Outbreak Investigation & Response Manual with SOPs

(including Climate Sensitive Diseases)

2023

IEDCR

World Health Organization
Bangladesh

Contributors

Outbreak Investigation & Response Manual with SOPs (Including Climate Sensitive Diseases). 2023

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Foreword

The first outbreak investigation manual was prepared in 2005 and the second edition in 2014, the draft version in 2021. Now many procedures to field investigation have improved in the national and international guidelines; especially after COVID-19 Pandemic. This third edition of Outbreak Investigation & Response Manual with SOPs (Including Climate Sensitive Diseases) Outbreak manual is the hard work, enthusiasm and commitment of a dedicative working group of relevant stakeholders with technical support from WHO county office. The dedicated group of experts worked with a vision to incorporate recent developments in the field of Outbreak investigation & Response and lessons learned from the COVID-19 Pandemic. This edition covers the basic knowledge about outbreak including epidemic, endemic and pandemic situation; it will serve as the guideline to follow the steps of field investigation during an emergency health related event or situation. This manual is to provide a standard, systematic and scientific operation for outbreak investigation & response. This version includes proper instruction for sample collection, sample storage and shipment from the field to the laboratory of IEDCR.

The experience gained during the COVID-19 pandemic was a great learning to the enrich manual; valuable reviews, contributions and feedbacks from the relevant expert-stakeholders and responsible officers of IEDCR helped to further improve the Outbreak Investigation and Response Manual with risk communication topics, communication with journalists and ethical consideration and other relevant topics.

I would like to point out the new features in this edition. This edition contains glossary of terms, Outbreak investigation of Climate Sensitive Diseases, entomological sample collection and transportation to the national laboratory at IEDCR, the record forms of Hotline/Media/Event Based Surveillance, daily outbreak reporting format, steps to write the summary report / final report of the outbreak investigation. The Standard Operating Procedures (SOPs) have also been added in this version. This edition of the outbreak manual is intended to provide core guideline to follow during an Outbreak Investigation & Response (including for Climate Sensitive Diseases).

I hope that this outbreak manual will support and guide the field investigation team to conduct the work congruously and exceed our service to another peak.

Let me express my sincere thanks to the WHO Bangladesh for their generous and technical support towards the development of this manual.

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Acknowledgement

We wish to thank all the learned & experienced specialists and expert officers of IEDCR, and all other expert from different Institutes and Government sectors who have contributed and provide their precious time and constructive inputs to produce this 'Outbreak Investigation & Response Manual with SOPs (Including Climate Sensitive Diseases).' In this edition of the outbreak investigation & response manual, we had tried our best to main the standard trait for outbreak investigation & Response. Our sincere effort was to incorporate all the changes based on recent emerging disease, one health approaches, upcoming zoonotic and pandemic threats that can affect our country and recent COVID-19 Pandemic lessons learned and Outbreak investigation of Climate Sensitive Diseases. We also included basic information about outbreak risk communication in this manual. Questionnaires, forms and templates are attached in this edition. The team, who will conduct outbreak investigation in future can further improve this manual based on new experiences and knowledge.

This was as daunting task to finish the manual on an expedited time line. Our profound gratitude is to Prof. Dr. Tahmina Shirin, Director, IEDCR & NIC; Professor Dr. Md. Nazmul Islam, Line Director, Communicable Disease Control (CDC), and Director Disease Control, DGHS; Prof Dr. Mahmudur Rahman, Former Director IEDCR & Country Director, Global Health Development | EMPHNET, Bangladesh and all the learned & experienced specialists of relevant sectors for their valuable quality time, important input and guideline to improve the manual and prepare the overall structure of the manual. We express sincere gratitude to the IEDCR experts and all other expert from different Institutes and Government sectors for the great support. We would also like to sincerely thank all who supported directly or indirectly in the development of the Manual.

Our heartfelt thanks to Mr. Shamsul Gafur Mahmud and Mr. Ahammadul Kabir of WHO-BAN, and WHO Bangladesh Country Office for the continued support and guidance. We highly appreciate and thank the World Health Organization-Bangladesh, Country office for providing the technical support. Our thanks to all the persons working behind the scene at WHO-BAN, country office to prepare the structure of this manual.

Overall, this "Manual" has provided a practical guide for public health and allied professionals for the investigation of clusters and outbreaks. The manual aims to enhance the preparedness and response capacity of public health authorities and partners in dealing with potential events that may pose a threat to human health and public health emergencies. The manual is intended to be a living document that can be updated and revised as new evidence and technologies emerge.

Finally, I would like to thank Dr. M Salim Uzzaman, Consultant WHO for the sincere hard work and all others experts, resource persons for completing the much need "Outbreak Investigation & Response Manual with SOPs (Including Climate Sensitive Diseases)" which will be a useful document guideline for 'Rapid Response Teams' and other relevant stakeholders in years to come.

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Glossary of Terms

Acute public health event

Any event that represents immediate threat to human health and requires prompt action, i.e. implementation of control and/or mitigation measures to protect the health of the public. This term includes events that have not yet led to disease in humans but have the potential to cause disease through exposure of humans to infected or contaminated food, water, animals, manufactured products, environments, or as a result of direct or indirect consequences of natural events, conflicts or other disruptions of critical infrastructure. (WHO)

Case-Control Study

A study that compares two groups of people: those with the disease or condition under study (cases) and a very similar group of people who do not have the disease or condition (controls).
(National Cancer Institute, USA)

Cluster

Refers to an aggregation of cases grouped in place and time that are suspected to be greater than the number expected, even though the expected number may not be known. (US CDC)

Climate Sensitive

Weather conditions, such as rainfall, temperature, humidity, and heat waves are well documented and affects on diseases. Prolonged periods of heavy rain increase the tendency of vector borne diseases spreading. Longer seasons of mild temperatures may increase the transmission likelihood of vector-borne diseases. In warmer temperatures, vectors become infectious more quickly and can transmit virus earlier in their lives. Warmer temperatures may increase a broad range of infections not typically associated with weather or climate. (Oxford, Clinical Infectious Diseases)

Cohort Study

Cohort studies are a type of longitudinal study—an approach that follows research participants over a period of time (often many years). Specifically, cohort studies recruit and follow participants who share a common characteristic, such as a particular occupation or demographic similarity. (BMJ, UK)

Endemic

Endemic refers to the constant presence and/or usual prevalence of a disease or infectious agent in a population within a geographic area. The amount of a particular disease that is usually present in a community (US CDC). It also refers to chronic high prevalence of a disease in such area or group in particular seasons in an yearly basis, e.g., typhoid fever, diarrhea in post monsoon period in Bangladesh.

Epi curve

An epidemic curve, also known as an epi curve, shows the number of illnesses in an outbreak over time. During an ongoing outbreak investigation, the epi curve is updated as new illnesses are reported.

Epidemic

Refers to an increase, often sudden, in the number of cases of a disease above what is normally expected in that population in that area. Epidemics occur when an agent and susceptible hosts are present in adequate numbers, and the agent can be effectively conveyed from a source to the susceptible hosts. (US CDC). The number of cases indicating the presence of an epidemic varies according to the agent, size, and type of particular population exposed; previous experience or lack of exposure to the disease; and time and place of occurrence.

A single case of smallpox or Ebola will be an epidemic phenomenon in a country today and also a sudden severe outbreak of a disease such as severe acute respiratory syndrome (SARS)

An outbreak can be declared an epidemic when the disease sudden rise in the number of cases to many people spreads rapidly.

Early Warning and Response (EWAR)

WHO's Early Warning, Alert and Response System (EWARS) is designed to improve disease outbreak detection in emergency settings, such as in countries in conflict or following a natural disaster. It is a simple and cost-effective way to rapidly set up a disease surveillance system.
This is the organized mechanism to detect as early as possible any abnormal occurrence or any divergence from the usual or normally observed frequency of phenomena.

"emic" approach

The "emic" approach is an insider's perspective, which looks at the beliefs, values, and practices of a particular culture from the perspective of the people who live within that culture.

Evaluation

The periodic assessment of the relevance, effectiveness and impact of activities in the light of the objectives of the surveillance and response systems

Event-based Surveillance

Event-based public health surveillance looks at reports, stories, rumors, and other information about health events that could be a serious risk to public health. Such information may be described as unstructured non-standardized or subjective information to detect unusual events that might signal an outbreak. (US CDC)

Event-Based Surveillance (EBS): is defined as the organized collection, monitoring, assessment and interpretation of mainly unstructured ad hoc information regarding health events or risks, which may represent an acute risk to human health. (WHO)

Event

The IHR define an event as "[…] a manifestation of disease or an occurrence that creates a potential for disease; […]" (which can include events that are infectious, zoonotic, food safety, chemical, radiological or nuclear in origin and whether transmitted by persons, vectors, animals, goods /food or through the environment.). In the context of event-based surveillance, an "event" also includes those of unknown origin and refers to "a signal" that has been "verified". (WHO)

Hyperendemic

Refers to persistent, high levels of disease occurrence. (US CDC)

Hypothesis

A hypothesis is a supposition or proposed explanation made on the basis of limited evidence as a starting point for further investigation. Hypothesis is comparison of prediction with experience. (Johns Hopkins Medicine)

Indicator Based Surveillance

Indicator-based public health surveillance is a more traditional way of reporting diseases (collecting, monitoring, assessing, and interpreting data) to public health officials involves reports of specific diseases

from health care providers to public health Centre. Such information are described as structured information because the information obtained is standardized. (US CDC)
Indicator-Based Surveillance (IBS): the systematic (regular) collection, monitoring, analysis and interpretation of structured data, i.e. of indicators produced by a number of well-identified, mostly health-based, formal sources (WHO)

Monitoring
It refers to the routine and continuous tracking of the implementation of planned surveillance activities (monitoring the implementation of the plan of action) and of the overall performance of surveillance and response systems [In the context of surveillance and response] (WHO)

Outbreak
Refers to an increase, often sudden, in the number of cases of a disease above what is normally expected, but is often used for a more limited geographic area. (US CDC).
A disease outbreak is the occurrence of cases of disease in excess of what would normally be expected in a defined community, geographical area or season. Outbreaks are maintained by infectious agents that spread directly from person to person, from exposure to an animal reservoir or other environmental source, or via an insect or animal vector. Human behaviour nearly always contribute to such spread. (WHO)

Pandemic
Refers to an epidemic that has spread over several countries or continents, usually affecting a large number of people. (US CDC). An epidemic is specific to one city, region or country, while a pandemic goes much further than national borders. A pandemic covers a much wider geographical area, often worldwide. A pandemic also infects many more people than an epidemic.

Point of entry (PoE)
In the IHR context this is "[…] a passage for international entry or exit of travelers, baggage, cargo, containers, conveyances, goods and postal parcels, and the agencies and areas providing services to them upon entry or exit", including ports, airports and ground crossings. (WHO)

Public health emergency of international concern (PHEIC)
Under the IHR this is "[…] an extraordinary event which is determined, as provided in these Regulations [i.e. IHR] (i) to constitute a public health risk to other States through the international spread of disease and (ii) to potentially require a coordinated international response".
In the context of a PHEIC a number of extraordinary provisions in the IHR apply in order to minimize risks of international spread and to avoid unnecessary interference with international traffic and trade. Only the Director-General of WHO determines if an event constitutes a PHEIC. States Parties report potential PHEICs to WHO under IHR. (WHO)

Public health risk
The IHR define a public health risk as "[…] a likelihood of an event that may affect adversely the health of human populations, with an emphasis on one which may spread internationally or may present a serious and direct danger." (WHO)

Reporting
The process by which health events and health risks are brought to the knowledge of the health authorities

Response
Any public health action triggered by the detection of a public health risk (e.g. monitoring of the event, information of the public, triggering field investigation and/or implementation of any control or mitigation measures). The nature of the response will have to be adapted according to the nature of the public health risk. (WHO)

Risk communication and Community engagement (RCCE)

Risk communication is the real-time exchange of information, advice and opinions between experts or officials and people who face a threat (from a hazard) to their survival, health or economic or social wellbeing. (WHO). The aim of Risk Communication & Community Engagement is to empower the community in such a way that they may take appropriate action to protect the lives and society from health hazard.

Risk assessment

A systematic process for gathering, assessing and documenting information to assign a level of risk to human health to an event. Risk assessment includes three components - hazard assessment, exposure assessment and context assessment. The risk assessment provides the basis to inform the action to be taken in order to manage and reduce the negative consequences of acute public health events. Risk assessment is a continuous process from the detection of the signal to the response to the event. (WHO)

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. Signals can be detected through any potential source (health or non-health, informal or official) including the media. Raw data and information (i.e., untreated and unverified) are first detected and triaged in order to retain only the one pertinent to early detection purposes i.e. the signals. Once identified signals must be verified. When it has been verified, a signal becomes an "event". (WHO)

SOP (Standard Operating Procedure)

A Standard Operating Procedure (SOP) is a step-by-step set of operating instructions to help teams or its members to accomplish a given task. SOPs are designed to ensure an efficient, quality output on a consistent basis, regardless of who follows them.

Sporadic

Refers to a disease that occurs infrequently and irregularly. (US CDC)

Surveillance

Epidemiological surveillance is the systematic collection, analysis and dissemination of health data for the planning, implementation and evaluation of public health programs. (US CDC)
Surveillance: the IHR define surveillance as "[…] the systematic on-going collection, collation and analysis of data for public health purposes and the timely dissemination of public health information for assessment and public health response as necessary". (WHO)

Syndromic surveillance

A method of surveillance that uses health–related data based on clinical observations rather than laboratory confirmation of diagnoses. Syndromic surveillance is used in order to detect outbreaks earlier than would otherwise be possible with laboratory diagnosis-based methods. Case definitions used for Syndromic surveillance are based on clinical signs and symptoms, rather than on specific laboratory criteria for confirmation of the causative agent. (WHO)

Threat:

A thing likely to cause damage or danger. A real or perceived danger. Sometimes, "threat" is used in reference to deliberate acts (while risk refers more to naturally occurring events). (WHO)

Triage

The process of screening the data and information that are relevant for early detection purposes (i.e. screening out mild/irrelevant events from potential acute public health events, and cleaning to eliminate duplicates and correct obvious mistakes). (WHO)

Vector-borne diseases

Vector-borne diseases are infections transmitted by the bite of infected arthropod species, such as mosquitoes, ticks, triatomine bugs (Kissing bugs), sandflies, and blackflies. Vector-borne diseases cause infectious diseases either by parasites, bacteria or viruses, and deaths. Arthropod vectors are cold-blooded (ectothermic) and thus especially sensitive to climatic factors. (ECDC & WHO)

Verification

In the context of the IHR (article 1): "[…] the provision of information by a State Party to WHO confirming the status of an event within the territory or territories of that State Party". Under the IHR, all States Parties are required to provide verification upon request by WHO within a limited time period. In the current document, verification is also the pro-active crosschecking of the validity (veracity) of the signals collected by Early Warning, Alert and Response System (EWARS), by contacting the original source, additional sources, or by performing field investigation Verification requires that hoaxes, false rumors, and artefacts are eliminated from further consideration. (WHO)

Zoonotic event

A manifestation of a disease or occurrence in animals (and animal derived products) that creates a potential for a disease in humans as result of human exposure to the animal source (or vector). (WHO)

Referenced definitions were taken or adapted from the following sources

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Annexure

Figures and Table.

