A cross-sectional study was designed, based on the latest guidelines of WHO and UNAIDS to determine the prevalence of HIV/STIs, risk behaviors, knowledge, attitude and practices, utilization of services and discrimination and stigma related to HIV among the key populations (KPs). Data collection time was between 8 October 2020 to 22 December 2021. Face-to-face interviews using a pre-tested structured questionnaire, and testing for HIV, syphilis and HCV were included in this surveillance. Data was collected from 8,397 study subjects from the intervention districts (2,382 FSWs; 2,376 PWID; 2,467 MSM and 1,172 TG) and 1,281 from the nonintervention districts (657 PWID and 624 FSW) in total.

Description of Study Sites Selection and Sampling Techniques
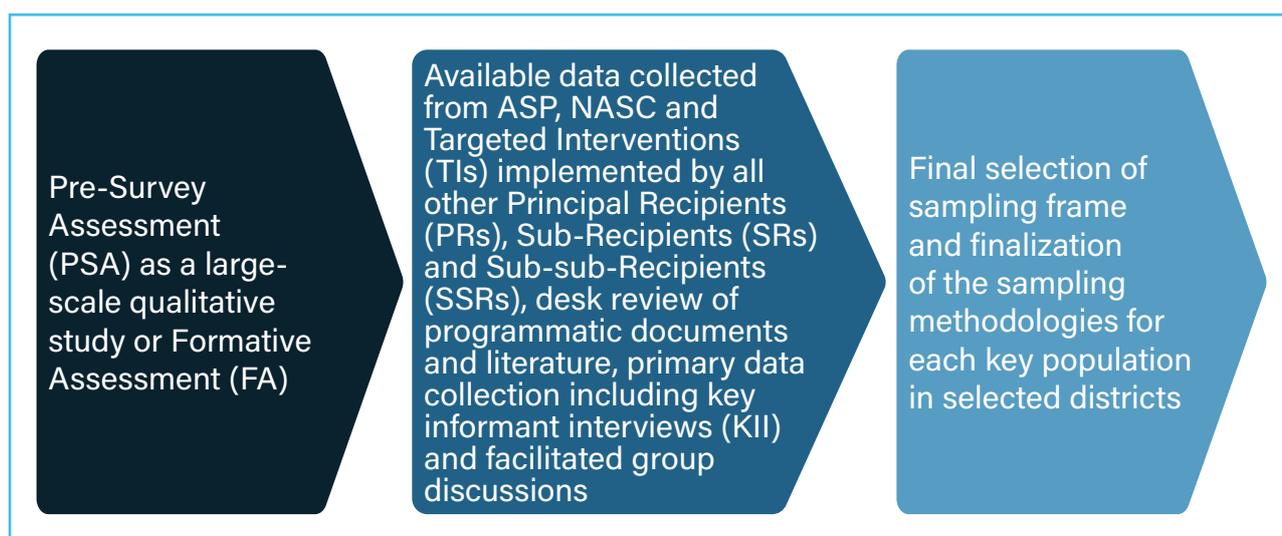
Figure 20. Three distinct sampling methods in IBBS survey

- **Respondent Driven Sampling (RDS) for MSM in all areas, and PWID and FSW in non-intervention areas**

RDS methodology was employed among men who have sex with men (MSM) in seven selected intervention districts - Dhaka, Narayanganj, Gazipur, Cumilla, Chattogram, Sylhet, and Khulna and among people who inject drugs (PWID) and female sex workers (FSW) in two non-intervention districts - Barishal and Mymensingh.

In the intervention districts, selected Drop-In Centers (DICs), Sub-DICs, and outreach outlets of existing implementing partners (Principal Recipients, Sub-Recipients, and Sub-Sub-Recipients) were used as venues for survey data and blood sample collection. However, in Barishal and Mymensingh, where no implementing partners for FSW and PWID were present, temporary rented spaces in schools and community centers were used instead.

Following the development of a data collection plan, the field team, in collaboration with NGO staff, identified suitable "seeds" to initiate the RDS recruitment process. These seeds were selected based on specific criteria outlined in the RDS Operational Manual.

To reach equilibrium in the recruitment chains:
- 5–6 seeds (only 5 in Khulna) were selected from the MSM community in each intervention district, based on characteristics such as age and whether they were clients of a DIC.
- In Mymensingh, 6–9 seeds were selected from the PWID and FSW communities.
- In Barishal, 6 seeds were selected from the FSW community and 9 from the PWID community.

Each seed received a detailed orientation from the field team regarding their role in the IBBS process and the correct use of recruitment coupons.

- **Time Location Sampling (TLS) for PWID and FSW in the intervention areas**

At each selected venue, a discrete and private location was identified for conducting the interviews and collecting biological specimens. These locations were easily accessible from the recruitment areas and were designed to be quiet, spacious, and confidential, ensuring the comfort and privacy of participants. In venues lacking sufficient infrastructure,

temporary structures such as tents or partitions were used to create appropriate spaces for data collection.

All participants were provided with a clear explanation of the survey objectives, and verbal informed consent was obtained prior to conducting the questionnaire interview and collecting blood samples for HIV testing. Rapid HIV tests were performed on-site immediately after sample collection.

The following steps were followed as part of the Time-Location Sampling (TLS) method:

1. Counting eligible individuals present at the venue during the defined time window.
2. Approaching and screening individuals to assess their eligibility for the IBBS.
3. Enrolling eligible participants into the study after obtaining consent.
4. Conducting the questionnaire interview and collecting biological specimens (e.g., blood samples).
5. Performing rapid tests on the biological specimens at the same location.

Each data collection team was responsible for recruiting approximately 12–14 respondents daily, typically from two different spots. Data collection was carried out over an eight-hour working period each day.

- **Conventional Cluster-based Sampling (CCS) for Hijra**

The cluster for the sampling of TGW population was the network of one guru (i.e., number of chelas under one guru). The list of all the clusters (sampling frame of clusters) was prepared for the intervention districts including their size (i.e., number of chelas under each guru).

Sample Collection and Testing Protocol

- **Types of specimens:** Blood. It is mentioned that there is no need to transport sample (ART centers). Sample transport procedure during IBBS could not be identified.

The HIV testing used a serial algorithm recommended by the WHO and was performed at the contact site.

- **Laboratory (IBBS):** BMU virology laboratory. The laboratory has their SOP. But it was not mentioned if the SOP is only for HIV surveillance. Rapid tests were conducted on-site using whole blood collected via finger stick. A linked anonymous testing approach was used, allowing participants to receive their results while maintaining confidentiality. Only laboratory technologists had access to individual test results. Blood specimens with reactive results were sent to the BMU laboratory in Dhaka for confirmatory testing. Participants who tested positive for anti-HIV or anti-HCV were informed of their results and referred to the nearest Drop-in Center (DIC), C-DIC, outlet, or clinic operated by PRs and SRs/SSRs for further evaluation, management, and follow-up. Final test results (HIV, HCV, and active syphilis) were shared with the ASP, PRs, and SRs/SSRs to ensure appropriate treatment of STI and HIV-positive individuals through the DICs/Sub-DICs/Outlets.
- **Laboratory for Regular HIV Surveillance:** There are 25 ART centers all over Bangladesh. In these centers, there is a facility to run screening and confirmatory tests from HIV/AIDS. Not only KPs, but any common people can also go there and test themselves (even without any prescription) and the test is totally free. This testing is supported (funded) by the GF.

Types of tests (IBBS)

1. **Testing for HIV**

   HIV rapid testing was carried out following pre-test counselling, conducted by trained laboratory technologists and was followed by post-test counselling.

2. **Testing for syphilis**

   The rapid test for syphilis was conducted at the survey sites using STANDARD Q Syphilis Ab test kit on whole blood collected through finger stick. All reactive samples were retested using BIOTEC RPR Test Kit (Lab 21 Healthcare Ltd. Dorset, UK) and IMMUTREP â TPHA Test Kit (Omega Diagnostics Ltd, Alva, UK) at the BMU laboratory in Dhaka to determine whether the infection was active and whether treatment was needed. Both two kits are CE marked and available and used in several standard laboratories in Bangladesh.

3. **Testing for viral hepatitis C (HCV)**

   HCV rapid test was conducted at survey sites using Standard Q HCV Ab (SD Biosensor, Korea) rapid chromatographic immunoassay. This test provides only an initial screening test result.

Types of Tests at ART centers

1. Determined
2. Unigold
3. Fast response

To declare any person HIV positive, all the three tests should be positive.

Data Flow and Reporting Mechanism (IBBS)
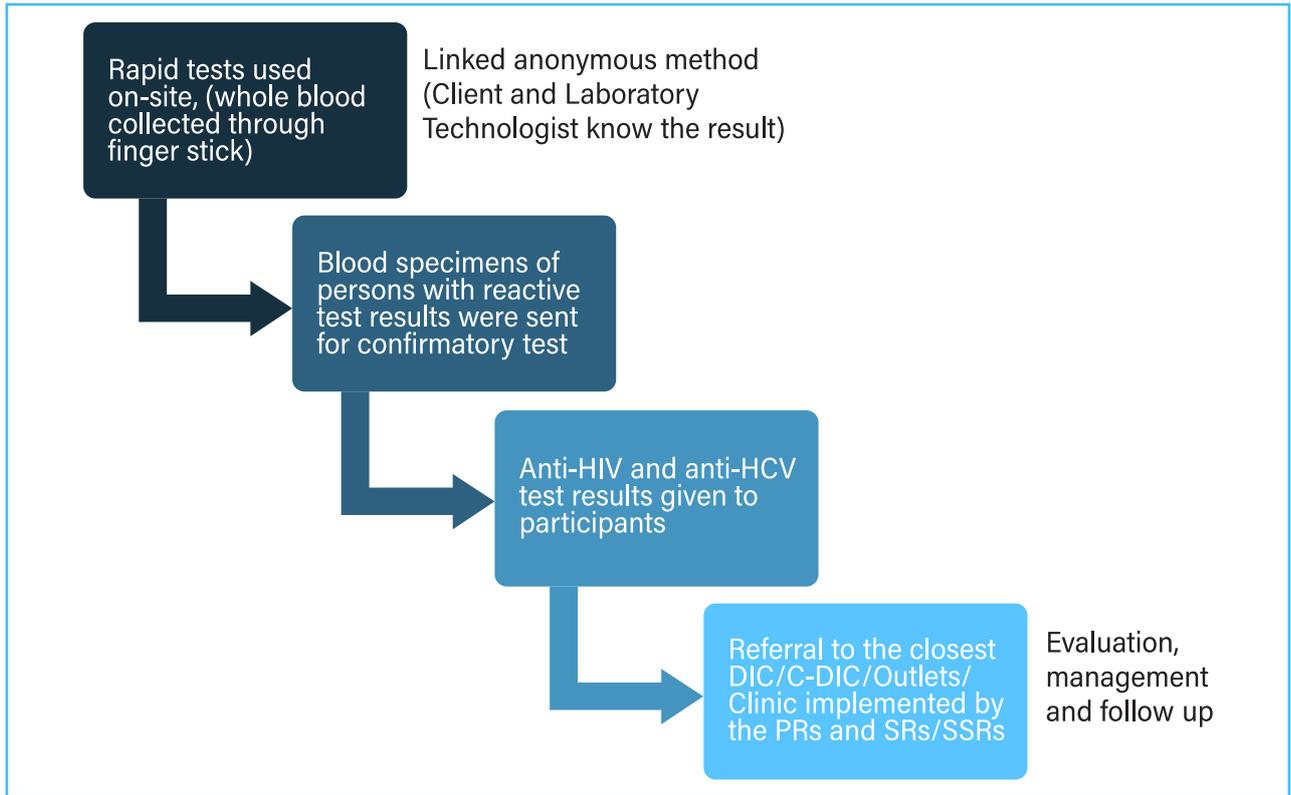
Figure 21. Data flow and reporting mechanism in IBBS survey

Testing process: Testing with Kit - On-spot Result - Interview with questionnaire - Data entry via pad on daily basis where test results are included and questionnaire is uploaded - Central server receives data from field daily

Data Flow in General
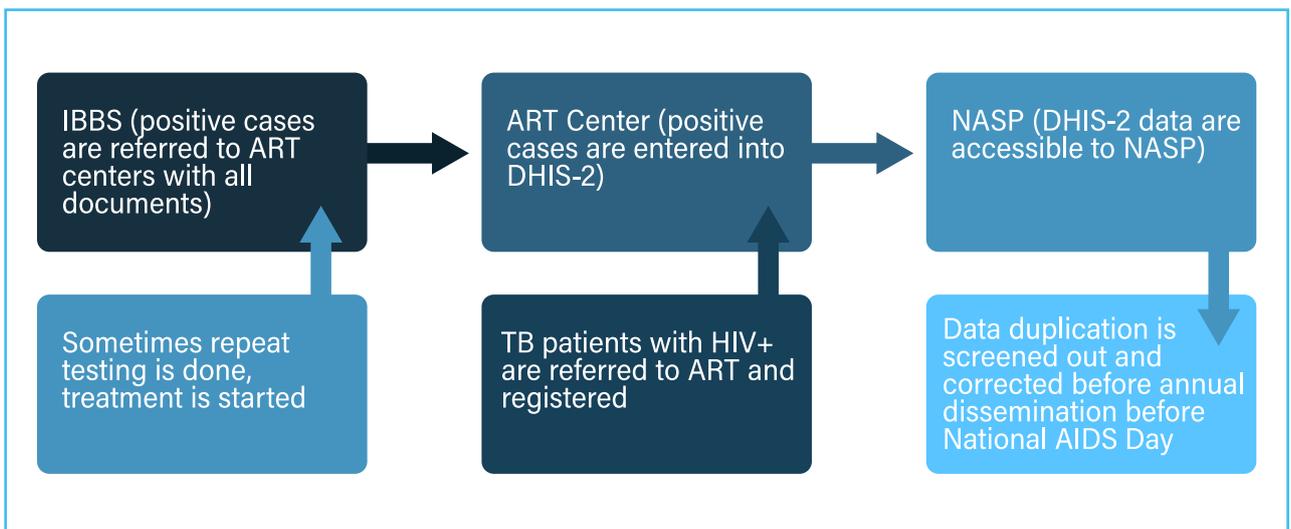
Figure 22. General data flow in IBBS

Data Interoperability, Analysis and Visualization

HIV surveillance data in Bangladesh are utilized to estimate the prevalence of HIV, syphilis, and hepatitis C (HCV), assess risk behaviors, evaluate access to prevention and treatment services, and monitor experiences of stigma, discrimination, and violence. The National AIDS/ STD Programme (ASP) employs a dedicated data analysis team to manage these tasks. Data is collected through various channels, including Integrated Biological and Behavioral Surveillance (IBBS) surveys, and are integrated into the District Health Information Software 2 (DHIS2), the national Health Management Information System. Within DHIS2, dashboards are available that provide updates on individuals who have tested for HIV/AIDS and those receiving treatment at Antiretroviral Therapy (ART) centers. These dashboards facilitate real-time monitoring and support evidence-based decision-making. However, it's important to note that IBBS data are not currently integrated into DHIS2. The ASP is actively working to enhance data interoperability, aiming to incorporate IBBS data into DHIS2 to provide a more comprehensive view of the HIV epidemic and improve the effectiveness of public health interventions. The data analysis team is hired/ recruited by National ASP. DHIS2 shows two dashboards which have updates of people who test for HIV/AIDS and for those who receive treatment from ART centers. It does not show any data from IBBS.

Use of Surveillance Data

HIV surveillance data in Bangladesh are published annually in the health bulletin and disseminated through seminars, such as on World AIDS Day. This data supports evidence-based policy formulation by identifying high-prevalence areas and key populations, guiding resource allocation and targeted interventions. Surveillance findings also inform tailored public health messaging to raise awareness, reduce stigma, and promote testing and treatment. Additionally, timely and accurate data reporting fulfills international obligations to bodies like WHO, strengthening global collaboration and technical support. Importantly, this data also plays a critical role in securing global funding necessary to control HIV effectively. Mentioned that the IBBS 2020 data directly influenced the expansion of Antiretroviral Therapy (ART) centers, increasing the number from 9 to 12 nationwide. Specifically, among the Forcibly Displaced Myanmar Nationals (FDMN) population, ART centers were increased from 1 to 2 to address emerging needs. Additionally, the IBBS data is instrumental in preparing and submitting reports to the Global AIDS Monitoring (GAM) framework, ensuring international accountability and resource mobilization. Furthermore, surveillance findings guide the estimation of the HIV/AIDS-affected population, enabling policymakers to adapt HIV/AIDS programs and implement policy changes aligned with current epidemiological trends. This evidence-based approach ensures that interventions remain targeted, effective, and responsive to the evolving epidemic landscape.

Challenges

- Infrequent surveillance
- Donor Dependency
- Stigma hinders the true information from Key Population

Way Forward

- Advocate for decriminalization or harm reduction to create safer environment for KPs
- Increase domestic funding and reduce donor dependency
- Share the importance of surveillance necessity for maintaining regular surveillance frequency.

4.2.6 Enteric-Fever Surveillance System

Brief History

Enteric fever (typhoid and paratyphoid) surveillance in Bangladesh was first initiated in 1999, primarily in Dhaka by Child Health Research Foundation (CHRF) [57]. The surveillance has been project-driven, with major initiatives including the Infectious Disease Surveillance for Children and the Surveillance for Enteric Fever in Asia Project (SEAP). These projects have generated important data on disease trends, burden, and AMR. Although 1999 is widely cited as the starting point for enteric fever surveillance, there is no publicly available documentation explaining the context, objectives, or structure of the initial system. However, based on a review of available literature and input from key informants, it is confirmed that the surveillance was initiated by the CHRF as part of its broader efforts in pediatric infectious disease research. At present Enteric Fever surveillance is done by CHRF only. From 2023 CHRF has expanded the surveillance in total 23 sites including 20 clinics under Popular Diagnostic Center Ltd. covering 11 districts across the country [57].

Surveillance Objectives

The core objectives of the Enteric Fever surveillance systems by CHRF include:

1. Estimating the burden of infectious diseases in children.
2. Supporting vaccine development and incorporation into the national immunization schedule.
3. Informing national and subnational health policy decisions.
4. Monitoring disease trends and generating evidence for strategic planning.

CHRF's Objective

1. To generate comprehensive data on the burden of typhoid and paratyphoid fever in Bangladesh, using the established network of sentinel and population-based sites. It also includes a follow-up component to measure deaths and disabilities caused by this disease.
2. To estimate the infectious disease burden, support vaccine incorporation, and inform policy decisions.

SEAP's objective

To characterize the burden of enteric fever in south Asia, including Bangladesh using:

1. Retrospective review of laboratory and hospital records for blood-culture confirmed cases of Salmonella Typhi and S. Paratyphi.
2. Prospective surveillance in Bangladesh, Nepal, and Pakistan to examine:
   a. Population-based adjusted incidence of enteric fever infections, risk factors, clinical complications, and long-term impact including fatality using a hybrid hospital- and community-based approach
   b. Patterns of antimicrobial resistance for *S. Typhi* and *Paratyphi*
   c. Serologic markers of typhoid infection
   d. Environmental water contamination with *S. Typhi* and *S. Paratyphi A*

Type and Structure of Surveillance

The enteric fever surveillance system running by CHRF is both active and passive type of surveillance system. The active hospital-based surveillance takes place in Bangladesh Shishu Hospital and Institute, M R Khan Shishu Hospital and Kumudini Women's Medical College and Hospital and the clinics under Popular Diagnostic Centers Ltd are implementing the passive surveillance of Enteric Fever.

Case Definition

- Suspected case: A patient clinically suspected of enteric fever without laboratory confirmation of Salmonella Typhi or Salmonella Paratyphi infection by blood culture.
- Laboratory-confirmed case: A patient with Salmonella Typhi or Salmonella Paratyphi isolated from blood culture.

Population and Geographic Coverage

The current active surveillance system of Enteric Fever includes children under 18 years of age and passive surveillance system covers all age groups.

Sentinel Healthcare Facilities

1. Bangladesh Shishu Hospital and Institute
2. M R Khan Shishu Hospital Dhaka
3. Kumudini Women's Medical College and Hospital

Laboratory Network Sites

There are 20 clinics of Popular Diagnostic centers across 11 districts of the country. The districts are Rangpur, Bogra, Dinajpur, Mymensingh, Gazipur, Rajshahi, Kushtia, Narayanganj, Dhaka, Barishal, and Noakhali.

Figure 23. Laboratory sites for sample collection and testing in enteric fever surveillance

Funding Agencies (excluding government) and Their Role

Table 30. Funding agencies and their role in Enteric Fever surveillance

Funding Agency	Roles
Bill & Melinda Gates Foundation	Provided funding for the surveillance activities
WHO	Coordinated the Global Invasive Bacterial Vaccine-Preventable Disease Surveillance Network (IB-VPD)
Sabin Vaccine Institute	Supported surveillance and research collaboration

Governance and Stakeholder Role

Table 31. Governance and stakeholder with their role in Enteric Fever surveillance

Stakeholder	Role/Responsibility
Principal Investigator (PI)	Overseas entire surveillance operations
Clinicians, Research Staff, Lab Assistants	Collect clinical data and biological samples
Bangladesh Shishu Hospital and Institute	
M R Khan Shishu Hosptal	Conduct laboratory testing and initial data management
CHRF	Leads data analysis and disseminates findings
Popular Diagnostic Center	Share test results and data

Sample Collection and Testing Protocol

Blood specimens are collected aseptically by trained laboratory assistants at the point of care, integrated within routine clinical services led by surveillance doctors. Approximately 2–3 mL of blood is drawn and inoculated into Trypticase soy broth supplemented with 0.25% sodium polyethanol sulphonate and 1% isovitalex or BACTEC Blood Culture System. Samples are incubated and subcultured on days two, three, and five following standardized procedures. Identification of Salmonella Typhi and Paratyphi isolates is performed using biochemical tests and serotyping with species- and serovar-specific antisera. Diagnostic testing is conducted within hospital laboratories, eliminating the need for sample transport. Standard bacteriological and antimicrobial susceptibility methods are employed to ensure accurate diagnosis.

Data Flow and Reporting Mechanism

- Data and samples collected at hospitals.
- Lab testing conducted at the same sites.
- Reports generated and shared with patients.
- CHRF performs centralized analysis and prepares surveillance reports.
- Dissemination occurs through stakeholder meetings and publications.

Data Interoperability, Analysis, and Visualization

- Integration Platforms like DHIS2 or WHO GOARN are not currently in use.
- Data Analysis is conducted by CHRF.
- Visualization and Dashboarding are not publicly accessible. All research is published as scientific papers.

Use of Surveillance Data

Surveillance findings are used to:

- Support national vaccine introduction decisions.
- Monitor trends in AMR.
- Inform policy development and public health strategies.
- Contribute to peer-reviewed research publications.

Data Protection and Privacy

The surveillance data is shared with project stakeholders although the data is not public, it is accessible through research publications. All data is collected and published anonymously according to international data protection standards.

Challenges

- Data from government health facilities are not included in the current surveillance as there is no link with CDC, DGHS or IEDCR.
- Lack of user-friendly diagnostic test.
- Only hospital admitted cases are included in the active surveillance which leads to under reporting of cases.
- Decrement of international financial supports.

Way Forward

- National health facilities need to be included in the surveillance.
- Integration of the current Enteric Fever Surveillance into MIS through CDC, DGHS.
- National Enteric Fever Surveillance system can be developed and integrated into DHIS 2.
- Introduction of disease modelling for estimation of under reporting.
- One health approach.
- National resource allocation for implementation of the surveillance.
- Integration of the current Enteric Fever surveillance with AMR surveillance data.

4.2.7 Dengue Surveillance

Brief History

Initially, dengue was sporadically reported following its first recorded appearance in 1964 as "Dacca fever," with no formal surveillance mechanism in place[58]. The first major outbreak in 2000, which resulted in 5,551 reported cases and 93 deaths, prompted the DGHS to initiate hospital-based surveillance in major public health facilities. In the subsequent years, sentinel surveillance sites were established across key urban centers, focusing primarily on clinical diagnosis due to limited laboratory capacity. Between 2010 and 2017, dengue was incorporated into the national notifiable disease framework through the IDSR system, and surveillance efforts expanded beyond Dhaka by the Government of Bangladesh with support from development partners. The large-scale outbreak in 2019, with over 100,000 confirmed cases and 179 deaths, exposed critical gaps in surveillance and response, leading to the initiation of daily public reporting and broader use of laboratory diagnostics, including NS1 antigen and IgM/IgG testing. The COVID-19 pandemic posed new challenges, particularly due to overlapping clinical symptoms and testing constraints, yet dengue transmission persisted. Since 2023, surveillance efforts have been enhanced through the integration of digital reporting tools such as DHIS2, and mobile applications, alongside expansion into all public and private health facilities in 2025. GIS-based vector surveillance started in 2000. From 2017, it is being regularly done 3 times a year in big city corporations and other urban areas. Initially started in Dhaka City Corporations (North and South) then expanded to other city corporations and selected other urban areas.

Before 2000 — Dengue first identified in 1964 as "Dacca fever" with no formal surveillance; only sporadic reporting.

2001–2009 — Sentinel surveillance sites established in hospitals, focusing on clinical diagnosis.

2018–2019 — Outbreak triggered daily public reporting and expanded lab-based diagnostics (NS1, IgM/IgG).

2023 — Integration with digital tools introduced; surveillance expanded to public and selected private health facilities.

2000 — First major outbreak led DGHS to initiate formal dengue surveillance with hospital-based reporting.

2010–2017 — Dengue included in the national surveillance system under IDSR; surveillance expanded beyond Dhaka

2020–2022 — COVID-19 disrupted surveillance. Serotyping and recognition of dengue's endemic nature continued

2025–Present — Individual patient data tracker introduced; all diagnostic labs directed to report dengue results (NS1, IgG, IgM, PCR) to DHIS2.

Figure 24. Timeline of dengue surveillance

Type and Structure Surveillance

The WHO defines a suspected dengue case as any person who has lived in or traveled to a dengue-endemic area and presents with fever accompanied by two or more of the following symptoms: nausea or vomiting, rash, aches and pains, a positive tourniquet test, leukopenia, or any warning signs. In Bangladesh, dengue surveillance primarily follows a hospital-based, passive case detection approach, focusing on admitted patients. This system relies on routine reporting from healthcare facilities where dengue cases are identified and recorded. However, laboratory-based reporting has only recently been incorporated into the dengue surveillance system.

Surveillance Objectives

Dengue surveillance has been identified as a key strategic priority in the National Dengue Prevention and Control Strategy (2024–2030), with the overarching goal of reducing dengue-related morbidity and mortality in Bangladesh [43]. The core objective of dengue surveillance is to enable early detection and forecasting of outbreaks, thereby facilitating timely and effective public health interventions. This encompasses the systematic monitoring of human cases, mosquito vectors, and environmental conditions that contribute to dengue transmission. The specific objectives of dengue surveillance in Bangladesh are outlined below:

1. To rapidly identify and report dengue cases, enabling prompt clinical management and reducing the risk of severe illness and death.

2. To monitor disease trends and patterns to forecast potential outbreaks and implement preventive measures proactively.

3. To track the distribution, density, and insecticide resistance of Aedes mosquito populations, thereby informing targeted vector control strategies.

4. To observe environmental factors such as rainfall, temperature, and humidity that influence mosquito breeding and disease transmission dynamics.

5. To identify high-risk geographic areas and vulnerable populations for focused interventions and efficient resource allocation.

6. To evaluate the effectiveness of ongoing vector control activities and public health interventions in mitigating transmission

7. To generate reliable data that supports evidence-based policymaking and strategic planning for dengue control

8. To promote coordinated action among government agencies, local authorities, and community stakeholders for a comprehensive response.

9. To enhance community knowledge and awareness regarding dengue transmission, prevention practices, and the importance of early healthcare-seeking behavior.

10. To ensure that healthcare facilities are adequately equipped and staffed to manage dengue cases, including severe and complicated cases.

Population and Geographic Coverage

Dengue surveillance in Bangladesh is designed to monitor the general population, with particular emphasis on individuals residing in dengue-endemic and high-risk areas. These include regions characterized by high population density, poor water management, and environmental conditions favorable for the breeding of Aedes mosquitoes. The surveillance system primarily focuses on patients with confirmed dengue who are admitted to both public and private healthcare facilities. The public health healthcare facilities are Medical Colleges hospitals, Specialized hospitals, District Hospitals, and Upazila Health Complexes that are part of the national sentinel surveillance network. Whereas, currently, hospital-based surveillance is also conducted through 59 selected private hospitals.
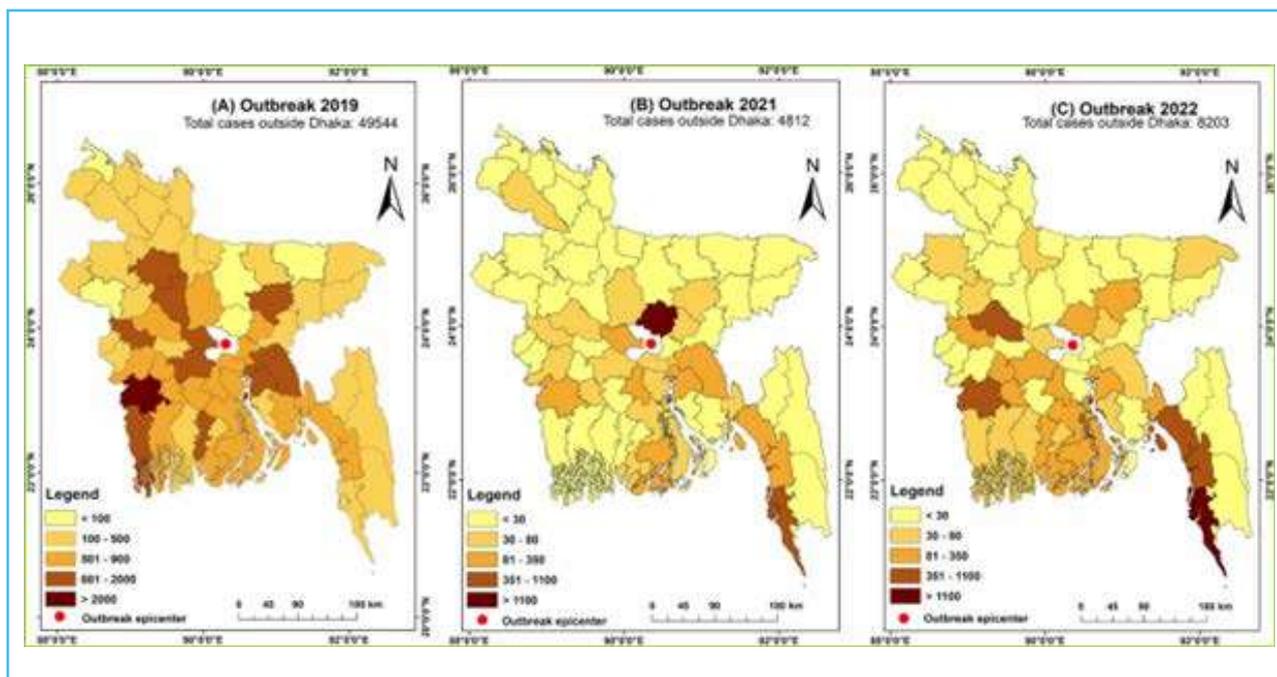
Figure 25. District wise spatial distribution of dengue reported cases in 2019 (A), 2021 (B) & 2022 (C) outbreaks in Bangladesh

Source: *Hossain, M.S. et al. (2023).*

Funding Agencies (excluding government) and Their Role

Table 32. Funding agencies and their role in Dengue surveillance

Funding Agency	Key Role
WHO	Supported for the development of the National Strategic Plan (NSP) for surveillance
The World Bank	Supported LGD for the dengue control activities including community-based interventions
	Supported LGD for the vector surveillance, climate-based early warning systems, and urban health infrastructure

Governance and Stakeholder Role

Dengue surveillance in Bangladesh is led by the CDC, MIS and IEDCR, which oversees data analysis, outbreak investigation, and reporting. DGHS manages hospital-based sentinel surveillance and data collection nationwide. MOHFW provides policy direction. City corporations and local governments conduct prevention and control activities. The stakeholder specific role in Dengue surveillance is given below.

Table 33. Governance and stakeholder with their role in Dengue surveillance

Stakeholder	Roles in Dengue Surveillance
MoHFW	• Provides strategic leadership and national coordination • Allocates funding (e.g., for entomological surveys) • Oversees integration into national disease surveillance policies
DGHS	• Monitored all the public healthcare facilities • Manages hospital-based surveillance network • Collect and compile data from public and private healthcare facilities • Operates national and district dengue control rooms
City Corporations & Local Government Bodies	• Conduct prevention and control activities (for example fogging, larviciding). • Co-ordinate with stakeholders.
BDRCS / IFRC	• Pilot community-based dengue surveillance in urban areas • Engages trained volunteers in early detection and local reporting • Logistic supports to government.
WHO	• Supports entomological surveillance. • Provides technical guidance and capacity building
US CDC	• Strengthens surveillance capacity and laboratory diagnostics • Supports field epidemiology training and outbreak preparedness
icddr,b	• Conducts research on dengue transmission dynamics and surveillance improvements • Assists in outbreak investigations
BRAC	• Community based dengue surveillance in climate -vulnerable and high-risk areas

Sample Collection and Testing Protocol

Blood samples are collected from individuals suspected of dengue infection at designated healthcare facilities. Diagnostic testing, including NS1 antigen, IgM, and IgG assays, is performed at Upazila Health Complexes (UHCs), specialized hospitals, district hospitals, medical college hospitals, and private hospitals, utilizing their in-house laboratory capacities. These healthcare facilities are responsible for both sample collection and laboratory diagnosis to ensure timely and accurate confirmation of dengue cases. Dengue serotyping is being done every year to know the circulating serotype in the country by IEDCR and NILMRC The Civil Surgeon's Office and the Divisional Director (Health) Office do not engage in sample handling or testing; instead, their functions focus on administrative oversight, coordination, and data reporting in support of national dengue surveillance efforts.