Figures:

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List of abbreviation

ARI	: Acute Respiratory Infection
CDC	: Communicable Disease Control (DGHS)
COVID-19	: Coronavirus disease 2019
CSD	: Climate sensitive diseases
CSO	: Chief Scientific Officer
CSIDs	: Climate-sensitive infectious diseases
DGHS	: Directorate General of Health Services
DRRT	: District Rapid Response Team
EIDs	: Emerging Infectious Diseases
EBS	: Event Based Surveillance
FAO	: Food and Agriculture Organization
FETP	: Field Epidemiology Training Program
GPS	: Global Positioning System
HBIS	: Hospital Based Influenza Surveillance
IBS	: Indicator Based Surveillance
IEDCR	: Institute of Epidemiology, Disease Control and Research
IHR	: International Health Regulation (2005)
IP&C	: Infection Prevention & control
MOHFW	: Ministry of Health and Family Welfare
NISB	: National Influenza Surveillance
NIPSOM	: National Institute of Preventive and Social Medicine
NRRT	: National Rapid Response Team
OHS	: One Health Secretariat
PHEOC	: Public Health Emergency Operations Center
PH	: Public health
PHE	: Public Health Event
PSO	: Principal Scientific Officer
RMO	: Residential Medical Officer
RRA	: Rapid risk assessment
RRT	: Rapid Response Team
SME	: Subject Matter Expert
SOPs	: Standard Operating Procedures
SSO	: Senior Scientific Officer
TOR	: Terms of reference
UNICEF	: United Nations Children's Fund
URRT	: Upazilla Rapid Response Team
US CDC	: United States Centers for Disease Control and Prevention
WBDS	: Web-Based Diseases Surveillance
WHO	: World Health Organization

Chapter 1: Introduction

1.1 Background

Outbreak investigation and response is the process of identifying the source, cause, and extent of an Emerging Infectious Diseases (EIDs) event / outbreak and implementing appropriate measures to control and prevent further spread. An Outbreak is the occurrence of cases of disease more than what would normally be expected in a defined community, geographical area or season. Cases varies according to the agent, population size and type of community exposed, previous experience or lack of exposure to the disease, and time and place of occurrence. Public health emergencies like disease outbreak can cause significant morbidity and mortality and serious and long-term socio-economic impact, thus demands timely measures and resources to manage efficiently. An outbreak investigation has high public health importance which requires robust attention and policy from the concerned health authorities. To minimize its impact early reporting, Rapid detection and prompt response to manage disease outbreak effectively is a prime responsibility of public health service providers.

Climate-Sensitive Infectious Diseases (CSIDs) are diseases that are affected by climate variables, various diseases are changing their characteristics and pattern, some diseases are remerging that and eventually increasing health risks among the communities. Some of these health outcomes showed strong association with climatic parameters and environmental issues (e.g., temperature, rainfall, humidity, climate extreme events, etc.) and environmental issues (air pollution, water pollution etc.) Multiple factors in relation to climate change and environment are complementing on health outcome positively.

Human health is severely undermined by climate change and climate variability in Bangladesh (UNICEF, 2019). Bangladesh, experiences outbreaks throughout the year and the unknown diseases causes panic and confusion in the community / general population. The country is facing new challenges including increased incidences of climate sensitive diseases in Bangladesh, with impact on health and increase in respiratory diseases, mosquito-borne diseases like Dengue, Chikungunya, Kalazaar, Cholera, and Malnutrition along with deteriorating mental health conditions.

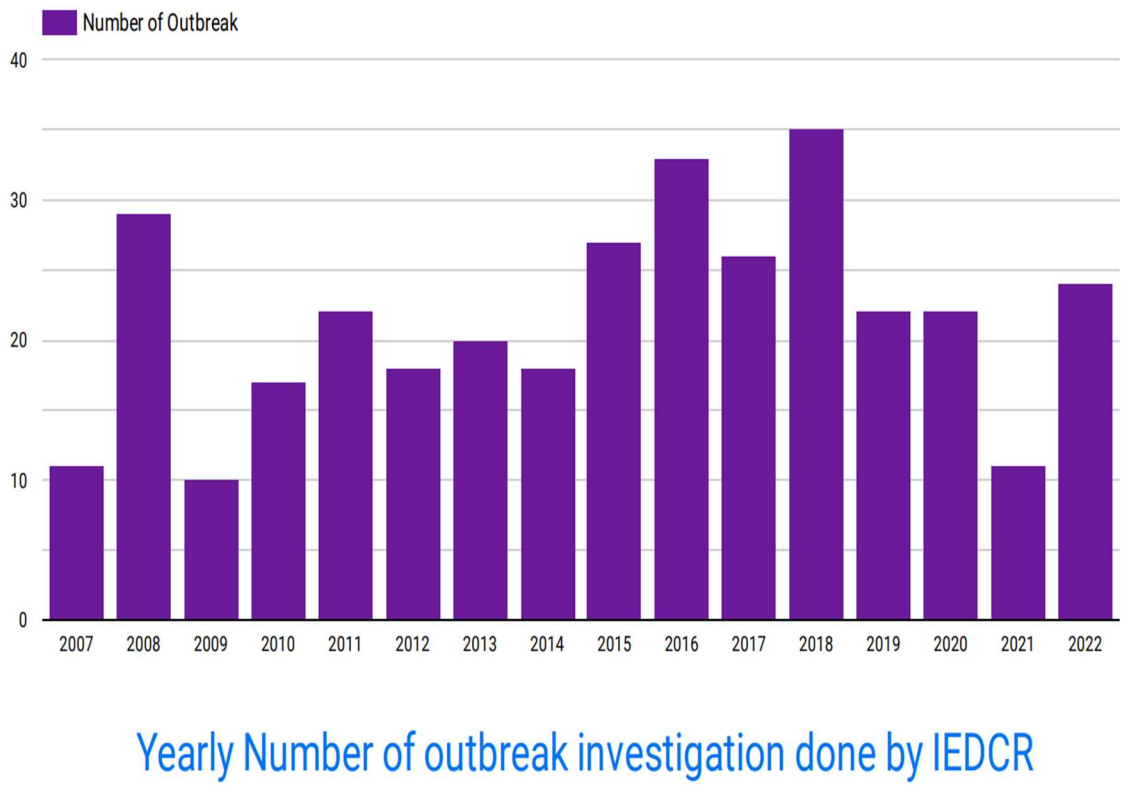
In Bangladesh, we experience outbreaks throughout the year. It varies from known to unknown diseases. Many of those cause panic and sensation in general population and bring the policy makers in action. According to The Epidemic Disease Act, 1897; Government of People's Republic of Bangladesh can take any measure (e.g., isolation, quarantine, closure of places etc) to prevent spread of infectious disease or control of outbreaks. The Public Health Ordinance; 1944; if public health emergency arises, government will take necessary special provisions to prevent the spread of the disease, safeguard public health, provide and maintain adequate medical and other services which would be essential for the health of the community. (IEDCR, Outbreak Investigation and Response Manual, 2018) and Infectious Diseases (Prevention, Control and Elimination) Act 20 (Act No.8 of 27). 2018. [*Infectious Diseases (Prevention, Control and Elimination) Act, 2018; Bangladesh (National), Issuing Authority: Bangladesh National Parliament, Type: Law/Policy Document; Issued: November 14, 2018*]

The Institute of Epidemiology Disease Control and Research (IEDCR) the mandated organization for outbreak investigation and response, has been providing important information on outbreaks of various diseases to the Directorate General Health Services (DGHS), Ministry of Health & Family welfare (MOHFW) for appropriate and timely response to contain spread of the diseases for long time. The exiting outbreak investigation and response manual of the IEDCR requires review and updating

considering the above mentioned factors taking into account several emerging and re-emerging diseases across the country especially in the climate sensitive areas and lessons learned after COVID-19 Pandemic.

The revised Manual also needs to be made climate resilient by incorporating various climatic issues considering the Climate Sensitive Diseases (CSD). IEDCR has initiated developing SOPs on outbreak investigation and response for relevant professionals working in different areas of the country. WHO has been providing technical assistance to IEDCR in strengthening its outbreak investigation and disease surveillance activities for long and now intended to provide technical assistance to develop a Manual with SOPs on outbreak investigation for climate sensitive diseases. Local health authorities will also be trained to conduct outbreak investigation in consultation with IEDCR through this manual.

Figure 1: Total number of outbreaks investigated by IEDCR (2007-2022)



https://www.iedcr.gov.bd/site/page/33e64737-03f9-4bd5-92ad-e76eb0ceb9c1/-

1.2 Objectives

The Objective of this 'Outbreak Investigation and Response Manual & SOPs and Response plan for Climate Sensitive Disease' manual is to support strengthening the capacity to carry out outbreak investigation including climate sensitive diseases.

Objective of the activity are to

i) Develop Outbreak Investigation & Response Manual with SOPs (Including Climate Sensitive Diseases).

ii) To Create a pool of master trainers on 'Outbreak investigation and response' aiming for a standard, systematic and scientific practice for outbreak investigation, and response.

Purpose of the Manual

This 'Outbreak Investigation & Response Manual with SOPs (including Climate Sensitive Diseases)' is designed for joint outcome from National Rapid Response Team (NRRT), District Rapid Response Team (DRRT), Upazila Rapid Response Team (URRT), members and public health specialist who deals with community health.

1.3 Target Audience of the Manual

This 'Outbreak Investigation & Response Manual with SOPs (including Climate Sensitive Diseases)' is intended to be used by public health professionals especially those, who are responsible for 'Event / Outbreak investigation and response' at all levels i.e. from National to Upazilla.

1. National Rapid Response Team
2. District Rapid Response Team
3. Upazilla Rapid Response team

This manual is also useful for public health practitioners, health inspectors, Medical officers, Laboratory personnel and others who may undertake or participate in the investigation and control of any outbreaks.

Role & Responsibilities of Public Health Emergency Operation Center (PHEOC) on Outbreak Investigation and Response (at IEDCR)

- Verify and confirm suspected 'Outbreak' information and prepare report for NRRT for next course of action
- Coordinate and Collaborate activities between NRRT and Outbreak-team and the OHS
- Coordinate with OHS for formation of One-Health Outbreak investigation team

Role & Responsibilities of One Health Secretariat (OHS), Bangladesh on Outbreak Investigation and Response

- Coordinate with NRRT for formation of One-Health Outbreak investigation team
- Coordinate and maintain communication with respective sectors Epi-unit on One-Health Outbreak investigation approach

Chapter 2: Outbreak Investigation and Response

2.1 What is a Disease Outbreak / Event?

According to World Health Organization (WHO, 2023) "A disease outbreak is the occurrence of cases of disease in excess of what would normally be expected in a defined community, geographical area or season. An outbreak may occur in a restricted geographical area, or may extend over several countries. It may last for a few days or weeks or for several years". The number of cases indicating an outbreak varies according to the agent, size and type of population exposed, previous experience or lack of exposure to the disease, and time and place of occurrence. In some diseases, one single case can be considered as an outbreak which requires urgent action (e.g., acute flaccid paralysis), while others require an increase above a certain threshold level before further investigation is needed (e.g., influenza).

The Disease Outbreaks are caused by infectious microorganism / agents that spread directly from one person to another, after exposure to an animal reservoir or other environmental source, or via an insect or animal vector. Human behaviors and activities almost always give rise to such spread. Timely detection and prompt reporting of such disease events is essential in prevention and minimizing their undesirable health, social and economic impact. Diseases of Public Health concern or Epidemic-prone diseases, including emerging and re-emerging diseases constitute the greatest threat to public health security and the disruption of social and economic developments of the countries.

2.2 Preparation for the Outbreak Investigation and Response

2.2.1 Sources of Outbreak detection in Bangladesh

Sources of Outbreak information:

- **Official Source**: Any governmental subnational, national or international institution (public or assimilated) accredited to provide information: e.g. National Institute of Public Health, the Ministries of Health & Family Welfare, Livestock, Agriculture, Foreign Affairs and other national sources, the reference laboratories, the international and regional organizations such as WHO, OIE, FAO, ECDC,
  US-CDC, other regional organizations and institutional networks.

- **Formal Sources**: Other Official sources (Filed Mangers) and authorized sources, i.e., non-official and not dependent from a government agency but in direct contact with the event (e.g. Non-Governmental Organizations, hospitals, and medical sources, clinicians, local laboratories, etc.).

- **Informal Sources**: these sources are neither official nor formal. Informal sources includes the Press and other electronic-media (radio, television, etc.)., Blogs, twitter®, social media network channels (Facebook®, WhatsApp, Viber, messenger etc.)

Therefore, the outbreak events can be detected through routine (active or passive) surveillance, through reporting by health professionals or through informal reports from other agencies including mass media,

social media and individuals. All reports of disease outbreaks and events should be taken seriously, verified and promptly investigated in order to implement appropriate control measure.

The outbreaks in Bangladesh are usually detected through different 'Indicator based surveillance' systems which are run by IEDCR. These are:

i. Indicator Based Surveillance (IBS):

In IBS the aggregate data collected on priority syndromes or diseases are monitor for trends to alert thresholds applied to the surveillance data to detect outbreaks. This is more traditional way of reporting diseases to public health officials which involves reports of specific diseases from health care providers. The information described in this surveillance are structured as per prior standardized case-definitions used to define the case. Data attained through indicator-based surveillance are received on a regular interval basis and entered routinely into a disease-reporting database from the field level and laboratory-confirmed.
IEDCR have indicator based surveillance for

- Acute meningo-encephalitis (Japanese Encephalitis, other bacterial meningitis)
- Influenza
- Web-Based Disease Surveillance (WBDS)
- Dengue Viral Infection
- Nipah Viral Infection
- Cutaneous Anthrax infection
- Leptospirosis

ii. Event Based Surveillance:

This surveillance looks at reports, stories, rumors, and other information about health events that could be potential public health risk. EBS is defined as the organized collection, monitoring, assessment and interpretation of mainly unstructured ad hoc information regarding health events or risks, which may represent an acute risk to human health. The information described as unstructured information because the information obtained is non-standardized or subjective (WHO & US CDC).
Such surveillance are

- 24/7 hotlines of IEDCR
- Through reporting by health professionals, Field Managers, other agencies
- Print and electronic media monitoring etc.
- Social media reporting

Hospital based Surveillance

Health care providers are instructed to report sudden increase of cases that meet specific case definitions, or sudden surge of unknown disease cases. Reports are usually credible, but needs epidemiological verification and needs laboratory verification to ensure cases meet a specific case definition, and laboratory confirmation diagnosis.

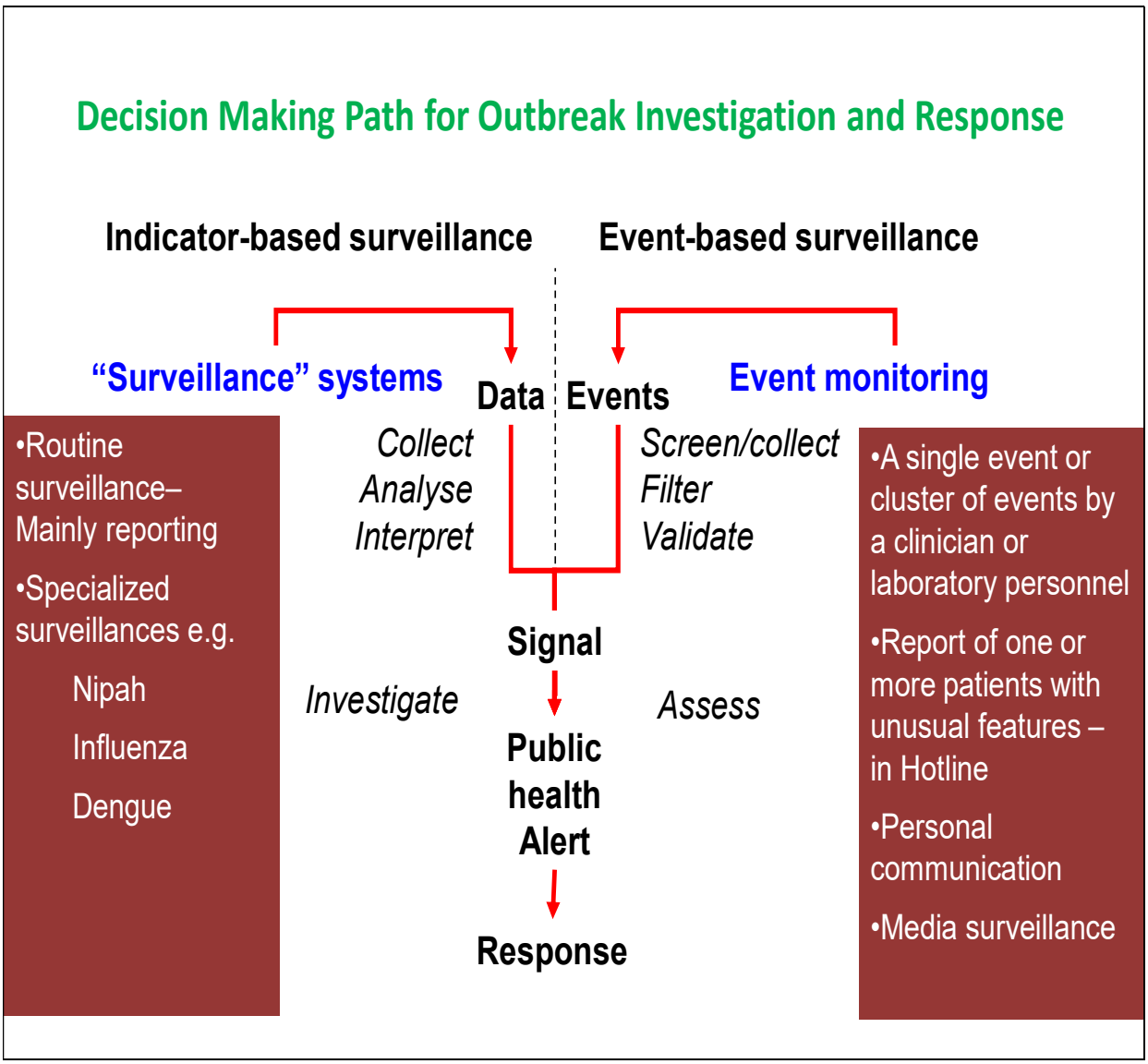
To detect an outbreak we need to apprehend the existing pattern of the disease and climate effect on the Emerging Infectious Diseases (EIDs). Some disease, like diarrhea or influenza, have seasonal pattern. So, a seasonal increase in number of cases in some part of the year may be a normal peak wave of that particular disease. So, we need to have an understanding of what is the normal pattern of the disease in that time of the year, which can be gathered from IBS. The normal pattern of the disease in sometimes called baseline. Any number above that baseline or sudden surge should indicate an outbreak. Naturally, if a disease is not present in Bangladesh, a single case would cross the baseline (zero) and trigger an outbreak and thereby response. Some other diseases those occur in Bangladesh at certain part of the year (eg. Nipah in winter) occurs every year, are still considered as outbreak because of their high mortality and public health impact.

Existing surveillance system at IEDCR (Present and near past)

- National Influenza Surveillance, Bangladesh (NISB)
- Hospital Based Influenza Surveillance (HBIS)
- Nipah Virus Transmission in Bangladesh
- Web-based Dengue Surveillance
- Hospital Based Rotavirus & Intussusception Surveillance (HBRIS)
- Cell Phone Based Disease Surveillance System (CPBDSS)
  - Non Communicable Diseases (NCD)
  - Reproductive Health Surveillance
- Antimicrobial Resistance (AMR) Surveillance in Bangladesh
- Child Health and Mortality Prevention Surveillance (CHAMPS)
- Cholera Surveillance
- Post MDA-Surveillance for Lymphatic Filariasis Transmission
- Molecular Xeno-monitoring for Detection of Residual Wuchereria bancrofti Infection
- Hospital Based Dengue Surveillance
- Web-Based Integrated Disease Surveillance
- Cutaneous Anthrax Surveillance
- Foodborne Illness Surveillance (FBIS) Bangladesh: HIV Surveillance in Bangladesh
  - Web-based surveillance
  - Cell-phone based surveillance
  - Laboratory based surveillance for diarrhea, jaundice and febrile illness (enteric fever and leptospirosis)
- Surveillance for Emerging Zoonotic Disease Threats in High-Risk Interfaces in Bangladesh
- Acute Meningo-Encephalitis Syndrome (AMES) Surveillance Focused on Japanese Encephalitis and Nipah

The following 'flow-chart' helps to apprehend the inflow of information of an event from the field and that helps to decide which event is an 'Outbreak' and when to investigate and response to that 'Outbreak'.

Figure 2: Outbreak Investigation and Management pathway



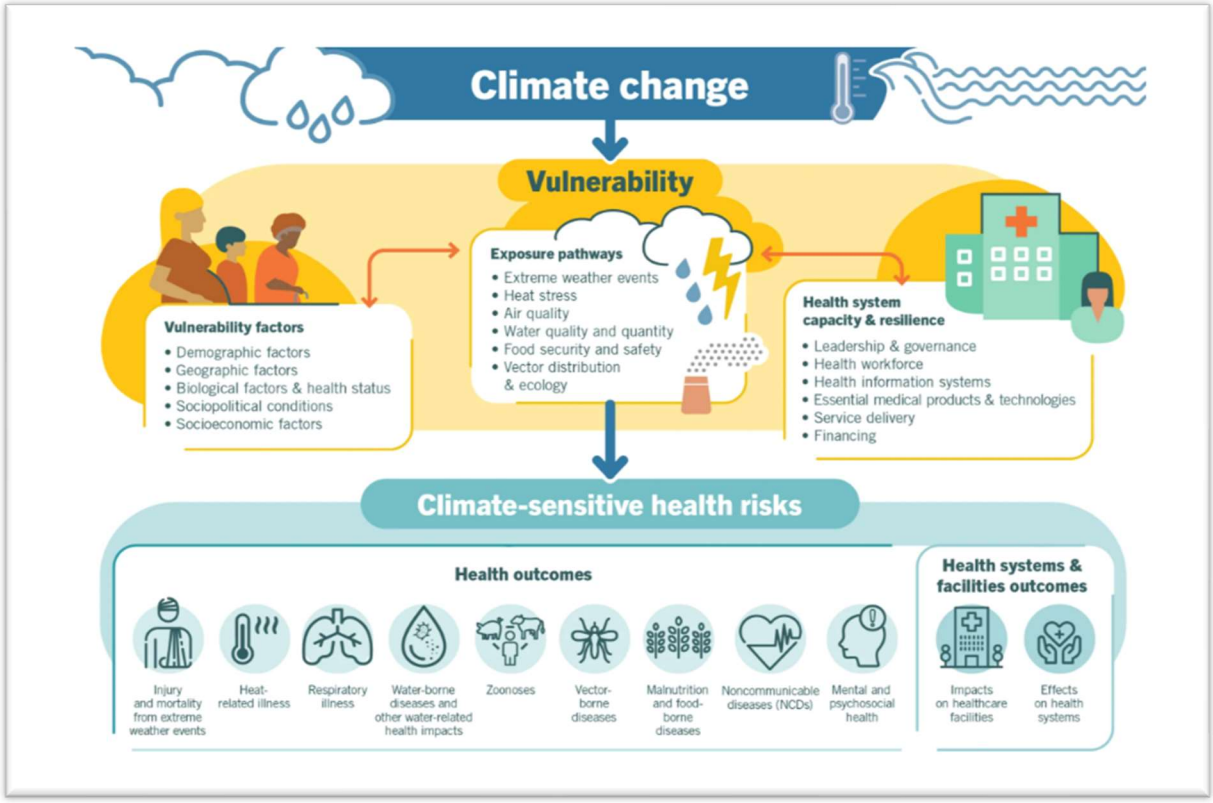
Source: IEDCR, Outbreak Investigation and Response Manual, 2018 (*Draft*)

2.2.2.Climate Sensitive Diseases.

Climate change and health

Figure 3: **An overview of climate-sensitive health risks, their exposure pathways and vulnerability factors.**

Climate change impacts health both directly and indirectly, and is strongly mediated by environmental, social and public health determinants.



Source: https://www.who.int/news-room/fact-sheets/detail/climate-change-and-health

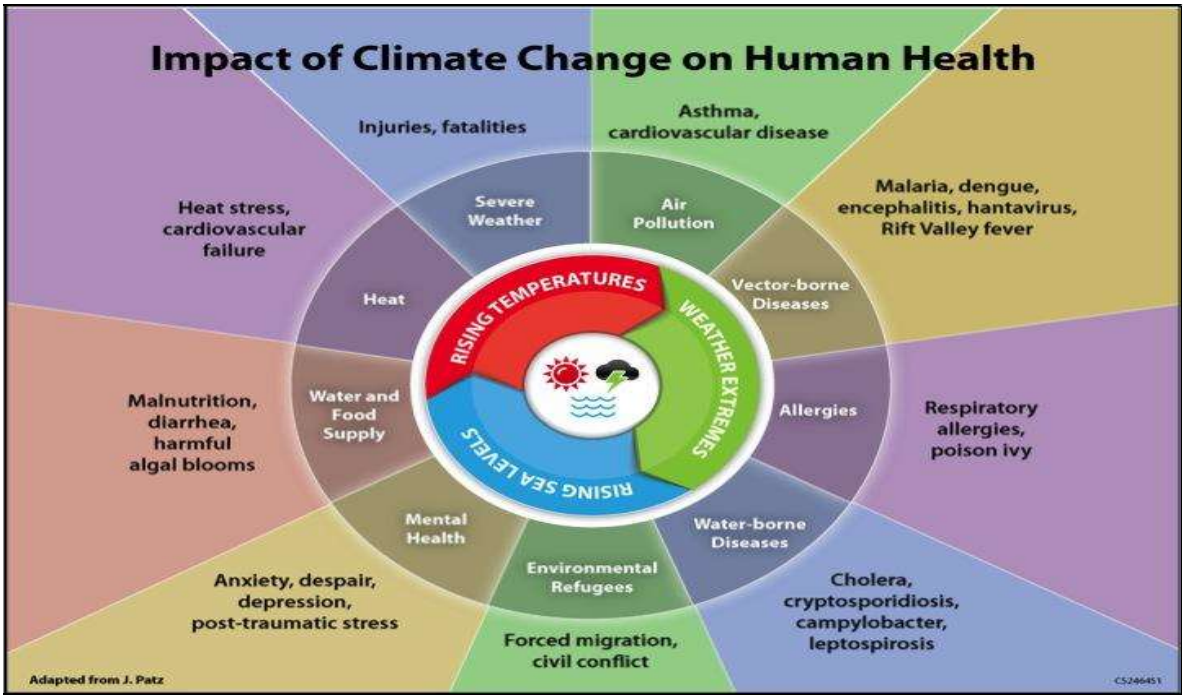
Marie McIntyre, Ph.D., a research associate epidemiologist at the Institute of Infection and Global Health within the University of Liverpool says "Climate sensitivity of pathogens is a key indicator that diseases might respond to climate change, so assessing which pathogens are most climate sensitive, and their characteristics is vital information if we are to prepare for the future." (NIH)

We know climate change is having a profound effect on infectious diseases. Extreme weather events and warming temperatures are giving rise to infectious diseases and providing more opportunities for them to expand to new regions, putting the lives of billions of people at risk. (Wellcome Trust, UK)

The frequency and distribution of many infectious diseases are changing under a changing climate. Recent outbreaks of Dengue, Chikungunya and West Nile virus in countries previously free from these diseases signal just some of the potential threats associated with changes in climate, trade, travel and the environment. (WHO)

Milder winters, warmer summers, and fewer days of frost make it easier for the infectious diseases to expand into new geographic areas and infect more people. To understand climate change's impact, it's important to look at some of the common ways these diseases spread—through mosquito and tick bites, contact with animals, fungi, and water. (US CDC)

Figure 4: Impact of Climate Change on Human Health



Source: https://www.genengnews.com/topics/translational-medicine/spread-of-infectious-disease-due-to-climate-change-may-be-greater-than-previously-thought/

Active IBS and EBS is essential tool for early warning systems to predict the risk of disease outbreaks like cholera and dengue or other 'Climate-sensitive diseases' which pose an enduring threat to human health and have major economic implications. Developing integrated surveillance can greatly enhance the capacity of health systems to prepare and adapt to climate-sensitive diseases. Integrated surveillance involves the integration of multiple surveillance systems (e.g. disease surveillance and weather surveillance) to improve the use of information for detecting, investigating and responding to public health threats. Importantly, climate-informed surveillance can enhance the preparedness of health systems via early warning systems that aim to anticipate risks and trigger early warning responses to avoid or reduce impact and prepare for effective response and improve health system preparedness and response mechanisms. In the context of a rapidly changing environment and risk landscape, early warning systems are a valuable tool for building the adaptive capacity and climate-resilience of health systems. Defining a threshold for declaring a disease outbreak (such as Dengue, Chikungunya, Cholera outbreaks, etc.) is challenging and can vary depending on the type and magnitude of the disease, capacity of the local health system, and the methodological approach that underlies the prediction model . The definition of an outbreak can also be based on the target population – for instance, certain diseases are of importance when they aim at vulnerable groups such as children, elderly and pregnant women (WHO)

Climate sensitive diseases burdens in Bangladesh

The following table 3 sums up the projection results of three childhood diseases and their health burden by 2050 (World Bank, 2014). With an increase in average temperature of 2°C and a 10% increase in the probability of flooding across regions in Bangladesh, the incidence of Acute Respiratory Infection (ARI) is projected to increase by almost two folds, and the incidence of fever is projected to increase by 10%.

Table 1: Projected Health Burden by 2050 (World Bank, 2014)*

Indicator	Estimation from DHS Data		Projection
	2004	2007	2050
Climate variable			
Average temperature (survey months)	23.5	27.8	29·0
Probability of flooding (%)	22.6	30.6	40.0
Disease incidence			
ARI			
Incidence (%)	18.7	12.3	23.0
Cases (thousands)	9,009	5,734	14,220
Diarrhea			
Incidence (%)	7	9.2	7.3
Cases (thousands)	3,376	4,296	4,529
Fever			
Incidence (%)	39.2	36.1	46.3
Cases (thousands)	18,916	16,787	28,605
Population ages 0-14 (thousands)	48,222	46,541	61,833

Note: The average temperature refers to the survey months. Flooding is defined as monthly rainfall above one standard deviation for a particular location and month.

*Climate Change and Health in Bangladesh, MOHFW
https://dghs.portal.gov.bd/sites/default/files/files/dghs.portal.gov.bd/page/a5b182fd_dea0_4512_b0cd_1c9bfe29b436/2022-03-03-10-17-072edab52fdfb00922a587f0203f0197.pdf

Key Observations and projections on climate change impacts on human health in Bangladesh

(WHO, 2018; WHO, 2015; UNICEF, 2016; Kabir et al., 2016)

1. Studies indicate that climate change have potential health risks in Bangladesh
2. Most climate sensitive diseases in Bangladesh include Diarrhea, Malaria, dengue, Kalazaar. In addition, heat stroke, cardiovascular disease, respiratory disease, allergies also affect many people especially in the urban areas. Emerging diseases include Chikungunya, Japanese encephalitis, and Zika virus and so on.
3. Dengue incidences have broken all earlier records in2019. Dengue outbreak attacked all 64 district of the country during July-August 2019.
4. On an average 7.2 million people will be affected by sea level rise between 2070 and 2100 if there is no adaptation investment.
5. By 2070, over 147 million people are projected to be at risk of malaria assuming a high emissions scenario (Bangladesh) file:///C:/Users/msali/Downloads/WHO_FWC_PHE_EPE_15.02_eng%20(1).pdf
6. Heat related deaths will be increased to 30 per 100,000 by 2080 for elderly people under high emission scenario.
7. Prevalence of child under nutrition in children under age 5 is 31.9% (2013). Without considerable efforts made to improve climate resilience, it has been estimated that the risk of hunger and malnutrition globally could increase by up to 20 percent by 2050.
file:///C:/Users/msali/Downloads/WHO_FWC_PHE_EPE_15.02_eng%20(1).pdf
8. Women and children are the worst victims of the household air pollution. Consequently, household air pollution is responsible for a larger proportion of the total number of deaths from ischemic heart disease, stroke, lung cancer and COPD in women compared to men.