Data Flow and Reporting Mechanism

- Information is collected from all levels of health facilities, including Upazila Health Complexes (UHCs), District Hospitals, Civil Surgeon Offices, government hospitals, and various government and private medical colleges hospitals.

- UHC: Daily data are uploaded to DHIS2 by a statistician. A hardcopy report is sent to the Civil Surgeon (CS) Office. Both aggregated and individual patient data are uploaded to DHIS2.

- District Hospital: Daily data are digitally entered into DHIS2 by a statistician. The report is also sent via email to the CS Office.
- Medical College Hospital: Daily digital data entry is carried out by a senior staff nurse (e.g., at RMCH) or a statistician. Additionally, daily dengue reports are sent via email to the CS Office and the Division Director's Office.
- Civil Surgeon Office: Civil surgeon Office receives monthly test reports from UHCs. Consolidated daily reports are forwarded to the control room, DGHS and a copy sent to the Divisional Director (Health) Office.
- Division Director (Health): The Division Director's Office does not upload data but is responsible for monitoring and analyzing reports uploaded to DHIS2 by other facilities.
- From control room, daily press release and report dissemination to relevant stakeholders.
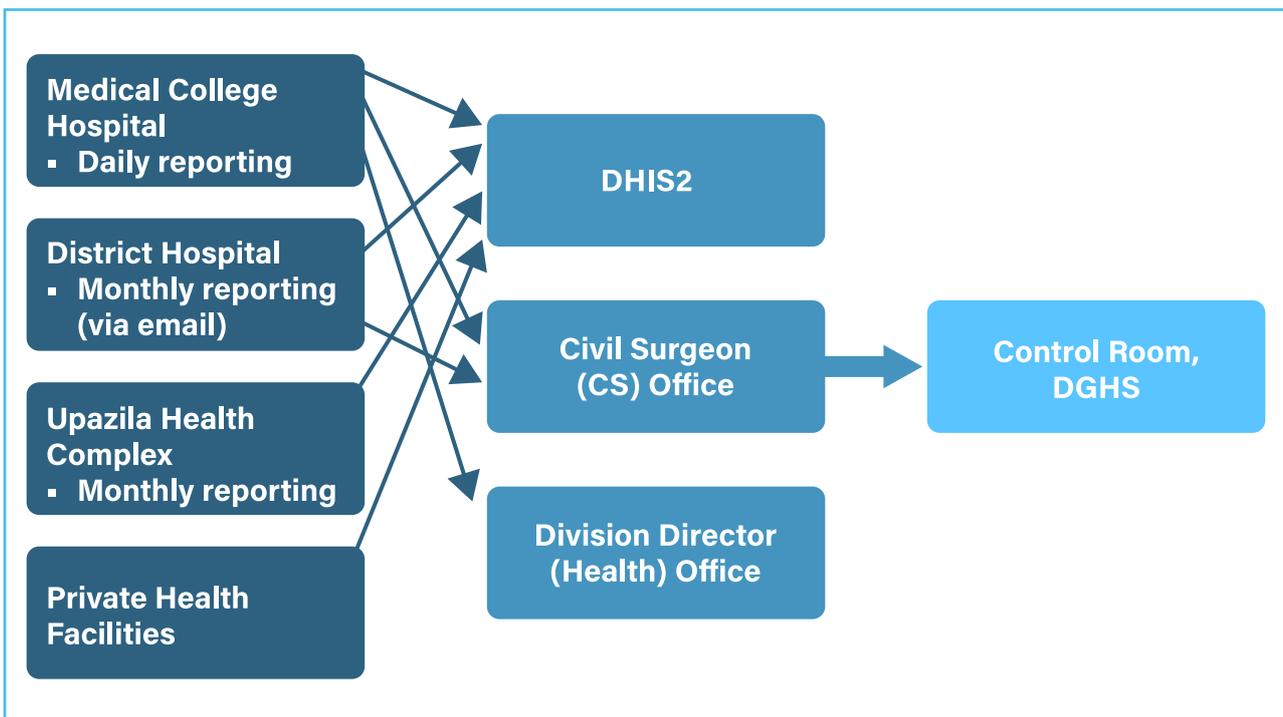
Figure 26. Data flow and reporting system in Dengue surveillance

Data Interoperability, Analysis and Visualization

Data analysis is conducted by statisticians at the Upazila level. Findings are presented using slide-based presentations during monthly meetings at the Upazila and are also shared during the Civil Surgeon (CS) Office's monthly meetings. At the district level, the data analysis team at the CS Office is led by the Medical Officer, Civil Surgeon (MOCS), and Medical Officer (MODC) along with the District Statistician. Final analysis and data triangulation are conducted centrally by the Control room, DGHS. These compiles analyzed data are visualized in a dashboard by MIS, DGHS.

Use of Surveillance Data

Dengue surveillance data is critical for detecting outbreaks, monitoring case trends, and guiding rapid response activities. Local authorities, City Corporations, and the Public Health Engineering Department use the data to implement vector control measures, such as mosquito eradication and larvicide spraying. Rapid response teams rely on daily data to target high-risk areas and adjust interventions.

The DGHS utilizes data to estimate caseloads, allocate emergency medical supplies, identify transmission hotspots, and support health education efforts. It also contributes to national policy development and operational planning.

Data Protection and Privacy

Dengue surveillance data is managed with strict data protection measures. Patient information is anonymized by replacing personal identifiers with unique codes, ensuring confidentiality. Access to identifiable data is limited to authorized health officials. Data sharing complies with national dengue guidelines and National Ethical Standards. While aggregated dengue data is available for public health planning and research, access to raw datasets remains restricted to protect patient privacy.

Challenges

- Limited data collection from many private hospitals and diagnostic laboratories.
- Absence of digital data-sharing mechanism.
- Lack of regular training and refresher sessions for healthcare workers.
- Shortage of funding for sustained dengue surveillance and response activities.

Way Forward

- Expansion of surveillance coverage by incorporating all public and private hospitals into the existing surveillance system.
- Scale up community-based surveillance to detect outbreaks earlier.
- Expand the dengue tracker.
- Conduct regular training for health workers, data managers, and at all levels.
- Ensure sufficient fund.
- Regular analyze and visualize data at all levels for targeted vector control and outbreak response.

4.2.8 Filariasis Surveillance

Brief History

The Elimination of Lymphatic Filariasis Program (ELFP), Bangladesh was launched in 2001, aiming to eliminate Lymphatic Filariasis (LF) through interrupting the transmission by 2030 (Microfilariae in blood < 0.5%)[59]. Bangladesh achieved WHO certification of elimination of LF as a public health concern (Microfilariae in blood <1%) in 2023 [60].

Type and Structure of Surveillance

- **Active Surveillance:** Hot spot-based surveillance in 19 endemic zones which is event or case based.
- **Passive Surveillance:** It is facility based when patient is suspected at the health facility, they notify the national program about the case for confirmatory diagnosis. Xenomonitoring: a surveillance technique that involves detecting the parasite's DNA in mosquitoes (the vectors) to assess the prevalence of infection and the effectiveness of elimination programs.

Surveillance Objectives

- Continuation of the validation status.
- Elimination of Filariasis as transmission by 2030.

Population and Geographic Coverage

Target population

Probable case: Suspected patients have clinical sign symptoms like lymphedema of limbs, breast, or scrotum and ICT for Filaria positive.

Confirmed case: Presence of Microfilariae in night blood film.

Asymptomatic: Most filarial infections stay asymptomatic and do not show any clinical symptoms for years after entering the body. However, in some people, a prolonged infectious period may cause damage to the lymph nodes and ducts, leading to various physical complications and even disabilities.

Acute: In some patients, clinical symptoms appear after the parasites enter the body, manifested by pain along the affected lymphatic vessels, fever, cough, shortness of breath, etc.

Chronic: In this case, after years of mosquito bites, even as long as 20 years, the affected limb may become thick and deformed and become a long-term or life-long disease. The legs are the most common location for swelling, but it can also involve the hands, arm, scrotum, genitals, or breasts. In Bangladesh, one of the symptoms of this disease is swelling of the scrotum - termed hydrocele.

Acute on chronic: The patient may have some acute symptoms in the affected limb in many chronic cases. These patients may experience sudden inflammation, reddening of the skin, high fever, headache, etc. In this case, the patient should contact the doctor/ health worker or the nearest community clinic (CC) immediately.

Geographic Coverage: 19 endemic zones in 4 divisions.

FILARIASIS (19 ENDEMIC ZONES IN 4 DIVISIONS)
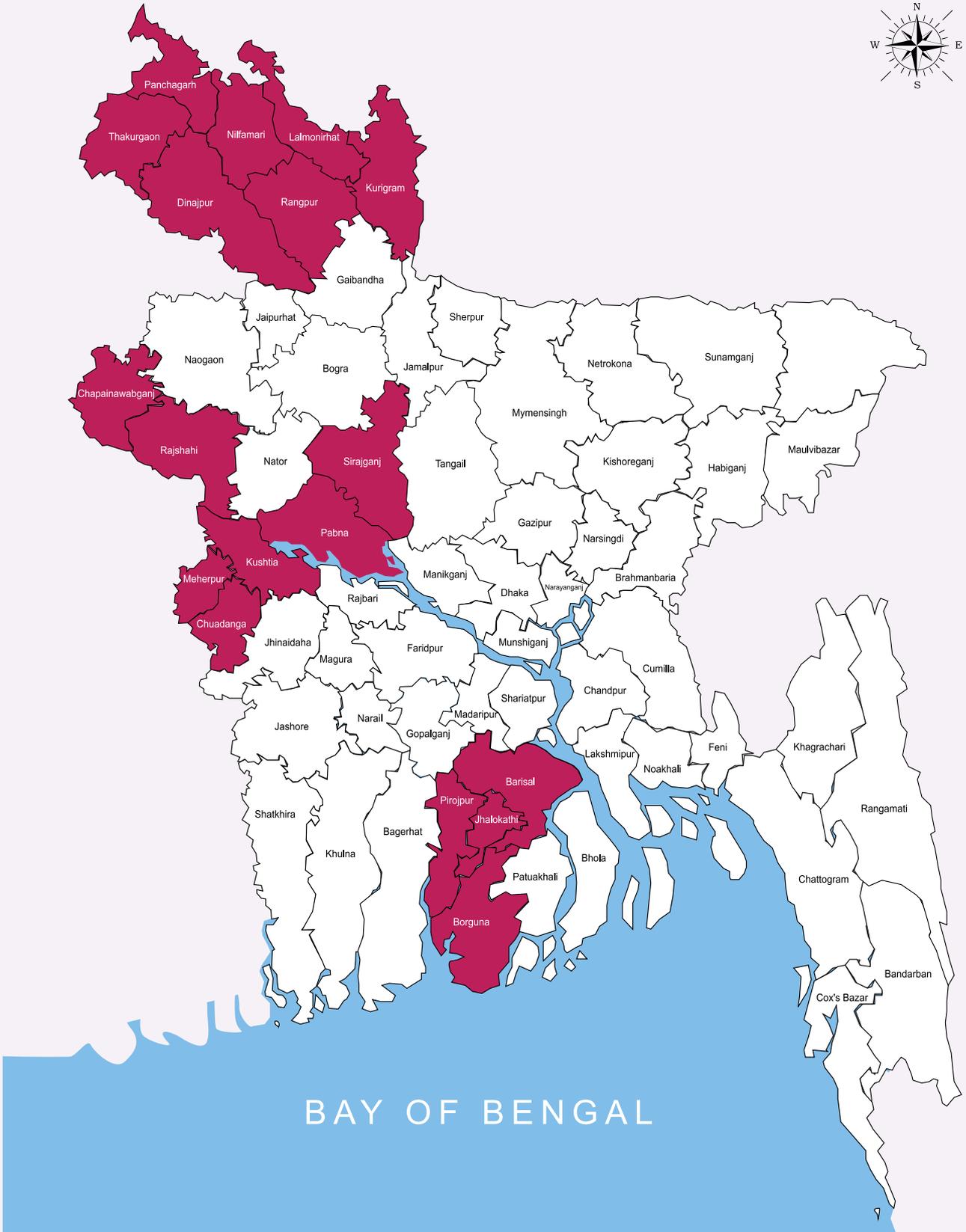
Figure 27. Sites of Filariasis surveillance

Funding Agencies (excluding government) and Their Role

Table 34. Funding agencies and their role in Filariasis surveillance

Funding Agency	Use of Fund
WHO	Provides financial resources and technical support for filariasis surveillance
Liverpool School of Tropical Medicine (LSTM)	Supports surveillance with funding and technical expertise
Research Triangle Institute (RTI)	Provides financial assistance and technical guidance
US CDC	Offers both funding and technical support for program implementation

Governance and Stakeholder Role

Table 35. Governance and stakeholder with their role in Filariasis surveillance

Name of the organization	Role in surveillance
CDC, DGHS	Leads national LF surveillance; provides technical and financial support.
IEDCR	Conducts epidemiological and lab-based surveillance; supports data analysis.
icddr,b	Provides research support and strengthens surveillance systems.
CIPRB	Supports field data collection and community-level surveillance.
Filariasis Hospital Nilphamari	Maintains morbidity surveillance and reports patient data.

Sample Collection and Testing Protocol

Sample Collection

For active surveillance sample collected and tested by the trained personnel from national program at the surveillance sites. For Xenomonitoring: sample collected from the surveillance site by Entomologist from DGHS, transported to national level for testing.

Testing

In case of active surveillance screening done by FTS (Filariasis Test Strip) and microscopy of night blood film done at surveillance site by program personnel. For Xenomonitoring samples are tested in NIPSOM, IEDCR or icddr,b.

Data Flow and Reporting Mechanism

Data Collection: Data collected manually at the surveillance site. Then the manual data is sent to national program for analysis.

Data reporting: Yearly surveillance report is sent to MIS, DGHS and WHO (Joint Application Package) and Public Health Wing of MoHFW.

Data Interoperability, Analysis and Visualization

- Data analysis is carried out centrally by the National LF Program
- Annual surveillance datasets are submitted to WHO in standardized Excel formats for inclusion in global reporting systems
- Surveillance results are presented annually at the Regional Programme Review Group (RPRG)

Use of Surveillance Data

- Policy making by National Program at Ministry level.
- Procurement medicine and test strip from WHO.

Data Protection and Privacy

- Measures in place to ensure confidentiality at the national program.
- Adherence to national/international data protection guidelines.

Challenges

- Lack of sustained political commitment.
- Funding crisis (as 4th HPNSP ended).
- Difficulty in retaining trained staff and limited number of trained personnel for both surveillance and laboratory activities.
- Porous borders increase the risk of imported infections from neighboring regions.
- Scarcity and short shelf life of Filaria Test Strips (FTS) disrupt surveillance.
- Operational Limitations in Xeno monitoring.

Way Forward

- Advocate for continued government and donor support to maintain program continuity and achieve 2030 elimination targets.
- Retain skilled surveillance personnel and ensure regular refresher training.
- Build technical capacity for both human surveillance and Xeno monitoring.
- Improve Laboratory support for Xeno monitoring
- Ensure availability of FTS kits with longer shelf life.
- Transition from manual to digital reporting to improve data accuracy and timeliness.
- Mainstream post-validation surveillance into routine health care system
- Promote active and passive surveillance in all endemic zones.
- Involve communities in surveillance and awareness campaigns to improve early detection and compliance.
- Collaborate with neighboring countries to prevent cross-border transmission in border districts.

4.2.9 Nipah virus (NiV) Surveillance

Brief History

Nipah virus was first identified in Bangladesh in 2001. Since the establishment of the National surveillance efforts titled "Nipah virus Transmission in Bangladesh" in 2006 [61]. Till date 347 cases have been recorded. Case fatality rate of Nipah virus infection is about 72%. Nipah cases were detected from 35 districts in Bangladesh. The human-to-human transmission rate is 28% [59].

Type and Structure of Surveillance

Nipah virus transmission in Bangladesh is a hospital-based sentinel surveillance which is focused on 12 tertiary care hospitals and 2 district hospitals. The health authorities are responsible for identifying cases, contact tracing, and systematic sample collection. Enhanced surveillance of Nipah virus is performed from December to April which involves visiting the private hospitals surrounding the surveillance hospitals, Govt. sub district hospitals, community clinics through Civil Surgeons of the district, nominating one doctor and one nurse of that respective hospitals, providing two hot line numbers (icddr,b and IEDCR) to inform any Nipah suspected case, and providing logistic supports for sample collection.

Table 36. Case definitions related to Nipah surveillance

Disease	Case definition
Suspected Case	Nipah Encephalitis: Acute onset of fever with (axillary temp 100.4º F) and evidence of acute brain pathology (e.g., altered mental states, new onset of seizures or new neurological deficit either diffuse or localized to the brain).
	Nipah Pneuminitis: Illness< 7days of duration and fever/ history of fever (axillary temp >100.4º F) and severe shortness of breath (i.e., dyspnea prevents patient from walking unassisted for 10 steps) and chest radiograph consistent with diffuse acute respiratory distress syndrome.
Probable Case	An individual with suspected Nipah infection who has an established epidemiological link of Nipah virus infection will be considered a probable case under the following circumstances: • Specimen is collected from this individual, but test results are pending, or • Specimen could not be collected for testing, either due to death or other reasons.
Confirmed Case	Laboratory confirmation via IgM ELISA or PCR.

Surveillance Objectives

General objective

- To understand the transmission of the Nipah virus infection well enough to develop sound strategies for prevention.

Specific objectives

- To identify more outbreaks of the Nipah virus in Bangladesh.
- To characterize the pathogenesis and viral shedding of Nipah patients and compare them between primary and secondary cases.
- Long-term follow-up of the Nipah survivors for neurological sequelae and to detect Nipah relapses encephalitis.
- To characterize Nipah virus strains and creating a global database of Nipah virus genome sequencing.

Population and Geographic Coverage

The targeted population of Nipah surveillance are the admitted patients of department of Medicine, Pediatrics and Neuro medicine of the hospitals under surveillance who meet the case definitions.

Faridpir medical College and Hospital ☑
Rajshahi Medical College & Hospital ☑
Rangpur Medical College & Hospital ☑
Chattogram Medical College & Hospital ☑
Khulna Medical College & Hospital ☑
Sher-e-Bangla Medical College & Hospital ☑
Mymensingh Medical College & Hospital ☑
Sylhet M.A.G Osmani Medical College & Hospital ☑
Cox's Bazar Medical College Hospital ☑
M Abdur Rahim Medical College Hospital ☑
Shaheed Ziaur Rahman Medical College Hospital ☑
Jessore Medical College Hospital ☑
Rajbari General Hospital ☑
Tangail Sador Hospital ☑

BAY OF BENGAL

Figure 28. Sites of Nipah Surveillance

Table 37. List of Nipah surveillance sites in Bangladesh

Name of the hospital	District
Faridpur medical College and Hospital	Faridpur
Rajshahi Medical College & Hospital	Rajshahi
Rangpur Medical College & Hospital	Rangpur
Chattogram Medical College & Hospital	Chattogram
Khulna Medical College & Hospital	Khulna
Sher-e-Bangla Medical College & Hospital	Barisal
Mymensingh Medical College & Hospital	Mymensingh
Sylhet M.A.G Osmani Medical College & Hospital	Sylhet
Cox's Bazar Medical College Hospital	Cox's Bazar
M Abdur Rahim Medical College Hospital	Dinajpur
Shaheed Ziaur Rahman Medical College Hospital	Bogura
Jessore Medical College Hospital	Jessore
Rajbari General Hospital	Rajbari
Tangail Sador Hospital	Tangail

Through Enhanced surveillance catchment area of that Medical College are covered and through event-based surveillance information come to IEDCR and icddr,b through hot line numbers.

Funding Agencies (excluding government) and Their Role

Table 38. Funding agencies and their role in Nipah surveillance

Funding Agency	Use of fund
US CDC	Technical support, laboratory infrastructure, equipment, reagents, capacity building, and training.
CEPI	

Governance and Stakeholder Role

Table 39. Governance and stakeholder with their role in Nipah surveillance

Stakeholder name	Role of stakeholder
IEDCR	Responsible for overall coordination of the Nipah virus transmission in Bangladesh.
icddr,b	Implementation and technical support for case detection
Selected Medical College Hospital	Provide technical support in identifying suspected case

Sample Collection and Testing Protocol

- Throat swab/ serum/ CSF is collected by Surveillance Physician and Field Assistants at the surveillance sites.

- During enhanced surveillance if any suspected case information is notified to IEDCR from the private hospitals surrounding the surveillance hospitals, Upazila Health Complexes, community clinics, IEDCR sends Field Assistant to collect the sample. The samples are stored at the surveillance sites by maintaining cryogenic temperature in dry shippers.

- During Nipah season (December to April), the samples are transported in 72-hour intervals by porters. If the cases have any epi link (H/O consumption of raw date juice/ contact with known Nipah cases/ H/O consumption of half-eaten fruits) sample is transported

within 24 hours by porters.

- From May to November sample is transported to Dhaka in every 15-day interval through dry shippers by cryovial, maintaining cryogenic temperature -78 to -159° Celsius by field assistants.

- Samples are tested in IEDCR and icddr,b by ELISA and PCR.
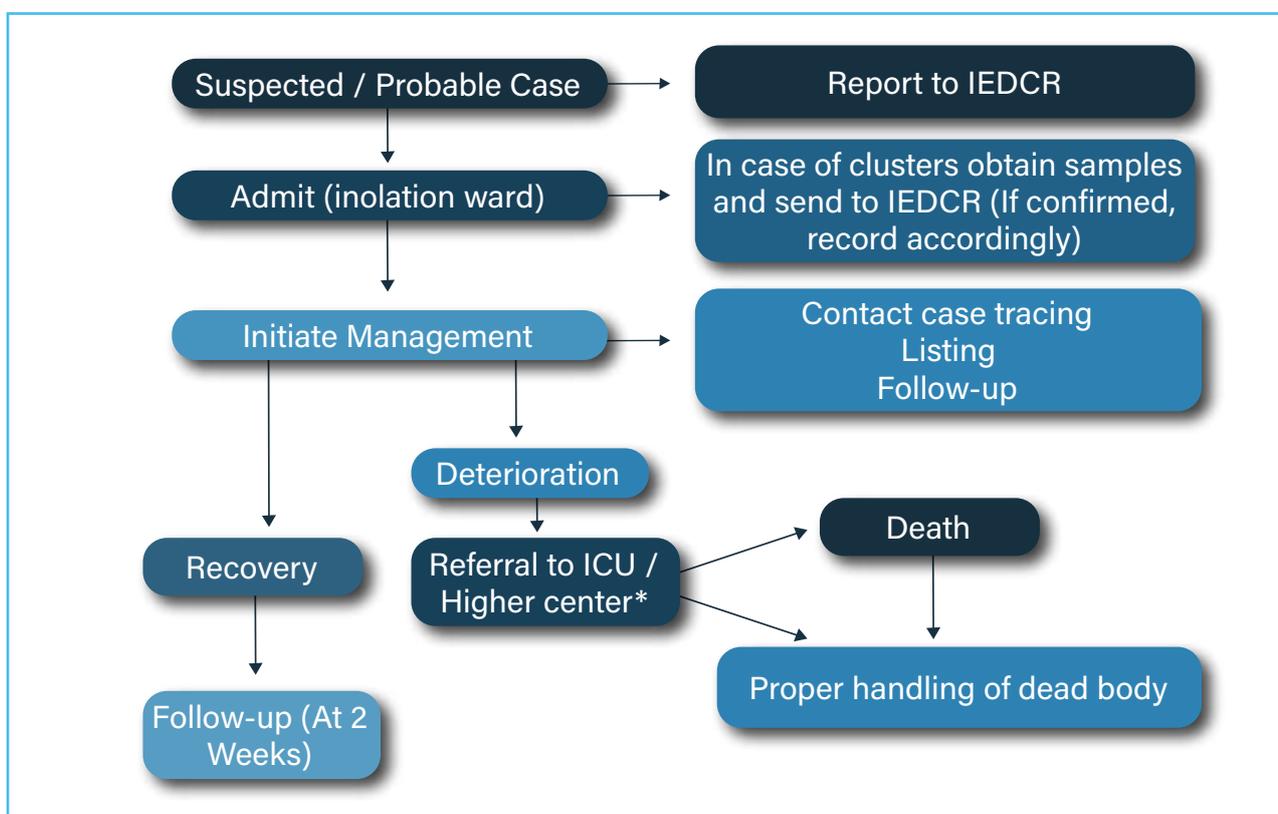
Figure 29. Data flow and reporting system in Nipah surveillance

* Referral doesn't always ensure better outcome, rather it may increase the risk of person-to-person transmission while transporting. So, managing the patient in the health care facility, where the patient got admitted, is preferable as long as possible.

Source: *National Guideline for Management, Prevention and Control of Nipah Virus Infection including Encephalitis, 2021*

Demographic and clinical data of patients are collected digitally by surveillance physicians and automatically shared through a real-time data server managed by IEDCR and icddr,b. Test results are communicated to patients using a fixed reporting format, while positive cases are reported to the Civil Surgeon (CS) office, Divisional Director, and surveillance hospitals. As Nipah is a notifiable disease under IHR 2005, IEDCR, as the IHR focal institute, reports cases to the IHR focal person (Director, Disease Control, DGHS) and the Director General (DG) of DGHS. The system supports continuous reporting with monthly online updates on the IEDCR website and hardcopy dissemination to the CS office and hospitals, alongside annual summary reports.

Data Interoperability, Analysis, and Visualization

Data analysis is done by both IEDCR and icddr,b. Annual dissemination of the surveillance reports is done from IEDCR for the stakeholders.

Use of Surveillance Data

- The surveillance data is used by the stakeholders for outbreak response, containment, public health planning, vaccines, therapeutics and monoclonal antibodies development and research.
- Outbreak response and containment.
- Public health planning.
- Vaccines, therapeutics, and monoclonal antibodies development and research.

Data Protection and Privacy

The surveillance data is stored in a password protected server in IEDCR and icddr,b.

Challenges

- Donor dependence.
- Diagnostic facilities are only available in Dhaka.
- Lack of community-based surveillance.

Way Forward

- Ensure national resource allocation for continued Nipah surveillance.
- Develop and implement a National Nipah Control Strategy.
- Establish regional laboratories for timely Nipah diagnosis beyond Dhaka.
- Develop and deploy point-of-care diagnostic tools.
- Increment of community involvement.
- Strengthen the school awareness campaign program.
- Implement community-level Behavioral Change Communication (BCC) activities focused on reducing raw date palm juice consumption.
- Develop legislation for Nipah control and prevention
- Promote research on Nipah vaccines, and therapeutics.
- Include the Infectious Disease Hospital (IDH), as a surveillance site.

4.2.10 Epidemiological Surveillance in Malaria Elimination Program

Brief History

Malaria is a significant public health problem in Bangladesh [61]. The disease is endemic in 13 (out of 64 total) districts, with over 17 million people at risk. Cox's Bazar and Chattogram hill districts (Bandarban, Khagrachari and Rangamati) report over 90% of cases and 80% of deaths. Over 80% of malaria cases occur in the high transmission period from May to September, when there is increased rainfall and high humidity. National malaria elimination program, CDC DGHS is supported by a consortium of non-government organizations led by BRAC. Evidence suggests that the prevalence of malaria in Bangladesh has decreased gradually since the Global Fund to Fight AIDS, Tuberculosis and Malaria started to support the National Malaria Elimination Program (NMEP) in 2007.

Type and Structure of Surveillance

- **Type:** Malaria data in Bangladesh is collected through both Active Case Detection (ACD) and Passive Case Detection (PCD). Case-based surveillance is carried out in the 10 elimination districts. In the three hill tract districts, which are considered malaria control areas, aggregated surveillance is conducted. Both community-based and facility-based surveillance are in place in control and elimination to strengthen case identification and reporting. Most malaria cases (more than 80%) are reported through this community-based active surveillance system.

- **Structure:**
  Reporting units:
  - **Facility level:** Under the passive surveillance system, all patients presenting with fever at outpatient (OPD) and inpatient (IPD) departments of government hospitals, as well as in NGO laboratories in malaria-endemic areas are tested for malaria using malaria microscopy and or rapid diagnostic tests (RDT). Confirmed positive cases are reported monthly by the Upazila Health Complex (UHC) through the malaria information system. In high-endemic areas, community clinics also contribute to malaria surveillance by reporting RDT-confirmed cases. Additionally, some private hospitals in these high-endemic districts have recently started to participate in passive surveillance by submitting monthly malaria reports to the Upazila Health and Family Planning Officer (UHFPO) or the Civil Surgeon.
  - **Community level:**
    > Government: HA, AHI, HI, CC diagnoses cases by using RDT and monthly reports UHC.
    > NGO Consortium: NGO worker diagnoses malaria by RDT kit and monthly reports to UHC.

Frequency of data collection and reporting:
Surveillance data reporting in malaria-endemic areas occurs in different frequency and through various channels.
  - In control area, monthly data are reported by UHC after consolidating data from community level as well as data from public and private facilities.
  - In malaria elimination areas, data reporting follows the "1-3-7" approach, a globally recognized strategy for rapid case detection and response. Under this system, malaria cases are reported within one day (Day 1) of detection, investigated within three days (Day 3), and appropriate response actions completed within seven days (Day 7).

Real-time notification begins on Day 1, when a service provider detects a suspected malaria case and immediately reports it via WhatsApp or email. This notification is simultaneously shared with the Upazila Health Complex (UH&FPO, MODC), district-level authorities (Civil Surgeon, MODC, Surveillance Medical Officer), and national-level programme officials.

Following notification, a field team visits the patient for a detailed case investigation. A standardized case investigation form is completed, and the case is classified as indigenous, locally imported, non-locally imported, or introduced. If the case is determined to be indigenous or locally imported, both epidemiological and entomological investigations are conducted by Day 3.

The epidemiological response includes screening febrile individuals within a 500-meter radius of the index case and conducting RDT or malaria microscopy for all household contacts. These steps ensure early detection of secondary cases and help prevent further transmission, in line with the established 1-3-7 malaria surveillance and response framework.

Surveillance Objectives

Overall Objective: A malaria free Bangladesh within 2030.

Specific Objectives

- To see the trend of diseases over time (Case, Death, and Geographical distribution).
- Details of the cases (age, sex, pregnancy, education, occupation).
- Timeliness, completeness and accuracy.
- In elimination area, follow 1-3-7 strategy.
- Early diagnosis and prompt treatment.
- Preventing disease within community.
- Prepare monthly disease profile: Test performed; Active and passive cases; RDT and microscopy; and Facility and community level.
- Confirm positive cases: Species; and Severity of cases.

Population and Geographic Coverage

- **Target population:** All people living in malaria-endemic areas of Bangladesh are under surveillance. The population groups at risk of malaria in these regions are broadly categorized into static and mobile/migrant populations. Static populations include traditional farming communities, fringe forest communities, workers involved in development projects, and tea garden workers. Mobile and migrant populations consist of traditional farming communities practicing Jhum or paddy field farming who travel to forest areas, forest workers/goers, seasonal laborers, defense and security personnel, Rohingya refugees (Forcibly Displaced Myanmar Nationals – FDMNs), cross-border workers, migrants, tourists, and staff of national and international organizations.

- **Geographic coverage:** In Bangladesh, malaria is endemic in 13 districts. The routine surveillance system collects malaria-related data from these endemic areas, with over 90% of confirmed cases reported from the three hill tract districts: Rangamati, Khagrachari, and Bandarban. These three hill-tract districts are considered as control areas for the surveillance system while the remaining 10 endemic districts are termed as elimination areas. These areas include Mymensingh, Netrokona, Kurigram, Sherpur, Sylhet, Moulovibazar, Sunamganj, Habiganj, Chattogram, and Cox's Bazar. In Cox's Bazar, FDMN community is also included in surveillance system.

Additional Surveillance Components

To support elimination efforts and maintain progress, the malaria surveillance system integrates additional specialized surveillance mechanisms across endemic districts:

- **Antimalarial Drug Efficacy Surveillance (Conducted Every Three Years)**

  Periodic therapeutic efficacy studies are conducted to monitor the effectiveness of first-line antimalarial drugs. This allows early detection of drug resistance and ensures treatment regimens remain evidence-based and effective.

- **Insecticide Resistance Monitoring**

  Routine monitoring of insecticide susceptibility is conducted among malaria vector populations. This is essential for guiding vector control strategies such as distribution of Long-Lasting Insecticidal Nets (LLINs) and planning indoor residual spraying (IRS), especially in areas with documented pyrethroid resistance.