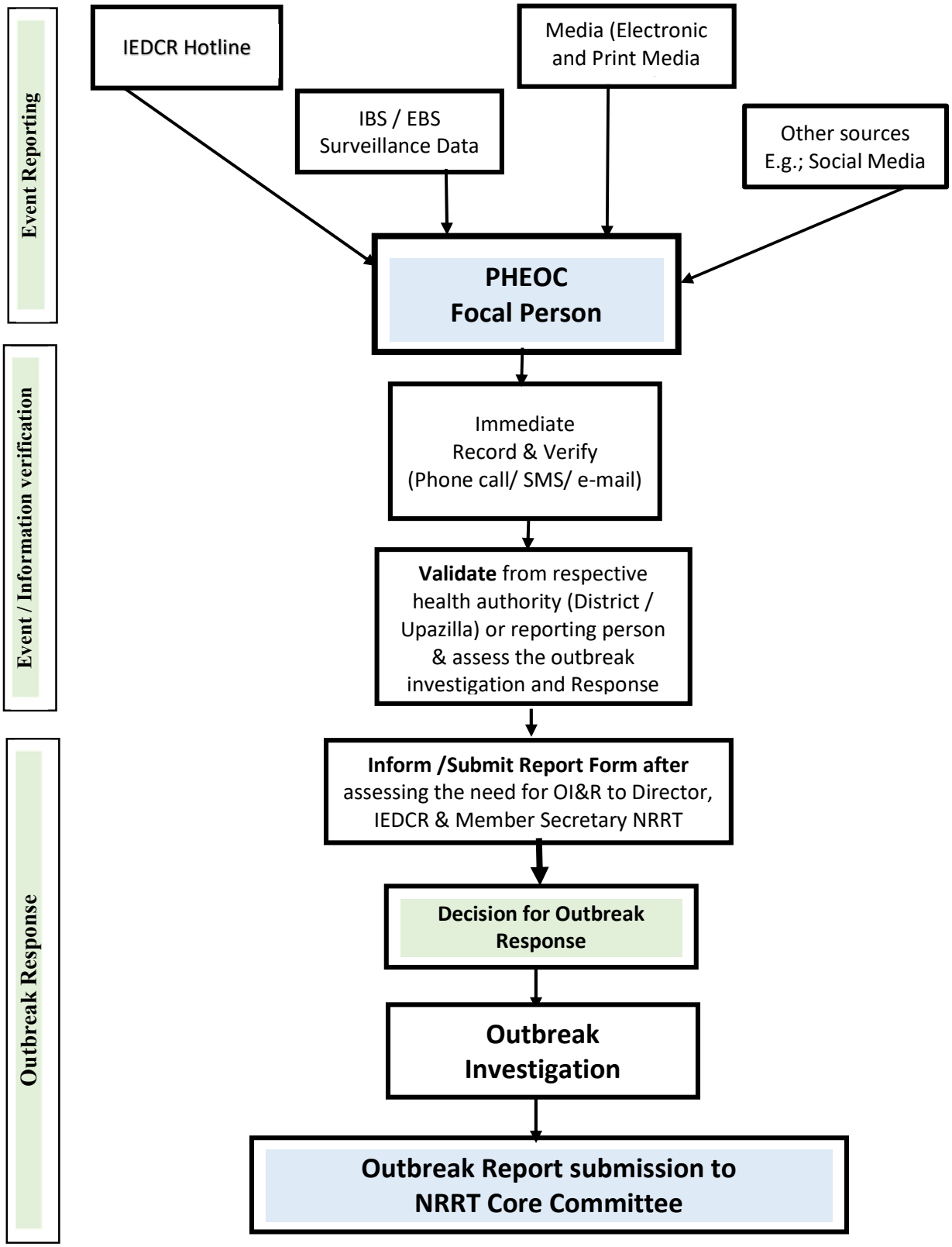
Climate change causes increase in Vector-borne**,** Water-Food borne (including Enteric diseases**),** Air-Borne and Other Infection/ Infectious Diseases, which causes 'Disease Outbreaks' of Public Health Concern. Respiratory illness rises with the increase in temperature and humidity.

It's important to understand whether the 'Disease cases surge' are due to Climate change effect (increase in temperature and humidity, Increase in Rainfall or intense droughts, etc.) or due to seasonal variation.

2.2.3. Initiation of an Outbreak Investigation

The Disease Outbreaks are generally reported from the 'Indicator based surveillance or Event based surveillance. In Bangladesh, the PHEOC concerned person or the responsible person of respective surveillance system validate the report from the respective Health care facilities e.g., Civil Surgeon (CS) or Upazilla health and family planning officer (UHFPO), or reporting person as applicable. S/he will also validate the report with the previous surveillance data and immediately notify the event to the Director, IEDCR and Member Secretary, NRRT. The NRRT committee will determine whether to initiate the 'Outbreak response' after going through the event reporting summary.
Other than the immediate reporting for initiating the outbreak response, the event is also reported through a specific format on daily basis to the NRRT core committee.

Figure 5: Algorithm of activities any suspected outbreak event



2.2.4 Criteria for sending team for Outbreak Investigation to the field

It is important to verify all the event reported from any source primarily. Usually the verification is the responsibility of the focal /responsible person at the PHEOC. S/he will records the event/information and do authentication / verification with the concerned responsible authority of the site through mobile, email or as means available. S/he will prepare a 'Verification Report' and share with the Director, IEDCR & Member Secretary NRRT. The Director, IEDCR, who is also chairperson of the National Rapid Response Team (NRRT) will usually discuss with the 'Member Secretary' of the NRRT and decide to call meeting the of NRRT. But they can also send Outbreak investigation team immediately if it's an urgency and outbreak of public health concern. Director, IEDCR and Member Secretary, NRRT usually take decision for sending team for outbreak investigation through assessment of the situation (See the Assessment questionnaire Table) and 'Initial Report' from PHEOC. The Response team will move at an earliest possible time. The DRRT and URRT will respond to investigate and verify as well.

Table 2: Assessment questionnaire for sending RRT team for the Outbreak investigation

Assessment Questions	Yes	No	Remarks
Does the event involve a notifiable disease or syndrome?			
Can the suspected disease cause outbreaks with a high potential for spread?			
Is there any death or mortality?			
Is there high/severe morbidity from the disease?			
Does the event have any atypical feature?			
Is the event unexpected in that community?			
Is there a cluster of cases or deaths with similar symptoms?			
Is there suspected nosocomial spread of the infection?			
Is the spread of illness sudden and involving large number of people?			
Is the Outbreak with unknown causative agent or source?			
Is the Outbreak with unknown mode of transmission?			
Does the URRT or DRRT require assistance?			
Did the event raise public or media concern?			
Does the event have a known consequence for human health (i.e. chemical spill, unexplained deaths in animals, suspected Nipah outbreak in animals)?			
Does the event have a possible consequence for human health (i.e. suspected zoonotic disease outbreak in animals)?			

An investigation sometimes may not be needed for each or every outbreak, especially if the outbreak appears typical for known disease with minimal public health risk. The Director IEDCR, Chairperson of the NRRT can consult and discuss with the DRRT or URRT (through PHEOC) to do the outbreak response.

Reasons for investigating an 'Outbreaks'

1. Primary- to contain and prevent the spread of existing disease outbreak
2. To determine the causes of disease, its source & mode of transmission
3. To identify changing mechanisms of transmission of known illnesses / diseases
4. To know magnitude and severity of the problem and determine who is at risk
5. To identify new Zoonotic Emerging Infectious Disease (EIDs) agents
6. To identify Emerging Infectious Disease (EIDs) agents due to climate changes.
7. To comply with WHO, International Health Regulations 2005

The Outbreak investigation and response also provides 'Research & training' learning opportunity for the next generation of fields epidemiologist.

Factors which may influencing 'Outbreak investigation & Response'

Ideally every disease outbreak should be investigated to determine its cause/source and to prevent further illnesses. However due to resource constrains prioritization is needed. Following influencing factors to be considered and useful in decision making to initiate investigation:

1) The disease agent or source and transmission mechanism is unknown
2) The outbreak is likely to have a high impact on public health because
   - Large number of people are affected
   - The illness has high case fatality or hospitalization or morbidity rate
   - Vulnerable group affected (children, elderly) or a particular professional group of people
3) The outbreak is continuing with evidence of ongoing transmission
4) More information is needed to develop preventive measures for Public, media or socio-political concern
5) Suspected Emerging Zoonotic disease with high impact on Animal Health

2.3. Rapid Response Teams

Rapid response teams (RRT) are at the frontline responders to conduct field investigations and respond to disease outbreaks. RRT may consists of an epidemiologist, a clinician, a laboratory technician, a risk communication officer, a point of entry officer, anthropologist and other relevant discipline experts, such as an animal health officer for zoonosis (as necessary for investigation). The RRT for Emerging Zoonotic Diseases may consist of One-Health Approach team members'. RRT works to ensure rapid, coordinated detection and response to any unusual events and to promote comprehensive outbreak investigation. The RRT is prepared 24/7 and ready-to-go whenever necessary in the shortest possible time to response. Their training includes outbreak-prone diseases which include Climate sensitive-diseases of public health concern; timely detection and quick response to outbreaks; Emerging Infectious Diseases (EIDs) of concern cases initial management and infection Prevention & control (IP&C); Community Risk communication; properly sample collection and transportation; deployment of RRTs; and a practical exercise. Rapid response teams (RRT) is also engaged to support the DRRT and URRT if necessary. They also works to improve the collaboration and partnership among officials in Upazilla, districts and divisions who work to detect and respond to disease outbreaks.
The NRRT, DRRT and URRT members will be trained by PHEOC at IEDCR.

2.3.1 Upazilla Rapid Response Team (URRT)

URRT is the multidisciplinary Rapid response team (RRT) at the Upazilla / Sub-district level to conduct field investigations and respond to disease outbreaks.

URRT Composition:

1) Advisor: Civil Surgeon
2) Chairperson:
   - Upazilla Health & Family Planning Officer (UHFPO)
3) Member Secretary:
   - Medical officer [completed 'Frontline FETP,B Training' (posted in Health Facilities at Upazilla or below)] or Medical officer (Disease Control)
4) Members:
   I. Resident Medical Officer (RMO)
   II. Junior Consultant (Medicine/ Pediatrics), required as per type of the Outbreak (nominated by Chairperson /UHFPO)
   III. Medical Officer
   IV. Nursing Supervisor
   V. Medical Technologist (Lab)
   VI. Health Inspector (In charge)
   VII. Upazilla Sanitary Inspector

- **Terms of Reference:**

1) The URRT will inform/ notify any locally occurring outbreak / event(s) of Health Concern to both the NRRT and the DRRT (virtually and Official Letter)
2) Under the direction and guidance of the DRRT and the NRRT, the URRT will response rapidly for respective outbreak investigations

3) The URRT will investigate and report to DRRT and NRRT about
    a. Verification the existence of an outbreak
    b. Identification the illness and contributing risk factors
    c. Assess the extent of the 'Outbreak'
    d. Proper initial management of the patient (including isolation)
    e. Prevention of further cases and secondary spread of infections
    f. Documentation of the investigations
4) The URRT will do the primary investigation and send request whether DRRT/ NRRT team is required to mobilize more expert team members for outbreak investigation(s) for further investigation.
5) In case of local outbreak investigation(s), the Chairperson/ Member Secretary of the URRT will update latest findings to the DRRT/ NRRT Chairperson or concerned person
6) Upon the completion of local outbreak investigation, the Chairperson/ Member Secretary of URRT will submit an 'Official report' along with primary data to the NRRT within 24 hours or earliest possible time.
7) During local outbreak investigation by the URRT, data confidentiality should be maintained. Sensitive information should not be shared/ disseminated without prior approval from the NRRT
8) After consultation with the DRRT/ NRRT Chairperson, the URRT Chairperson, can share the outbreak information with the media.
9) The URRT will support the outbreak investigation team of DRRT and NRRT whenever needed
10) In consultation with the DRRT, the respective URRT should conduct coordination meetings at the field level (if required)
11) Under the guidance of DRRT and NRRT, the URRT members will ensure for implementation of recommendations related to containment
12) The URRT will provide technical support to Upazilla Multi Sectorial Coordination Committee
13) The URRT should coordinate with the URRT (livestock) in case of zoonotic disease outbreak.
14) The URRT can Co-opt new expert-member as necessary

2.3.2 District Rapid Response Team (DRRT)

DRRT is the multidisciplinary Rapid response team (RRT) at the District level to conduct field investigations and respond to disease outbreaks.

DRRT Composition:

Advisory team:

- Divisional Director, Health
- Superintendent, District General Hospital
- Chief Health Officer (in case of City corporations)

Chairperson:

- Civil Surgeon

Member Secretary:

- Medical Officer, Civil Surgeon (MOCS)

Members:

i. Deputy Civil surgeon (DCS)
ii. Resident Medical officer (RMO), District General hospital
iii. Consultant (Medicine/ surgery/ pediatrics etc.), depending on the type of Outbreak. (Would be nominated by Superintendent)

iv. Consultant of Pathology or Microbiology, if infectious disease
v. Surveillance and Immunization Medical Officer (SIMO), WHO
vi. Senior/ Junior Health Education Officer
vii. Public Health Nurse / Nursing Supervisor
viii. District Sanitary Inspector
ix. Health Officer/ Medical Officer (in case of city corporations/ municipality)

Terms of Reference:

1) The DRRT will notify any locally occurred outbreak of health event(s) to the NRRT
2) Under the direction and guidance of the NRRT, the DRRT will response rapidly for respective local level outbreak investigations
3) The DRRT will investigate and take appropriate measures to control outbreak in coordination with the NRRT. Investigation procedures are:
    a. Verification the existence of an outbreak
    b. Identification the illness and contributing risk factors
    c. Proper initial management of the patient
    d. Assess the extent of the 'Outbreak'
    e. Prevention of further cases and secondary spread of infections (Ensure IP&C measures)
    f. Documentation the investigations and as prevention & control measures add community awareness
4) The DRRT will participate in the outbreak investigations and request/ propose whether NRRT team is required to mobilize for outbreak investigation(s). It also assess the type of resources required for the outbreak investigation(s)
5) In case of local outbreak investigation(s), the Chairperson/ Member Secretary of the DRRT will update latest findings with the NRRT Chairperson or any person assigned by the NRRT
6) Upon the completion of local outbreak investigation, the Chairperson/ Member Secretary of DRRT will submit an 'Official Report' along with primary data to the NRRT within 24 hours or earliest possible time
7) During local outbreak investigation by the DRRT, data confidentiality should be maintained. Sensitive information should not be shared/ disseminated without prior approval from the NRRT
8) The respective DRRT Chairperson, after consultation with the NRRT Chairperson can share the outbreak information with the media
9) The DRRT will support the outbreak investigation team of NRRT
10) After consultation with the NRRT, the respective DRRT should conduct coordination meetings in the field (if required)
11) Under the guidance of NRRT, the DRRT will ensure the implementation of recommendations on recently completed specific outbreak investigations
12) The DRRT will closely monitor and follow up the appropriate health care service delivery in places
13) The DRRT will closely follow up the patient management in District Health Facilities (if admitted)
14) The DRRT should coordinate with the DRRT (livestock) if necessary
15) The committee will Co-opt any official (Department of Human Health/ Animal Health/ Others) as and when required

2.3.3 National Rapid Response Team (NRRT)

The National Rapid Response Team is at the central/ National level and is at the IEDCR, MoHFW. Officers /Scientist of IEDCR, FETP fellows' officers, other IEDCR officers including laboratory Experts members from partner organizations are part of the team (as necessary). The NRRT can 'co-opt, expert members as and when necessary as per need for the 'Outbreak response'. Director IEDCR is the Chairperson of the NRRT and s/he nominates the Members Secretary for NRRT from IEDCR.