- **Vector Bionomic Surveillance**

  Regular assessment of vector species composition, behavior, breeding sites, biting patterns, and resting habits helps refine targeted interventions. This surveillance is especially important in the hill tract districts, where diverse and forest-associated vector species influence transmission dynamics.
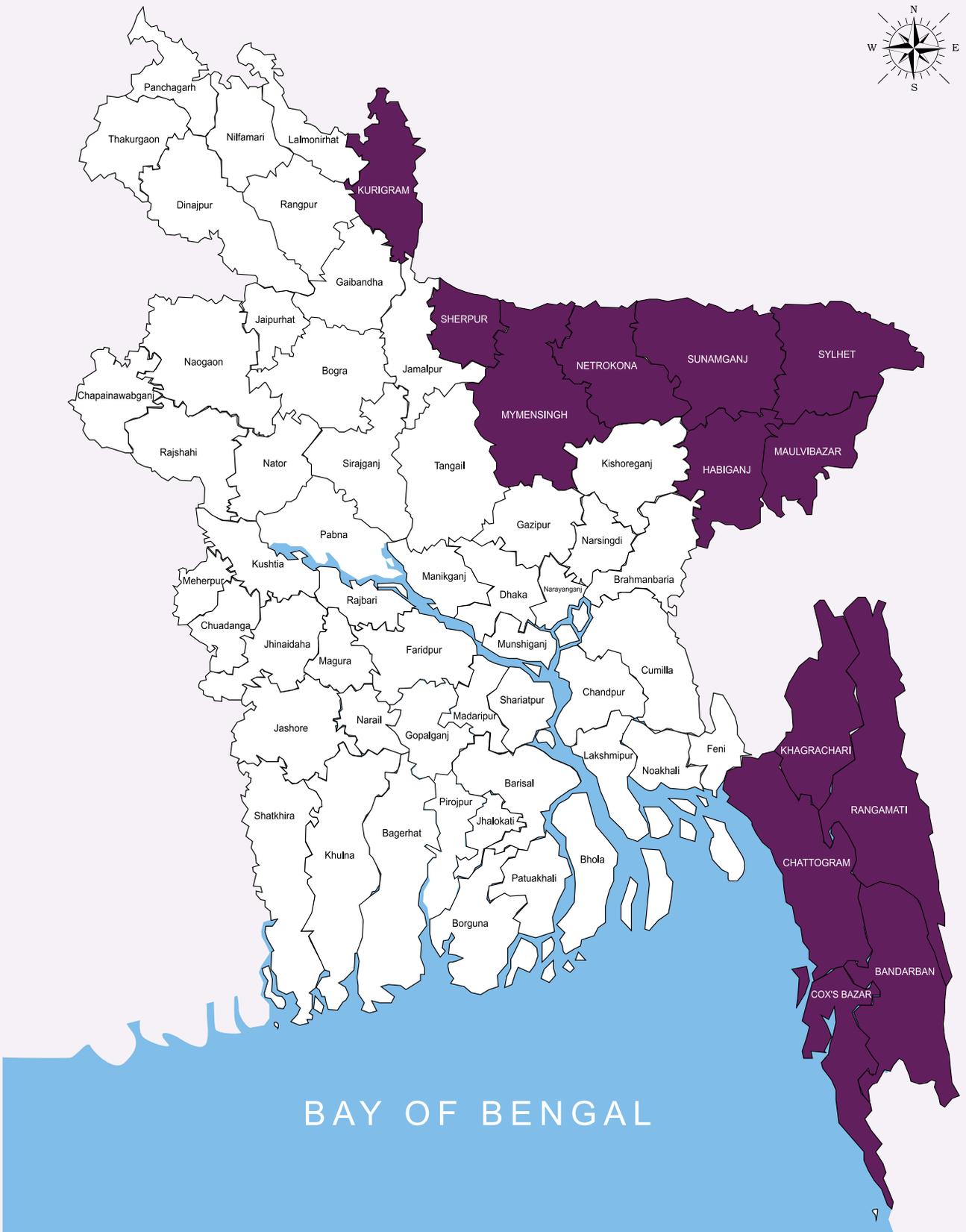
Figure 30. Sites of Malaria Surveillance

Funding Agencies (excluding government) and Their Role

Table 40. Funding agencies and their role in Malaria surveillance

Funding Agency	Use of fund
The Global Fund	Provides additional HR, logistic support, Drugs and diagnostic, maintenance of reporting system.
WHO	Provides technical support (joint review, guideline development.)

Collaborating organizations

There are several collaborating organizations actively involved in malaria elimination and surveillance efforts in Bangladesh. Key partners include BRAC, Mukti, ACLAB, and N.Z. Ekata Mohila Samiti, among others. These organizations contribute through community-based interventions, case management, awareness-raising, and support for surveillance and reporting activities.

Governance and Stakeholder Role

Table 41. Governance and stockholder with their role in Malaria surveillance

Stakeholder	Role
NMEP, CDC, DGHS	• To overview the overall disease situation • Strongly engaged in implementation • To review disease specific report. • Coordination with government and other stakeholders. • To monitor upsurge of the cases and take necessary action. • To manage HR and support diagnostic drugs and logistics
Divisional Director	• Monitor, review and supervise the surveillance system. • Check for any data discrepancy and take action by communicating with civil surgeon and UH&FPO of respective area. • Take action when number of malaria cases and death increase. • Report any special situation to central level. • Monitor whether the reports are being uploaded in system. • Oversee the activities implemented by the NGO partners. • Coordinate overall surveillance system.
	• Monitoring regular reporting. • Provide solution whenever any issue arises. • Provide support for managing severe malaria. • Support in developing treatment protocol, training module, ISE guideline.
Director, Medical College Hospital (Chattogram, Cox bazar, Sylhet, Mymensingh)	• Monitoring regular reporting. • Provide solution whenever any issue arises. • Provide support for managing severe malaria. • Support in developing treatment protocol, training module, ISE guideline.
Civil Surgeon	• Evaluate and implement control measures/elimination measures. • Monitor the surveillance system whether it is functioning or not. • Supervise data reporting • Supervise capacity building activities

Stakeholder	Role
UH&FPO	• Timeliness, completeness and accuracy of report. • Monitor disease trend. • Actively participates in 1-3-7 approach (involve in case investigation, support verbal autopsy (VA) of malaria death). • Logistic management. • Provide capacity building activities. • Coordinate with NGO partner. • Refer severe malaria to higher facility. • Provide support for special survey, such as TD activities. • To know if the reports are going to the right authority. • To monitor if the reports are being uploaded regularly.

Community workers engaged by the related GO and NGO are responsible for identifying malaria cases at the community level using rapid diagnostic test (RDT) kits. When a patient tests positive, they immediately administer the first-line treatment on-site, as they are already equipped with the necessary medication. Patient details are recorded in a register and reported to the nearest health facility. In cases of severe malaria, the patient is referred to as a higher-level facility for appropriate care. During the development of treatment guidelines, the central level consults medical college hospitals, particularly for input on managing severe malaria cases. The program receives funding from the NGO and operates in collaboration with the government.

Case Detection Protocol

Almost 90% of malaria cases are diagnosed at the community level, where GO and NGO Community Health Workers (CHWs) play a central role. When a person presents with fever, community members inform the CHW, who then performs a Rapid Diagnostic Test (RDT) using a malaria test kit and if positive, he administers the first-line oral anti-malarial drug and ensures that the patient takes the medication The case is then reported to the Upazila Health Complex (UHC), and followed up by a clinician. If further confirmation through malaria microscopy is required, it is done at the UHC. A statistician at the UHC compiles data from both the community, laboratory and facility upload the compiled data to the online malaria information system on a monthly basis. In case of severe Malaria, which is not manageable at the UHC, they are referred to secondary or tertiary level district or medical college hospitals. Before referring to a pre-referral form is completed with detailed information on diagnosis and treatment, and a rectal artesunate suppository (under five) is administered to prevent further deterioration during the patient's transfer.

Data Flow and Reporting Mechanism

• The malaria surveillance system in Bangladesh is based on real-time reporting and follows the 1-3-7 strategy adopted by the national program in elimination district. At the community level, field workers perform Rapid Diagnostic Tests (RDTs) on individuals presenting with fever. When a case tests positive, it is immediately notified via WhatsApp/email on Day 1 (the same day as diagnosis) to all relevant authorities, including up to the central level. In addition to WhatsApp/email reporting, patient details are recorded in registers maintained by field staff and later submitted to the Upazila Health Complex (UHC) monthly.

• Community clinics also report RDT positive cases to the UHC. In high-endemic areas, private clinics actively participate in the surveillance system and report positive cases to either the UHC or the Civil Surgeon's Office. At the UHC, the statistician is responsible for uploading consolidated malaria data to the malaria reporting system monthly. Data from the UHC is also shared with the Civil Surgeon's Office. Divisional Director can see reports on digital platforms.

In cases where private or other government hospitals report cases directly to the Civil Surgeon's Office, those cases are also entered into the malaria information system monthly. Through this process, the National Malaria Elimination Program (NMEP) receives surveillance data from multiple entities via enabling centralized tracking and response coordination.
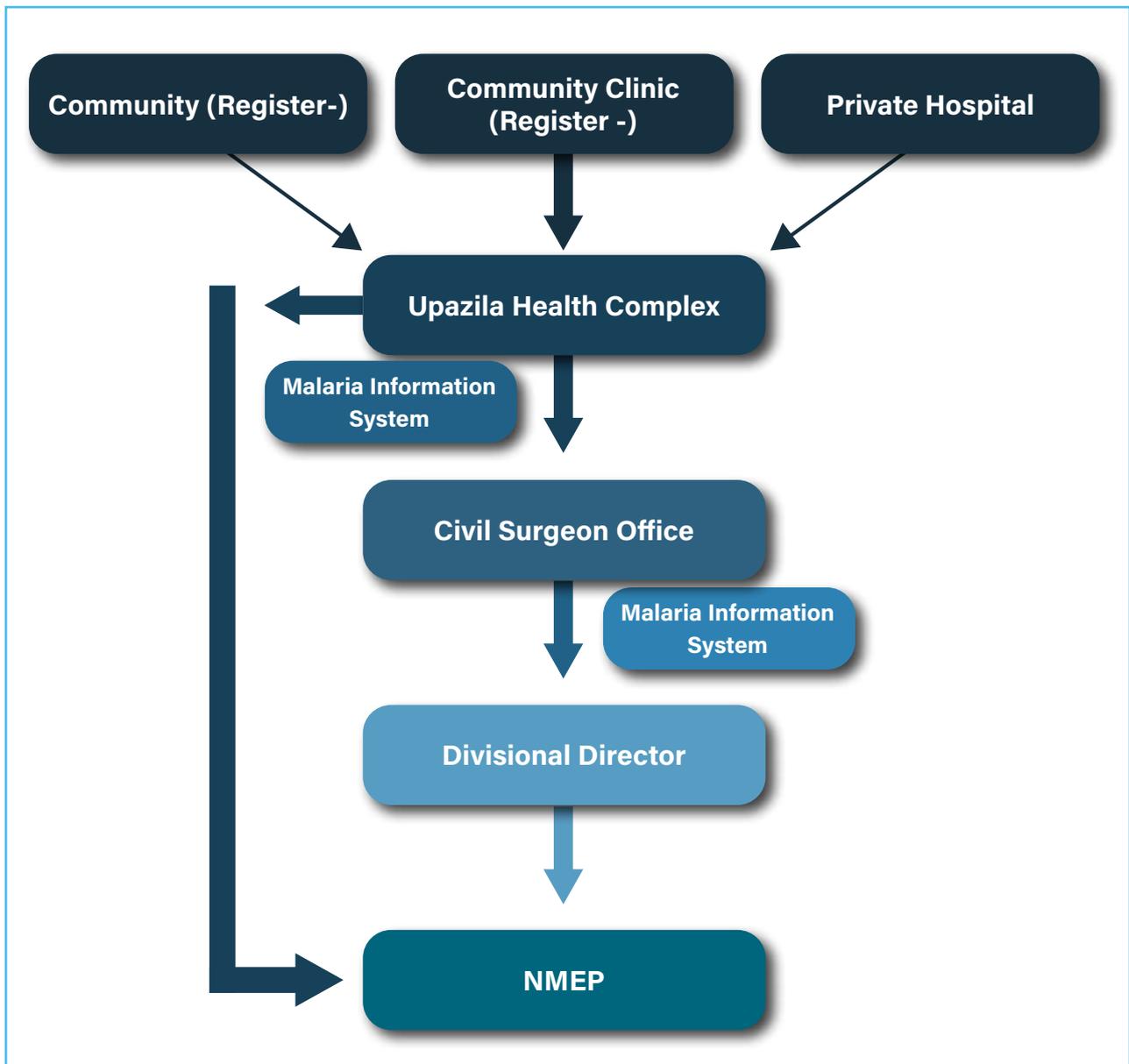
Figure 31. Data flow and reporting mechanism of Malaria surveillance

Data interoperability, Analysis and Visualization

Surveillance data analysis is conducted at multiple administrative levels, including the central, upazila, and community levels. At these levels, data is routinely reviewed to identify trends such as increases or decreases in malaria cases. Monthly and quarterly analyses, focusing on trend analysis and disease burden; are conducted to inform planning and response activities. Community-level health workers maintain records and can detect changes in case patterns within their areas. At the Upazila level, a statistician stationed at the UHC is responsible for analyzing the data and uploading monthly reports to the MIS and National Malaria Elimination Program (NMEP) systems. However, no structured data analysis is performed at medical college hospitals.

Use of Surveillance Data

The malaria surveillance system in Bangladesh incorporates elements of forecasting, early warning, and early detection, guided by both climatic and epidemiological parameters. A particularly critical period for outbreak detection is observed during the month of June, when seasonal transmission tends to increase rapidly. During this time, surveillance focal points at the district and upazila levels, along with peripheral health workers and community volunteers, remain on high alert. NMEP also prepares to provide additional support, including essential drugs and commodities, to ensure a timely response.

Surveillance data is utilized for multiple purposes within the malaria control system. It is essential for tracking trends, death in case numbers—both increases and decreases—and for initiating appropriate actions aligned with strategic plans. The data supports routine monitoring and informs the development and adjustment of intervention strategies. It plays a vital role in upsurge detection, enabling prompt responses and facilitating investigations into potential causes. Additionally, surveillance data helps identify system gaps and limitations, guiding corrective measures. It contributes to awareness-raising initiatives and outbreak control, including the preparation and deployment of Rapid response teams. Furthermore, the data is used by surveillance teams to trace sources of infection, reduce disease transmission, enhance health education, implement preventive measures, and support the development of evidence-based guidelines.

Data Protection and Privacy

Data privacy and security are maintained at both central and peripheral levels. At the central level, software-based platforms are protected by user-specific IDs and passwords. At the peripheral level, register is securely maintained and accessed only by authorized personnel. Any additional access requires prior permission from the designated authority, ensuring confidentiality of patient information and surveillance data.

Challenges

- Unauthorized movement of FDMN population to districts within the Chattogram Hill Tracts (CHT) districts contribute to increased number of cases and deaths.
- High burden of malaria cases in Bandarban and Rangamati contribute around 90% of total cases
- High risk occupational groups (forest goers, jhum cultivators, students etc.)
- Cross border movement

Way Forward

- Continuing and scale up Targeted Drug Administration (TDA) in high transmission villages based on the success in Lama, Juraichari, and Barkal. The TDA was piloted in 4 villages in Lama in 2023. Till today no cases are reported from these 4 villages. In 2024, a total of 31 villages were under TDA in Jurachari and Barkal of Rangamati and case load were dramatically reduced.

- Sustain Mass Drug Administration (MDA) and malaria vaccination efforts in 75 villages of Lama and Alikadam Upazila.

- Recruit and retain Malaria Mobile workers from forest goer and Jhum cultivator groups.

- Strengthen special health camps and malaria posts in border and hard to reach areas.

- Ensure consistent distribution of forest packs for high-risk occupational groups.

- Restrict unauthorized movement of FDMN populations.

- Seek ministerial level support for cross border collaboration with India and Myanmar.

- Continuing WhatsApp based case support for managing severe malaria.

- Organize online orientation programs for doctors in endemic areas.

4.2.11 Influenza Surveillance in Bangladesh

Brief History

Influenza is a contagious viral illness that can range from mild to severe and has the potential to trigger widespread epidemics and global pandemics. To strengthen global preparedness and response, the WHO established the Global Influenza Surveillance and Response System (GISRS), which has been operating for over 73 years and currently includes 152 National Influenza Centers (NICs) across 129 member countries [62]. In 2007, IEDCR was designated as the National Influenza Centre for Bangladesh by WHO. Serving as the national reference laboratory for influenza, IEDCR plays a vital role in GISRS by conducting routine surveillance, collecting and analyzing virus specimens, and contributing to global risk assessment and vaccine composition decisions. Bangladesh conducts influenza surveillance through two key platforms: Hospital-Based Influenza Surveillance (HBIS) and National Influenza Surveillance Bangladesh (NISB). The HBIS, launched in 2007, is implemented by icddr,b in collaboration with IEDCR. To expand and strengthen nationwide influenza monitoring, IEDCR initiated NISB in 2010. Both surveillance systems are supported by the U.S. CDC. Notably, by leveraging this system, two additional surveillance activities are being conducted: SARS-CoV-2 surveillance, initiated in January 2020, and Respiratory Syncytial Virus (RSV) surveillance, launched in October 2022 through an integrated platform focusing on children under five years of age. On 2024, Pandemic Influenza Severity Assessment (PISA) reporting initiated, which is a tool developed after the 2009 influenza pandemic to measure the severity of seasonal and pandemic influenza. It uses key indicators such as transmissibility, morbidity and mortality, and seriousness of disease. In 2024, Bangladesh started implementing PISA following WHO guidance, and the National Influenza Centre (NIC) began training and selecting indicators for regular reporting.
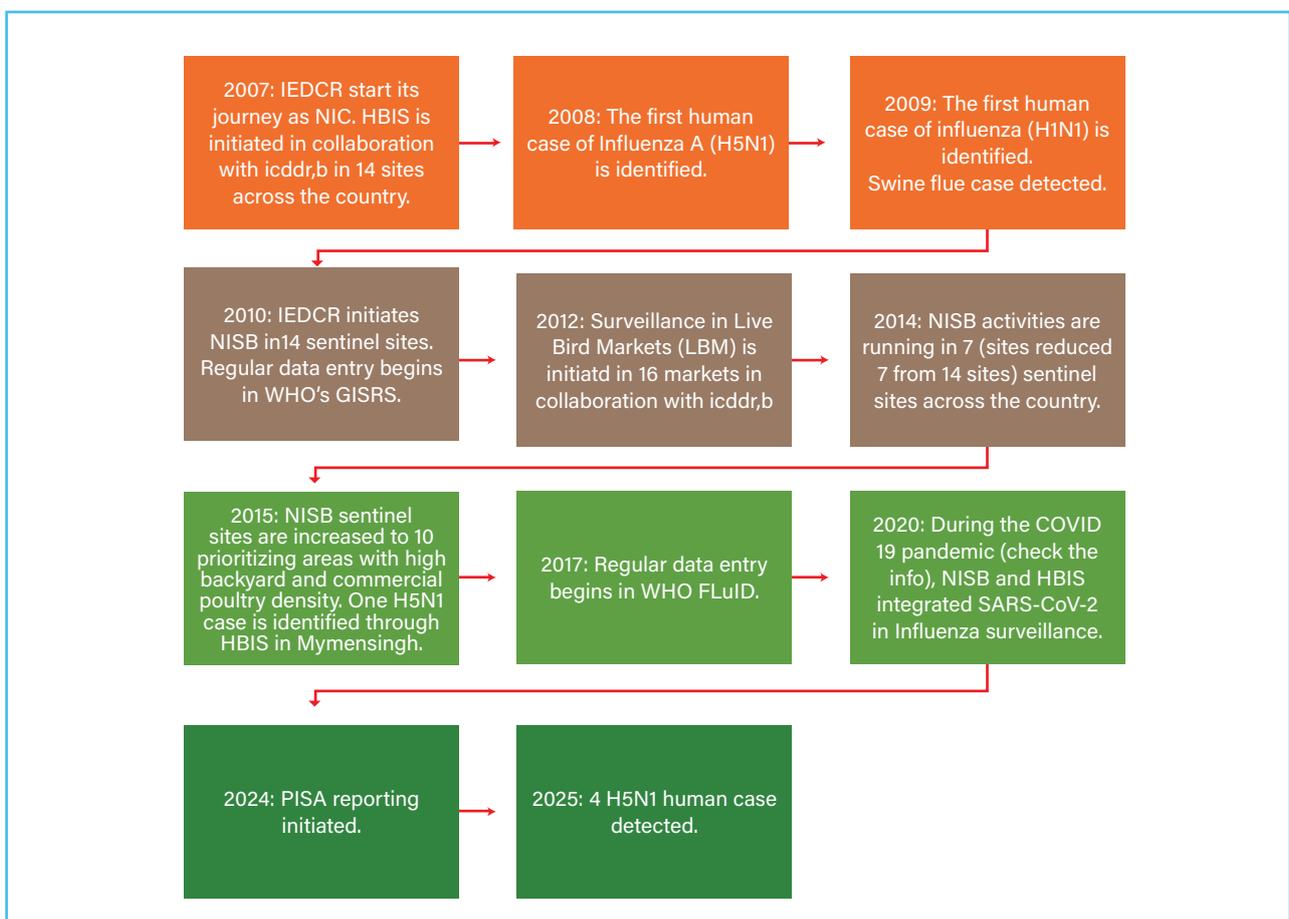
Figure 32. Important milestones for National Influenza Centre

Type and Structure

NISB and HBIS are primarily a sentinel-based, laboratory-confirmed surveillance system with syndromic surveillance components. Participants are enrolled from the pediatric and medicine departments of designated sentinel hospitals, which serve as the primary reporting units. Two categories of cases are included: (i) Influenza-Like Illness (ILI) cases from outpatient departments, and (ii) Severe Acute Respiratory Infections (SARI) cases from inpatient departments, using case definitions outlined in below Table 62. Case identification and sample collection occur daily, while data are compiled and reported to NIC on a weekly basis. The system is aligned with international standards, particularly those set by the WHO's GISRS and the International Health Regulations (IHR 2005), ensuring both national relevance and global compatibility.

Table 42. Case definition of SARI and ILI

Severe acute respiratory infections (SARI)	Influenza like Illness (ILI)
An acute respiratory infection with: • History of fever or measured fever of ≥ 38 ℃ • Cough • Onset within the last 10 days • Requires hospitalization	An acute respiratory infection with: • Measured fever of ≥ 38 ℃ • Cough • With onset within the last 10 days

Objectives

1. To describe the epidemiology of influenza, SARS-CoV-2 and RSV including clinical characteristics, seasonality and trend

2. To estimate the severity of influenza

3. To monitor and characterize the circulating strains of influenza, SARS-CoV-2 and RSV

4. To detect any emergence of novel influenza strains of pandemic potential

5. To integrate other respiratory pathogens of public health importance into the surveillance system

6. To utilize the platform for special investigations or other public health measures

7. To provide evidence-based guidance for public health action

8. To estimate annual incidence rate of clade from the subset of positive influenza cases

Patients who meet the case definitions for Influenza-Like Illness (ILI) and Severe Acute Respiratory Illness (SARI) are systematically enrolled. The main goal of the National Influenza Surveillance is to track influenza virus trends and detect outbreaks in a timely manner to guide public health responses. Specifically, the system aims to identify both seasonal and pandemic influenza outbreaks, monitor associated morbidity and mortality, and inform evidence-based policymaking.

Population and Geographic Coverage

NISB targets individuals of all age groups presenting with ILI or SARI symptoms, making it inclusive of both outpatient and inpatient populations. The surveillance is implemented through a network of sentinel sites strategically distributed across Bangladesh's eight administrative divisions, ensuring a broad geographic representation. However, the sentinel sites are primarily tertiary- or district-level hospitals and therefore do not adequately represent rural areas. These sentinel sites are situated in major public hospitals, which serve large catchment populations and provide a realistic overview of influenza circulation patterns in the general population.

Table 43. List of Sentinel Sites for Influenza Surveillance (NISB and HBIS)

Sl. No.	Name of Hospital	District	Type
National Influenza Surveillance Bangladesh (NISB)			
1	Thakurgaon District Hospital	Thakurgaon	District Hospital
2	Naogaon District Hospital	Naogaon	District Hospital
3	Satkhira District Hospital	Satkhira	District Hospital
4	Narshingdi District Hospital	Narshingdi	District Hospital
5	Habiganj District Hospital	Habiganj	District Hospital
6	Cox's Bazar District Hospital	Cox's Bazar	District Hospital
7	Joypurhat District Hospital	Joypurhat	District Hospital
8	Patuakhali District Hospital	Patuakhali	District Hospital
9	Dhaka Medical College Hospital	Dhaka	Tertiary Hospital
10	Shaheed Tajuddin Ahmed Medical College Hospital	Gazipur	Tertiary Hospital
Hospital-Based Influenza Surveillance (HBIS)			
1	Jahurul Islam Medical College Hospital	Kishoreganj	Private Medical College
2	Rajshahi Medical College Hospital	Rajshahi	Tertiary Hospital
3	Cumilla Medical College Hospital	Cumilla	Tertiary Hospital
4	Khulna Medical College Hospital	Khulna	Tertiary Hospital
5	Jashore General Hospital	Jashore	District Hospital
6	Jalalabad Ragib Rabeya Medical College & Hospital	Sylhet	Private Medical College
7	Sher-e-Bangla Medical College Hospital	Barisal	Tertiary Hospital
8	Chattogram Medical College Hospital	Chattogram	Tertiary Hospital
9	Dinajpur Medical College Hospital	Dinajpur	Tertiary Hospital

NATIONAL INFLUENZA SURVEILLANCE BANGLADESH (NISB)
HOSPITAL-BASED INFLUENZA SURVEILLANCE (HBIS)
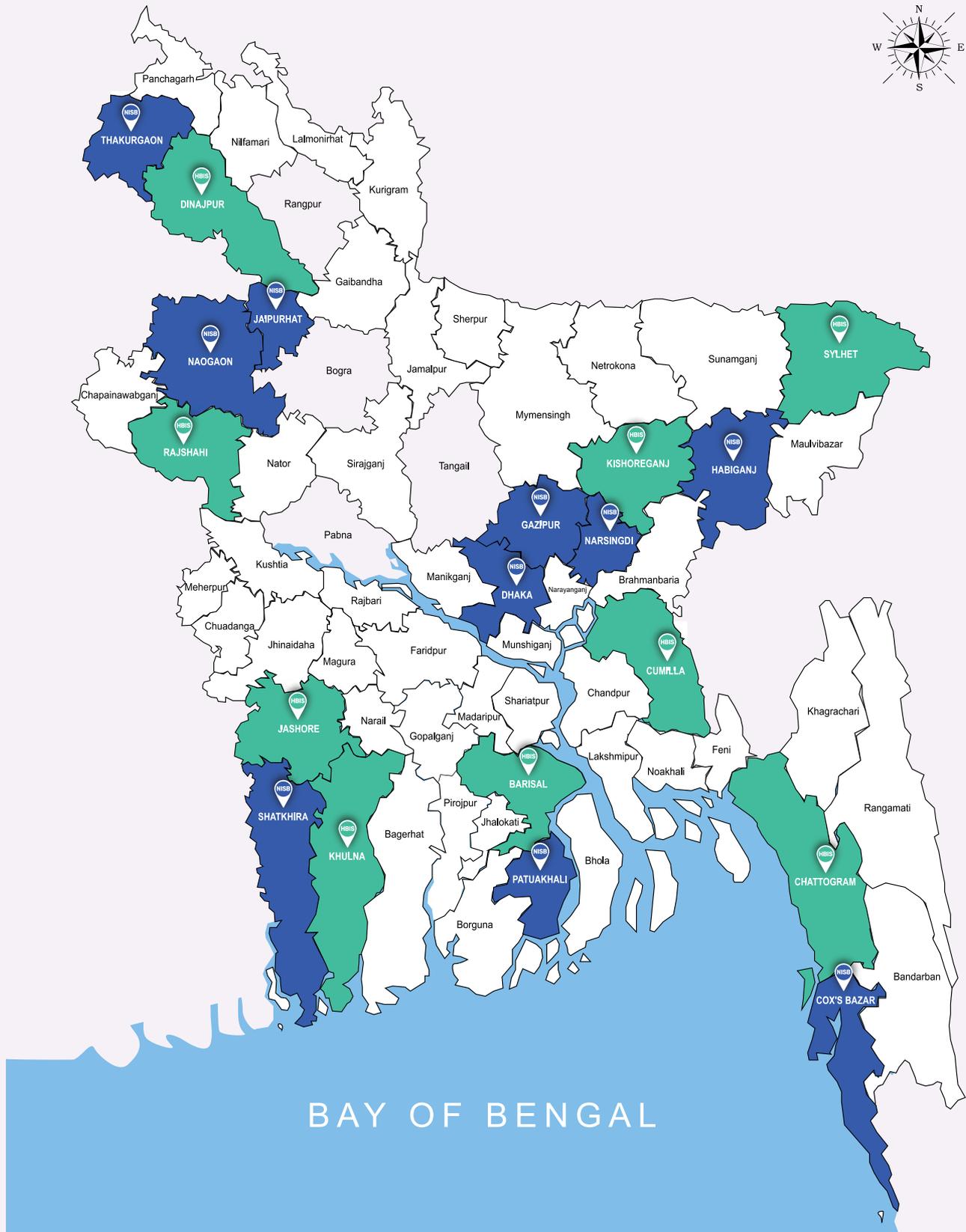
Figure 33. Distribution of the National Influenza Surveillance sites in Bangladesh

Funding Agencies (excluding government) and Their Role

Table 44. Funding agencies and their role in Influenza surveillance

Funding Agency	Use of fund
US CDC	Support for laboratory infrastructure, equipment, reagents, capacity building, training, and full coverage of human resources for both NISB and HBIS platforms, including sentinel site staff and key central-level officials at IEDCR and icddr,b.
WHO	Provide technical support for protocol development and data sharing through FluNet and FluID. Also, support to other stakeholders ensures the continued operation and development of the surveillance system.

Governance and Stakeholder Role

The governance of NISB is led by IEDCR, which is responsible for coordination, laboratory testing, data analysis, and dissemination. HBIS led by icddr,b. Sentinel hospitals serve as the operational arms of the surveillance system, managing patient enrollment, data collection, and specimen transport. IEDCR as part of NIC coordinates and collaborates with both surveillance systems. International partners such as CDC and WHO provide ongoing technical and advisory support to ensure the system remains robust and aligned with global best practices of the global.

Table 45. Governance and stockholder with their role in Influenza surveillance

Stakeholder	Role
IEDCR	Operate NISB, patient enrolment, sample collection, laboratory testing, analysis, national and international reporting as NIC as IEDCR is responsible for overall coordination and advocacy of NISB and HBIS
icddr,b	Operate HBIS, patient enrolment, sample collection, laboratory testing, data analysis, and dissemination.
DGHS	Policy making, reporting IHR, WHO. And also, takes control and preventive measures on pandemic situation
Sentinel Hospitals	Case detection, data collection, sample collection and storage, and transport to central laboratories
US CDC	Funding support for human resources, technical assistance, laboratory reagent support, capacity building, and global reporting alignment
WHO	Technical assistance, laboratory reagent support, capacity building, and global reporting alignment

Sample Collection and Testing Protocol

The surveillance system collects nasopharyngeal and throat swabs from patients who meet the case definitions for ILI or SARI. Specimens are transported under a maintained cold chain to the IEDCR and icddr,b virology laboratory for testing. At the laboratory, testing is conducted weekly using real-time reverse transcription-polymerase chain reaction (RT-PCR) techniques, in accordance with standard operating procedures (SOPs) for sample processing, virus detection, and subtyping. This rigorous process enables the timely identification of circulating influenza strains, which is critical for both early outbreak detection and contribution to global surveillance efforts. Currently, three influenza virus subtypes - A(H1N1) pdm09, A(H3), and B/Victoria - are circulating in Bangladesh. Ongoing monitoring of these subtypes through systematic sample collection and laboratory testing informs public health response strategies, guides vaccine formulation, and helps protect at-risk populations nationwide.

Data Flow and Reporting Mechanism

Data reporting is both paper based and real time. Data from sentinel sites are first recorded on paper or digital forms at the hospital level and then sent to IEDCR and icddr, b, electronically (real time) and by hand (weekly with sample). NIC share weekly epidemiological data (FluID) and virological data (FluNet) of HBIS and NISB in GISRS. These data help in visualizing the influenza season and circulating strains through GISRS. And also guide the annual selection of influenza vaccine strains. In addition to weekly reporting, the system produces monthly reports for the Government of Bangladesh, partner institutions, US CDC, and WHO. Laboratory testing reports and feedback are shared with sentinel sites on regular basis. In case of outbreaks, IEDCR communicates immediately to support a rapid response.
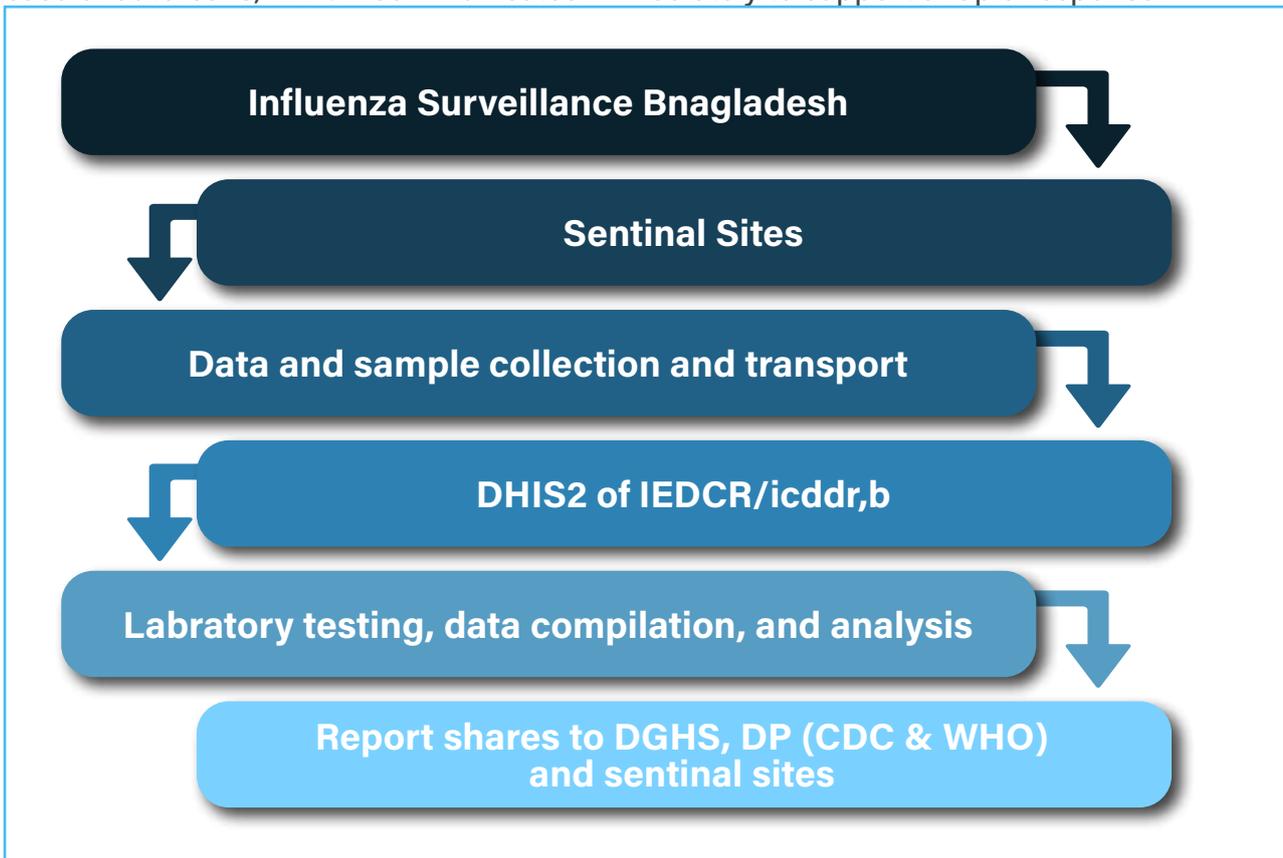
Figure 34. Data Flow for National Influenza Surveillance

Data Interoperability, Analysis, and Visualization

Data analysis is conducted by the epidemiology and virology teams at IEDCR and icddr,b, using a mix of tools for analysis and visualization. Weekly and monthly analyses are conducted to monitor virus circulation, detect unusual signals, and support data-driven decision-making. For example, Figure 35 demonstrates influenza seasonal trend between May 2007 to August 2024, highlighting seasonality in the monsoon months between April-September with peak in June-July. Such analysis helps policy makers undertake preventive and control measures such as vaccination timing prior to season, and readiness of health facilities for respiratory infections. Monthly reports are regularly updated on IEDCR website that is accessible for all.

Use of Surveillance Data

NISB and HBIS data are crucial for informing public health responses, including the early detection of outbreaks and the implementation of control measures. The data guide influenza seasonality, influenza vaccine strain selection, identification of circulating sub-types, and

disease severity. Surveillance outputs are also used in shaping national policies, revising clinical guidelines, and targeting public health messaging. At the international level, influenza surveillance contributes to WHO's global surveillance efforts through regular reporting to FluNet, FluID and PISA strengthening global pandemic preparedness.
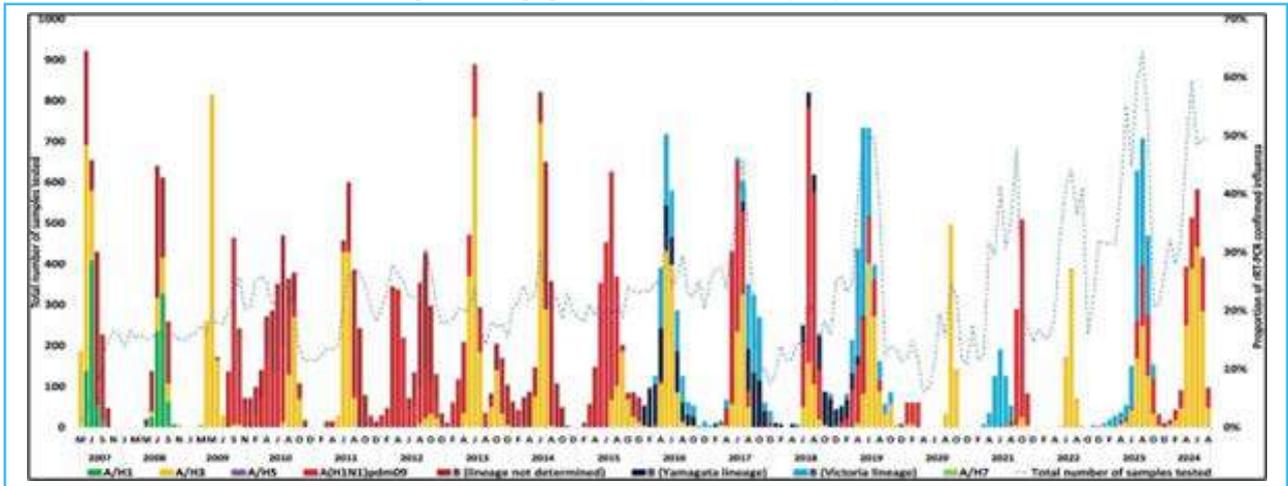
Figure 35. Influenza Seasonality and Subtypes May 2007–Aug 2024 (Hassan et al. (2025).

Data Protection and Privacy

The system ensures the confidentiality of patient information through data anonymization and secured data storage practices. Unique identifiers are used instead of personal identifiers, and access to data is restricted to authorized personnel. Data sharing follows national ethical guidelines and international standards such as WHO's data protection policies. Access to raw datasets is restricted, while aggregate data is made more widely available for programmatic and research purposes.

Challenges

- Sustainability of surveillance activities due to dependency on external funding and limited domestic resource allocation.

Way Forward

- Strengthen the influenza surveillance system, including infrastructure, and integration with DHIS2.
- Ensure sustainability through government funding and increased domestic investment.
- Develop and implement a national pandemic preparedness plan.
- Enhance data sharing and coordination on zoonotic influenza through a One Health approach.
- Improve logistics management for laboratory supplies, reagents, and specimen transport.
- Conduct advanced research and disease burden estimation to guide vaccine policy and resource prioritization.

4.2.12 Kala-Azar Surveillance System

Brief History

Visceral leishmaniasis (kala-azar, KA) was first documented in 1824 in the Jessore district with hallmark features of prolonged irregular fever, weight loss, hepatosplenomegaly, and high fatality [63]. Epidemic waves occurred every 20–40 years in the region, with major peaks in the 1820s, 1860s, 1920s, and 1940s, affecting both East and West Bengal. The malaria eradication campaign in the 1950s–60s, involving indoor DDT spraying, coincided with a steep decline in KA incidence. However, cases resurged in the 1970s after vector control ceased, likely due to untreated Post-Kala-Azar Dermal Leishmaniasis (PKDL) patients acting as reservoirs. In Bangladesh, sporadic cases reappeared in the 1970s with a major outbreak in Pabna in 1980 and continued transmission, thereafter, primarily affecting districts like Sirajganj, Pabna, Mymensingh, and Tangail. Historically, KA surveillance in Bangladesh was limited to passive case detection, with health facilities sending paper-based aggregate reports to district and national levels. This system lacked timeliness, case-level detail, and sensitivity—especially for detecting PKDL cases. A turning point came with the launch of the National Kala-azar Elimination Programme (NKEP) in 2010, and particularly with the implementation of the District Health Information Software 2 (DHIS2) in 2015. The DHIS2 digital platform allowed for standardized, real-time reporting of KA and PKDL cases, enabling improved case tracking, timely response, and data-driven decision-making at national and subnational levels.

Surveillance data since 1994 show epidemic peaks in 1997 and 2006, with the latter primarily affecting Mymensingh. A notable spike in 2010–2011, driven by Médecins sans Frontières' active case detection in Fulbaria, highlighted the underestimation of cases under passive surveillance - 1145 PKDL and 1087 KA cases were identified compared to far fewer in adjacent areas using routine reporting. Since 2008, case numbers have shown a steady decline, with the DHIS2 system playing a crucial role in monitoring progress and targeting interventions. The success of the strengthened surveillance system is evident in the enhanced geographic precision, increased PKDL detection, and overall case reduction, contributing significantly toward the goal of eliminating KA as a public health problem in Bangladesh.

Surveillance Objectives

- Estimate disease burden
- Determine incidence trends over time
- Detect outbreaks in a timely manner and provide information to classify the outbreak as of national or international importance
- Assess new foci or importation of cases in non-endemic/endemic areas
- Identify risk groups
- Determine the distribution and spread of KA (mapping)
- Evaluating control measures
- Identify causative parasites
- Entomological surveillance and vector control monitoring and evaluation
- Inform appropriate levels of health system for effective public health responses

Type and Structure of Surveillance

Type

- Active case-based surveillance
- Passive surveillance (When a suspected case of Kala-azar is reported from UHC)
- **Health personnel involved in surveillance and management of kala-azar**
    1. **Upazila Level: Upazila Kala-azar Surveillance Unit**
        - Head: Upazila Health and Family Planning Officer (UH&FPO)
        - Focal person: Medical Officer (MO)/ MODC
        - Senior Staff Nurse (SSN)
        - Statistician
        - HI incharge
        - Concerned HA
        - MT lab

    2. **District Level: District Kala-azar Surveillance Unit**
        - Head: Civil Surgeon (CS)
        - Focal Person: MO (CS/DC)
        - Statistician

    3. **Government Medical College Hospitals/ Specialized Hospital**
        - Director (Hospital)
        - Focal Person: to be assigned by the Hospital Director (medicine/ID specialized)
        - Senior staff nurses (SSN)
        - Statistician

    4. **Central level**
        - Programme Manager (PM)
        - Deputy Programme Manager (DPM)
        - Senior advisor
        - Technical Advisor
        - Monitoring and evaluation manager
        - Surveillance Medical Officer (SMO)
        - Entomological unit (ESEs)
        - Data Manager
        - Logistic and supply chain officer

Structure

Responsibilities of upazila surveillance units include prompt reporting of KA and PKDL cases using the web-based system, complete follow up of treated KA patients, supply and cold chain maintenance, monitoring trends of the disease and taking appropriate response based on surveillance data. The upazila-level surveillance unit is tasked with completing Kala-azar (KA) patient registration and follow-up forms following the treatment of KA and PKDL patients. It ensures timely reporting of KA and PKDL cases through a web-based system, oversees the functioning of single-dose AmBisome treatment centers, and manages the

supply and cold chain of essential items like AmBisome, Miltefosine, and Deltamethrin. The web-based registration system helps maintain a comprehensive database of all diagnosed and treated KA cases across healthcare facilities including UHCs, district hospitals, and tertiary/specialized hospitals.

The follow-up form plays a vital role in monitoring patients after treatment by documenting mandatory follow-up visits at one and six months. The digital reporting process uses a modular "Patient Registration and Follow-up Form," which includes several sections: general patient information (after hospital admission), details before treatment, condition post-treatment and before discharge, suspected adverse drug reactions (ADRs) and a list of adverse events, and follow-up information.

Overall, the upazila surveillance units are responsible for timely web-based reporting of KA and PKDL cases, ensuring follow-up of all treated patients, maintaining drug supplies and cold chains, tracking disease trends, and initiating appropriate responses based on surveillance data.

Figure 36. Data management system of Kala-Azar

Table 46. Key actors of surveillance

Levels	Department	Key Actors	Role
Central	Disease Control, MIS	Director/LD, PM, DPM, assigned personnel	Disease burden identification & to provide a timely mechanism for the dissemination of summary data
Tertiary	Divisional Health Office MCH, DH	Divisional Director Director, Superintendent, assigned personnel	Generation & compilation of surveillance data
Secondary	Civil Surgeon Office	CS, MOCS/MODC assigned personnel	Compilation of surveillance data & to provide a timely mechanism for the dissemination of summary data
Primary	UHC, Upazila Health Office	RMO, MODC, UH&FPO assigned personnel	Generation & compilation of surveillance data

Population and Geographic Coverage

- **Target population:** All aged people.
- **Case Definition:**

  A case of visceral leishmaniasis is a person showing clinical signs (mainly prolonged irregular fever, splenomegaly and weight loss) with serological (at geographical area level) and/or parasitological confirmation (when feasible at central level) of the diagnosis.

  New Kala-azar (NKA)/Primary Visceral Leishmaniasis

  i. **Fever for >2 weeks AND**

     Residing/traveling in Kala-azar endemic areas AND
     Splenomegaly AND
     rK39 RDT +ve
     With or without weight loss, anemia, enlarged liver, darkening of skin

  ii. **Kala-azar Treatment Failure (KATF)**

     Diagnosed as NKA and history of treatment for NKA AND

     No improvement after initial treatment within 15 days AND/OR reappearance of symptoms and sign of KA within 6 months

  iii. **Relapse Kala-azar (RKA)**

     Diagnosed as NKA and history of treatment for NKA AND
     Reappearance of symptoms and sign of KA after 6 months of the end of treatment

  iv. **Post Kala-azar Dermal Leishmaniasis (PKDL)**

     Residing/travelling in the endemic areas AND
     History of treatment for Kala-azar any time in the past AND
     Suggestive skin lesion without loss of sensation: macular, papular, nodular or mixed AND
     Exclusion of other causes of skin disease: leprosy, vitiligo, pityriasis, ring worm, arsenicosis AND
     rK39 (+ve) and/ or slit skin smear positive or PCR positive.

  v. **Past case of Kala-azar**

     An illness with 2 or more weeks of fever AND
     At least one of the following: weight loss, abdominal fullness, and/or skin darkening, WITH clinical improvement after anti-leishmanial treatment

Geographic Coverage:

▬ PROGRAMMATIC ENDEMIC ZONES OF KALA-AZAR
(100 UPAZILAS UNDER 26 DISTRICTS)

PANCHAGARH

THAKURGAON

Nilfamari

Lalmonirhat

DINAJPUR

RANGPUR

Kurigram

Gaibandha

Sherpur

JAIPURHAT

Netrokona

Sunamganj

Sylhet

NAOGAON

BOGRA

JAMALPUR

CHAPAINAWABGANJ

MYMENSINGH

Maulvibazar

RAJSHAHI

KISHOREGANJ

Habiganj

NATOR

SIRAJGANJ

TANGAIL

GAZIPUR

NARSINGDI

PABNA

Brahmanbaria

KUSHTIA

MANIKGANJ

DHAKA

Narayanganj

Meherpur

RAJBARI

Munshiganj

Cumilla

Chuadanga

Faridpur

Chandpur

JHINAIDAHA

Magura

Shariatpur

Khagrachari

Narail

Madaripur

Lakshmipur

Feni

Rangamati

Jashore

Gopalganj

Noakhali

Barisal

Shatkhira

Bagerhat

Pirojpur

Jhalokati

KHULNA

Borguna

PATUAKHALI

BHOLA

Chattogram

Bandarban

Cox's Bazar

BAY OF BENGAL

Figure 37. Programmatic Endemic zones of Kala-Azar

Table 47. Programmatic Endemic zones of Kala-Azar

Programmatic Endemic zones of Kala-azar 169 Upazilas under 37 Districts			
District	**Upazila**	**District**	**Upazila**
Bagerhat	Kachua	Mymensingh	Nandail
Bandarban	Bandarban Sadar	Mymensingh	Phulpur
Bhola	Lalmohan	Mymensingh	Trishal
Bogra	Dhunat	Mymensingh	Ishwarganj
Bogra	Sherpur	Naogaon	Badalgachhi
Bogra	Sonatola	Naogaon	Dhamoirhat
Bogra	Dupchachia	Naogaon	Mahadebpur
Bogra	Adamdighi	Naogaon	Manda
Chandpur	Kachua	Naogaon	Niamatpur
Chandpur	Shahrasti	Naogaon	Patnitala
Chapai Nawabganj	Chapai Nawabganj Sadar	Naogaon	Porsha
Chapai Nawabganj	Nachole	Naogaon	Sapahar
Chapai Nawabganj	Shibganj	Naogaon	Naogaon Sadar
Chapai Nawabganj	Gomostapur	Narail	Kalia
Chattogram	Satkania	Narsingdi	Raipura
Comilla	Burichang	Narsingdi	Shibpur
Comilla	Debidwar	Narsingdi	Narsindi Sadar
Comilla	Meghna	Narsingdi	Belabo
Comilla	Murad Nagar	Natore	Baraigram
Dhaka	Dhamrai	Natore	Gurudaspur
Dhaka	Savar	Natore	Lalpur
Dinajpur	Birampur	Natore	Natore Sadar
Dinajpur	Chirirbandar	Natore	Bagatipara
Dinajpur	Dinajpur Sadar	Natore	Singra
Dinajpur	Fulbari	Netrakona	Netrokona Sadar
Dinajpur	Ghoraghat	Pabna	Atgharia
Dinajpur	Nawabganj	Pabna	Bera
Dinajpur	Parbatipur	Pabna	Bhangura
Dinajpur	Birganj	Pabna	Chatmohar
Dinajpur	Bochaganj	Pabna	Faridpur
Faridpur	Nagarkanda	Pabna	Ishwardi
Faridpur	Faridpur Sadar	Pabna	Pabna Sadar
Gaibandha	Shaghata	Pabna	Santhia
Gaibandha	Gobindaganj	Pabna	Sujanagar
Gaibandha	Polashbari	Panchagarh	Atwari
Gaibandha	Fulchhari	Panchagarh	Boda
Gaibandha	Gaibandha Sadar	Panchagarh	Debiganj
Gazipur	Gazipur Sadar	Panchagarh	Panchagarh Sadar
Gazipur	Kaliakair	Patuakhali	Dashmina
Gazipur	Sreepur	Patuakhali	Galachipa

Gazipur	Kaliganj	Patuakhali	Rangabali
Gazipur	Kapasia	Pirojpur	Pirojpur Sadar
Gopalganj	Tungipara	Rajbari	Pangsha
Gopalganj	Gopalganj Sadar	Rajbari	Rajbari Sadar
Jamalpur	Jamalpur Sadar	Rajbari	Baliakandi
Jamalpur	Madarganj	Rajshahi	Godagari
Jamalpur	Melandaha	Rajshahi	Puthia
Jamalpur	Sharishabari	Rajshahi	Tanore
Jamalpur	Islampur	Rajshahi	Bagha
Jessore	Jessore Sadar	Rajshahi	Durgapur
Jhenaidah	Kaliganj	Rajshahi	Charghat
Jhenaidah	Kotchandpur	Rajshahi	Paba
Jhenaidah	Maheshpur	Rajshahi	Rajshahi CC
Joypurhat	Panchbibi	Rangpur	Pirganj
Joypurhat	Khetlal	Shariatpur	Bhedorganj
Joypurhat	Kalai	Shariatpur	Damudya
Joypurhat	Joypurhat Sadar	Shariatpur	Gosairhat
Khulna	Terokhada	Sherpur	Jhenaighati
Kishoreganj	Hossainpur	Sherpur	Nalitabari
Kishoreganj	Pakundia	Sirajganj	Belkuchi
Kishoreganj	Kishoregonj Sadar	Sirajganj	Chauhali
Kurigram	Raumari	Sirajganj	Kamarkhanda
Kurigram	Ulipur	Sirajganj	Royganj
Kushtia	Daulatpur	Sirajganj	Shahjadpur
Kushtia	Kumarkhali	Sirajganj	Sirajganj Sadar
Lakshmipur	Ramgati	Sirajganj	Tarash
Lalmonirhat	Aditmari	Sirajganj	Ullahpara
Madaripur	Madaripur Sadar	Sirajganj	Kazipur
Magura	Magura Sadar	Sunamganj	Dharmapahsa
Manikganj	Daulatpur	Tangail	Basail
Manikganj	Manikganj Sadar	Tangail	Bhuapur
Manikganj	Saturia	Tangail	Delduar
Manikganj	Ghior	Tangail	Dhanbari
Manikganj	Shibalaya	Tangail	Ghatail
Meherpur	Gangni	Tangail	Gopalpur
Meherpur	Meherpur Sadar	Tangail	Kalihati
Munshiganj	Serajdikhan	Tangail	Madhupur
Mymensingh	Bhaluka	Tangail	Mirzapur
Mymensingh	Dhobaura	Tangail	Nagarpur
Mymensingh	Fulbaria	Tangail	Sakhipur
Mymensingh	Gaffargaon	Tangail	Tangail Sadar
Mymensingh	Haluaghat	Thakurgaon	Baliadangi
Mymensingh	Muktagachha	Thakurgaon	Haripur
Mymensingh	Mymensingh Sadar	Thakurgaon	Thakurgaon Sadar
		Thakurgaon	Ranisankail

Funding Agencies (excluding government) and Their Role

Table 48. Governance and stockholder with their role in Kala-Azar surveillance

Funding Agency	Their role
WHO	Provides funds for the activities of kala-azar surveillance system. It supports kala-azar surveillance in Bangladesh through technical guidance, capacity building, and strategic planning. It helps to train health workers and strengthens diagnostic and reporting systems. WHO also assists in monitoring progress toward elimination, supports data management through systems like DHIS2, and promotes integration with broader disease surveillance frameworks. Coordinates with government and partners, facilitates research, and advocates sustained commitment to the kala-azar elimination program.

Governance and Stakeholder Role

Table 49. Lead and supporting organizations in Kala-Azar surveillance

Stakeholder	Role
CDC DGHS	Collaboration of Kala-azar related activities, surveillance
WHO	Provide fund
icddr,b	Conduct relevant research
BMU	Provide treatment of patients, referral of complicated cases and capacity building
	IDH Dhaka (admission of patients for treatment purpose)

Stakeholders Interaction

WHO representative shares the same office with Kala-azar surveillance system run by CDC, DGHS. So, there is regular direct interaction between them.

Sample Collection and Testing Protocol

There is no need to collect samples as there is a kit test at place to diagnose rapidly. Bone marrow aspirations and cytology to see LD Body inside macrophage can be done. But no one does that as RK-39 is easy and widely used screening test:

- Active case on community: RK-39 test by supplied kit
- Passive case detection at health care facility: Clinical diagnosis and RK-39 test

After being tested positive, the KA patients are referred to nearby referral centers for treatment with a referral form. These patients are tracked by HI and Assistant HI. If the patient comes from OPD and is tested positive in a laboratory, the MT lab has their phone number and is responsible for their tracking.

Data Flow and Reporting Mechanism
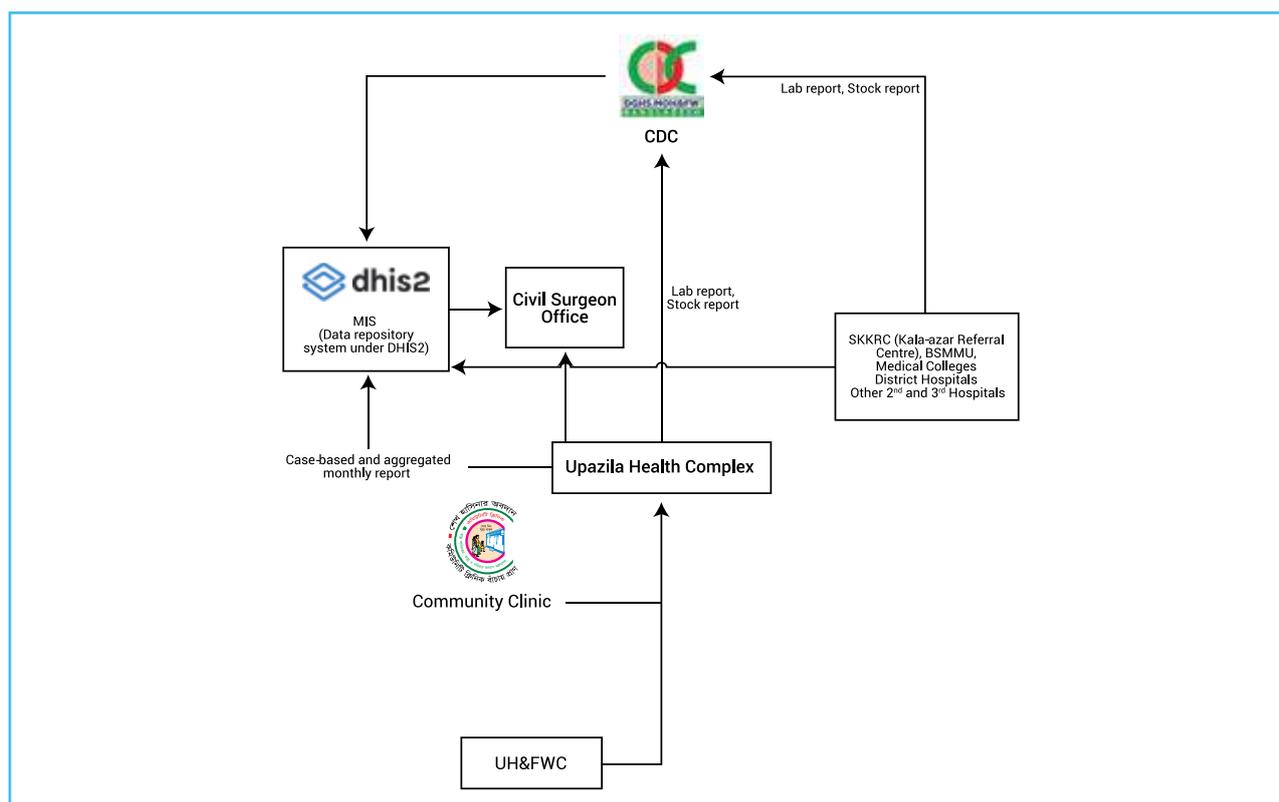
Figure 38. Data flow and reporting systems in Kala-Azar surveillance

Reporting Mechanism

Table 50. Reporting mechanism from health centers for Kala-Azar surveillance

Type of report	Reported by	Frequency	Reported through
Case-based reporting of Kala-azar and PKDL cases through DHIS2	Endemic zones	Real-time	DHIS2
Monthly zero reporting	► From endemic zones: Evidence based ► From non-endemic zones: Not evidence based	Monthly	DHIS2
Reporting of cases identified by field health workers through active surveillance approaches	Endemic upazilas	After active surveillance activities	Paper/mobile app-based
Monthly logistic report for drugs and diagnostics	Endemic upazilas	Monthly	Paper/DHIS2

- Annual reporting and dissemination of data
- Quarterly and annual report on cases, deaths and logistics to WHO

Data interoperability, Analysis and Visualization

Surveillance data Analysis procedure

- At central level, analysis is done by the Monitoring and Evaluation Officer data manager at CDC, DGHS
- At national level, data analysis team of CS Office is led by MOCS (MOCS+ MOCO), Statistician
- No analysis is done at UHC

Surveillance data archiving process

- For Active Case Detection (ACD) -google sheet (online)
- Register book is maintained, evaluated after 5 years
- DHIS-2 is the only platform for data integration of Kala-azar.

Use of Surveillance Data

- To make policy
- Development of management guidelines
- Updating the existing guidelines
- ICDDRB, IEDCR, MSF use these data for research, publications
- Data generated and reported by the KA surveillance system provided crucial information used by NKEP and the KA technical working group committee to prepare updated National Strategic Plan for Kala-azar Elimination in Bangladesh 2020-2030.

Data Protection and Privacy

- Data is not shared with anyone except authorized people and without the permission of authority. MIS decides whom to share.
- DHIS2 is a password protected website. It is accessible to designated medical colleges and UHCs of endemic upazila. So, data is well protected.

Data Dissemination

Annual report on KA is prepared by the Government of Bangladesh. This is uploaded to the DGHS website. This report is also shared with WHO headquarters.

Challenges

- To ensure the sustainability of Kala-azar elimination activity through Government Budget
- Constrains related to trained health personnels and workforce
- Difficulty in sustaining supply chain
- ACD and PCD on regular basis
- Procurement in Diagnostic kit and IRS Insecticides and other logistics
- Procurement and distribution of medicines for kala-azar listed in national treatment guidelines
- Strengthening laboratory capacity for confirmation of Kala-azar
- Presence of asymptomatic infections

Way Forward

- Allocate adequate government budget to sustain Kala-azar elimination efforts, diagnostics, medicines and vector control logistics.
- Intensify ACD in endemic areas and outbreak investigation in non-endemic areas.
- Promote regular PCD at health facilities.
- Conduct technical training on DHIS2 for statisticians and focal personnel.
- Build capacity of health workers on ACD, PCD and Case Management.
- Improve lab capacity for confirmation of KA cases beyond RK -39.
- Ensure procurement and supply chain of diagnostic kits, medicines, IRS insecticides, and other logistics
- Implement screening of household contacts of confirmed cases.
- Strengthen coordination between Disease Control, DGHS, WHO, icddr,b, and development partners.

4.2.13 Rabies Surveillance (Human)

Brief History

Since 2010, the Government of Bangladesh has prioritized 'Rabies Control' as an important program. A joint initiative of the Ministry of Health and Family Welfare, Ministry of Fisheries and Livestock and Ministry of Local Government and Rural Development started 'Rabies Control' activities from 2011 and prepared a 'National Strategy Paper' on rabies control and developed a roadmap for its implementation by 2023 with the commitment to 'Rabies free Bangladesh'. The Disease Control under the DGHS is working diligently to implement this roadmap and moving forward to eliminate rabies from Bangladesh by 2030.

Type and Structure of Surveillance

Rabies surveillance is mainly passive surveillance. The majority of data are collected through routine reporting from health facilities (Upazila health complex and district hospitals, medical colleges, infectious disease hospitals) where patients report animal bites or suspected rabies. The DHIS2 platform is used to record and report these data regularly by the health sector.

Surveillance Objective

Zero human death from dog related rabies by 2030.

Population and Geographic Coverage

Case definition

Suspected case: a case showing an acute neurological syndrome (i.e., encephalitis) dominated by forms of hyperactivity (furious rabies) or paralytic syndromes (paralytic rabies) progressing towards coma or death, usually by cardiac or respiratory failure, typically within 7–10 days of the first signs if no intensive care is instituted. These may include any of the following: aerophobia, hydrophobia, paresthesia or localized pain, dysphagia, localized weakness, nausea, or vomiting.

Probable case: a suspected case plus a reliable history of contact with a suspected, probably or confirmed rabid animal in the last 12 months. This is considered a clinically confirmed case.

In 2013, Technical Working Group and the National Steering Committee were formed to provide technical and ethical support from the highest level of government for the immediate and successful implementation of adopted strategies. CDC has set up total 410 centers of rabies vaccination and prevention. Including, one 'National Rabies Prevention and Control Center' (NRPCC) at Infectious Disease Hospital (IDH) at Mohakhali, Dhaka and 64 'District Rabies Prevention and Control Center' (DRPCC) at all District Sadar Hospitals as well as one in BITID at Chattogram and 'Upazila Rabies Prevention and Control Center' (URPCC) at 338 Upazila Health Complex to Ensure modern management of animal bite (dog, cat, fox, mongoose, monkey etc.).

Funding Agencies (excluding government) and Their Role

Table 51. Funding agencies and their role in Rabies surveillance

Funding Agency	Use of Fund
WHO	Technical support, development of strategy, Guideline, SOP, awareness materials etc.
FAO	Technical Support.
US CDC	Technical Support, Helps in field implementation.
WVS	Technical Support, Field implementation.

Governance and Stakeholder Role

Table 52. Lead and supporting organizations in Rabies surveillance

Name of Organization	Role
CDC, DGHS (Lead)	Funding, Planning, implementation, monitoring and supervision and reporting, coordination among different stake holder.
DLS	Helps in field implementation and diagnosis of rabies case.
Local Government	Initial funding and field implementation.
Development partners (WHO, FAO, NGOs (Animal welfare organizations), WVS (World veterinary services)	Technical support and field implementations.