Multiple 'Outbreak Response teams' are formed by Member Secretary in-consultation with NRRT Chairperson. The teams are ready-to-go for 'Outbreak investigation and response' 24/7 after receiving official instructions from the NRRT chairperson through the Member secretary.

The co-coordinator / Focal person of Public Health Emergency Operation Center (PHEOC) maintains the updated roster of the response-teams. Any change due to unavoidable circumstances in the roster is done upon consultation with NRRT Chairperson and Member secretary, NRRT. The respective team 'Team-leaders' are responsible to conduct the 'Outbreak investigation-Response' and regular update the NRRT core committee, which includes Director IEDCR (NRRT Chairperson, NRRT Member Secretary and persons identified by the Chairperson). The team keeps all the information and finding confidential.

Composition of NRRT:

Chairperson:

- Director IEDCR

Member Secretary:

- Focal Person PHEOC or designated person by the Chair from IEDCR

Members:

i. All CSOs, IEDCR
ii. All PSOs, IEDCR
iii. All SSOs, IEDCR
iv. All Medical Officers, IEDCR
v. Graduate fellows FETP,B working at IEDCR
vi. FETP, B Fellows at IEDCR
vii. PHEOC Focal person (from IEDCR)
viii. PHEOC Consultant
ix. Disease Surveillance Consultant, Outbreak investigation Consultant
x. Another person from IEDCR or other specialized institute or organization (as invited by the chair)

- **Terms of reference:**
  1) The NRRT will investigate and take appropriate measures to control outbreak. They should
     a) Identify the Diseases of Concern and the contributing risk factors
     b) Assess the extent of the 'Outbreak'
     c) Ensure proper initial management of the patient
     d) Give preventive measures to stop secondary spread of infections
     e) Provide Risk communication
     f) Document the investigations
     g) Activate 'active surveillance system' or strengthen the existing surveillance system
  2) The NRRT will support the outbreak investigation team of DRRT / URRT
  3) Should conduct coordination meetings in the field with the relevant stakeholders (if required)

4) Guide the DRRT /URRT to ensure the implementation of recommendations on recently completed specific outbreak investigations
5) Closely monitor and follow up the appropriate health care service delivery in places
6) The respective team will provide regular updates (from the field) to the NRRT core committee, which includes Director IEDCR (NRRT Chairperson), NRRT Member Secretary and expert-persons identified by the Chairperson.
7) Prepare Report and present to Director IEDCR (NRRT Chairperson), NRRT Member Secretary and expert-persons identified by the Chairperson within 3 working days of return.
8) The NRRT can Co-opt new expert-member as necessary

The general structure of National Level 'Outbreak investigation team':

- Team Members can be increased and additional experts can be included in the team from relevant disciplines as per directions of the NRRT Chairperson and NRRT Member Secretary.
  i. Chief Scientific Officer / Principal Scientific Officer
  ii. Senior Scientific Officer / Medical Officer
  iii. Outbreak Investigation Officer/ Veterinary consultant
  iv. FETP,B Fellows (Graduates / Students)
  v. Medical Technologist
  vi. Support Staff
  vii. Driver

2.4 Organizing Outbreak Investigation

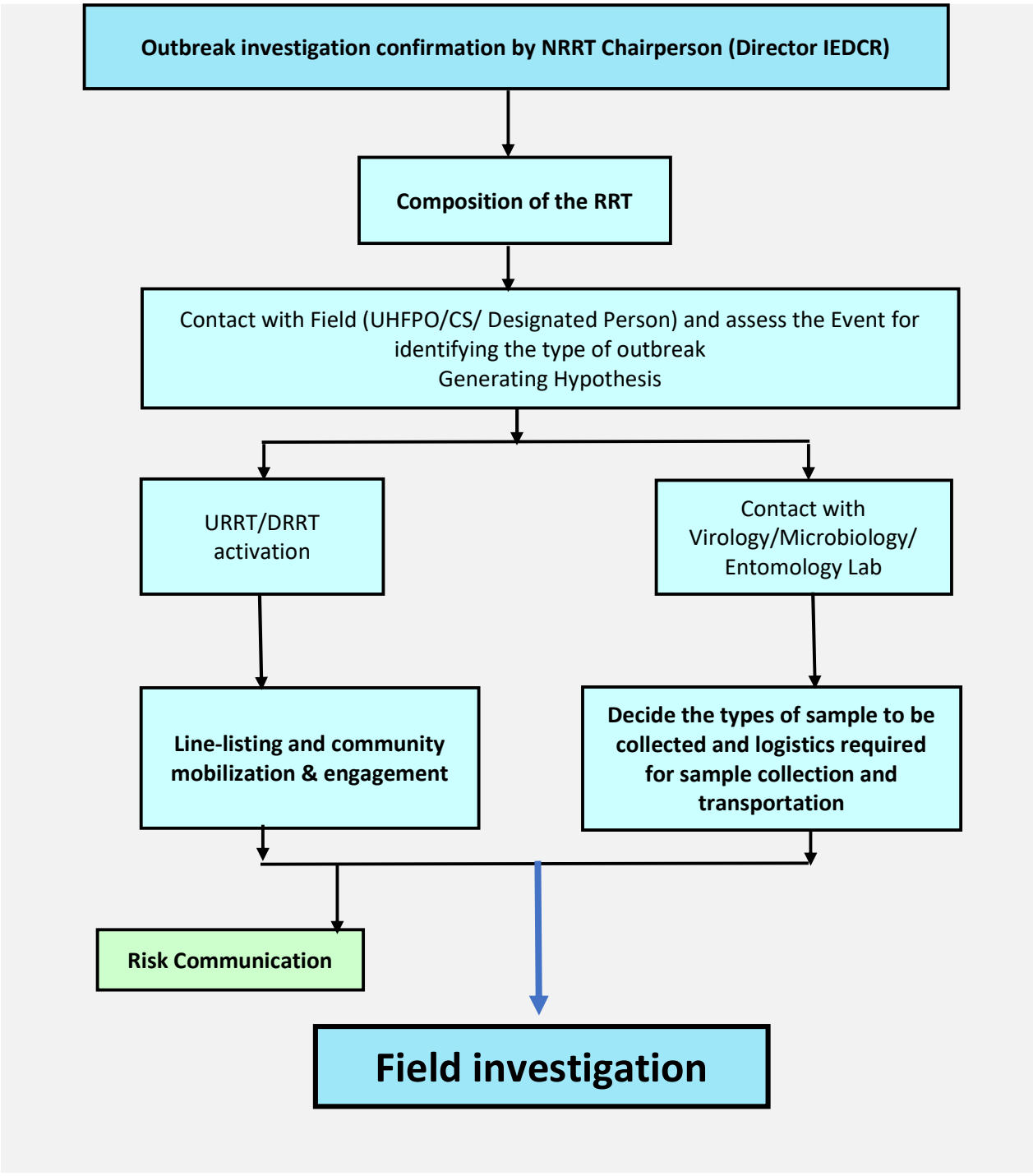
The Outbreak investigation team members are ready-to-go, 24/7. Team leader of the respective team communicates with the team members and start as soon as possible after getting the decision from NRRT Chairperson (Director IEDCR) or Member Secretary.

The outbreak investigation team will collect the following information before leaving for field:

1. Official Order (or Instructions)
2. Details of the Investigation site (Epidemiological, Diseases trends etc.) and contact personnel in the field
3. Assess the type of outbreak, contact with field and assess the type of support required in the field
4. Contact with respective laboratories of IEDCR (virology, microbiology and entomology) to take guidance for sample collection, preservation and transportation
5. Share the preliminary investigation plan with NRRT Chairperson (Director IEDCR) and Member Secretary and incorporate their suggestions
6. Ensure required logistics, resources and administrative orders before leaving for the outbreak investigation

- Two outbreak kits will be prepared and kept ready and available under Member Secretary, NRRT or Coordinator / Focal person of PHEOC.

Figure 6: Organizing an outbreak investigation team before leaving for the field



Chapter 3: Initiation and Steps of an Outbreak Investigation & Response

Once the outbreak is identified and decision to conduct a field investigation of an outbreak has been made, rapid measure by the team is essential. Under such circumstances, public Health scientist / epidemiologists find it useful to have a systematic approach to follow, such as the sequence listed below. This approach ensures that the investigation proceeds without missing important steps along the way.

Before starting the outbreak investigation, it is important to understand the area in which the team will be working which includes geography, socio-demographic situation, communication and about the health facilities; whether the media has already some coverage of the reported outbreak and whether there are any cultural or ethnic sensitivity, whether the Outbreak is Climate sensitive. It is also important to identify the definite stakeholders (local health department, local senior health worker, community leader, religious leaders etc.). The Team also needs to determine if there is any special need or special approvals required to travel or work in the area of the reported outbreak. It's also important to ensure means of communication and accommodation facilities for the team etc. before the team starts.

Step 1: Prepare for the filed work (investigation team and Resources)

Depending on the specific outbreak, spread of disease and available resources at each level it is important to take some preparation for the field visit just prior to conducting an outbreak investigation. There should be a well-organized plan. First step for this plan is to prepare a Rapid Response Team (RRT).

- Outbreak RRT should be in place in every level of health service delivery system. At present, there are three levels of RRT – National, District and Upazilla RRT (respectively – NRRT, DRRT, URRT).
- The designated chairperson of an RRT holds the authority to initiate and activate an outbreak response team.
- NRRT will get an official approval from NRRT Chairperson (Director, IEDCR) to start for the field investigation.
- Which level of RRT will respond to a specific outbreak, depends on the spread of the disease, capacity of RRT involved and available resources at each level.

Preparations should be undertaken primarily in three areas:

a) Coordination:

The Outbreak team members must be selected before leaving for the filed investigation and they must know their expected roles and responsibilities in the field. Team leader is responsible to organize the team to ensure proper coordination amongst team members and field workers before, during and after the investigation. A good field outbreak investigator must be a good manager, supervisor and collaborator as well as a good epidemiologist, because most outbreak investigations are conducted by a team rather than just single individual.

Before departing, team-lead should have a plan of action for the investigation, details epidemiological information, Area map, demographics information and socio-demographic situation, diseases trend and other relevant information of the investigation site etc.

b) Logistics / Resources and administrative arrangements:

Make necessary administrative and personal arrangements including travel plans, office order, financial support and also necessary logistics e.g., data and sample collection tools, personal protective equipment etc.

Laboratory officials/ staff should be consulted (also informing them about the outbreak) before leaving for a field investigation, to ensure taking the proper laboratory material(s) for the proper collection, storage, and transportation techniques.

Following materials are necessary for 'Outbreak investigation & Response'.

1) Prepare Questionnaires for data / information collection
2) Basic stationeries
3) Laboratory Materials for collecting and transporting laboratory specimens
4) A list of cell-numbers of experts, IEDCR officers and administrative authority
5) Personal Protective Equipment (PPE)
6) Area map, demographics information and socio-demographic situation.
7) Global Positioning System (GPS) Coordinates (if possible) device
8) Transport with Driver (and fuel)
9) Adequate cash for initial activities.
10) Others (as necessary)

C) Technical:

The Team should do some literature review, if necessary discuss the situation with someone knowledgeable about the disease and about field investigations, and review the applicable literature on the disease to have some in-depth knowledge. Discuss the situation among all members and consult other experts such as laboratory-staff, epidemiologist, and other specialists.

Before departing, you should have a plan of action

Step 2: Establish the existence of an Outbreak event (confirm the outbreak)

One of the first tasks of the field investigator is to verify that it's unusual aggregation of cases or cluster of cases and indeed an outbreak. Some clusters turn out to be true outbreaks with a common cause, some are sporadic and unrelated cases of the same disease, and others are unrelated cases of similar but unrelated diseases. (US CDC)

In order to establish the existence of an outbreak, we need to assess through Figure-2 and the Table-2. We must compare current information and figures with previous incidence in the community during the same period of time and determine whether the observed number of the cases exceeds the expected number. If IBS surveillance is there it can be done easily. But if not the 'Event' is new and unknown, single case or

there is a clustering of cases is also a predetermined definition of an outbreak. This initial verification will help to determine whether the outbreak is really an outbreak.
This verification is done at the field level by URRT and if needed by DRRT.

Authentication and verification of the reported information about the Occurrence / Event to Confirm:

- Making sure that the reported cases do exist. Initial case-reports are not based on incorrect information or rumors.
- The increase number of cases of that particular prevalent disease is not due to Seasonal Variation or an increase in the size of the population
- The upsurge in cases is not a result of reporting from a new surveillance (Notification artefacts), a change in a laboratory test (Diagnostic Bias) or a laboratory mistake (Pseudo Outbreaks).
- In case of infrequent or controlled disease a single case-reported is considered to be an outbreak e.g. polio, avian influenza A (H5N1), novel influenza (H7N9), small pox, unknown disease etc.

Step 3: Verify the diagnosis

Goals in to verify the diagnosis

1) To ensure that the reported cases has been properly diagnosed (physical examination)
2) To ensure correct lab-diagnosis and rule out laboratory-error as the basis for the increase in diagnosed cases.

Following measures can be taken to verify the diagnosis

1) Make sure that reported cases really exist with same clinical syndrome or disease.
2) Physical examination of patients for clinical findings
3) Discuss with the attending clinician or health care service providers
4) Review the available Medical records
5) Review the Clinical findings and laboratory results
6) Consult with experienced physician about diagnosing the patients

For confirmatory laboratory diagnosis:

1) Collected Specimens should be properly and timely transported to laboratory and for testing
2) Any doubts in test results, specimens should be sent to reference laboratory for verification.
3) Diagnosis should be as a defined syndrome rather than a specific etiological diagnosis

It is not always necessary to confirm all the cases but a significant percentage of cases should be tested for confirmation of the diagnosis.

Step 4: Case Definition and identify the cases

Case definition

A case definition is a set of criteria for determining who should be classified as a "case", or a person with the particular item(s) of interest. Good case definitions often include simple and objective clinical criteria (e.g., diarrhea defined as three or more loose stools in a 24-hour period, abdominal pain, nausea, or vomiting with a fever ≥ 101ºF). A case definition is a standard set of criteria for deciding whether an individual should be classified as having the health condition of interest. A case definition includes clinical criteria and--particularly in the setting of an outbreak investigation--restrictions by time, place, and person. Whatever the criteria, they must be applied consistently to all persons under investigation. The case definition must not include the exposure or risk factor you are interested in evaluating. Diagnoses may be uncertain, particularly early in an investigation. Investigators can create different categories of a case definition, such as confirmed, probable, and possible or suspect, that allow for uncertainty. (US CDC)

A line list is defined as a systematic collection of essential information in a brief tabular form to identify cases according to case definition. A line list (Annexure 3) should include

- **Identification Number-** Patient No. for identification
- **Person-** age, gender
- **Place (address / location)-** school, village, Institution, work places, fair, mass gathering
- **Time / Date of onset-** period of time in which the illness has occurred or all the case started at a particular point of time
- **Clinical symptoms-** Symptoms of complains of illness
- **Outcome –** result due to illness (morbidity / mortality)
- **Lab results-** Collected samples lab-report

Step 5: Describe and Orient the data in terms of time, place and person

Any outbreak should be characterized in terms of time, place and person. The information collected through line list and questionnaire will be used for descriptive epidemiology.