Sample Collection and Testing Protocol

When a patient is suspected as a case of having rabies throughout Bangladesh, he is referred to a referral center, one is the Infectious Disease Hospital, Mohakhali, Dhaka, and another is the Bangladesh Institute of Tropical and Infectious Disease at Chattogram. Upon admission, clinical samples are collected and properly stored. Usually routinely saliva is collected on admission for testing. Also, CSF and blood are tested on demand. By maintaining a cold chain, the sample is sent to the Central Disease Investigation Laboratory, Fulbaria, Gulisthan, Dhaka, for PCR testing. The test report is shared via email.

Data Flow and Reporting Mechanism

Animal bite reorting: Dog bite reporting is done monthly basic from each facility. Directly uploaded in DHIS2.

Upazila Rabies Prevention and Control Centre: Manual data entry using register and monthly reporting dog bite cases in DHIS2.

District Rabies Prevention and Control Centre: The yearly reports from all upazilas, compiled through the Civil Surgeon's Office and the Sadar Hospital, are sent to the CDC via email, including the number of reported dog-bite cases.

National Rabies Prevention and Control Centre, IDH, Dhaka: Manual data entry using a register and monthly reporting of dog bites. Rabies case notification is done immediately after confirmation.

Rabies Prevention and Control Centre, BITID, Chattogram: *Manual Data entry using register and monthly reporting dog bite. Rabies case notification done immediately after confirmation. Human anti-rabies vaccine (ARV), rabies immunoglobulin (RIG), and animal ARV are distributed nationwide by the CDC. Health facilities across Bangladesh submit a monthly hardcopy list of vaccinated individuals to the CDC, delivered by designated personnel when collecting vaccines from the CDC.*

Rabies Case Reporting

When patient is clinically confirmed as a case of rabies, notification is sent to National Rabies Elimination Program, CDC. Usually, Surveillance Medical Officer is informed via phone.

Data Interoperability, Analysis and Visualization

Data manager/SMO from Zoonotic disease control program, CDC, DGHS is responsible for data analysis. Data visualization process is still under development.

Use of Surveillance Data

Updated compiled data is shared in the annual report/health bulletin published by DGHS each year. Presentation also done on "Rabies Day" and other occasions. Regular data helps to monitor progress. Research and publication can be done using this data.

Data Protection and Privacy

Data is very protected. Data is only available to authorities.

Challenges

- Underreporting of rabies case.
- Lack of diagnostic laboratories and facilities for human rabies confirmatory testing.
- Coordination among stake holders.
- Funding for continuation of surveillance.
- Inadequate adherence to Integrated Bite Case Management (IBCM).
- No specialized wards or isolation facilities for managing confirmed human rabies cases.
- Collection of samples from suspected rabies patients for laboratory confirmation is difficult.
- Difficulty in tracing rabid animals.

Way Forward

- Enhance active and community-based surveillance to reduce underreporting.
- Ensure consistent and complete data entry into DHIS2 and integration with the One Health dashboard.
- Establish and expand laboratory capacity for confirmatory diagnosis of human rabies.
- Strengthen coordination among the stakeholders for integrated rabies surveillance.
- Secure dedicated funding to sustain rabies surveillance, diagnostics, logistics, vaccine supply, and program operations.
- Establish dedicated rabies care wards in referral centers.
- Improve adherence to Integrated Bite Case Management (IBCM) at all levels.
- Improve rabid animal tracing and timely response through integrated zoonotic surveillance and field coordination.

4.2.14 Antimicrobial Resistance (AMR) Surveillance

Brief History

Since 2016, IEDCR has been conducting countrywide AMR surveillance at five sentinel sites which later expanded to nine, with the support of the Government of Bangladesh (GoB) and the WHO, US CDC and Fleming Fund [64]. The Bangladesh Livestock Research Institute (BLRI), Central Disease Investigating Laboratory (CDIL), and Department of Livestock Services (DLS) epidemiology unit are also conducting small-scale AMR surveillance. Percentage of bloodstream infections due to selected antimicrobial-resistant organisms is the indicator of SDG target 3.d.2. Bloodstream infections due to selected antimicrobial-resistant organisms, namely MRSA & ESBL E. coli were 68.7% and 64.8% respectively in 2024. Overall, it is visible from the data that the global situation on anti-microbial resistance needs to be addressed urgently.

Integrated AMR Surveillance

Bangladesh launched its first pilot integrated AMR surveillance system in July 2023. The project, titled "Piloting integration of human, animal and environmental AMR surveillance to monitor ESBL-producing E. coli using a One Health approach in Bangladesh," was initiated by the One Health initiative led by the Environmental Health and WASH Group at icddr,b. It was implemented in partnership with IEDCR, CDC-DGHS, the Department of Livestock Services (DLS), and the Department of Environment (DOE). The pilot is funded by the Integrated Health Science Research & Development Fund of the Ministry of Health and Family Welfare.

The main goals of this pilot are to establish a coordinated multisectoral AMR surveillance system, detect and estimate the prevalence of ESBL-producing E. coli, identify transmission pathways through genomic analysis, and understand factors that influence seasonal changes in resistance patterns. In the National AMR Surveillance Report 2025, this initiative is referred to as the TROYEE Study.

AMR Monitoring in the Rohingya Community (RP)

Through 33 camps in Ukhiya and Teknaf, Cox's Bazar, this project is establishing a case-based AMR surveillance system targeting 1.4 million Rohingya refugees and members of the host community. Stool, blood, and urine samples are collected weekly from ten sentinel health facilities and tested at the IEDCR Field Laboratory located at Cox's Bazar Medical College. The monthly sample collection targets are 80 urine samples, 40 blood samples, and 80 stool samples.

Type and Structure of Surveillance

- Case-Based Surveillance: Involves the collection of epidemiological and laboratory data and specimens from patients diagnosed with selected diseases and syndromes (UTI, diarrhoeal diseases, wound infection, pneumonia, and septicemia).
- Laboratory-Based Surveillance: Involves the collection of AMR related laboratory data from patient specimens for antimicrobial susceptibility testing.

Surveillance Objectives

General Objective

To establish a surveillance system to determine the status of AMR among common pathogens in Bangladesh.

Specific Objectives

- To improve the capacity of national and sentinel laboratories conducting AMR surveillance
- To develop standardized Identification and AST of the pathogen from target clinical specimens
- To develop antibiogram periodically
- To support development and update of Standard Treatment Guideline (STG) of infectious diseases)
- To establish networking among participating laboratories
- To establish a national database for AMR by developing a web-based data entry and data sharing system

Population and Geographic Coverage

Population Under Surveillance

General population, high-risk individuals in healthcare settings, primarily attending the tertiary care hospitals and private laboratories, with a focus on the following 5 cases, e.g.

1. Urinary Tract Infection
2. Septicaemia
3. Diarrhoea
4. Pneumonia
5. Wound Infection

Also, there is a variety of specimens from patients submitting specimens in private laboratories.

Sentinel Sites

Bangladesh's AMR surveillance network currently comprises 11 sentinel sites distributed across the country. Of these, nine are public medical colleges and hospitals, one is a private medical college and hospital, and one is a dedicated infectious disease institute in Chattogram. Additionally, two new sentinel sites have been established and are expected to commence their surveillance activities in the near future, further expanding the national monitoring capacity.

BANGLADESH
AMR surveillance Sites

Case-Based Surveillance Sites (11 Sites)

Lab-Based Surveillance Sites (21 Sites)
Barishal (1); Chattogram (2); Dhaka (11);
Gazipur (1); Khulna (1); Kushtia (1);
Mymensingh (1); Narayanganj (1);
Noakhali (1); Sylhet (1).

BAY OF BENGAL
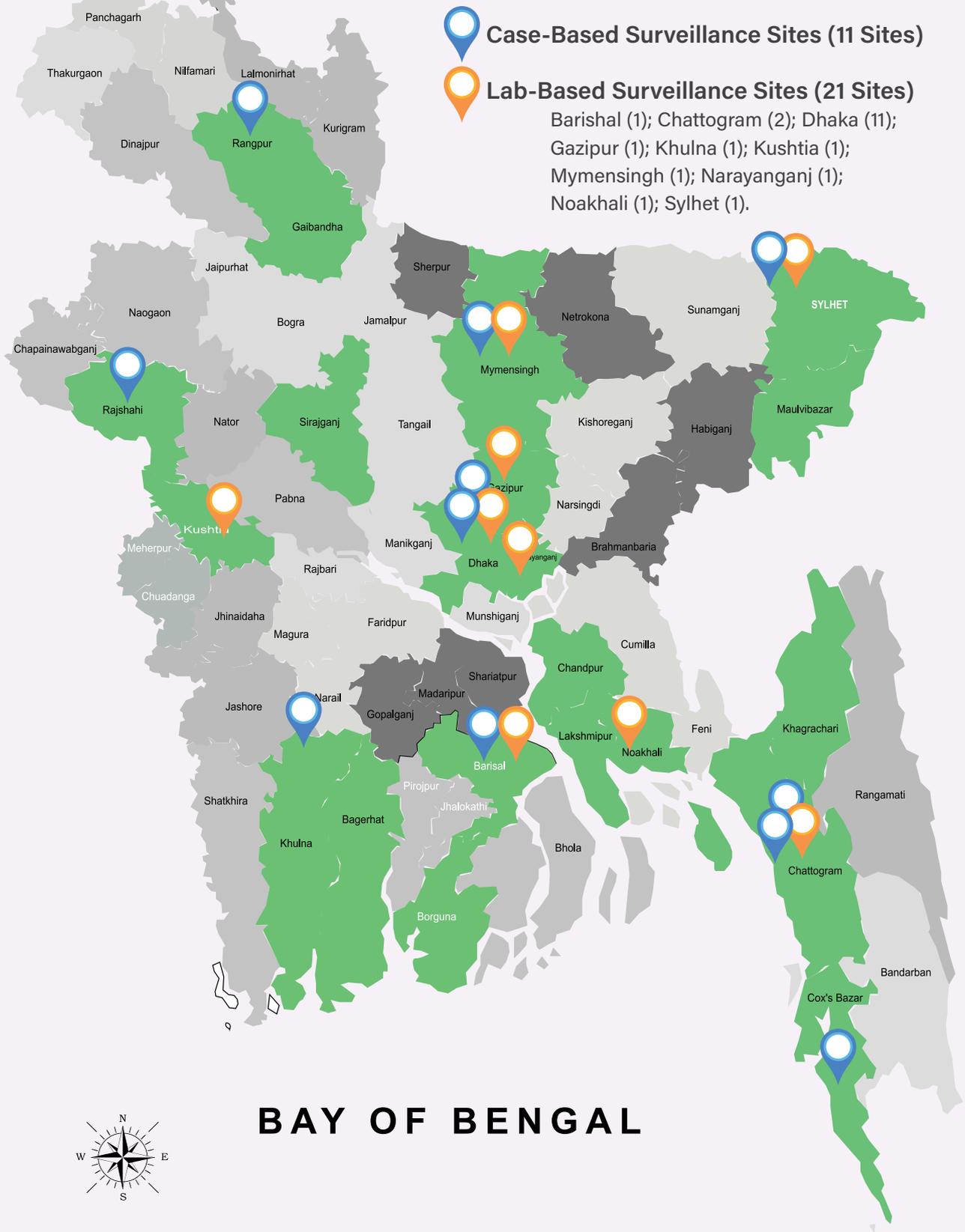
Figure 39. AMR surveillance sites (IEDCR, 2023)
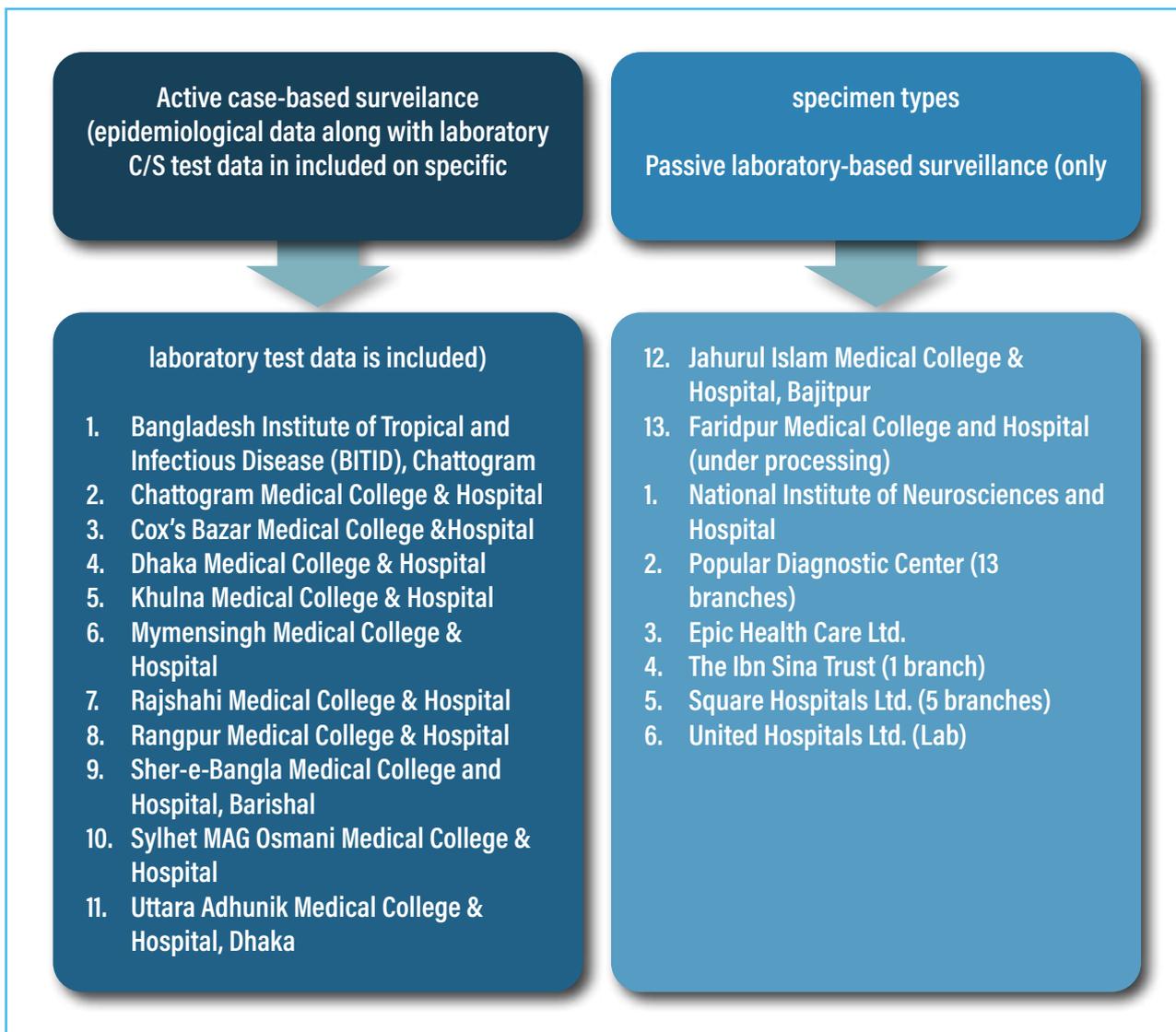
Figure 40. Institutions under the active and passive AMR surveillance system

Table 53. Key actors of AMR surveillance

Levels	Department	Key Actors	Role
Central	IEDCR, DGHS	Sector Coordinators, Steering Committee	Oversee and manage AMR surveillance; provide strategic direction
Tertiary	Medical Colleges/Hospitals	Microbiologists, Epidemiologists Clinician	Conduct laboratory testing, data collection, sample testing, and analysis at hospitals
Selected Private Laboratory	Microbiology	Microbiologists	Sample test, reporting

Funding Agencies (excluding government) and Their Role

Table 54. Funding agencies and their role in AMR surveillance

Funding Agency	Use of Fund
US CDC	Funded AMR surveillance since 2016 via GHSA Cooperative Agreement; supported site selection, SOPs, logistics, human resources, and technical assistance; ongoing support through SafetyNet.
WHO	Technical support to strengthen surveillance, policy, guidelines, sentinel sites, data dissemination, antimicrobial consumption monitoring, and capacity building; supports DGHS and DGDA in AMR containment.
Fleming Fund (UK Aid)	Supports One Health AMR strategy, refurbishes labs, provides equipment/reagents, strengthens surveillance across human, animal, and aquaculture sectors, develops AMR dashboard, and runs fellowship program.

Governance and Stakeholder Roles

Table 55. Governance and stockholder with their role in AMR surveillance

Name of Organization	Role
DGHS	National focal point; coordinates AMR activities, committees, and GLASS reporting.
IEDCR	Coordinates sentinel sites; provides training, technical/logistics support, data management, and dashboard oversight.
DGDA	Monitors antimicrobial use/consumption; enforces drug regulations; supports AMR strategy implementation.
DLS	Conducts animal health AMR surveillance via CDIL and four sentinel labs; reports through BAHIS.
BLRI	Monitors AMR in livestock and poultry; supports One Health strategy.
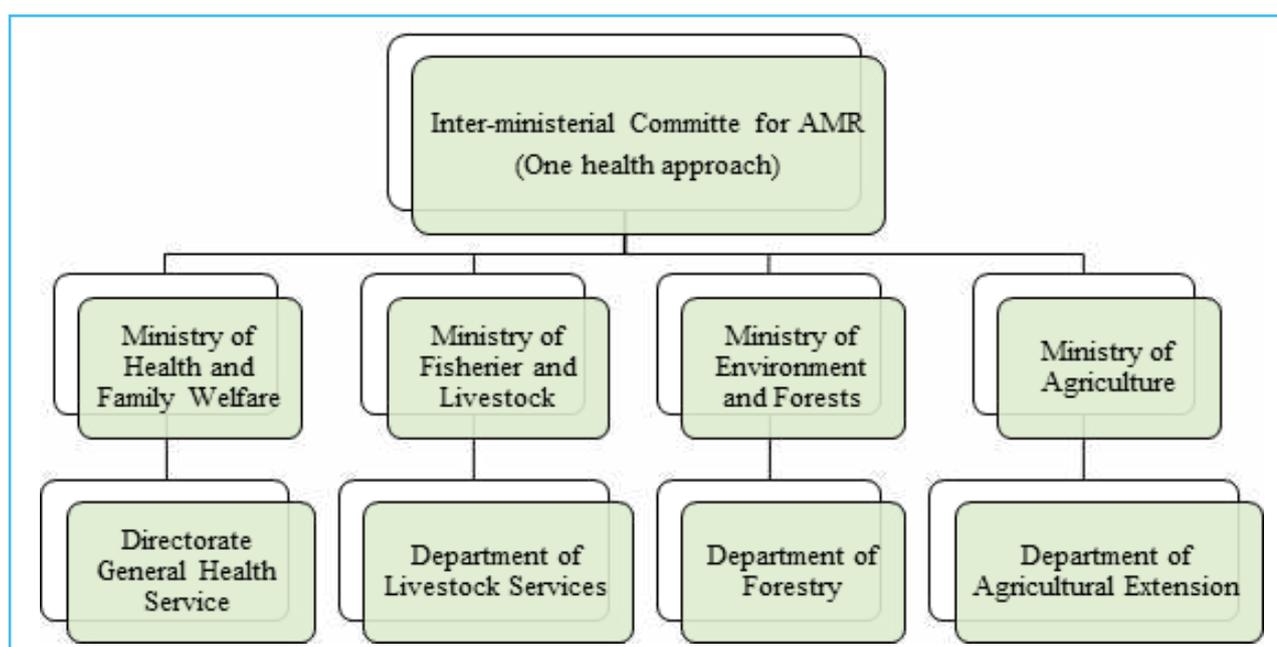
Figure 41. Organogram of Inter-ministerial Committee for AMR

Sample Collection and Testing Protocol

Strategic Documents

Sample collection is done according to AMR Surveillance Protocol. Sentinel site laboratory functions according to their SOP. These documents are different. Number of samples is fixed per week on each sentinel site. There are some forms available at the sentinel sites to collect information. CRF (Case enrolment request form) form and data collection form (demographic information of patients) are at place for AMR surveillance. Types of specimens collected (e.g., blood, swab, sputum)

Information Collection

The system collects data from 11 sites, which include both data and bacterial isolates sent to the National Reference Laboratory (NRL) for further analysis.

- **Case-Based Surveillance:** Surveillance is conducted through both Outpatient Department (OPD) and Inpatient Department (IPD) data

- **Laboratories:** The system involves 6 institutes and 22 laboratories, who provide data regularly. Data is collected from the laboratories regularly and is visible to all through dashboard. with lab-based data variables being recorded for analysis

Table 56. Information on the suspected case of AMR

Epi-data Collection Form	- Case ID - Interview Date - Hospital Reg of Patient - Ward/ Unit no. - Date of Admission - Department - Personal Profile of Respondent (Name, age, sex, father/ husband's name, mother's name, occupation, educational status, mailing address, phone) - Clinical Information (UTI, Diarrhea/ Dysentery, Lower RTI, Wound Infection, Sepsis, Urethral discharge) - Antibiotic and Treatment History - Co-morbidity - Provisional Diagnosis - Collected specimen with date and time - Outcome
Case Enrolment Request Form	- Surveillance site - Provisional diagnosis - Specimen for C/S - Case ID - Time date - Barcode

Surveillance Sample

Surveillance samples included urine, stool, wound swabs, blood, and endotracheal aspirates, along with bacterial isolates collected for antimicrobial resistance testing. All the laboratory activities at the sentinel sites are performed following SOPs. The SOPs provided by NRL at IEDCR. These SOPs are prepared by NRL and are updated from time to time with the support of renowned microbiologists of the country.

Bacterial isolates from the sentinel sites are regularly sent to the central repository at NRL, IEDCR. These isolations are utilized for rechecking and providing feedback to sentinel sites, research purposes, and for repositories and achieving. Quarterly a certain percentage of isolates are retested at NRL and conduct root cause analysis which is discussed with the sites.

Transportation of Sample

For transportation and storage of samples, SOPs from IEDCR are followed. Sentinel sites usually do not send samples outside or to IEDCR. Usually, tests are done at their own laboratories. The samples are collected and stored at -8°C temperature and transported to the microbiology lab by a laboratory attendant. If the sample is tested locally, there is no need to do further storage. Sentinel sites send all bacterial isolates to repository at NRL, IEDCR. This is done for quality assurance purposes.

The site teams, coordinated by PF, manage the sample collection process. Surveillance nurses assist in ensuring proper sample handling. Specimens collected for case-based surveillance include blood, urine, wound swabs, stool, and endotracheal aspirates. Specimens for lab-based data include all culture data.

Samples are processed and cultured at medical college labs, where all culture data related to bacterial resistance is recorded and analyzed.

The collected data is managed through CAMS software (Comprehensive AMR Data Management System), with permission from the chief scientist. IT-driven auto analysis through a dashboard streamlines data processing and monitoring.

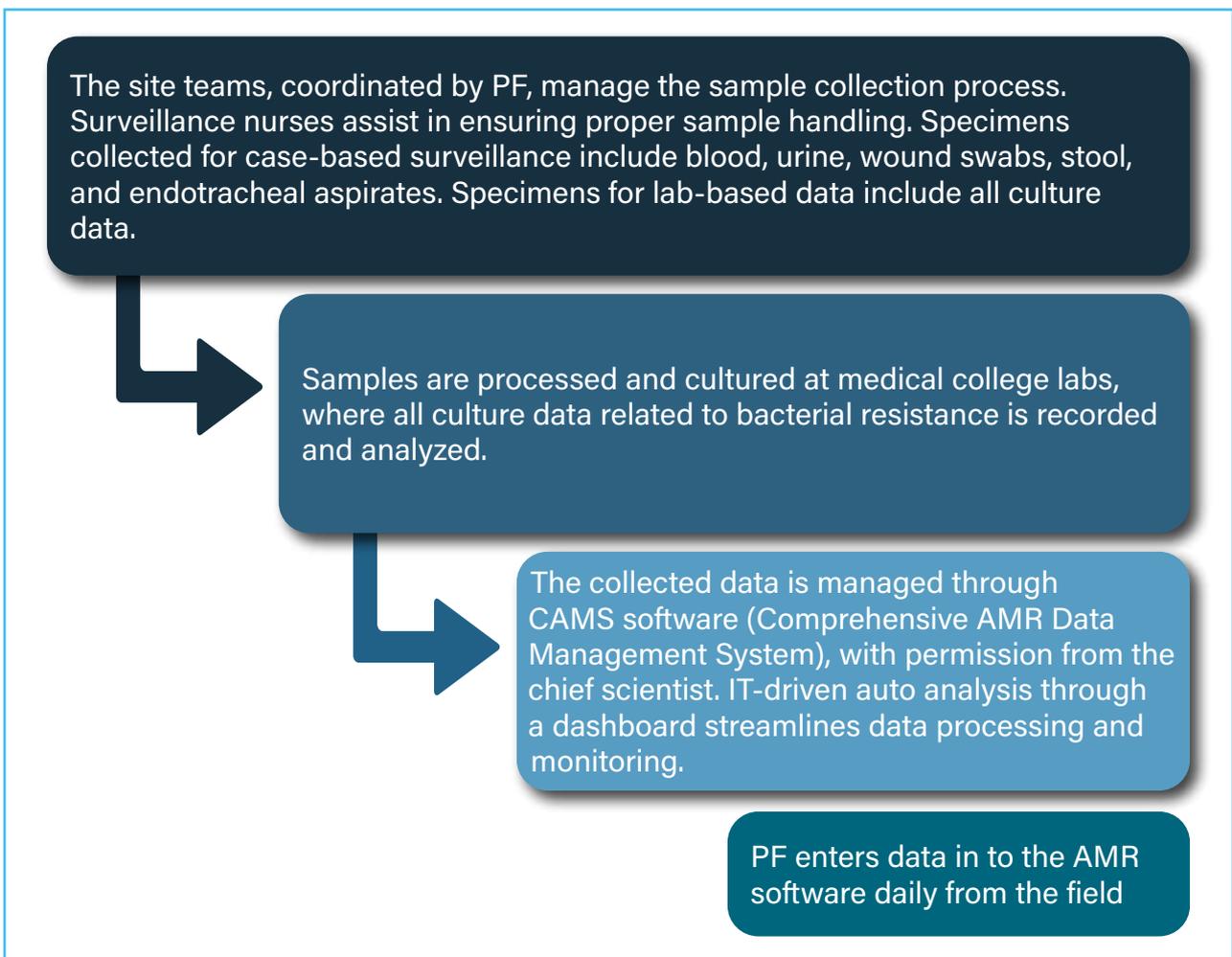PF enters data in to the AMR software daily from the field

Figure 42. Data flow and reporting system in AMR surveillance

Data Interoperability, Analysis and Visualization

Data management

In the case-based surveillance system, project facilitators collect patient epidemiological and laboratory data using a prescribed format, both in hard copy and digitally via tablets. This dataset includes clinical symptoms, comorbidities, and antibiotic history. The collected data is uploaded into the Comprehensive AMR Data Management System (CAMS), developed by the IEDCR IT team. Once uploaded, the data is accessible to the central data management team and is also visualized on the AMR dashboard hosted on the IEDCR website.

The AMR dashboard supports clinicians by guiding empirical antibiotic selection. It offers interactive filtering options by surveillance site, specimen type, or organism, including their respective susceptibility patterns - both overall and site-specific. Data completeness and the regularity of uploads are centrally monitored to ensure accuracy and reliability.

For lab-based surveillance, only laboratory test data from the respective facilities is collected and made publicly visible through CAMS by division.

CAMS software

The Comprehensive AMR Data Management System (CAMS) is a hybrid software platform developed to collect epidemiological, clinical, and laboratory data from sentinel sites through an Android-based application. The system processes and analyzes the incoming data, which is then displayed on a user-friendly, web-based dashboard. This enables real-time visualization and interpretation of surveillance trends. CAMS also provides the central monitoring team with advanced functionalities, including data download options for in-depth analysis. The integration of real-time data transmission, automated report generation, and an intuitive report entry interface greatly enhances the efficiency and effectiveness of surveillance monitoring. Data reporting is done weekly from sentinel sites. The data input is done through CAMS. They also report IEDCR weekly through an excel sheet. These are done by Project Facilitator and Technologist. Monthly reports are sent to IEDCR as both hard copy and soft copy. Epidemiological and laboratory data reporting is a continuous process. Data input is done by the project facilitator daily and is reported to IEDCR on a real-time basis. Data from Private laboratory is submitted usually monthly.

Data Analysis procedure

Usually, surveillance data is analyzed by NRL at IEDCR and Surveillance Microbiologist of the sentinel sites. The analysis is done for preparing the national report for IEDCR, research purpose and publication etc. Data is analyzed for resistance patterns, and antibiograms are created. Trends are reviewed regularly, and data is used to inform policy recommendations.

Frequency of Surveillance data analysis

Data is analyzed for resistance patterns, and antibiograms are created. Trends are reviewed regularly. Yearly analysis and dissemination are done focusing on AMR awareness week (18 to 28 November). Data analysis is done to make institutional antibiogram, site specific antibiogram at the sentinel sites and dissemination.

Surveillance report sharing process

Reports are submitted to sentinel sites, DGHS, WHO, and other stakeholders. Hardcopy is published and distributed. Softcopy is also available on websites and can be used at any time.

Surveillance report archiving process

- Annual report prepared by IEDCR
- Data Archiving process: GLASS platform of WHO
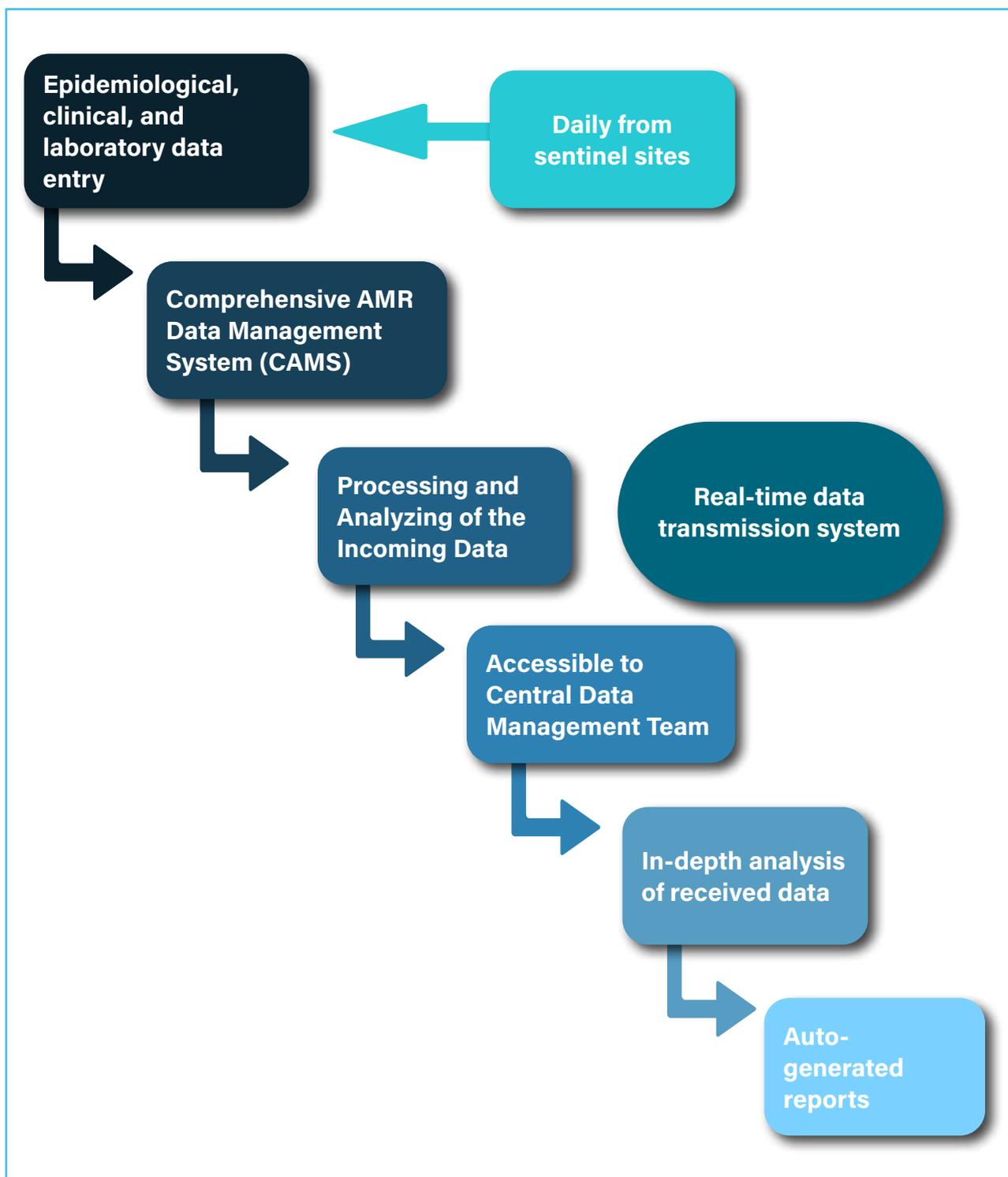
Figure 43. AMR surveillance report archiving process

Data Collection and Distribution

Table 57. Data collection and reporting frequency for AMR surveillance

Data Collection Frequency	Data Distribution Frequency	Source	Distributed To
Weekly from sentinel sites	Weekly/Monthly	Medical College Hospitals and BITID	DGHS, WHO, US CDC, Government of Bangladesh, IEDCR

Use of Surveillance Data

- DGHS: Uses the data to monitor trends in AMR, develop national treatment guidelines, and allocate resources for AMR control.
- WHO: Uses the data for global health monitoring, research, and to guide international AMR response efforts.
- US CDC: Collaborates on global health security, monitoring trends for potential global threats, and assisting with interventions.
- Government of Bangladesh (GoB): Uses the data to inform national health policies, interventions, and funding allocation.
- Researchers: Use the data to study AMR patterns, impacts, and prevention strategies.
  > Awareness program and dissemination regarding antimicrobial susceptibility
  > Antibiogram distribution

Other Anticipated Uses:

- Public Health Interventions: Data may inform the development of AMR control programs and public health campaigns.
- Policy Development: Supporting the development of national and international AMR policies, including antibiotic stewardship programs.
- Global Surveillance: Contributing to the WHO Global Antimicrobial Resistance and Use Surveillance System (GLASS)

Data Visualization

IEDCR, together with a One Health partner, has developed an online dashboard called the AMC One Health Dashboard to display AMR data. This public platform shows AMR patterns by various parameters. It features regularly updated data, including organism-specific and sentinel site-specific information, facilitating transparency and data-driven decision-making. The dashboard link is- https://dashboard.iedcr.gov.bd/amr/

Data Protection and Privacy

Stakeholders Interaction

1. Formal and informal meetings (in person, online, over telephone)
2. Regular monitoring by IEDCR
3. Yearly dissemination of findings of the surveillance and
4. Publication of national report
5. Multisectoral collaboration and report sharing

Types of reports for stakeholders

- 2016-2023 National Antimicrobial Resistance (AMR) Surveillance Report, Bangladesh.
- Report on National AMR Surveillance System 2024

Platforms for data integration

- IEDCR Website for AMR [https://dashboard.iedcr.gov.bd/amr/]
- DHIS-2

Interoperability or data sharing related challenges

- Less frequent data sharing (only once a year) is seen as a challenge by some sentinel sites' focal persons. Others do not see any challenges regarding this matter.
- Data download feature from monitoring dashboard are recently introduced.