Descriptive epidemiology is done to:

Provide comprehensive description of an outbreak by showing its trend over a period of time, its geographic extent and population affected by the disease. This description will help to commence assessing the outbreak in light of what is known about the disease and develop casual hypothesis and in turn test this hypothesis using technique of analytic epidemiology. It should be noted that descriptive epidemiology should be done early during the course of an outbreak and update it as the team collect additional data.

- **Characterizing by time:**

The graph which shows the time course of epidemic by onset of symptoms is called epidemic curve or "Epi curve". It gives a display of time trend and outbreak magnitude. The epidemic curve (epi curve) is a graphical presentation of the number of cases of illness by the date of illness onset. It also shows the time course of the onset of symptoms among cases in an outbreak.

Usefulness of an Epi curve:

An epidemic curve help to detect the course of outbreak investigation and to predict future course. The disease incubation period can be estimated.

The example on how to draw and interpret an epidemic curve is given in the '**Annexure …**'.

- **Characterizing by person**

Characterizing an outbreak by person refer to a groups of similar / comparable people who have similarities in age, race, sex etc. These information are important to identify the causative agent before directing for further laboratory testing.

Usually person demographic data are presented in a table or chart.

- **Characterizing by place**

Geographical distribution of cases through spot map provides clues about the source of outbreak that can be obtained from the spatial information. A spot map of cases in a community shows clusters or patterns that reflect water supplies, bat roost, poultry farm, restaurant or grocery store etc. If available, the team will use 'Global Positioning System (GPS) coordinates to create the spot map.

Traditionally, the information described above is collected on a standard case report form, questionnaire, or data abstraction form; but irrespective of which form is used, the 'data collection form' better include the following types of information about each case. (US CDC)

- **Identifying information**. A name, address, and telephone number is essential if investigators need to contact patients for additional questions and to notify them of laboratory results and the outcome of the investigation.
- **Demographic information**. Age, sex, race, occupation, etc. provide the **person** characteristics of descriptive epidemiology needed to characterize the populations at risk.
- **Clinical information**. Signs and symptoms allow investigators to verify that the case definition has been met. Date of onset is needed to chart the time course of the outbreak.
- **Risk factor information**. This information must be tailored to the specific disease in question. For example, since food and water are common vehicles for hepatitis A but not hepatitis B, exposure to food and water sources must be ascertained in an outbreak of the former but not the latter.
- **Reporter information**. The case report must include the reporter or source of the report, usually a physician, clinic, hospital, or laboratory. Investigators will sometimes need to contact the reporter, either to seek additional clinical information or report back the results of the investigation.

Step 6: Develop hypothesis

Having all preliminary information (basic descriptive epidemiology) about the event so far the data's summarized, the next step is to formulate a hypothesis considering which specific exposure(s) may have caused the disease. A clearly defined hypothesis should address about the etiology of an outbreak, or potential sources of exposure, or mechanisms of transmission, history of travel, it's useful to know as much as possible about the diseases under consideration. Is it airborne? Is it respiratory droplet? Is it contact? Is it foodborne? Hypothesis development also consider about the risk factors, agent's usual reservoir etc. It would be open ended and wide. Often it is useful to talk to talk to a few of the case-patients or community people and gather their perception regarding the event prior to develop a hypothesis.

This includes the modes of transmission: Is it airborne? Is it respiratory droplet? Is it contact? Is it foodborne? The incubation period and communicable periods; the clinical manifestations of disease; and any unusual risk factors those are associated with particular diseases. When the etiology and risk factors are unclear, open-ended conversations with the cases is frequently productive. It is found useful to ask cases where they think they were exposed or what they think is causing the problem. Frequently, the patient themselves can tell you the answer. And finally, the importance of scrutinizing outliers cannot be overestimated. Cases that are part of an outbreak, that have little in common with many of the other cases frequently can hold the clue as to the etiology or mode of transmission.

Step 7: Evaluate/Test hypothesis

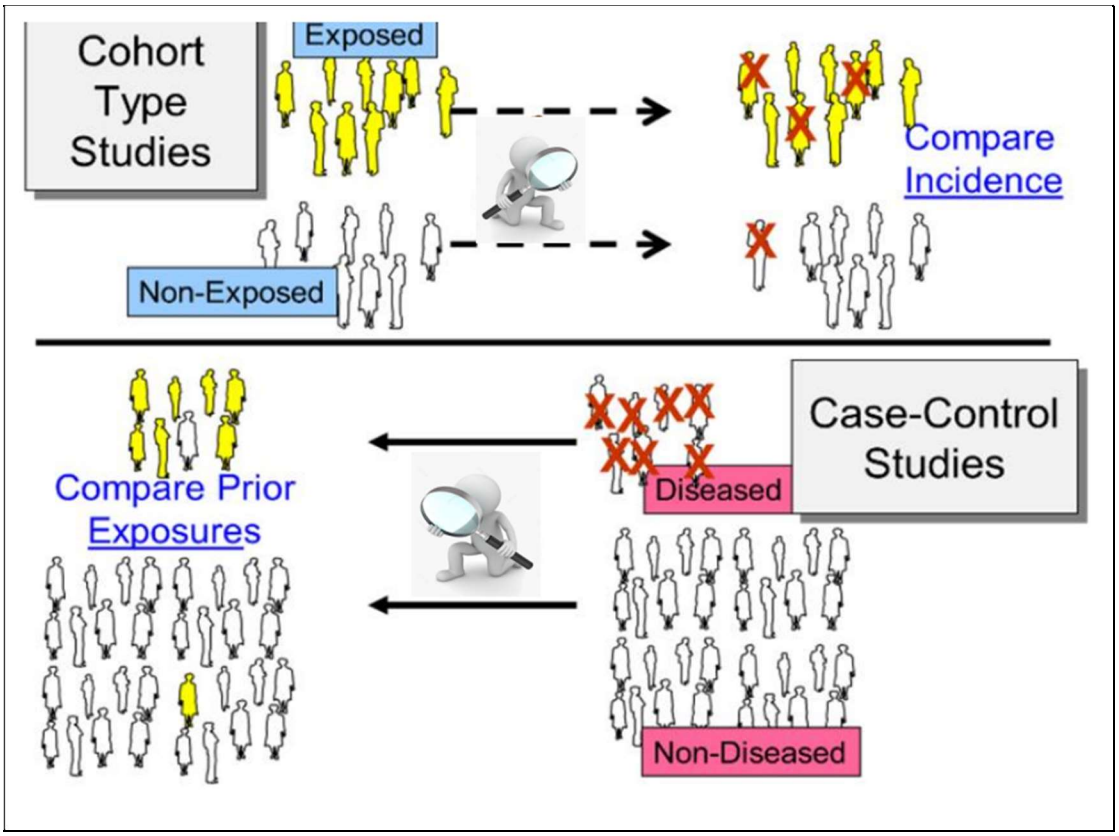
After a hypothesis for an outbreak has been developed, the next step is to evaluate the plausibility of that hypothesis. Hypotheses in a field investigation are evaluated or tested using a combination of epidemiology, laboratory science and environment evidence. (US CDC). Testing hypotheses employs a more advanced type of epidemiology. In the descriptive epidemiology section, we reviewed how to use the data collected to characterize the outbreak by person, place, and time. After generating hypotheses from the clues provided by this information, we can now use analytical epidemiology to test these hypotheses by comparing groups with different characteristics to test whether there are significant associations with particular risk factors or exposures. In this part of the investigation, we shift our focus from who, where, and when, to asking how and why as we search for the cause of an outbreak.
From an epidemiologic point of view, hypotheses are evaluated in one of two ways: either by comparing the hypotheses with the established facts or by using analytic epidemiology to quantify relationships and assess the role of chance.

If the evidence of the event is strong enough hypotheses testing may not be required. When the exact cause is not clear and there is need to test the hypothesis, following are the two ways by which you can evaluate your hypotheses depending on the nature of data:

1. Case control studies
2. Cohort studies

At times, hypothesis need to be refined or additional studies need to be undertaken to find a definitive answer. If the current hypothesis doesn't bear any definite result, it's useful to reevaluate and see if other potential explanation have been overlooked. Sequential case control study may be needed to narrow down exposures and definitively identify the risk factors responsible for the disease. For example, in a foodborne outbreak, your initial study might implicate customers who frequently eat at a particular food establishment. At this point, additional case control studies might be useful to identify particular foods or other associated factors.

Figure 7: Cohort Studies and Case-Control Studies illustration summarizes the key Differences between these two study designs



Source (Collected): https://sphweb.bumc.bu.edu/otlt/mph-modules/ph/outbreak/outbreak_print.html

Laboratory results provide useful supportive evidence that help the outbreak investigation team to confirm the findings. Public health laboratories (e.g., IEDCR, NIPSOM etc.) have a much bigger role in analyzing specimens during outbreak investigations. These laboratory can test environmental samples and clinical specimens. They conduct confirmatory diagnostic testing. Their role is to identify specific agent and subtype. Detail of environmental and lab investigation specimen collection, storage and transport is described in 'Annexure '.

Step 8: Implement prevention and control measures

The primary goal in the outbreak investigations is to contain and control of the outbreak and prevention of additional cases. These measures are more general to begin with (e.g. hand or respiratory hygiene education, health promotion) and become more specific and feasible as more information about the cause of the outbreak is identified. Prevention and control measures should be developed consulting with the Chairperson (Director, IEDCR) and Member Secretary of NRRT. Control measures should also include the methods of implementation and responsible authorities for implementations. For implementing the control measures by the staff of the local healthcare facilities, the outbreak investigation team can conduct special training sessions for the physicians and supporting staff. The outbreak investigation team needs to review those messages as per WHO / US CDC risk communication guideline to deliver each message to the community**.**

Control measures may be taken if there is a suspected source (identify and removing suspected food from sale, closing a restaurant, chlorinating a water source), mode of transmission (vector control, community education messages, hand hygiene measures) or a vulnerable population (immunization, prophylaxis). The number of cases of illness should decrease once control measures are in place. Continued surveillance to identify a decrease in the number of cases will help to assess whether your control measures have been effective.

Step 9: Communicate findings with Follow-up and implementation of control measures

Communicate findings

Good communication is crucial during all aspects of outbreak investigations, including while the investigation is ongoing, as well as once the investigation is complete. Timely and accurate information needs to be provided frequently, both to your team working on the investigation with you, to others in your institution, including other programs who may be involved in the outbreak response Outbreak Investigation team in the community should be kept up on what's happening while an outbreak is occurring, as well as after an outbreak has subsided, regarding the findings of your investigation and implications for disease prevention in the future. In order to comply with your recommendations for assistance or management of cases during the outbreak, healthcare facilities and laboratories should be kept well-informed on an ongoing basis. Particularly for large or unusual outbreaks, it's important to keep the public informed Communicating with the public is typically done through the media, but also through schools and at times organizations, particularly when they are directly impacted.

Establishing relationships and reliable communication mechanisms with these partners is very useful before an outbreak occurs. During an outbreak, information needs to be communicated rapidly. It's generally best to be available to the media on a regular basis and issue frequent updates. Be prepared with background information and anticipate questions, such as how serious is the problem, who is at risk, and how the disease can be prevented. Provide sufficient detail to meet public health needs and address public concern, but keep confidentiality in mind. Despite the best efforts, rumors may circulate and it's important to correct these mistakes by publicizing accurate information. Another important tip is not to over reassure and acknowledges what you don't know. It is important to communicate the findings of the investigation to the relevant stakeholders in consultation with the Chairperson (Director, IEDCR) and Member Secretary of

NRRT. The communication can be done by oral briefing or power point presentation for the local health personnel and other agencies for whom the information is useful. A preliminary summarized written report must be prepared as soon as the investigation of an outbreak is complete. This report should contain information i.e., present status of the outbreak, control measures taken and recommendations for preventing future outbreak. Official report will be confidential and detail report should not be undisclosed except to the relevant authority.

Assign a credible spokesperson. You should get your public information officer and communications specialists involved early on.

Follow-up of implementation of control measures

Monitoring of the implementation of recommendations and control measures and assesses its effectiveness should be done for at least two incubation periods of the infectious disease under investigation to assure public health security. This will suggest that the outbreak is subsiding. Individual cases will be monitored by URRT/DRRT for symptoms of new cases.

Step 10: Risk Communication

Knowing how the public or members of affected groups perceive a risk affects what you, as a field investigator, might communicate and how you frame the key messages. Many times, persons most affected by a disease outbreak or health threat perceive the risk differently from the experts who mitigate or prevent the risk. Additionally, persons perceive their own risks differently, depending on how likely they think the actual hazard will affect them personally and their beliefs about how severe the harm might be. Perceptions of health risks also are tied to the degree to which persons feel alarmed or outraged—when the event causes a high level of worry or anxiety, the risk is perceived to be at a similarly high level. Persons are usually more accepting of risks or feel less outrage when the risks are voluntary, under their control, have clear benefits, are naturally occurring, are generated from a trusted source, or are familiar (US CDC). The field investigator and, if part of the investigation team, the health communication specialist should foster effective collaboration and coordination among all of the agencies and organizations involved.

Risk communication is the real-time exchange of information, advice and opinions between experts or officials and people who face a threat (from a hazard) to their survival, health or economic or social wellbeing. The purpose of risk communication is to enable people at risk to make informed decisions to mitigate the effects of a threat (hazard) – such as a disease outbreak – and take protective and preventive measures. (WHO)

For risk communication **five** critical practices influence the effectiveness of outbreak communication.

- **Build trust**
  Outbreak communications is to communicate with the public in ways that build, maintain or restore trust
- **Announce early**
  When an outbreak occurs authority should announce early to build trust, early announcement contributes to early containment.

- **Transparency**
  Communication which is easily understood, complete and accurate is defined as transparent during outbreak
- **Respect public concerns**
  Effective risk communications is a dialogue between technical experts and the public.
- **Planning**
  Planning is essential for effective outbreak communications. Outbreak communications planning must be a part of outbreak management planning from the start.
  (More details in **Annexure 11**: Outbreak Risk Communications)

Step 11: Initiate and maintain surveillance

Once event control and prevention measures have been implemented, it's essential to be monitored. If surveillance has not been ongoing, it's time to initiate active surveillance. If active surveillance was initiated as part of case finding efforts, it should be strengthen and continued.

The reasons for conducting active surveillance at this time are twofold. (US CDC).
First, you must continue to monitor the situation and determine whether the prevention and control measures are working. Is the number of new cases slowing down or, better yet, stopping? Or are new cases continuing to occur? If so, where are the new cases? Are they occurring throughout the area, indicating that the interventions are generally ineffective, or are they occurring only in pockets, indicating that the interventions may be effective but that some areas were missed?

Second, you need to know whether the outbreak has spread outside its original area or the area where the interventions were targeted. If so, effective disease control and prevention measures must be implemented in these new areas.

US CDC: https://www.cdc.gov/csels/dsepd/ss1978/lesson6/section2.html#step12

Standard Operating Procedure (SOPs)
Outbreak Investigation and Response (OBI&R)

SOP Title:	Outbreak Investigation & Response Manual with SOPs (including Climate Sensitive Diseases)
Effective Date:	07/2023
Dates of previous SOP's with this title:	None

I. Introduction

Timely Response to Indicator based Surveillance (IBS) or Event based surveillance (EBS), surge of cases or response to signals is one of the most important steps for early Detection, effective Prevention and adequate response is key to control of spreading outbreaks.
Standard Operating Procedures is a systematic practice of set-of-steps to ensure that the Outbreak investigations are carried out correctly (quality) and always in the same manner (consistency) to bring out fruitful outcome and timely containment of an event.

II. Purpose and Scope of the SOP

- This SOP focuses on the key steps that should be undertaken in investigating all cases and outbreaks in human.
- This SOP will be used by medical doctors and assigned health personnel

III. Objective

The primary reason to investigate cases or outbreaks is to detect, prevent and control the outbreak and, with lessons learned from that investigation, help prevent future outbreaks.

Specific objectives of investigations may include, but are not limited to:
1. Determining the magnitude of the outbreak and characterizing chain(s) of transmission
2. Describing characteristics of populations, including demographic, health status, clinical characteristics (for cases), and exposures, stratified by case status.
3. To treat the cases appropriately
4. To prevent spread of the disease
5. To monitor close contacts for early diagnosis and treatment
6. To identify new risk groups to prevent further transmission
7. Implementing measures to prevent or mitigate transmission

Step 1. Confirm the existence of an Outbreak event

Action Required	Action taken / Remarks
PHEOC Focal person will verify the information received and confirm the existence of event or signal or surge of cases and	
Collect more information on the suspected Outbreak	
Record forms of Hotline / Electronic Media/ Social media/ Event-based surveillance for documentation and submit to the NRRT Chairperson (Director IEDCR) and Member Secretary	
Member Secretary in consultation with Chairperson, will **call meeting of the N**RRT as necessary	
Laboratory logistics will be arranged by the laboratory in charge of corresponding departments of IEDCR.	
Outbreak investigation questionnaires will be developed according to disease patterns / characteristics.	
Other logistics, vehicle support & administrative arrangements will be arranged by the IEDCR Administration.	
Immediate Financial arrangement will be done by the Accounts office, IEDCR.	
Field preparation and plan to attain outbreak investigation	

Step 2. Develop Case Definition of Outbreak:

Action Required	Action taken / Remarks
Patient Under Investigation Possible Case, Probable Case, Confirmed Case	
Outbreak refers to an increase, often sudden, in the number of cases of a disease above what is normally expected, but is often used for a more limited geographic area. (US CDC).	
Cluster of infections with possible epidemiologic linkage. A single case of emerging disease may be considered as an outbreak. An outbreak may occur in a restricted geographical area, or may extend over several countries. It may last for a few days or weeks or for several years.	

Step 3. Go to the field for investigation with Resources

Institute of Epidemiology, Disease Control and Research (IEDCR) is the mandated Government organization to conduct the 'Outbreak investigation and Response' in the country. Outbreaks may be notified to Director IEDCR in different ways (Direct Communication from Field 24/7 Hotlines, Email, SMS, Print & Electronic Media, and Social Media etc.). The outbreaks in Bangladesh are usually detected through different surveillance systems (IBS & EBS) which are run by IEDCR and PHEOC.

Action Required	Action taken / Remarks
Source of information: a) Indicator Based Surveillance: Influenza, Anthrax, Leptospirosis, Dengue, Resp. EBS, etc. b) Event Based Surveillance: Direct Communication from Field 24/7 Hotlines, Email, SMS, Print & Electronic Media, and Social Media etc. to PHEOC of IEDCR or the Director IEDCR after,Identifying any potential outbreak c) National Health Crisis Center and Control Room of Management Information System (MIS) will routinely send notification to Director IEDCR and PHEOC regarding any news of outbreak d) Informal reporting e) Any person/ organization/ entity may inform Director IEDCR if any unusual health related events identified f) Surveillance run by other institutes or organization notify Director IEDCR through official letter and report if any unusual trend identified	
Confirmation Confirmation of Source and information (Validation of information) by PHEOC, IEDCR	
Coordination Coordination by Team-lead and members of Outbreak team with NRRT/ DRRT/ URRT as necessary. Coordination with the Laboratory expert for properly sample collection. Specify Roles and Responsibility of the Team members (One person of the team assigned as team-lead)	

Step 4. Determine the Key steps for field visit and investigation

A number of critical activities have to be undertaken as part of "Outbreak investigation" which includes fro climate sensitive diseases as well. The order of the activities may vary depending on local circumstances and often multiple activities (flowing Outbreak Investigation and Response Steps) will be undertaken in parallel.

For investigation, case definitions will be followed (with preliminary information) which can be revised and confirmed later in the field as necessary.

Action Required	Action taken / Remarks
Form of Team for Investigation The team for the investigation will be formed from members of Rapid Response Teams (RRT) of national, district and upazilla level. The team should preferably consist (along with other members) of Public health Specialist /Epidemiologist Clinician Laboratory Medicine Specialist Medical Technologist The expanded team members may be · Veterinarians · Medical sociologist / Anthropologist · Logisticians, Support staff	
Preparation for field Visit and interviewing the case	

Develop Questionnaire Interviewing and data collection The investigation team has to collect basic demographic and epidemiological information and record clinical data. Information should be collected using structured questionnaire Prepare a line list from the information collected	
Sample collection and Laboratory diagnosis Collection, testing and confirmation of clinical samples from the case patient(s) has to be done on urgent basis. Samples should be collected from both cases and contacts Team members must use of PPE while collecting samples Team members can choose to interview persons outdoor and not in a close interior setting and avoid direct face-to-face contact. Detail of sample collection, storage, transport for investigation instructions followed	

Step 5. Initiate an Outbreak investigation

Any outbreak is an urgency which needs immediate initiating of an investigation (24/7 response), and should be signal .of public health concern when:

Action Required	Action taken / Remarks
Two or more persons presenting with unexplained acute respiratory illness with fever (≥ to 38°C) or died of an unexplained respiratory illness with onset of illness within a period of two weeks and or reside in the same geographical area and/or are epidemiologically linked;	
Two or more persons presenting with unexplained fever (≥to 38°C) with or without acute respiratory illness; with or without skin rash or died of an unexplained illness with onset of illness within a period of two weeks and or reside in the same geographical area and/or are epidemiologically linked;	
Health-care workers or people who develop acute fever (≥ to 38°C) with unexplained illness after providing care to patients or dead case with unexplained acute illness with fever (≥ to 38°C);	
Two or more persons working with birds/animals present with unexplained acute lower respiratory illness with fever (≥ to 38°C) with other unexplained illness;	
People or Health-care workers having unexplained fever (≥ to 38°C) with altered mental status in the same geographical area and/or are epidemiologically linked;	
Routine surveillance to detect seasonal surge of cases and illness in human • An unusual distribution by age group, • High frequency of pneumonia, or • Unexplained acute moderate-to-severe respiratory illness in previously healthy adults or adolescents. • Surge of Acute Diarrhoeal Diseases with or without fever (≥ to 38°C) • Surge of Acute Enteric Diseases with Fever (≥ to 38°C) • High fever with unexplained deaths	

• Surge of Acute Fever (≥ to 38°C) cases with hemorrhagic manifestation	
Active case-finding in the community	
Active case-finding in the hospital and clinics	
Contact Tracing and Management	

Step 6: Confirm Case Definition to identify the cases

Action Required	Action taken / Remarks
Brain storming by the 'Outbreak Team' to develop 'Suspected Case definition' according to information gathered and disease patterns & existing knowledge.	
Develop outbreak investigation questionnaires according to after initial observation of cases and investigation at affected investigating sites/locality.	
'Suspected case definition could be revised after initial observation of cases and investigation at affected investigating sites/locality.	
Revision of outbreak investigation questionnaires according to after initial observation of cases and investigation at affected investigating sites/locality.	

Step 7: Prepare and describe and Orient the data in terms of time, place and person (Descriptive Epidemiology)

Action Required	Action taken / Remarks
Detailed Epidemiological Data will be collected.	
Communication with the attending physicians to collect information	
The data collection form must include in the questionnaire: • Case Identifying information, • Demographic information and Epidemiological Data • Clinical information, • Transmission pattern among contact (and family members) • Risk factor information, • Anthropological Information • Reporter's information	
Preparation of line list of suspected cases for further investigation	
Specific samples would be collected for further confirmation of the disease.	
Detailed Epidemiological Data will be collected. • Active case-finding in the family and the community • Active case-finding in the hospital and clinics Appropriate samples would be collected after consultation with corresponding lab's focal person	
Find cases systematically and record information	

Step 8: Develop hypothesis

Although the next conceptual step in an investigation the Outbreak investigators will generate hypotheses. Hypothesis is developed through extensive literature and documents review. The hypotheses may address the source of the agent, the mode (and vehicle or vector) of transmission, and the exposures that caused the disease. The hypotheses should be testable, since evaluating hypotheses is the next step in the investigation.

Action Required	Action taken / Remarks
Develop hypotheses	

Step 9: Evaluate/Test hypothesis

The hypotheses will be tested in the field investigation using a combination of environmental evidence, laboratory science, and epidemiology. From an epidemiologic point of view, hypotheses are evaluated in one of two ways: either by comparing the hypotheses with the established facts or by using analytic epidemiology to quantify relationships and assess the role of chance.

Action Required	Action taken / Remarks
Test the hypotheses	

Step 10: Implement control and prevention measures

Action Required	Action taken / Remarks
Control measures to be taken as per following criteria:	
Suspected source (removing suspected food from sale, closing a restaurant, chlorinating a water source),	
Control measures directed against the chain of transmission (agent, source, mode of transmission, portal of entry, or host) that are susceptible to intervention	
Block Mode of transmission (vector control, protect from portals of entry (prevention of insect bite), community education messages, hand hygiene measures)	
Vulnerable population (immunization, prophylaxis) illness.	
Case isolation & suspected case quarantine	
Preventive Medical support. e.g.; Use of Drugs, Vaccination	
Ensure Confidentiality	

Step 11: Communicate findings with Follow-up and implementation of control measures

Action Required	Action taken / Remarks
Daily Report preparation and Communication with NRRT:	
• Collected descriptive data will be analyzed. • Daily activities with Epi-curve, descriptive analysis (eg: Mapping, frequency analysis etc) and next day plan should be in the daily report. • Clinical and Exposure information will be evaluated. • Daily reports will be shared with NRRT members & others assigned persons through email. • Virtual meeting/ teleconference could be arranged to update core NRRT (as required) • Daily reporting with activities will be continued till the outbreak tram returns centrally. • Daily Communication through email.	
Local Communication	
• Coordinate with local authority for local accommodation and local transportation support during outbreak investigation.	

• Local health authorities will be involved during outbreak investigation (eg: involvement of URRT/ DRRT with NRRT team) and the attending clinician. • Local logistics support like collection of sample, preservation of sample & sample transportation will be taken. • Cold chains maintenance for sample transportation & preservation support could be taken from local health authorities. • Discuss with health-care providers (traditional and non-traditional), hospitals and outpatient facilities, community leaders in the area where the case patient resided and/or travelled	

Step 12: Do Risk Communication

Action Required	Action taken / Remarks
Risk communication to be done with real-time exchange of information, advice and opinions between experts or officials and people who face a threat (from a hazard) to their survival, health or economic or social wellbeing.	
For risk communication **five** critical practices influence the effectiveness of outbreak communication; eg: build trust, announce early, transparency, respect public concerns and planning	
The communication can be done by oral briefing or PowerPoint presentation for the local health personnel and other agencies for whom the information is useful.	

Step 12: Post Outbreak investigation communication

Action Required	Action taken / Remarks
A preliminary technical outbreak report will be prepared & shared with the chairperson of NRRT within three days of the return at IEDCR.	
A PowerPoint presentation will be prepared and shared with NRRT for further discussions, suggestions and recommendations	
Report should contain the status of the outbreaks with recommendations	
Chairperson of NRRT will brief the report with media/ higher authority (DGHS/MoHFW etc)	
NRRT will give continuous feedback to the local authorities regarding the findings of the active surveillance	
The continuation of active surveillance will depend on case detection and suggestion from NRRT Chairperson	
All IHR (2005) notifiable diseases or Pandemic Potential diseases will be immediately informed to the IHR Focal person (Director Disease Control Unit & LD CDC, DGHS)	
Initiate and maintain surveillance if necessary	

Criteria for 'Outbreak investigation team' to return

1. Laboratory confirmation of the outbreak disease
2. Number of cases decline at affected locality
3. Control of the outbreak
4. Preliminary findings dissemination with local & other relevant authorities with the permission of NNRT chairperson
5. Approval from the NRRT chairperson (Director, IEDCR)
6. Outbreak investigation team will also initiate active surveillance and engage local concerned authorities to continue new case detections
7. Upon detection of new cases local concerned authorities will inform NRRT chairperson immediately

Annexures

Annexure 1:

Record forms of Hotline / Electronic Media/ Social media/ Event-based surveillance

Register of Hotline / Media/ Event-based surveillance

Time and Date: Reg. no:

<table>
<tr><td rowspan="2">Source of information</td><td colspan="2">Description of the event</td><td rowspan="2">Verification process</td><td rowspan="2">Action Taken</td></tr>
<tr><td>Event, Time , Place</td><td>Person</td></tr>
<tr><td rowspan="5">Hotline/
Electronic Media/
Surveillance/
Social media/
Other(s):
(Specify)</td><td>Event/Major symptoms</td><td rowspan="4">Approximate number of cases reported:

Number of Hospitalization:

Number of death:

Others:</td><td rowspan="5"></td><td rowspan="3"></td></tr>
<tr><td>Date of event:</td></tr>
<tr><td></td></tr>
<tr><td>Location:</td><td>Follow-up:</td></tr>
<tr><td>Village/ Area:

Thana:

District:</td><td></td></tr>
</table>

Call received by:

Signature: **Signature**

Name: ..... Name: .....

Designation..... Member Secretary, NRRT

Annexure 2:

List of logistics required in an Outbreak Investigation (Outbreak kit)

The outbreak investigation team should arrange and follow the checklist of logistics before moving to the field for an outbreak investigation.

Types of logistics

Logistics for an outbreak investigation can be classified as the following types:

A. Outbreak investigation documents

B. Specimen collection kits

C. Other supporting logistics

A. Outbreak investigation documents and other Logistics/ Materials :

The following need to be prepared prior to an outbreak investigation:

1. Government official order to conduct an outbreak investigation
2. Government official order copies to the concerned Civil Surgeon, District Commissioner/NDC and other concerned authorities to cooperate with the outbreak investigation team
3. Initial outbreak news and investigation reports, if any
4. Questionnaire for outbreak investigation
5. Line-listing form and other relevant forms
6. Notebook for recording data
7. Personal protective equipment (PPE)
8. Stethoscope, BP, Thermometer, Torchlight and other examination Equipment.
9. Laptop: Data entry, analyze etc.
10. GPS (Global Positioning System) device.
11. Local point of contact and details (cell phone numbers, address)
12. Specimen collection labeling sticker
13. Stationery items
14. Portable printer and scanner.
15. Dedicated mobile/cellphone with SIM card.
16. Power Bank.
17. Computer TAB
18. Others (as necessary)

- **Personal protective equipment (PPE):**

  Personal protective equipment (PPEs) need to be ready. The number of PPEs that we should consider to accompany with an outbreak investigation team, in fact, depends upon the type and severity of the outbreak. Ideally, there should be at least 10 PPEs packed together for an outbreak investigation, which includes PPE for outbreak investigation team-members.

B. Specimen collection kits:

Blood specimen collection kit should be common in any outbreak investigation. Other specimen collection kit will be used as 'add-ons' in the outbreak investigation depending upon the presenting symptoms. The outbreak-team must consult lab-experts before leaving to better understand specimen collection and transportation.