Data privacy and security ensured in surveillance data management

Only one sentinel site has mentioned that their laboratory has its own protocol regarding this which is followed. They did not know about how central level does it is.

Challenges

- The surveillance system relies heavily on donor funding, which threatens its sustainability. With the national health budget already underfunded, the ARC receives the smallest allocation among all CDC and DGHS programs.
- Greater ownership and active participation from sentinel sites are needed.
- As AMR lacks the immediate visibility of many other health emergencies, it is challenging to convey its intensity and severity to policymakers.
- Limited awareness of the AMR threat - ranging from policymakers to end-users, regulatory bodies to health professionals, and industrial producers to farmers - poses a major obstacle to achieving program goals.
- Some other common challenges
  - Habitual self-medication with antimicrobial medicines is common.
  - Antimicrobial medicines are easily accessible to the public.
  - There is resistance to strengthening and enforcing legislation controlling antimicrobial distribution.
  - AMR is challenging to detect due to its asymptomatic nature, unlike other infectious diseases.
  - Globalization and rapid transportation contribute to the widespread dissemination of antimicrobial-resistant bacteria.
  - There are insufficient knowledge and limited technology available for effective AMR containment.
  - The development of new antimicrobial agents is inadequate, leading to shortages.
  - Antimicrobials are frequently and indiscriminately used in animal and aquatic farming.

Way Forward

- The government should ensure sustained funding and policy support for AMR containment efforts.
- Surveillance sites should ensure self-sufficiency in laboratory operations and integrate their data into a unified platform for timely outbreak detection.
- The national reference laboratory should ensure capacity building in molecular surveillance and genome sequencing.
- The Centralized Antimicrobial Monitoring System (CAMS) should be regularly updated to improve data analysis and antibiogram preparation.
- All laboratory data from sentinel sites should be consolidated into a common platform to facilitate timely detection and effective containment of AMR outbreaks.

- Healthcare facilities should ensure adequate microbiology infrastructure and mandate routine culture and sensitivity testing before prescribing antibiotics.
- Healthcare providers should ensure adherence to antibiotic stewardship programs and participate in ongoing training on responsible antibiotic use.
- Public health authorities should ensure widespread awareness campaigns to educate the public on AMR risks and discourage unregulated antibiotic use.
- Research institutions and regulatory bodies should ensure support for antimicrobial research and enforce regulations on antibiotic sales and distribution.
- Multisectoral collaboration among human, animal, and environmental health sectors should be ensured to effectively address AMR.
- All stakeholders should ensure timely and coordinated actions to preserve antibiotic effectiveness and protect public health now and in the future.

4.2.14.1 Antimicrobial Consumption (AMC)

Context

Following the adoption of the WHO Global Action Plan (GAP) on AMR by the World Health Assembly, all countries were urged to develop their own National Action Plans (NAPs) in alignment with the GAP's strategic objectives (WHO, 2015). In response, Bangladesh developed its strategic framework titled "National Strategy for Antimicrobial Resistance Containment in Bangladesh 2011–2016" and "National Action Plan (NAP) for Antimicrobial Resistance Containment". To operationalize this, a detailed framework titled "Roadmap of the National Action Plan of AMR Containment" was later introduced. A crucial component of the NAP is the estimation of antimicrobial consumption (AMC) in both the human and animal health sectors. The Directorate General of Drug Administration (DGDA) is designated as the lead authority for overseeing and estimating AMC in both domains. In the National Strategy and Action Plan for Antimicrobial Resistance Containment in Bangladesh (2021–2026), Section 3.3.3 assigns the DGDA the responsibility to establish a national surveillance system for monitoring antimicrobial consumption in the human health sector.

In 2017, DGDA established the "Task Force to Monitor Antimicrobial Consumption in Bangladesh." to review and approve the methodology for studying antimicrobial consumption in the country, including necessary adaptations of the WHO-recommended methodology to suit the national context. Several meetings were held to develop and finalize the surveillance methodology for antimicrobial consumption (AMC) in Bangladesh. The MoHFW restructured the group into the "Task Force to Monitor Antimicrobial Consumption and Antimicrobial Use Surveillance in Bangladesh", expanding its scope to include both consumption and usage surveillance in 2021. With funding and technical assistance from the Fleming Fund Fellowship, a Standard Operating Procedure (SOP) was developed to guide the implementation of AMC Surveillance in Bangladesh. This effort was supported through mentorship from the Statens Serum Institut, Denmark, and the Fleming Fund AMC/AMU Surveillance Fellow successfully conducted surveillance for the years 2019 and 2020.

Recognizing the importance of this initiative, the MoHFW officially designated the DGDA as the National Centre for AMC Surveillance. Additionally, national and alternate focal persons were nominated to represent Bangladesh in reporting AMC data to the WHO GLASS-AMC platform.

Formation of DGDA AMR Cell

The designation of DGDA officials who have been appointed to the reformed AMR Cell to perform the AMR related activities of the DGDA are as follows:

- Director, DGDA
- Assistant Director (5)
- Superintendent of Drugs (2)

TOR of DGDA AMR Cell

1. To conduct AMC/U surveillance in Bangladesh.

2. Periodic review and approval of the National Antimicrobial Consumption and Antimicrobial Use survey activity & report

3. Coordinate and implement AMR awareness

4. On behalf of DGDA this cell will work on AMR related activities

Relevant Stakeholders

The registered manufacturers of antimicrobial drugs in Bangladesh, the importers and the Government agencies who are involve in donation receive (antimicrobial drugs) are the main key stakeholders.

Guidelines

DGDA uses the following WHO guidance documanets as its common technical references:

1. WHO methodology for a global programme on surveillance of antimicrobial consumption.

2. GLASS Methodology for surveillance of national antimicrobial consumption.

3. GLASS Manual on the management of antimicrobial consumption data
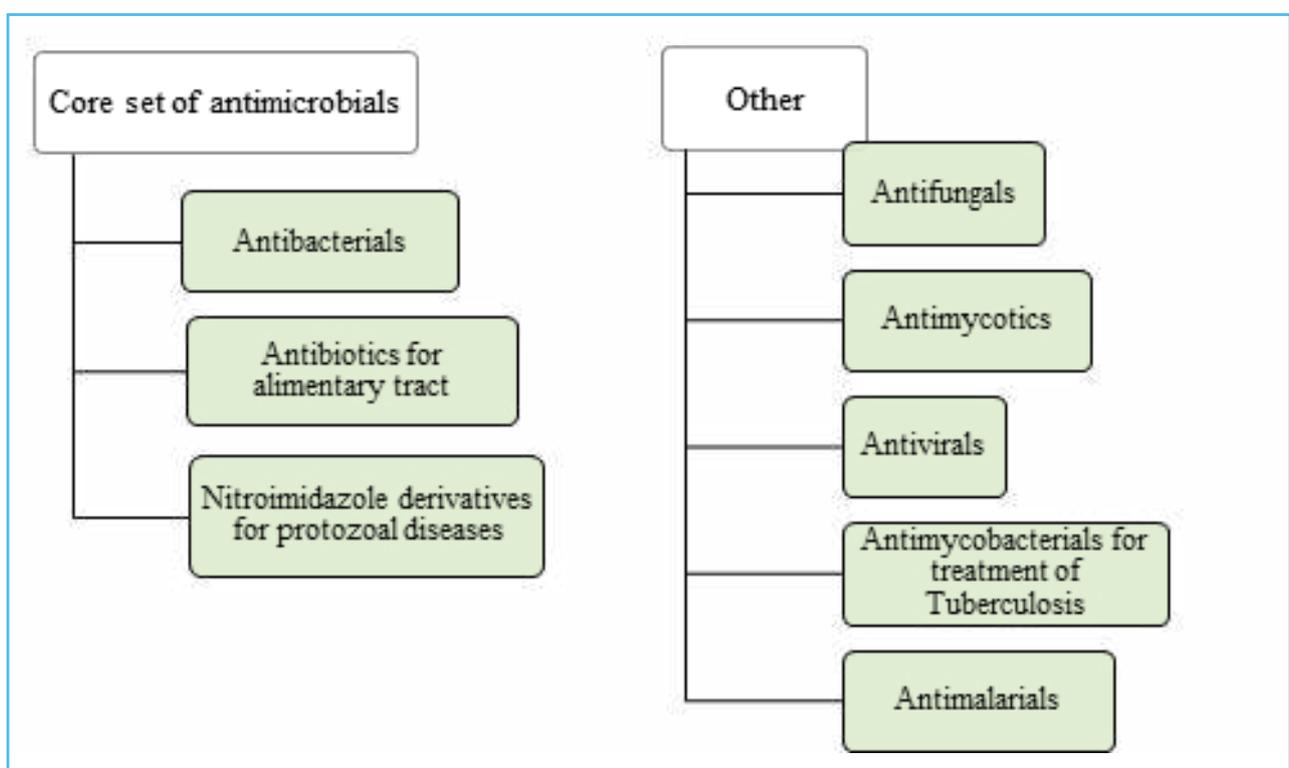

Figure 44. Monitoring systems in AMC surveillance

Data Source of AMC Surveillance

As per GLASS Methodology, AMC Information can be obtained from the following five levels of the value chain of medicine.

a. Procurement and supply
b. Distribution
c. Prescribing
d. Dispensing
e. Patient use.

In Bangladesh, the DGDA currently collects distribution data on antimicrobials from the wholesale depots of pharmaceutical manufacturing companies to monitor antimicrobial consumption patterns across the country.

Data Collection Sources

Template for Data Collection

The WHO AMC Excel template has multiple worksheets. Consumption data at product level including the list of products and the consumed number of packages per year are included.

Data Utilization

- Publication of DGDA AMR Bulletin
- Working to include a "red label" with the message "Do not use this medicine without the prescription of a registered physician" on antibiotic packaging to create public awareness and easy identification of antibiotics.
- Producing various awareness materials, including the comic book "Tinu Minu & Superbug" (which was also adapted into an animation for children), a coloring book titled "Invention of Penicillin," and different awareness posters, including the "WHO-AWaRe" poster.

Role of Antimicrobial Consumption (AMC) Surveillance Data

National surveillance of antimicrobial consumption provides critical insights into usage patterns, supporting the development of policies that encourage rational use. It reveals significant variations across countries due to both data collection differences and actual practices, highlighting the need for prescription enforcement and effective stewardship programs. This surveillance also drives improvements in pharmaceutical systems by prompting reviews of regulations, procurement, and supply chains. Timely reporting and data sharing at national and global levels are vital for coordinated efforts to combat AMR.

Challenges

- Financial and Technical Resource Constraints
- Lack of public and retail sector awareness and OTC use without prescription
- Limited technical and human resource and logistic capacity to control more than 2 lac pharmacy shops
- Fragmented digital infrastructure and data collection software
- Reduction of watch group and antibiotic use and prescription monitoring

Way Forward

- Strengthening regulatory enforcement and scale up public awareness campaigns to discourage OTC antibiotic use without prescription.
- Expand AMC surveillance coverage to include data from retail pharmacies, prescribers and patients.
- Ensure cross-sectoral data integration (DGDA, DGHS, IEDCR, DLS) for a unified surveillance ecosystem.
- Develop and roll out national software and data collection templates aligned with WHO-GLASS methodology in the context of Bangladesh.
- Limited human resources, technical and logistic capacity to control more than 2 lac pharmacies. So, improve logistics and human resources and capacity building for comprehensive AMC/ AMU monitoring.
- Secure sustainable financing and political and industry commitment, especially from pharmaceutical manufacturers.

Insights from ARCH Study on AMR

Several initiatives have been undertaken in Bangladesh to combat the growing threat of AMR. National and institutional surveillance programs have been established to monitor resistance trends and support evidence-based decision-making. Alongside these efforts, multiple research studies have been carried out to explore the prevalence, transmission, and underlying drivers of AMR in both community and healthcare settings. These initiatives aim to strengthen infection prevention and control (IPC) practices, promote the rational use of antibiotics, and inform national strategies to curb the spread of resistant pathogens.

Though numerous studies have contributed valuable insights, the Antimicrobial Resistance in Communities and Hospitals (ARCH) initiative stands out as the first to systematically investigate colonization of AMR pathogens across both communities and hospitals. This is led by icddr,b in collaboration with US CDC and The Task Force for Global Health (TFGH)[66]. Colonisation refers to the presence of bacteria in or on the body without causing immediate illness; however, such bacteria can spread and later lead to infections that are difficult to treat.

The ARCH 1.0 study conducted by icddr,b, which has been carried out in 2019, detected alarmingly high levels of resistant bacteria in both healthy community members and hospitalized patients. Extended-spectrum cephalosporin-resistant Enterobacterales (ESCrE) were widespread, found in 78% of people in communities and 82% of hospital patients. Carbapenem-resistant Enterobacterales (CRE) appeared more frequently among hospitalised individuals (37%) than in the community (9%). Colistin-resistant Enterobacterales (ColRE) were also identified in 11% of community participants and 7% of hospital patients. In addition, around 20% of participants carried methicillin-resistant Staphylococcus aureus (MRSA). Whole-genome sequencing of over 2,600 bacterial isolates showed considerable genetic variation, suggesting that antibiotics effective against one strain may not be effective against another [66]. Expanding upon these findings, icddr,b has recently released the discoveries of ARCH 2.0, which offered new evidence on how AMR impacts patients in critical care units, including newborns and adults. In neonatal intensive care units (NICUs), 81% (342 out of 423) of newborns were colonized with carbapenem-resistant Klebsiella pneumoniae (CR-Kpn), identified by the WHO as a pathogen of highest concern. Over two-thirds of these cases (70%, 185) developed colonization after 48 hours of hospital admission, confirming that hospitals themselves are a key source of exposure. Among adults in intensive care, 60% were colonized with CRE, and these patients were more likely to develop subsequent infections and experience longer hospital stays [66].

To understand how resistance spreads over time, the study also followed mother-infant pairs. Within the first year of life, about 40% of infants carried CRE and nearly 90% carried ESCrE. The highest rates were observed in babies who remained in hospital for more than 72 hours after delivery. By age one, more than 80% of these infants had been treated with antibiotics at least once, raising serious concerns about early antibiotic use and its long-term effects on gut microbiota and resistance development[66].

Importantly, ARCH also demonstrated that simple infection prevention and control (IPC) strategies, such as promoting hand hygiene among health workers and improving environmental sanitation - can greatly reduce colonisation by resistant bacteria and decrease bloodstream infection rates in NICUs. These outcomes, presented during the seminar, highlight that even in resource-limited healthcare settings, evidence-based interventions can effectively protect vulnerable patients and curb the spread of antimicrobial resistance[66].

4.2.15 Anthrax Surveillance

Brief History

Bacillus Anthracis is the spore-forming bacteria that causes anthrax, an acute bacterial zoonotic disease in humans and livestock. Anthrax outbreak was reported 1980s in livestock; however, sporadic human infections were reported prior to 2009 in Bangladesh [65]. Between 2010 and 2017, repeated outbreaks of human cutaneous anthrax from 16 districts resulted in a total of 2,581 suspected anthrax cases. Therefore, in 2018, One Health secretariat recommended to initiate sentinel surveillance for human anthrax in North Western anthrax endemic districts. As a result, Institute of Epidemiology Disease Control and Research (IEDCR) commenced an active anthrax surveillance in nine upazilas throughout five northwestern districts in Bangladesh, including Sirajgonj, Pabna, Meherpur, Tangail, and Rajshahi in 2019. The reported cases were declined in sentinel sites other than Meherpur. Therefore, currently the surveillance is continued only in three upazilas of Meherpur district.

Surveillance Objectives

- To establish active surveillance in anthrax endemic districts of Bangladesh through:
    - Active human case findings and data collection in structured questionnaire in selected endemic Upazilas
    - Specimen collection, safe specimen transport, and improved laboratory diagnostics to allow rapid identification of anthrax cases and outbreaks

- To investigate anthrax outbreaks among people of Bangladesh through:
    - Rapid response to reported anthrax outbreaks
    - Identify risk factors and sources of outbreaks by conducting investigation using semi structured outbreak questionnaire among the cases in each reported outbreak of anthrax throughout the country

- To identify and characterize B. anthracis circulating among humans and animals in Bangladesh.
    - IEDCR conduct laboratory testing of human anthrax cases
    - DLS is involved in laboratory testing animal anthrax

- To apply knowledge on source of outbreaks, epidemiology, risk factors and strain characterization learned from objectives 1, 2 & 3 to therefore
    - Crafting the appropriate educational materials and conducting public health education among stakeholders using pictorial leaflets, brochures, messages by involving health assistants and community volunteers.
    - advocating and ensuring increased vaccination in target areas in collaboration with DLS

Type and Structure of Surveillance

- Active Event-based surveillance (Active surveillance and enhanced reporting through multi-sectoral collaboration)
- Passive surveillance (When a suspected case of anthrax comes to the UHC)

Field Level Surveillance Structure: At the community level, Health Assistants (HA), Community Health Care Providers (CHCP), and Veterinary Field Assistants (VFA) identify, and report suspected human anthrax cases and unusual animal deaths to Health Inspectors (HI)/Assistant HIs (AHI) and Upazila Livestock Officers (ULO), respectively. HI/AHI report to the UHFPO, facilitates local surveillance, coordinates field staff, and sends suspected patients to UHC, while ULO coordinates with both UHFPO and higher authorities. Suspected human cases are then referred to by the UHC, where Medical Technologists collect and store samples, fill case report forms (CRFs). Medical Officers provide antibiotics. Samples and CRFs are sent to IEDCR via designated porters every 2 weeks.
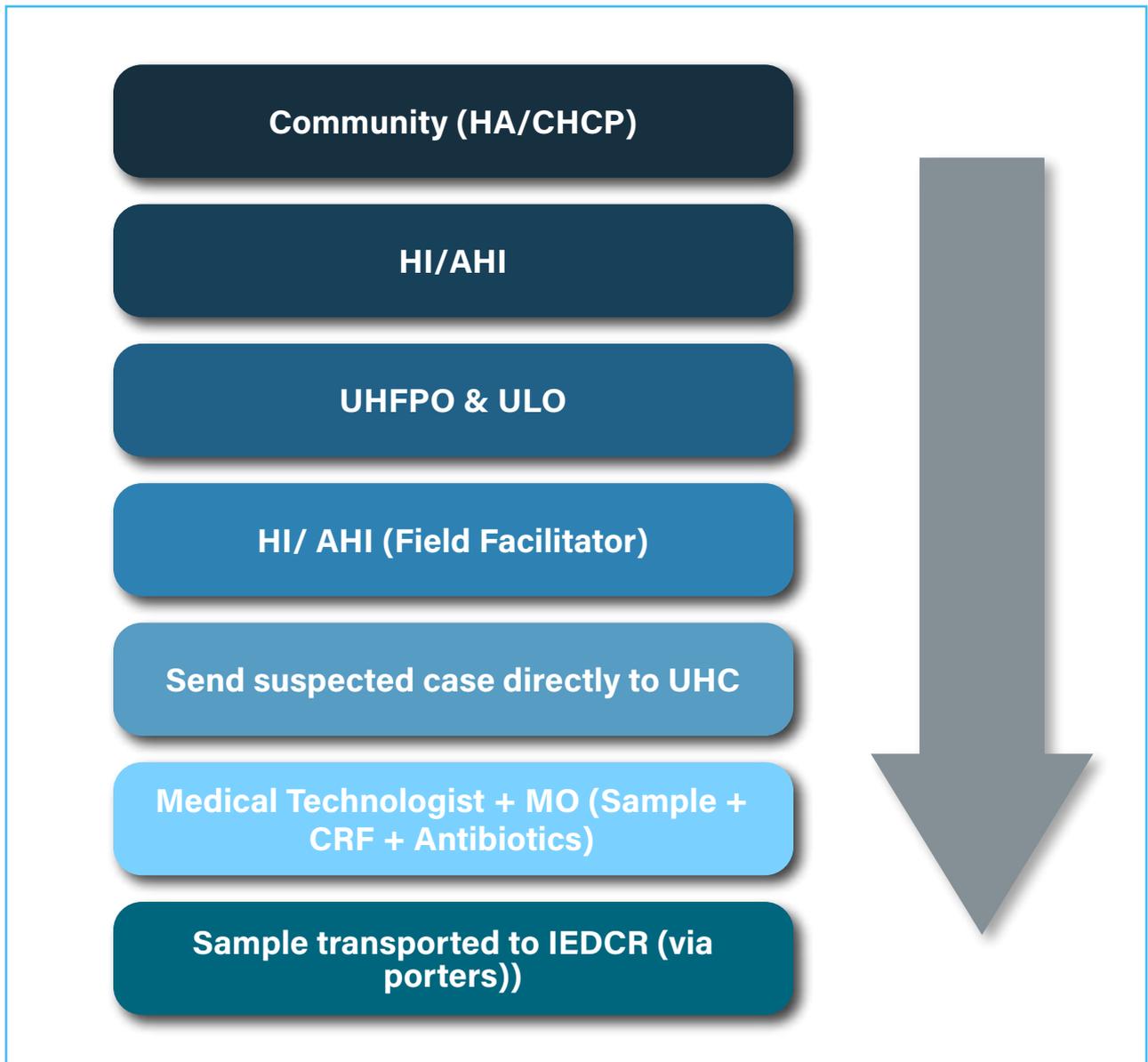
Figure 45. Field-level Anthrax surveillance structure

Central level structure: At the central level, the Central Laboratory Coordinator (CLC) oversees surveillance operations, coordinates sample logistics, storage and testing at IEDCR, monitors field facilitators and ensures timely data flow and trouble shooting. The CLC collaborates with UHFPO, ULO, and the Microbiology Department, and reports findings to the Director, IEDCR.
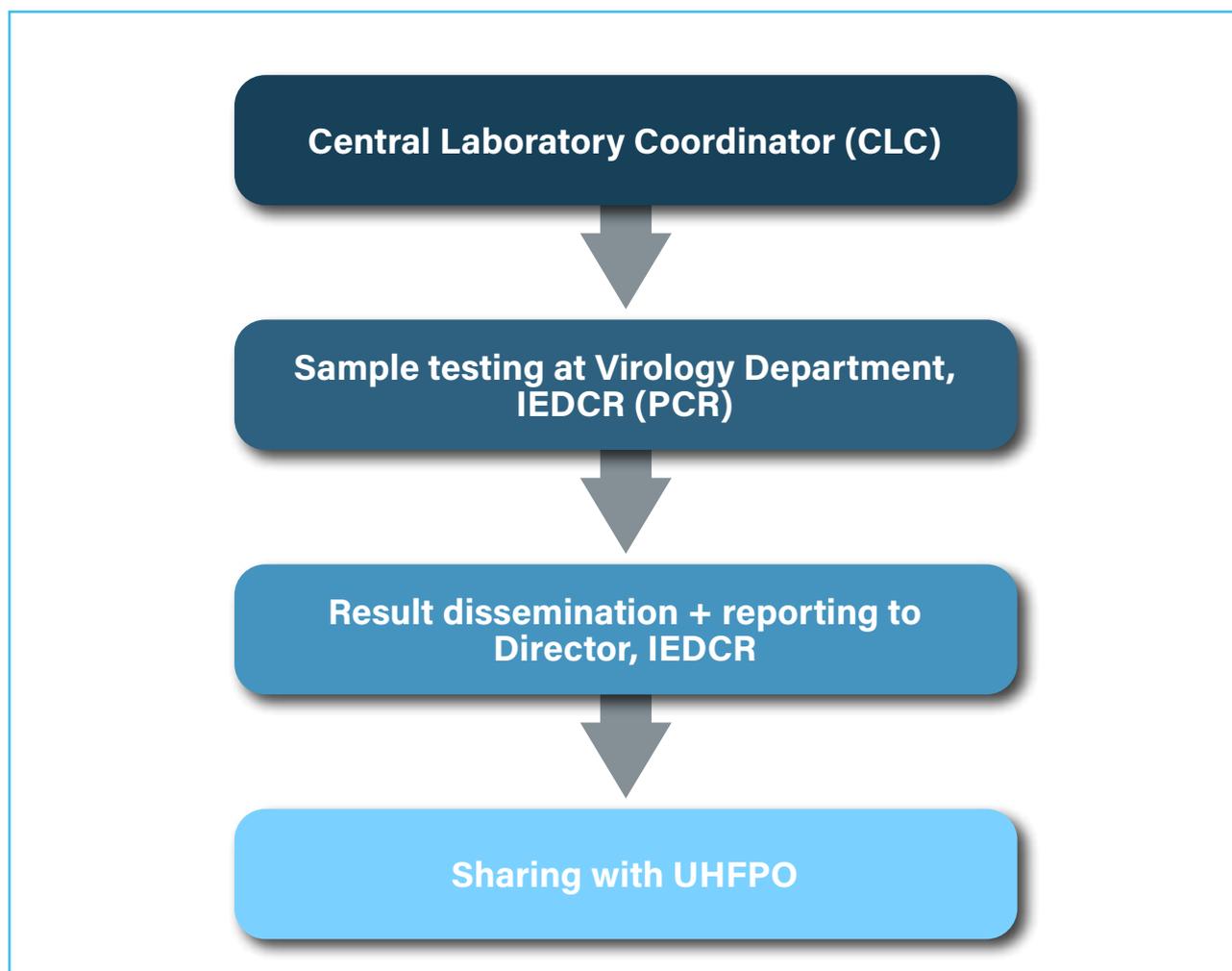
Figure 46. Central-Level Structure for Anthrax Coordination

Population and Geographic Coverage

- Target population: People living in Meherpur district
- Case Definition: Clinical Description and Case Classification

Cutaneous anthrax

Cutaneous anthrax is an acute illness characterized by a painless skin lesion that develops over 2 to 6 days, progressing from a papule to a vesicle and then to a depressed black eschar, often surrounded by edema. It may also be accompanied by fever and lymphadenopathy.

Ingestion anthrax

a. **Oropharyngeal anthrax:** An acute illness characterized by sore throat, difficulty in swallowing and swelling of the neck and may be associated with fever, fatigue, shortness of breath, abdominal pain, nausea, vomiting, ascites and altered mental status.

b. **Gastrointestinal anthrax:** An acute illness characterized by severe abdominal pain,

nausea, vomiting, and hematemesis. Bloody diarrhea, fever abdominal swelling, septicemia followed by massive ascites.

c. **Inhalation anthrax:** An insidious onset of mild fever, fatigue, headache, muscle ache, cough and mild chest pain followed by sudden development of hypoxia, dyspnea or acute respiratory distress with resulting cyanosis and shock

d. **Meningeal anthrax:** An acute illness, or post-mortem examination revealing fever, convulsions, coma, or meningeal signs. Signs of another form will likely be evident as this syndrome is usually secondary to the above syndromes.

Case classification (humans)

a. **Suspect:** A case that meets the clinical description, but with no presumptive or confirmatory laboratory evidence, or epidemiologic evidence relating it to anthrax.

b. **Probable:** A case that meets the clinical description AND has presumptive laboratory test results (gram positive bacilli identified in gram staining or demonstrated McFadyean's reaction with polychrome methylene blue),

OR,

A case that meets the clinical description AND has an epidemiologic link (exposure to environment, food, animal, materials, or objects that is suspect or confirmed to be contaminated with B. anthracis; consumption of food that is suspect or confirmed to be contaminated with B. anthracis; exposure to the same environment, food, animal, materials, or objects as another person who has laboratory-confirmed anthrax; consumption of the same food as another person who has laboratory-confirmed anthrax).

c. **Confirmed:** A case that meets the clinical description AND has confirmatory laboratory test results (one of the following: encapsulated, non-motile, non-hemolytic gram-positive bacilli susceptible to penicillin; detection of Bacillus anthracis nucleic acid collected in clinical samples by Polymerase chain reaction (PCR).

Geographic coverage: Outbreaks of anthrax have been reported every year from different areas of Bangladesh, especially in the Northern part of the country. However, the current surveillance sites only include 3 upazilas (i.e., Meherpur Sadar, Gangni, and Mujibnagar) of Meherpur District.
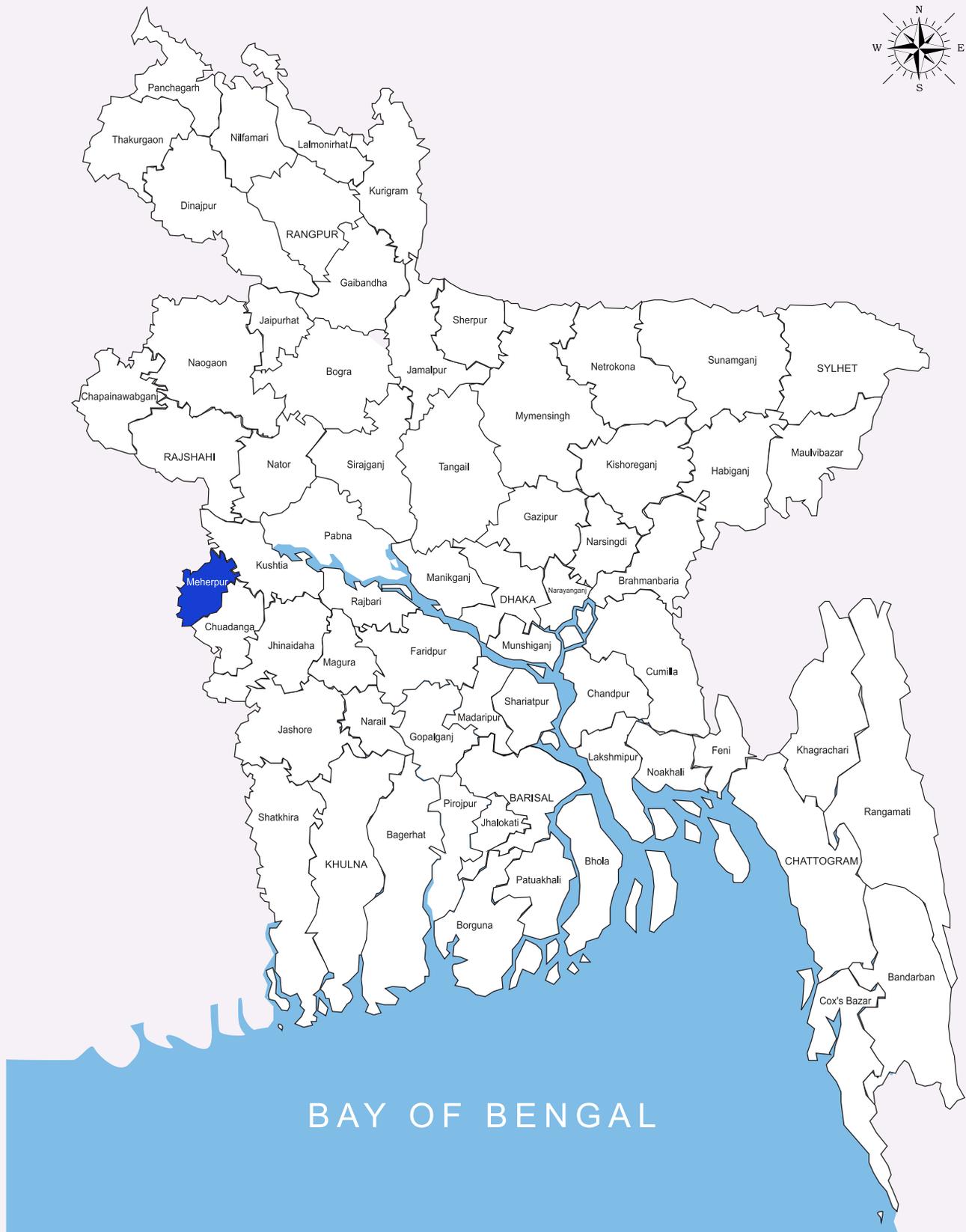
Figure 47. Sites of Anthrax surveillance

Funding Agencies (excluding government) and Their Role

Table 58. Funding agencies and their role in Anthrax surveillance

Funding Agency	Their role
US-CDC	Provide fund to the IEDCR

Governance and Stakeholder Role

Table 59. Governance and stockholder with their role in Anthrax surveillance

Levels	Institute	Department	Key Actors	Role
Central	IEDCR	Coordination Team	Technical Lead	Coordinate surveillance, ensure sample transport, and oversee testing. Monitoring and analysis of data collected from various sentinel sites, Prepare IC materials and develop protocols
			Central Laboratory Coordinator (CLC)	Ensure proper sample storage and oversee testing. Monitoring and analysis of data collected from various sentinel sites Prepare IC materials.
		IEDCR Virology Lab	Lab Specialists	Perform molecular and cultural testing of anthrax samples.
	DGHS	CDC-DGHS	Director	Collect reports (need basis)
Peripheral level	District Level	District Health Offices	Civil Surgeon, MOCS	Facilitate training and field implementation of surveillance. Collect reports (Need basis)
	UHC and below	OPD and IPD at sentinel sites (UHC/field)	UHFPO, Medical Officer, Medical Technologists, Health Inspector, Health Assistant (HA), Community Health Care Provider (CHCP), AHI, Sanitary Inspector, Statistician, DHS (district health superintendent)	Identifying cases, sample collection and documentation Collect data, monitor cases, and report to UHFPO/ULO.

Sample Collection and Testing Protocol

Protocol followed

- National Guideline for Management and Prevention of Human Anthrax
- Anthrax Surveillance and Response in Bangladesh Protocol

Laboratory testing

- Diagnosis is based on bacteriological culture, microscopy & RT-PCR
- From 2022, bacteriological culture is only done for outbreak samples

Collected Sample

Samples are collected from patients at the Upazila Health Complex (UHC). However, not all patients are able to provide samples—particularly in cases classified as "dry cases," where

no discharge or sample material is present. For eligible patients, two swab sticks are used for sample collection, and one microscope slide is prepared for further analysis.

Transportation of Sample

Samples collected at the Upazila Health Complex (UHC) are transported to IEDCR within one week of collection. Designated personnels serve as porters for this process. In the event of an outbreak, sample collection is carried out by Medical Technologists. Once collected, the samples are similarly transported to IEDCR by designated porters following standard protocols.

Data Flow and Reporting Mechanism
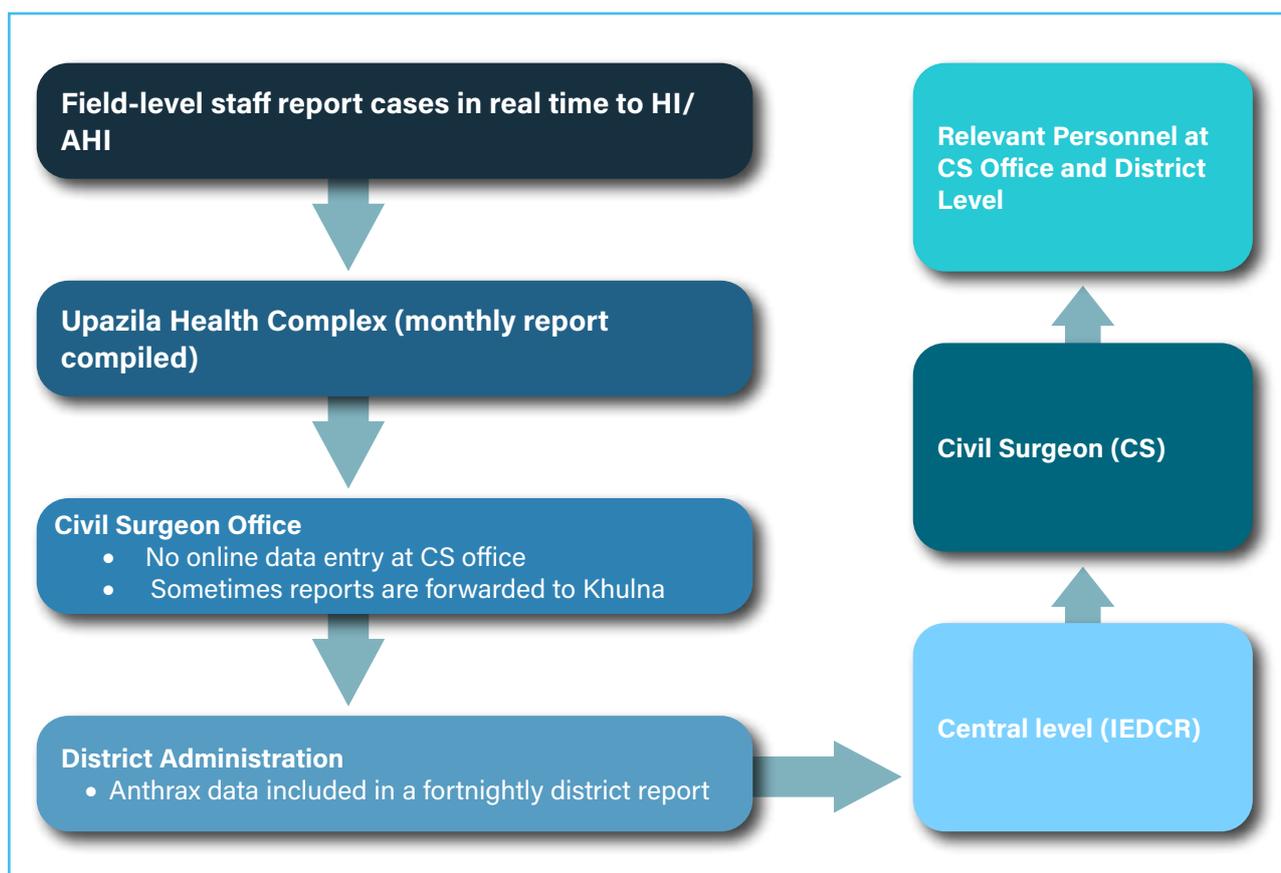
Figure 48. Data flow and reporting system in Anthrax surveillance

Surveillance information flows from the facility to the central level through a paper-based system, using a register khata in the emergency department to record anthrax cases, including patient details, demographics, and contact history with infected animals. Reporting occurs in real time, with cases communicated immediately upon detection. The feedback mechanism involves direct communication between the IEDCR team and both the UHC and the Civil Surgeon's office to verify information and provide necessary guidance.

Data Interoperability, Analysis and Visualization

- Analysis is done by IEDCR
- IEDCR (Data entered in Epi Info 7 database, validated via double entry, and analyzed using statistical packages)
- Anthrax is not entered in DHIS-2. But the IEDCR has a dashboard dedicated to anthrax.

Use of Surveillance Data

- Informing IEDCR and forming an outbreak investigation team
- Public health awareness
- Supporting disease prevention efforts through community engagement by distributing IEC (Information, Education and Communication) materials, such as posters and trifold leaflets.
- Develop Anthrax management guidelines for community intervention and campaign programs
- Conduct awareness programs at the hospital premises of endemic zones to increase knowledge on caring for sick animals, disposal of carcasses, and vaccination of animals.

Data Protection and Privacy

They maintain the privacy of all register books. These books are only used by selected people at the CS office. Without getting permission from the authority, no data is shared with anyone.

Challenges

- Not having continuous funding flow (Surveillance was interrupted in 2024)
- Frequent turnover of surveillance personnel
- Coordination with local level staff of DLS in supporting activities
- Maximize surveillance coverage due to community hesitancy to participate in surveillance rather than taking easily accessible medication for anthrax.
- Detecting cases from other sites than ongoing sentinel sites.

Way Forward

- Commencement of Integrated Anthrax Surveillance involving Animal Health (DLS)
- Awareness program to sensitize Community and Local administration to increase surveillance participation
- Dissemination of surveillance findings regularly to relevant stakeholders.
- Increase coordination between local level field staff, especially HA and VFA.

4.2.16 Other Surveillance Sytems

4.2.16.1 COVID-19 surveillance

Primarily, IEDCR served as the sole institution with the capacity to conduct RT-PCR–based molecular diagnosis of COVID-19. As the pandemic evolved, Bangladesh undertook a rapid and strategic expansion of its diagnostic and surveillance capabilities. A national committee oversaw the assessment of existing institutional capacity and guided the establishment of additional testing facilities across the country. Through the mobilization of major medical colleges and specialized research institutes, diagnostic coverage was extended to all regions. This coordinated scale-up markedly strengthened the national infrastructure for COVID-19 detection and formed a critical pillar of Bangladesh's overall surveillance response.

A centralized reporting mechanism was introduced, where all designated diagnostic centers and health facilities - public and private - submitted daily data to laboratory call centers and directly into the DHIS2-based MIS platform. These data streams were compiled, analyzed, and interpreted by statisticians at MIS-DGHS, enabling timely updates for decision-makers. The MIS-DGHS COVID-19 Reporting Cell consolidated incoming reports and displayed them through the national COVID-19 Dynamic Dashboard developed by MIS-DGHS and IEDCR with technical support from UNICEF. The dashboard, accessible to the public, provided daily updates on confirmed cases by demographic and geographic breakdown, quarantine and isolation status, recoveries, deaths, and information on treatment facilities and COVID-19 vaccination progress. This integrated digital platform supported data-driven decision-making and enhanced transparency throughout the pandemic response.

4.2.16.2 Leptospirosis Surveillance

Bangladesh's environmental and demographic characteristics - including prolonged monsoon seasons, recurrent flooding, stagnant water accumulation, high ambient temperatures, and dense human - animal interactions - create highly conducive conditions for the transmission of Leptospira spp [67]. In response to this persistent risk, the Institute of Epidemiology, Disease Control and Research (IEDCR), in collaboration with the Bacterial Special Pathogens Branch (BSPB) of the US CDC, established a national leptospirosis surveillance system in 2019. The initiative operates across eight sentinel sites representing diverse geographic regions.

The surveillance system follows a structured workflow: suspected cases are identified based on clinical and epidemiological criteria; patient data and biological samples are collected; rapid diagnostic tests (RDTs) are performed at sentinel facilities; and confirmatory RT-PCR testing is conducted at IEDCR. A secure sample transport chain ensures the integrity of specimens from field sites to the central laboratory.

Between 2019 and 2023, the system tested 5,325 samples for leptospirosis, confirming 334 cases - yielding a positivity rate of 6.3% [67]. The highest burden was observed in Satkhira, Chattogram, and Dhaka, areas characterized by recurrent flooding and close proximity to livestock. These findings indicate that leptospirosis remains an endemic and under-recognized public health threat in Bangladesh.

Sites of the Leptospirosis Surveillance

Table 60. Surveillance sites of the Leptospirosis

District	Name of Hospital
Satkhira	District Sadar Hospital
Chattogram	Bangladesh Institute of Tropical and Infectious Diseases
Dhaka North	Uttara Adhunik Medical College Hospital
Dhaka South	Dhaka Medical College Hospital
Habiganj	250-Bed District Sadar Hospital
Naogaon	250-Bed General Hospital
Patuakhali	250-Bed General Hospital
Cox's Bazar	250-Bed Sadar Hospital

4.2.16.3 Web-Based Disease Surveillance System (WBDSS)

The WBDSS is a structured, routine, digital surveillance system DHIS2 platform operated by IEDCR that captures weekly reports on priority communicable diseases from all UHCs across Bangladesh. Introduced in 2009 with technical assistance from the US CDC, it aimed to serve as a key component of national disease monitoring. Initially covering 19 diseases, the reporting list was later streamlined to 10 high-priority diseases to reduce duplication with program-specific registries (e.g., malaria) and to minimize the reporting burden caused by a lack of interoperability with the DHIS2 system of MIS.

A revised reporting format was rolled out through refresher training to 100 high-performing UHCs, selected for their regular and frequent reporting, with support from WHO and EMPHNET. These sites now report on the updated 10-disease list, while the remaining UHCs continue reporting on the original 19 diseases to avoid confusion until they receive formal training. Although a new SOP and guidelines have been prepared, their publication remains pending with WHO.

The system allows flexibility in data submission by reducing the number of required indicators/parameters per disease. Data entry is a mix of aggregate and case-based formats—aggregated data is collected from OPD weekly and cross-checked with case-based data for selected diseases. Input is provided mainly by the UH&FPO, statisticians, and senior staff nurse using unique login credentials. Data entered in real time supports visualization, outbreak detection, intervention tracking, and national reporting.

Disease surveillance reporting is conducted through both case-based and aggregated reporting mechanisms, depending on the reporting frequency and service delivery point. Daily case-based reporting from indoor (inpatient) services covers acute encephalitis syndrome, acute watery diarrhoea, chickenpox, chikungunya, COVID-19, cutaneous anthrax, dengue, fever (other than dengue and chikungunya), jaundice, and respiratory tract infections. This reporting includes detailed personal information such as patient name, age, sex, date of admission, date of symptom onset, address (village/para, union, upazila/thana, district/city), and mobile number. In contrast, weekly aggregated reporting from outdoor (outpatient) services includes acute watery diarrhoea, chickenpox, chikungunya, COVID-19, cutaneous anthrax, dengue, fever (other than dengue and chikungunya), jaundice, and respiratory tract infections, and captures limited demographic information, primarily age and sex.
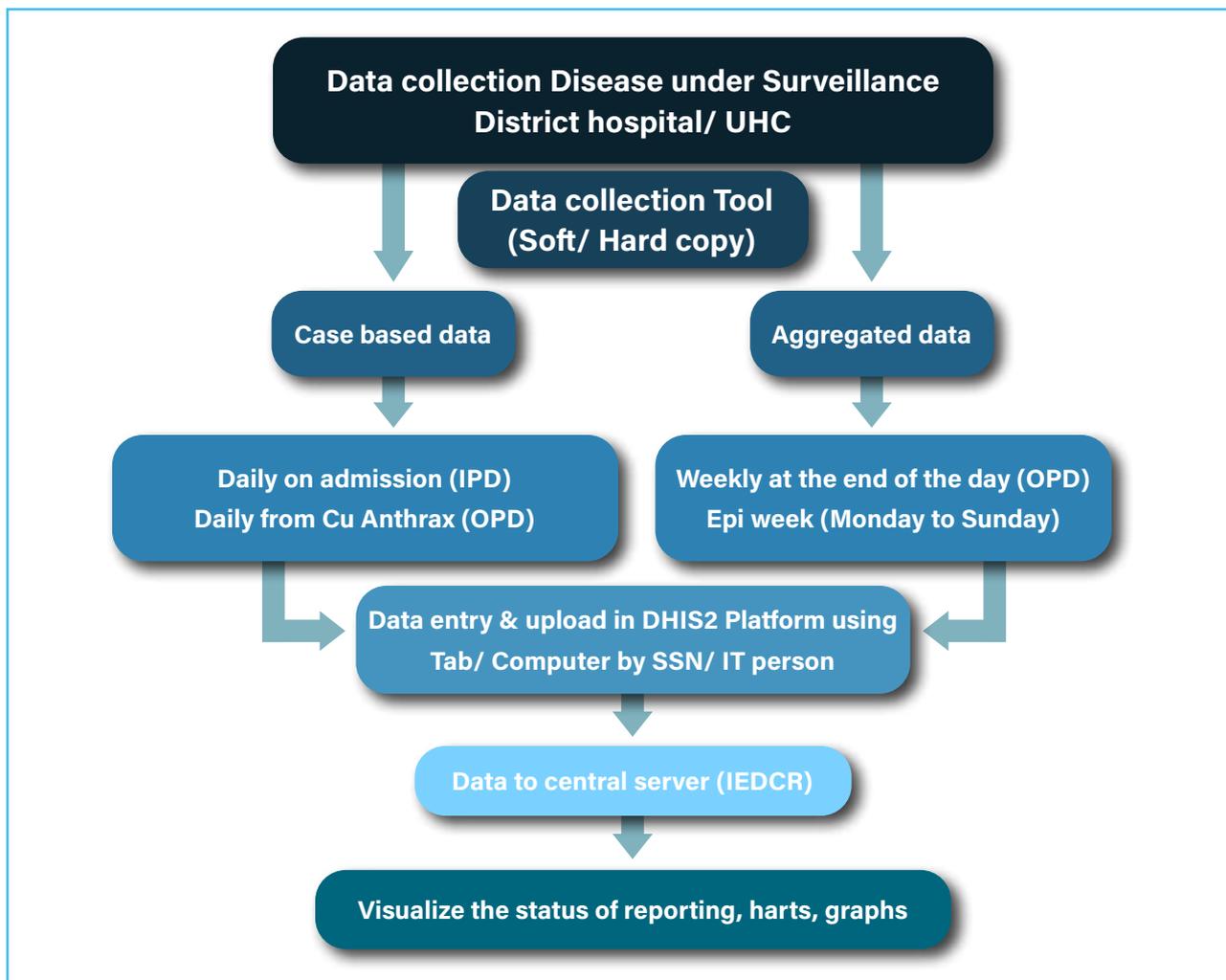
Figure 49. Web-based Surveillance Data Flow

Advantages of WBDSS

- Covers all Upazilas of Bangladesh.
- Enables real-time data entry, analysis, and visualization.
- Supports outbreak detection, intervention tracking, and national reporting.

Challenges

- Irregular input from many UHCs, training disparities, and unpublished SOPs (e.g., WHO-pending guidelines) pose challenges.
- No interconnectivity between "web-based disease surveillance" digital platform of IEDCR with DHIS2 of MIS.
- Many UHCs submit irregularly or not at all; the top 100 reporting upazilas received refresher training but gaps persist across the rest of the country.
- No assigned statistician in many UHCs.

Way Forward

- Expand the web-based surveillance system to district hospitals.
- Implement minimal interoperability between DHIS2 and the WBDSS to strengthen infectious disease surveillance.

4.2.16.4 Community-based Surveillance

Community-Based Surveillance (CBS) was a joint initiative of the Bangladesh Red Crescent Society (BDRCS) and IEDCR, established to strengthen early detection and rapid response to epidemic-prone diseases [69]. It was implemented under the Epidemic and Pandemic Preparedness and Response (EPPR) pillar of the Pilot Programmatic Partnership (PPP) through the Disaster and Climate Risk Management (DCRM) Department of BDRCS, with technical and financial support from the German, Danish, Swedish, and Norwegian Red Cross Societies, the International Federation of Red Cross and Red Crescent Societies (IFRC), and the Humanitarian Aid Department of the European Commission (ECHO).

CBS followed five widely recognized surveillance steps: detection, triage, verification, risk assessment, and response. The program officially began in August 2023 after an MoU was signed between BDRCS and IEDCR. The pilot phase was conducted in urban settings—two wards of Dhaka South City Corporation, five wards of Rajshahi City Corporation, and five wards of Sylhet City Corporation—selected because most government health infrastructure was concentrated in rural areas, while urban communities faced unique challenges.

With support from partner organizations, CBS utilized a password-protected mobile application for real-time data collection, covering an estimated population of approximately 155,330 people. The initial pilot phase, supported by the Danish Red Cross, was completed in June. It focused on five priority conditions: influenza-like illness (ILI), acute watery diarrhea (AWD), acute jaundice syndrome (AJS), suspected dengue fever, and any unusual event. Data collection was carried out by 240 trained Community Volunteers (CVs) from BDRCS, who also promoted household-level health awareness, hygiene practices, and risk communication. This dual role ensured that no potential cases were overlooked, as CBS activities closely resembled a household survey approach.

The system was supported by an IEDCR central dashboard, enabling real-time monitoring of community-level alerts. Following the completion of the first pilot, with the support of IFRC, Norwegian Red Cross and Swiss Red Cross, a second pilot was launched in two unions of Rajshahi, with plans to add four more unions in the coming months. Supporting tools such as a volunteer-focused SOP/manual, disease-specific flipcharts, COVID-19 hygiene promotion materials, and a published National CBS Guideline were developed. A dedicated dashboard for real-time community-based surveillance data was also established to enhance analysis and response.

Objectives of CBS

- To contribute to earlier detection and notification of potentially serious and epidemic-prone risks/events, enabling timely response and control.
- To improve the effectiveness of epidemic response operations with community-level real-time data to inform monitoring and targeted control actions.

4.2.16.5 Cell Phone Based Surveillance (CPBS)

Since 2012, IEDCR has employed the Cell Phone Based Surveillance (CPBS) platform to collect health-related data of public health significance, supplementing traditional face-to-face data collection methods [70]. Through strategic partnerships with organizations, such as the International Association of National Public Health Institutes (IANPHI), United Nations Population Fund (UNFPA), UNICEF, FAO, Bloomberg Philanthropies, Bill & Melinda Gates Foundation, Johns Hopkins University (JHU), London School of Hygiene & Tropical Medicine (LSHTM), Bangladesh Telecommunication Regulatory Commission (BTRC), and mobile network operators in Bangladesh, CPBS has addressed various health issues including communicable and non-communicable diseases, sexual and reproductive health, foodborne illnesses, and COVID-19 surveillance activities such as case follow-up and contact tracing. Since 2015, collaboration with JHU has focused on improving mobile phone survey methodologies to collect data on non-communicable disease (NCD) risk factors. Recent CPBS initiatives include the Rapid Mortality Mobile Phone Survey (RaMMPS) aimed at estimating excess COVID-19 mortality and evaluating survey feasibility; a nationally representative NCD risk factor survey conducted via computer-assisted telephone interviews (CATI) based on WHO's STEPwise approach; validation studies comparing mobile phone and face-to-face survey data; and the development and testing of mobile phone survey tools to assess primary health care status across multiple countries, supported by Resolve to Save Lives (RTSL).

4.2.16.6 Event Based Surveillance (EBS)

Event Based surveillance

Event Based Surveillance (EBS) can be defined as the organized and rapid capture of information about events that are potential risk/ concern to public health. These are unusual events occurring in the community which may have a known, suspected or possible impact on human health. Consequently, it raises concern, fear and alarm in the community.

Implementation in Bangladesh

In Bangladesh, EBS implemented by the mandated IEDCR under the Public Health Emergency Operations Center (PHEOC). The system operates as a real-time mechanism to capture unstructured and ad hoc information on potential public health threats. Unlike traditional surveillance systems that rely on structured data from health facilities, EBS focuses on signals and events that arise informally from various sources such as community rumors, unusual disease occurrences, and reports from media or health workers. This proactive approach allows IEDCR to identify and respond to potential outbreaks before they spread widely [71].

Objective of EBS

To rapidly detect and appropriately respond to acute health events of any origin, ensuring timely implementation of effective control measures.

Institutional Role and Coordination

Under the framework of the World Health Organization's International Health Regulations (IHR 2005), IEDCR coordinates national-level EBS operations as part of Bangladesh's commitment to global health security. The system integrates alerts from community levels into a centralized verification and response system. Once a signal is received, rapid response

teams are mobilized to verify its credibility, assess the potential public health risk, and implement immediate control measures if necessary.

Sources and Signals

EBS at the IEDCR relies on multiple sources to identify potential public health threats. Signals are primarily gathered from media monitoring, hotline number, formal notification of information from health facilities through letters or telephone calls and informal notifications.

On average, IEDCR responds to 20-25 outbreaks annually, indicating that at least this number of confirmed signals are generated and verified for outbreak investigation each year. While the signal related to Respiratory Event- Based Surveillance (REBS) that has been confirmed after verification is officially recorded, there remains an opportunity to standardize the process for capturing and documenting all signals across disease categories that come to IEDCR.

EBS Tools and Data Flow

At present, the mechanism for capturing EBS data at IEDCR is primarily paper- based particularly for the REBS component.
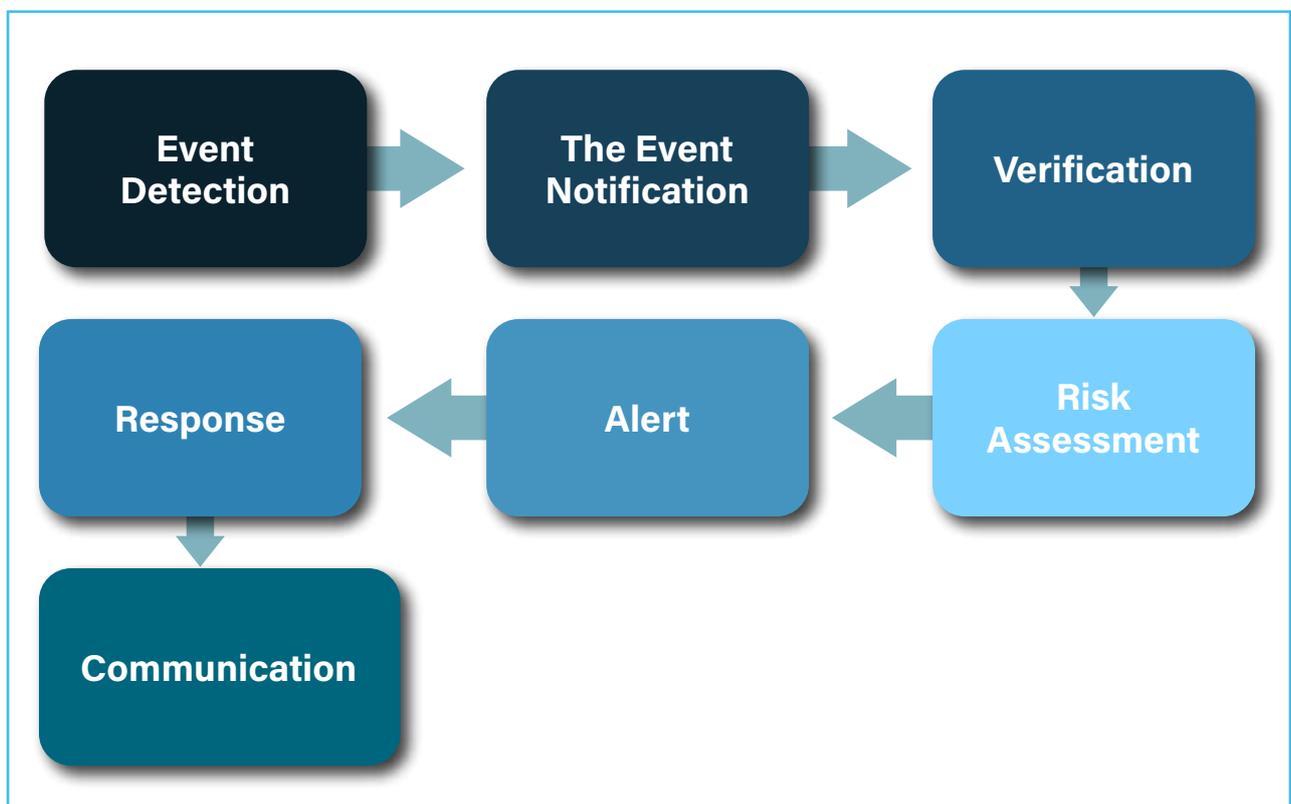
Figure 50. Data flow and reporting mechanism in EBS

Capacity Building

IEDCR conducts regular training for Rapid Response Teams (RRT) each year at various administrative levels, with around 300 - 400 health personnel trained so far.

Collaborations and Multisectoral Engagement

Although there is no formalized multisectoral One health or multisectoral technical working group (TWG) for EBS, cross-sector collaboration often takes place during outbreak investigations, involving ministries such as Agriculture, Environment and Local Government.

Partnerships with development agencies including WHO and US CDC have provided valuable technical and financial support in building surveillance capacity.

Policy and Governance Framework

While Bangladesh does not yet have a dedicated legislation or national policy framework for EBS, progress has made through the development of guidelines for Respiratory Event Based Surveillance. Moving forward, establishing a comprehensive national EBS policy and Standard Operating Procedures (SOPs) could help ensure consistency, sustainability and alignment with international best practices.

Monitoring, Evaluation and Financing

Currently, there is no dedicated budget line for EBS within the national health budget. However, external partners have supported its implementation. Integrating EBS into government financing mechanisms would strengthen sustainability. Similarly, developing a structured Monitoring and Evaluation (M&E) framework would enhance the system's accountability, quality assurance and data driven decision making.

Conclusion

EBS plays a vital role in strengthening the country's disease surveillance network by detecting events that may not appear through formal indicator-based reporting systems. By monitoring unusual or emerging patterns in real time, EBS accelerates the detection of outbreaks and supports early interventions. This system not only complements traditional surveillance but also enhances Bangladesh's preparedness and resilience against emerging infectious diseases and other health emergencies, contributing significantly to the nation's overall public health security.

4.2.16.7 Respiratory Event Based Surveillance

Background

Bangladesh is one of the world's most population-dense countries and an outbreak of respiratory disease could have devastating consequences to its people. The respiratory event-based surveillance system aims to enhance and strengthen existing event-based surveillance activities across Bangladesh and to improve early detection and rapid reporting of emerging and re-emerging respiratory disease threats.

Respiratory event-based surveillance started in 2017 with US CDC fund. The operational guidelines were also developed. In 2018, orientation and training were conducted for all medicine, pediatrics and ICU doctors as well as medical technologists of tertiary and district hospitals across six administrative divisions in two parts (Hospital Based and Civil Surgeon Office) to support this surveillance program. But the program was operational from 2018-2020.

In November 2022, the respiratory event-based surveillance program restarted. Food and Agriculture Organization of the United Nations (FAO) provided one year of funding to revive activities. The operational guidelines were updated, and training design was changed. Respiratory medicine department was included in this program. Thirteen govt and private hospitals of Dhaka city as well as Rajshahi, Bogra and Rangpur medical colleges were included in this surveillance. This iteration of the surveillance system was largely oriented toward COVID 19, and several signals, particularly those with chest X-ray findings. Since

2023, Activities continued and expanded under funding and technical support from partners including US CDC. In this (third edition) we looked beyond COVID 19 and included on other respiratory pathogens of epidemic and pandemic potential. So, some of the signals are also changed.

Objective

1. To implement event-based surveillance for early detection and reporting of acute respiratory infections that could significantly threaten public health.

2. To enhance partnership and strengthen collaboration between hospitals and IEDCR for rapid identification, reporting and response to public health events.

Case Definition (SARI) Signals for Immediate Reporting

Severe acute respiratory infection (SARI): A case definition for influenza virus surveillance defined by the World Health Organization (WHO). The definition is: an acute respiratory infection with history of fever or measured fever ≥ 38°C; cough; onset within the last 10 days; requires hospitalization.

Signal: data and/or information considered by the *Early Warning and Response system* as representing a potential acute risk to human health. Signals may consist of reports of cases or deaths (individual or aggregated), potential exposure of human beings to biological, chemical or radiological and nuclear hazards, or occurrence of natural or man-made disasters. Once identified signals must be verified. When it has been verified, a signal becomes an "event".

Signals:

Signal 1: A case of SARI

- with international travel history within last 2 weeks of symptom onset

or

- with history of contact with an international traveler within last two weeks of symptom onset

Signal 2: A case of SARI

- who works at a poultry or live bird market

or

- who has history of exposure to a sick or dead poultry or bird or animal within last two weeks of symptom-onset.

Signal 3: A case of SARI in a health-care provider who cared for a case of SARI within last two weeks of symptom-onset.

Signal 4: A cluster of two or more cases of SARI from the same family, workplace, educational institute, prayer place, social group, school or Ward/ Mohalla within two weeks.

Signal 5: A sudden increase (in relation to time or season) in the number of cases of SARI at the hospital.

Signal 6: A case of SARI with atypical or unusual x-ray findings.

Signal 7: Any unexplained or unusual SARI-related death based on clinician judgment.

Sentinel Sites

To optimize the resources, the respiratory event-based surveillance sites were integrated with the existing NISB surveillance sites. The current operational network comprises nine sentinel sites (Habiganj not yet included).

Event Detection, Reporting and Verification Workflow

The surveillance physician is responsible for overall surveillance, and the Project facilitator (PF) is responsible for case identification/signal identification. They can also take samples from patients, as they are mostly medical technologists (MT). The nurses in the team may also take samples.