General

1. Specimen collection form
2. Pen
3. Permanent marker for labeling
4. Hand sanitizer
5. Disposable Gloves and Mask
6. Biohazard bag
7. Specimen rack
8. Disinfectant (Hypochlorite Solution and 70% alcohol)
9. Band aid
10. Material for packaging and transport
    a) Secondary container
    b) Vaccine carrier / Cold-Box
    c) Ice packs
11. Dry Shipper
12. Stationery items

Specific: Specimen collection kits can be of following types:

1. Blood specimen collection kit
2. Respiratory tract specimen collection kit
3. Gastrointestinal tract specimen collection kit
4. CSF specimen collection kit
5. Urine specimen collection kit
6. Breast milk specimen collection kit
7. Environmental specimen collection kit
8. Animal specimen collection kit

- **Blood specimen collection kit**

1 Disposable syringe with needle
2 Butterfly needle
3 Tourniquet
4 Alcohol pad
5 Vacutainer tubes
6 Centrifuge machine
7 Transfer pipettes
8 Sterile vials to collect centrifuged samples
9 Viral transport media (VTM)
10 Bacterial culture media
11 Screw cap tube containing anticoagulant
12 Eppendorf/ Cryo vials
13 Glass slides with cover slips

14 Cold-box with ice pack
15 Band aids
16 Disposable gloves and Mask
17 Permanent Marker pen for sample labeling

- **Respiratory tract specimen collection kit**

1 N95
2 Dacron/Polyester fiber-tipped swab stick
3 Viral transport media (VTM)
4 Disposable tongue depressor
5 50 ml syringe
6 Wide mouth sterile sputum container
7 Gloves and PPE
8 Disposable Plastic dropper
9 Cryo vial

- **Gastrointestinal tract specimen collection kit**

1 Stool sample collection container
2 Sterile dry vials/container to collect samples
3 Wide mouth screw cap plastic container
4 Swab stick
5 Normal Saline
6 Bacterial transport media

- **CSF specimen collection kit**

1. Lumbar puncture set
2. Local anesthetic
3. Sterile cryo-vials to collect samples
4. Viral transport media (VTM)
5. Bacterial Transport media
6. Liquid nitrogen, if necessary

- **Urine specimen collection kit**

1. Clean, dry vials/container to collect samples
2. Gauze pads
3. Urine collection bag, for infant
4. Bacterial transport media
5. Viral transport media (VTM)
6. Catheter

- **Skin sample collection kit**

1. Alcohol pad
2. Swab stick
3. Glass slide
4. Container
5. Normal saline,
6. VTM
7. Needle
8. Scrapping material collection tool (Scalpel)

- **Breast milk specimen collection kit**
    1. Collection equipment
    2. Clean dry vials/container to collect samples

- **Environmental specimen collection kit**
    1. Collection equipment
    2. Clean, dry vials/container to collect samples

- **Animal specimen collection kit**

1. Disposable syringe with needle
2. Polyester fiber-tipped /swab stick
3. Alcohol/Iodine swab
4. Gauge pads
5. Vacutainer tubes
6. Centrifuge machine
7. Transfer pipettes
8. Cryo-vials to collect specimen
9. Viral transport media (VTM)
10. Bacterial culture media
11. Torch-light
12. Glass Slide
13. Different size zip lock bag
14. Anesthetic

C. Other supporting logistics:

Other supporting logistics include the following items:

1. Vehicle and fuel (with Driver)
2. Others (if and as necessary)

Sample transportation

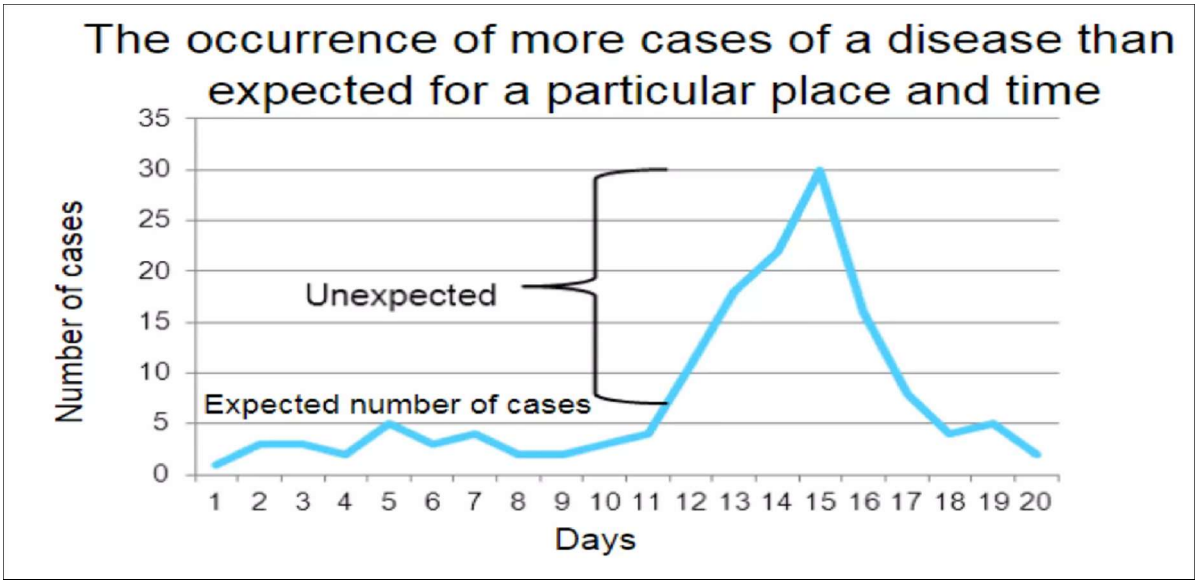
1) Sample to be transported in cool box (maintaining Cold-chain if advised) or dry shipper
2) Serum should be separated from blood samples before transport
3) If delay during transportation in cool box, ice packs in cool box to be checked, if necessary, ice pack to be changed from adjacent district or Upazilla.

Annexure 3: Case definition

Case definition

Good case definitions often include simple and objective clinical criteria (e.g., diarrhea defined as three or more loose stools in a 24-hour period, vomiting, or nausea with a fever ≥ 101ºF). A case definition is a standard set of criteria for deciding whether an individual should be classified as having the health condition of interest. A case definition includes clinical criteria and--particularly in the setting of an outbreak investigation--restrictions by time, place, and person (US CDC).

Development of a clear case definition is critical to effective investigation of an outbreak. Use of a common case definition allows for standardization of the cases of interest both within an ongoing outbreak investigation and possibly between outbreak investigations that differ over time or geographic location. (US CDC)



Source: Curves in epidemiology: An overview (Dr. Bhoj Raj Singh)
Outbreak : https://www.slideshare.net/singh_br1762/curves-in-epidemiology-an-overview . (IVRI & ICAR)

The Common components of an outbreak case definition

1. Person- age, gender (Who)
2. Place - school, village/community, Institution, facility etc. (Where)
3. Time - period of time in which the illness has occurred (When)
4. Clinical features – this will usually include a description of signs and symptoms (What)
5. Laboratory results–Cultures, Serology (What)

Therefore the 'Case definition' is answer to 'Who', 'What', 'When' and 'What'.

Suspected, Probable and Confirmed Case:

In an outbreak investigation, it may be worthwhile to have a more inclusive case definition or several case classifications (e.g., confirmed, probable, or suspect).

1. **Suspect case:**
   A case with several, but not all, of the criteria might be classified as a suspect case

2. **Probable case:**
   A case that exhibits the typical clinical characteristics of the disease and meets the time, place, and person criteria, could be some rapid laboratory test positive but has no laboratory confirmation might be considered a probable case
3. **Confirmed case:**
   A case is classified as confirmed if laboratory confirmation of the disease is available and if the time, place, and person criteria have been met

   During early/initial stages/period of an outbreak investigation, a sensitive or broader case definition is preferable which will include all criteria. With the progression of the investigation, the case definition will change and will become more specific.

Case Classification	Clinical Feature	Epidemiology Link*	Lab Configuration
Suspected	✓		
Probable	✓	✓	
Confirmed	✓	✓	✓

* Epi. Link by time, place & person

Examples of outbreak case definitions of hepatitis:

Suspected case: a person visiting or residing in the affected community of any age reporting yellow coloration of eyes or skin with onset of illness during the outbreak period.

Probable case: Any person who meets the criteria of a suspected case with elevated serum bilirubin or ALT.

Confirmed case: Any person who meets the criteria of a probable case with a serum sample positive for Hepatitis E virus specific anti-HEV immunoglobulin M (IgM) antibodies to the virus in a person's blood

Finding cases and obtaining information

Please follow the below mentioned procedures:

1) Enhance the existing surveillance system by informing health centers, hospitals, laboratories and the community about the outbreak
2) Encourage and assure people who are sick in surrounding community.
3) Local RRT (URRT or DRRT) members should obtain information from the suspected cases and prepare the line list
4) Information of the cases will be collected using a standardized questionnaire and should includes
   a) Demographic information (age, gender, address and telephone number)
   b) Travel history
   c) Possible exposures history (food consumption, environmental or animal exposure etc.)

d) Clinical information (date of onset of illness, signs and symptoms, hospitalization)
e) Laboratory test results
f) If possible collect photocopies of medical and laboratory records from individual cases and attach with questionnaire

Interviewing cases about what may have caused their illness is important. It is important to understand the information to be collected may differ in outbreaks depending on the probable causes of the outbreaks e.g. travel history, immunization history or detail about their profession. Epidemiologists can assist with developing questionnaires. Depending on the outbreak, it may also be important to interview contacts.

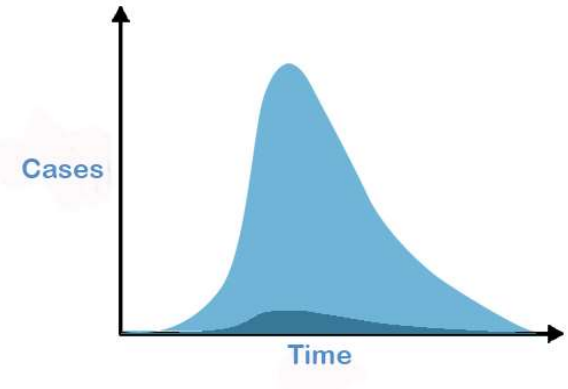
Annexure 4:
Making an epidemic curve, Spot map and line list and its interpretation

An epidemic curve (epi curve) is a graphical presentation of the number of cases of illness by the date of illness onset. It also shows the time course of the onset of symptoms among cases in an outbreak. The epidemic curve is a histogram with an *x*- and a *y*-axis. It has the following format.
The x-axis depicts the time or date of onset of symptoms.

- The y-axis depicts the number of cases.

The epidemic curve helps to illustrate the dynamics of the outbreak, including the

- number of people affected
- time course of the outbreak and
- whether it is continuing



Epidemic curve also helps to form hypothesis on route of transmission, probable exposure period and incubation time. It may also give clues to the mode of transmission and help to relate the timing of key events (such as possible exposures and control measures) to the onset of symptoms.

Data will be oriented in terms of time, place and person to have socio-demographic epidemiology

1. **Time**: draw epidemic curves
2. **Place**: construct spot maps
3. **Person**: line listing

Time

Traditionally, we look at the course of an epidemic by drawing a histogram of numbers by numbering a type (or date). This picture spread through outbreaks of a population is called an epidemic curvature, or an epi curve for small. It changes with the agent, its generation time, transmission and exposure type and duration.

Create an Epi Curve in Microsoft Excel*

1. Highlight all data you want to include in your epi curve. Do not include column titles/headings.
2. Ensure date of onset is in column before (to the left of) number of cases.
3. Click the "Chart Wizard" on the tool bar.
4. Choose "Column" as the chart type and click "Next".
5. Review graph and click "Next".
6. Chart Options: Go to "Titles" tab: Add Chart title, X axis title, Y axis title.
7. Chart Options: Go to "Legend" tab: unclick "Show Legend". Click "Next".
8. Decide where to place chart, as object in sheet or as separate sheet.
9. Click "Finish".

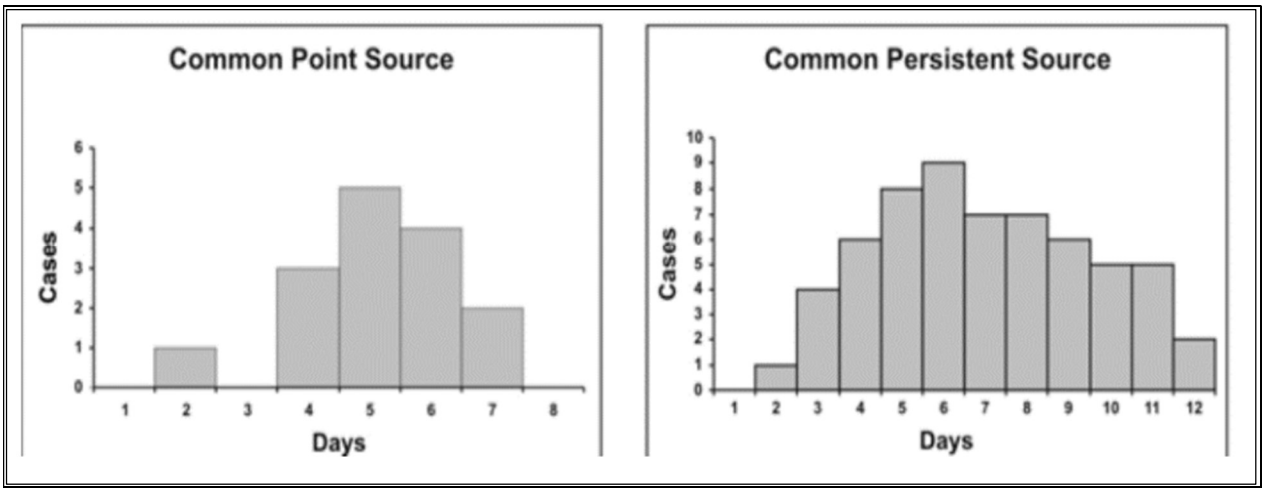
10. Double click on one of the bars. In “Options” tab, change “Gap width” to “0”.
11. Default background is gray. To change color, double click anywhere on gray background to view “Format Plot Area” pop up box. Select “none” under Border and “none” under Area for a white background.
12. If Y axis is in units of .5, double click on Y axis and select “Scale” tab. Change “Major unit” to 1 and “Maximum” to nearest whole number (if necessary).

Interpretation of an Epi curve

The first step in interpreting an epidemic curve is to consider its overall shape. The shape of the epidemic curve is determined by the epidemic pattern (for example, common source versus propagated), the period of time over which susceptible persons are exposed, and the minimum, average, and maximum incubation periods for the disease. An epidemic curve that has a steep upslope and a more gradual down slope (a so-called log-normal curve) is characteristic of a point-source epidemic in which persons are exposed to the same source over a relative brief period. In fact, any sudden rise in the number of cases suggests sudden exposure to a common source one incubation period earlier.

In a point-source epidemic, all the cases occur within one incubation period. If the duration of exposure is prolonged, the epidemic is called a continuous common-source epidemic, and the epidemic curve has a plateau instead of a peak. An intermittent common-source epidemic (in which exposure to the causative agent is sporadic over time) usually produces an irregularly jagged epidemic curve reflecting the intermittence and duration of exposure and the number of persons exposed. In theory, a propagated epidemic — one spread from person-to-person with increasing numbers of cases in each generation — should have a series of progressively taller peaks one incubation period apart, but in reality few produce this classic pattern.

Graphical presentation of different types of outbreaks:



Adapted from: European Programme for Intervention Epidemiology Training [Internet]. Solna, Sweden: Smittskydds institute [updated 2004 Sep 27; cited 2006 Sep 22] Available from:
Source: http://www.epiet.org/course/Presentations/2004/04-Outbreak investigation/03-Outbreak investigation-filer/frame.html

Using an Epi Curve to determine most likely period of exposure

Incubation Period

The incubation period is the time from exposure to the causative agent until the first symptoms develop and is characteristic for each disease agent.

To determine the most likely period of exposure for an outbreak, you need to know the average incubation period for the disease and the range of incubation periods, which are the minimum and maximum reported incubation periods.