If any of the seven signals are identified among the SARI cases from admitted (indoor) patients during routine inpatient care, the project facilitator notifies the hospital focal person. Then hospital focal person or the project facilitator informs IEDCR through the hotline number of IEDCR (01401196291) within 8 hours and informs the Hospital Coordinator. Every signal report is documented in the IEDCR Signal Database. Within 24 hours, the Hospital focal person, or IEDCR will conduct the verification. Then the hospital focal person/facilitator completes a verification form. After verification, the site MT or nurse collects sputum, nasal and oropharyngeal swabs as well as additional specimens when appropriate. All Event Verification Forms and specimens are stored according to the guidelines and transported to IEDCR for sample processing and analysis within 48 hours of the original hospital call reporting the signal. IEDCR performs the Fast-track Diagnostic test 33 (FTD33), which identifies 22 Viruses and 13 Bacteria. Laboratory findings are emailed by the IEDCR focal person to the hospital focal person (head of Respiratory Medicine, Medicine, Pediatrics, or ICU) in a timely manner, at the respective surveillance sites, maintaining confidentiality. Verified events are reported to the IEDCR Director with recommendations with further action. IEDCR leads the investigation and response, with full cooperation from the hospitals.
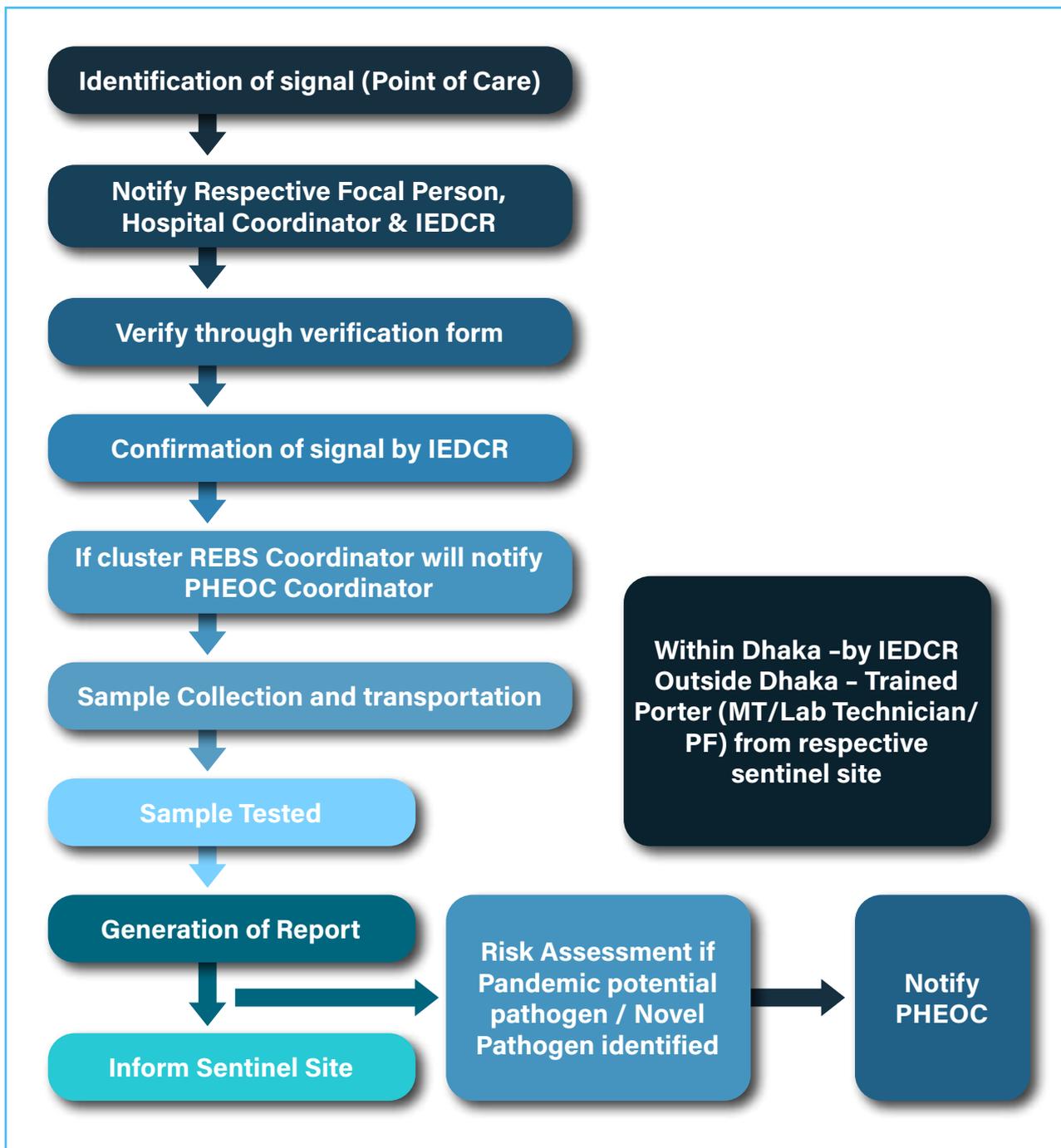
Figure 51. Case identification process in respiratory event-based surveillance

Note: If outbreak is suspected, PHEOC will respond. When a patient aligned with the signal, dies before sample collection inform IEDCR

List of FTD33 Pathogens

Table 61. Pathogens of Fast-track Diagnostic test 33

Viruses (20)	Bacteria (13)
Influenza A, B, C	Pneumocystis jirovecii
Influenza A (H1N1) swl	Mycoplasma pneumoniae
Parainfluenza 1, 2, 3, and 4	Chlamydia pneumoniae
Coronaviurses NL63, 229E, OC43, HKU1	Steptococcuspnumoniae
Human metapneumoviruses A, B	Haemophilusinfluenzae
Respiratory syncytial viruses A, B	Haemophilusinfluenzae type B
Adenovirus	Staphylococcus aureus
Enterovirus	Moraxella catarrhalis
Parechovirus	Bordatellaspp
Bocavirus	Klebsiellapnumoniae
	Legionella pneumophila/ Legionella longbeachae
	Salmonella species

Monitoring and Evaluation

Under the supervision of IEDCR, the EBS surveillance officer is responsible for conducting monthly online coordination meetings. IEDCR is also responsible for doing a six-month surveillance evaluation.

Data Management

The database is maintained by IEDCR, and reports are shared with relevant stakeholders and policy makers. According to the Guideline, IEDCR is supposed to conduct a dissemination at the end of the year.

4.2.16.8 International Health Regulation

Background

The International Health Regulations serve as a global framework aimed at preventing and responding to public health risks that have the potential to cross borders. Bangladesh, as a participating country, has committed to developing and sustaining core public health capacities for timely surveillance and response to health emergencies [72]. Despite these commitments, significant challenges persist in effectively linking the country's IHR coordination mechanisms with routine disease surveillance systems. Current practices are largely reactive, triggered during outbreaks or emergencies, with limited routine engagement between IHR focal points and national surveillance programs. Strengthening this integration remains essential for improving early detection and coordinated public health action.

IHR Coordination and Notification Process in Bangladesh

Disease classified notifiable under IHR (2005), or pandemic potential diseases are immediately informed to the IHR Focal person designated as Director Disease Control Unit & LD CDC, DGHS. IHR activities are activated reactively during public health emergencies, such as disease outbreaks (e.g., dengue, cholera, COVID 19). From local level Civil Surgeon or the UHFPO first inform the IHR focal point. Then IHR focal point ask icddrb and IEDCR. IEDCR and icddr,b is primarily responsible for outbreak investigation and laboratory confirmation. They also liaise with WHO SEARO via the IHR focal point.

Point of Entry (PoEs) and Referral Mechanism

In Bangladesh, four international airports currently offer limited health screening capabilities: Hazrat Shahjalal International Airport (Dhaka), Shah Amanat International Airport (Chattogram), Osmani International Airport (Sylhet), and Cox's Bazar International Airport. When immigration officials suspect a potential health threat at the airport, they alert the designated health officer who complete two forms the Patient Examination Ticket (Reg No, Passengers Name, Age, Sex, Passport Number, Address, Date of Birth, Date and Time of Examination, C/C, O/E, P/D, Inv, P/D) and Patient Referral Slip (Reg Number, Passengers Name, Age, Sex, Passport Number, Date of Birth, Date and Time of Examination, Chief Complaints, O/E, P/D, Adv and Referred to) capturing clinical, demographic and referral details. The Health Officer then immediately informs the IHR and Communicable Disease Control (CDC) focal person via phone and refers to designated hospitals. Confirmatory testing and isolation are conducted in designated hospitals, including:

- Kurmitola General Hospital and Infectious Diseases Hospital, Dhaka.
- Bangladesh Institute of Tropical and Infectious Diseases (BITID), Chattogram
- Shaheed Shamsuddin Ahmed District Hospital, Sylhet

At all points of entry in Bangladesh—including airports, land ports, and seaports—a range of personnel have been deployed by the Ministry of Health. These include Doctor, Nurse, SACMO, SI, MTLab, Lab Attendance, PIS Personnel, IT Maintenance Technician, Field Monitoring officer, Data Manager, Data Entry Operator, PoE Supervisor, Accountant, Ambulance Driver, Office Assistant, Steno Typist, Storekeeper, Pharmacist, MLSS. Despite this robust staffing, health screening at land and seaports remains inadequate. Despite having 22 land ports and 3 seaports, Bangladesh lacks standard health screening and surveillance infrastructure. While administrative health officers (Assistant Directors for Health) are posted at these ports, operational public health support is lacking. When suspected cases are identified at these entry points, they are referred to the nearest Upazila Health Complex or District Hospital. From there, the UHFPO or Civil Surgeon notifies the IHR and CDC focal point for further investigation and action.
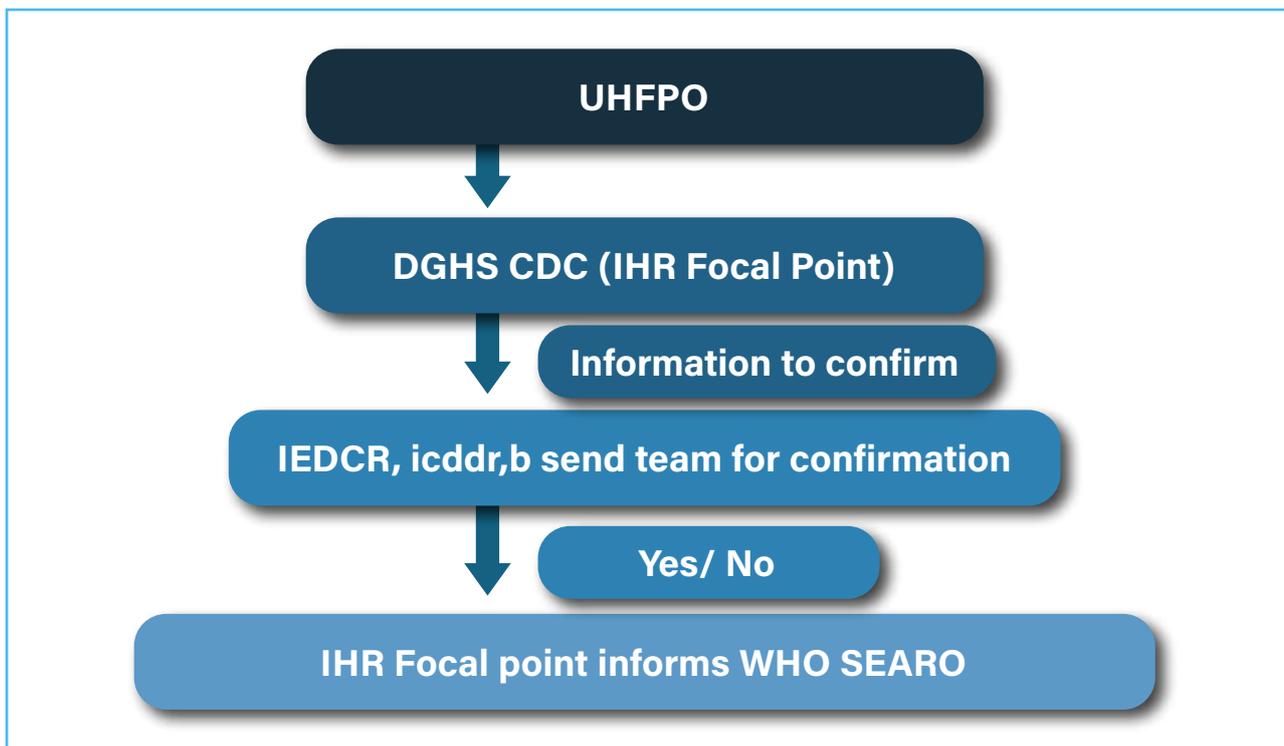
Figure 52. Case notification process in International Health Regulation

Challenges

- Limited Health Screening is present in four International Airports.
- Lack standard health screening and surveillance infrastructure in land and seaports.
- Limited integration of IHR coordination with national surveillance platforms (e.g., DHIS2, disease-based surveillance).
- Lack of trained human resources at PoEs for disease detection and reporting.
- Inconsistent outbreak reporting chain, relying heavily on manual alerts (e.g., phone calls) instead of automated notification system.

Way Forward

- Strengthening Health Screening at International Airports
- Establishing Standardized Surveillance Infrastructure at Land and Seaports
- Enhancing Integration of IHR Coordination with National Surveillance Systems
- Building Human Resource Capacity at Points of Entry
- Digitizing and Streamlining Outbreak Reporting Mechanisms

4.2.16.9 Child Health and Mortality Prevention Surveillance (CHAMPS)

Background

Child Health and Mortality Prevention Surveillance (CHAMPS) is a global surveillance network [73]. It generates and shares accurate information on causes of stillbirths and child deaths in high-mortality settings in Africa and South Asia. It collaborates closely with communities and their leaders to rapidly identify child deaths. With families' consent, the program uses advanced diagnostic techniques to uncover the underlying causes. These insights empower families to take steps that improve child health, while also supplying critical evidence to health authorities at local, national, and global levels. By informing policies, shaping programs, and guiding investments, CHAMPS helps drive effective actions to prevent future child deaths. Bangladesh, a South Asian country, is among the sites where the CHAMPS program is being implemented. Funded by the Bill and Melinda Gates Foundation CHAMPS are implemented through partnerships with the Emory Global Health Institute of the Emory University and Johns Hopkins University (JHU).

CHAMPS' Approach:

CHAMPS operates in nine countries, including Bangladesh, establishing study sites of about 200,000 people in partnership with community and public health leaders, with continuous community engagement to ensure alignment with local practices. Each site conducts mortality surveillance to rapidly identify stillbirths and deaths in children under five, and with parental consent, teams collect minimally invasive tissue samples (MITS), perform laboratory testing, review clinical records, and conduct verbal autopsies. A panel of local experts then determines causes of death through the DeCoDe process, while pregnancy and demographic surveillance systems track pregnancy outcomes, births, and deaths to contextualize all cases captured by CHAMPS.

CHAMPS Bangladesh Sight

In Bangladesh, CHAMPS works in Baliakandi sub-district of Rajbari, where the child mortality rate is 50 per 1,000 live births. Despite more than 30 healthcare facilities, including health centers and private clinics, challenges persist in saving children's lives.

The Baliakandi Upazila Health Complex (BUHC), the main referral hospital, provides important services like maternal and child health, reproductive health, nutrition, and mental health care, making it a key site for CHAMPS' work. Additionally, CHAMPS works with Faridpur Medical College Hospital (FMCH) and Zahid Memorial Children's Hospital (ZMCH). Key local partners include icddr,b, Bangladesh Medical University (BMU), and the Institute of Epidemiology, Disease Control and Research (IEDCR), which together utilize CHAMPS data to improve child health outcomes and inform public health strategies.

Objective of CHAMPS Bangladesh

To understand the causes and prevention of under five deaths and stillbirths, Bangladesh joined CHAMPS network with the following objectives:

- To identify under-5 deaths and stillbirths in Baliakandi sub-district of Rajbari district
- To determine causes of under-5 deaths and stillbirths in the study population in Baliakandi and the extended area, including using minimally invasive tissue sampling (MITS)
- To estimate overall and cause-specific mortality rates (stillbirth and under-5)

Key Implementing Partners

- icddr,b - technical lead for field implementation, data generation and analysis.
- IEDCR - national focal point; leads "data to action" initiatives and coordinates withy MoHFW.
- BMU - provides clinical expertise, training, diagnostics, and supports the DeCoDe review process.

Governance and Oversight

There are three established stakeholder committees to ensure smooth implementation of CHAMPS activities in Bangladesh: Technical Committee; Coordination Committee; and DeCoDe Committee.

Surveillance in CHAMPS

CHAMPS network-initiated mortality surveillance in Baliakandi and Faridpur Medical College Hospital (FMCH) in September 2017. The surveillance began with a demographic surveillance system (DSS) and real-time notifications via a call-in center. Then pregnancy surveillance is conducted alongside DSS to identify stillbirths and neonatal deaths. By October 2018, the mortality surveillance system expanded to include Zahed Memorial Child Hospital (ZMCH) and Baliakandi Upazila Health Complex (Ba-UHC). To improve the likelihood of obtaining consent for performing Minimally Invasive Tissue Sampling (MITS), the study sites were further expanded in October 2018 to include six additional upazilas in Faridpur district: Bhanga, Boalmari, Madhukhali, Nagarkanda, Saltha, and Sadar. This broadened the population base and increased the surveillance coverage for stillbirths and under-5 deaths, along with the implementation of MITS. Initially MITS procedures are conducted at sentinel health facilities after parental consent. Later, community deaths in Baliakandi undergo MITS at BUHC or specially equipped vehicle/mobile sites, based on discussions, ethnographic information and committee advice.This approach was introduced in June 2019 in the Baliakandi sub-district, allowing the CHAMPS project to continue both community and facility-based mortality surveillance across the extended region. The expanded model strengthens data collection on mortality causes in under-5 children and stillbirths, enhancing the scope of mortality surveillance and MITS implementation across Baliakandi and the wider Faridpur district. A CHAMPS contact center, a toll-free hotline, has been set up to offer medical advice, referrals and strengthen community support for CHAMPS activities.

Sample and Laboratory Test

Tissue samples such as brain material, tissues from lung, liver, placenta & umbilical cord, bone marrow, CSF, blood, nasopharyngeal swab, rectal swab are collected by trained experts. Samples undergo advanced histopathology and molecular screening. BMU and icddr,b scientist received specialized training to facilitate proper diagnosis. Epidemiologic data and standard WHO verbal autopsies are conducted for each fatal case. Maternal and child clinical information, household and individual demographic and epidemiologic data, verbal autopsy, microbiology, molecular biology (TAC), clinical diagnostics, site histopathology findings, and CHAMPS pathology laboratory (CPL) histopathology findings are analyzed to determine cause of death by the DeCoDe committee. DeCoDe panel consisting of 8-10 experts- paediatrician, obstetrician, microbiologist, pathologist, epidemiologist- reviews all the cases to determine the cause of death.
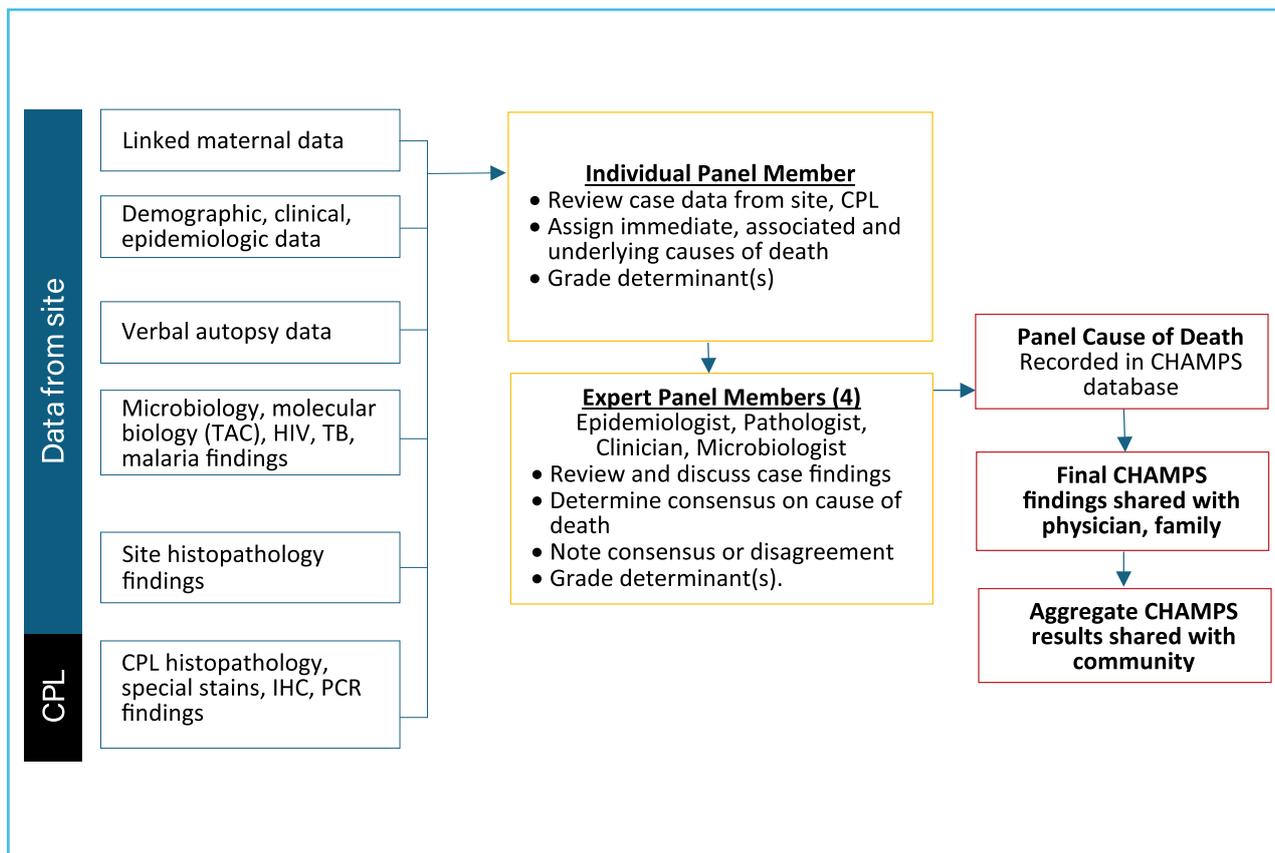
Figure 53. CHAMPS local expert panel to determine cause of death (DeCoDe)

A web-based system for sharing CHAMPS findings via the IEDCR website has been established. Pathologically confirmed CHAMPS data provides clear insights into causes of child deaths, guide prevention strategies, and help reduce child morbidity and mortality in Bangladesh.

CHAMPS Mortality Category

Congenital Infection, Diarrhoeal Diseases, Lower Respiratory Infections, Measles, Meningitis/ Encephalitis, Neonatal preterm birth complications, Neonatal sepsis, other infections, Perinatal Asphyxia/ hypoxia, Sepsis.
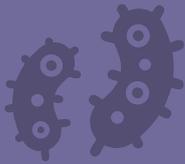
Conclusions

5. Conclusions

Bangladesh has established a foundation for infectious disease surveillance through dedicated programs that provide essential data for public health decision-making and support outbreak response. Over the years, the country has demonstrated its capacity to mobilize resources, leverage international partnerships, and adapt innovative approaches to address emerging health threats. These achievements reflect a growing national commitment to strengthening health security and advancing toward universal health coverage.

Despite this progress, persistent challenges remain, including fragmented vertical programs, limited integration with the national health information system, uneven laboratory capacity, shortages of trained personnel, underdeveloped genomic and monitoring systems, weak reporting mechanisms, limited engagement of the private sector, limited One Health coordination, and inadequate cross-border collaboration. These shortcomings ultimately undermine the overall functionality and effectiveness of the surveillance systems.

Addressing these constraints will require strengthened system integration, enhanced digital infrastructure, expanded workforce development, sustainable financing, and effective multisectoral coordination. By advancing these priorities, Bangladesh can establish a resilient, data-driven surveillance system that ensures early detection, rapid response, and effective control of infectious disease threats. This progress will not only safeguard national health security but also demonstrate Bangladesh's leadership as a regional model for resource-constrained countries striving to build stronger, more adaptive, and more equitable public health systems.

Strengthening infectious disease surveillance in Bangladesh offers a practical model for resource-constrained countries seeking to enhance early detection, response, and health security. By aligning systems with international standards, integrating fragmented programs, institutionalizing multi-sectoral coordination, ensuring sustainable financing, leveraging digital tools, and fully engaging the private sector, Bangladesh can achieve a resilient, data-driven surveillance infrastructure. These recommendations demonstrate how targeted investments, strategic governance, and inclusive stakeholder engagement can transform surveillance systems into actionable platforms, providing lessons applicable across similar global contexts.

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85. Dr. Mahfuza Rifat, Country Representative, Damien Foundation

86. Dr. Sabbir Ahmed, Senior Manager, Bangladesh Rural Advancement Committee (BRAC)

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* The designations and institutional affiliations reflected herein are updated as of 22 December 2025

Annex 7.2 Technical and Project Team

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Project Team

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12. Sabikun Nahar, Project Coordinator-Operations, Jhpiego

Annex 7.3 List of Infectious Disease Surveillance in Bangladesh

SL	Infectious diseases surveillance	Systematic	Ongoing	Sample collection	Data analysis	Data interpretation	Dissemination	Human health-related data	Linked to public health practice
1. Diarrhoeal disease surveillance:									
1.1	National Cholera Surveillance	y	y	y	y	y	y	y	y
1.2	Acute Watery Diarrhea Surveillance	y	y	y	y	y	y	y	y
1.3	Hospital-based cholera surveillance	y	y	y	y	y	y	y	y
1.4	Hospital Based Rotavirus and Intussusception surveillance (HBRIS)	?	?	?	?	?	?	?	?
2. Respiratory disease surveillance:									
2.1	National Influenza Surveillance Bangladesh (NISB)	y	y	y	y	y	y	y	y
2.2	Hospital Based Influenza Surveillance (HBIS)	y	y	y	y	y	y	y	y
2.3	National SARS-CoV 2 Genomic Variant Surveillance in Bangladesh (NGSB)	y	y	y	y	y	y	y	y
2.4	National Respiratory Pathogen Genomic Surveillance (NRPGS)	y	y	y	y	y	y	y	y
2.5	Respiratory Event-Based Surveillance	?	?	?	?	?	?	?	?
3. Vector-borne disease									
3.1	Dengue Surveillance	y	y	y	y	y	y	y	y
3.2	Filariasis Surveillance	y	y	y	y	y	y	y	y
3.3	Epidemiological Surveillance in Malaria Elimination Program	y	y	y	y	y	y	y	y
3.4	Hospital-based surveillance for Japanese Encephalitis	y	y	y	y	y	y	y	y
3.5	Kala-azar surveillance system	y	y	y	y	y	y	y	y

SL	Infectious diseases surveillance	Systematic	Ongoing	Sample collection	Data analysis	Data interpretation	Dissemination	Human health-related data	Linked to public health practice
4	Vaccine Preventable Disease & AEFI Surveillance System	y	y	y	y	y	y	y	y
5	HIV/AIDS Surveillance	y	y	y	y	y	y	y	y
6	Tuberculosis Surveillance System	y	y	y	y	y	y	y	y
7	Foodborne Disease Surveillance	?	?	?	?	?	?	?	?
8	Anthrax surveillance	y	y	y	y	y	y	y	y
9	NIPAH Virus Transmission in Bangladesh	y	y	y	y	y	y	y	y
10	Enteric fever	y	y	y	y	y	y	y	y
11	Antimicrobial Resistance (AMR) surveillance	y	y	y	y	y	y	y	y
12	Chikungunya	?	?	?	?	?	?	?	?
13	Zika	?	?	?	?	?	?	?	?
14	Ebola	n	n	n	n	n	n	n	n
15	MERS-CoV (Middle East Respiratory Syndrome Coronavirus)	n	n	n	n	n	n	n	n
16	Leprosy Surveillance	?	?	?	?	?	?	?	?
17	Leptospirosis Surveillance	y	y	y	y	y	y	y	y
18	Rabies Case Surveillance (Human)	?	?	?	?	?	?	?	?

**

Y= Yes

n= No

?= No information found from available documents review (we will collect information later using KII and meetings)

Annex 7.4 Key Informant Interview Guideline

Tool for Mapping Surveillance System in Bangladesh

KII with the National level focal person

KII Guideline

Guiding questions:

1. What are the surveillance systems ongoing under your administration?

2. What types of surveillance mechanism are currently in place (e.g., event-based, indicator-based, community based, hospital based/ Sentinel/ early warning system) *

3. Can you tell us about the objectives of this surveillance system? (Disease specific response)

4. What is your specific role in surveillance? (Disease specific)

5. Can you describe the components and operation of the system? (Please ask the questions below)

    ♦ Organizations involved in disease surveillance.

    ♦ Officials involved in this surveillance system.

    ♦ Sites for surveillance

    ♦ Which population is involved in this surveillance?

    ♦ Funding organizations

    ♦ Any SOP/ flow chart/ or any strategic documents related to this surveillance? (Collected all if they have any)

    ♦ Operational flow of the surveillance system (from community to national level)?

    ♦ Capacity development activities related to surveillance system (responsible dept./ organization) (in last year, if not, mention the last one)

6. About Surveillance Data, Reporting & Interoperability:

    ♦ How is surveillance data collected, stored, and transferred*

    ♦ What are the reporting channels for relevant surveillance?

    ♦ Timeframe of data collection & reporting

    ♦ How is surveillance data visualized and analyzed?

    ♦ Who uses the surveillance system data and how? (Give example)

    ♦ How do stakeholders interact and share information within the surveillance system?

    ♦ What types of reports are generated for stakeholders? frequency of Report sharing.

    ♦ What platforms (DHIS2, OpenHIE, WHO GOARN) are used for data integration of surveillance system?

    ♦ What do you think about other anticipated uses of the data? (e.g., research, publication, policy making etc.)

    ♦ Are there any interoperability or data sharing related challenges between different data sources or among the stakeholders?

    ♦ How are data privacy and security ensured in surveillance data management?

    ♦ Are national data protection laws aligned with international standards?

    ♦ What key indicators should be included in dashboards and reports?

7. Do you think this system is enough to provide estimates of the magnitude of morbidity and mortality related to the health problem under surveillance?

8. Does this surveillance system stimulate epidemiologic research likely to lead to control or prevention?

9. Does surveillance identify the risk factor associated with disease occurrence?

10. Does this system permit assessment of the effects of the control measures?

11. System's capacity to give early warning to detect epidemics.

12. How well does the system detect and respond to outbreaks? Is there any assessment mechanism? (Collect the last assessment report).

13. Do you think this surveillance system lead to improved clinical practice by the health care providers who are the constitute of the surveillance system?

14. What monitoring tool/mechanism is used for the surveillance system?

15. What is the role of the private sector, NGOs, and academic institutions in surveillance?

16. What regions/decentralized have limited or no surveillance coverage?

17. What are the approaches for increasing coverage/capacity for enhancing the system effectiveness from national level?

18. Do you think there are any challenges in the surveillance system? (Data collection, sample collection, data quality, use of data, logistical support, funding, transportation, any other operational challenges)

19. What is your recommendation for strengthening the disease surveillance system?

Name of Interviewer:

Signature of Interviewer:

Contact number of Interviewer:

Date (dd/ mm/ yyyy) & Time:

About the interviewee:

Institution:

Designation:

Related Surveillance System:

Role in the Surveillance System:

Tool for Mapping Surveillance System in Bangladesh
KII with the District/ Upazila Level Focal Person
KII Guideline

Guiding questions:

1. What are the surveillance systems ongoing under your administration?

2. What types of surveillance mechanism are currently in place (e.g., event-based, indicator-based, community based, hospital based/ Sentinel/ early warning system) *

3. Can you tell us about the objectives of this surveillance system? (Disease specific response)

4. What is your specific role in surveillance? (Disease specific)

5. Can you describe the components and operation of the system? (Please ask the questions below)

    ♦ Organizations involved in disease surveillance.

    ♦ Officials involved in this surveillance system.

    ♦ Sites for surveillance

    ♦ Which population is involved in this surveillance?

    ♦ Funding organizations

    ♦ Any SOP/ flow chart/ or any strategic documents related to this surveillance? (Collected all if they have any)

    ♦ Operational flow of the surveillance system (from community to national level)?

    ♦ Capacity development activities related to surveillance system (responsible dept./ organization) (in last year, if not, mention the last one)

6. About Surveillance Data, Reporting & Interoperability:

    ♦ How is surveillance data collected, stored, and transferred*

    ♦ What are the reporting channels for relevant surveillance?

    ♦ Timeframe of data collection & reporting

    ♦ How is surveillance data visualized and analyzed?

    ♦ Who uses the surveillance system data and how? (Give example)

    ♦ How do stakeholders interact and share information within the surveillance system?

    ♦ What types of reports are generated for stakeholders? frequency of Report sharing.

    ♦ What platforms (DHIS2, OpenHIE, WHO GOARN) are used for data integration of surveillance system?

    ♦ What do you think about other anticipated uses of the data? (e.g., research, publication, policy making etc.)

    ♦ Are there any interoperability or data sharing related challenges between different data sources or among the stakeholders?

    ♦ How are data privacy and security ensured in surveillance data management?

    ♦ Are national data protection laws aligned with international standards?

    ♦ What key indicators should be included in dashboards and reports?

7. Do you think this system is enough to provide estimates of the magnitude of morbidity and mortality related to the health problem under surveillance?

8. Does surveillance identify the risk factor associated with disease occurrence?

9. Does this system permit assessment of the effects of the control measures?

10. System's capacity to give early warning to detect epidemics.

11. How well does the system detect and respond to outbreaks? Is there any assessment mechanism? (Collect the last assessment report).

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17. Do you think there are any challenges in the surveillance system? (Data collection, sample collection, data quality, use of data, logistical support, funding, transportation, any other operational challenges)

18. What is your recommendation for strengthening the disease surveillance system?

Name of Interviewer:

Signature of Interviewer:

Contact number of Interviewer:

Date (dd/ mm/ yyyy) & Time:

About the interviewee:

Institution:

Designation:

Related Surveillance System:

Role in the Surveillance System: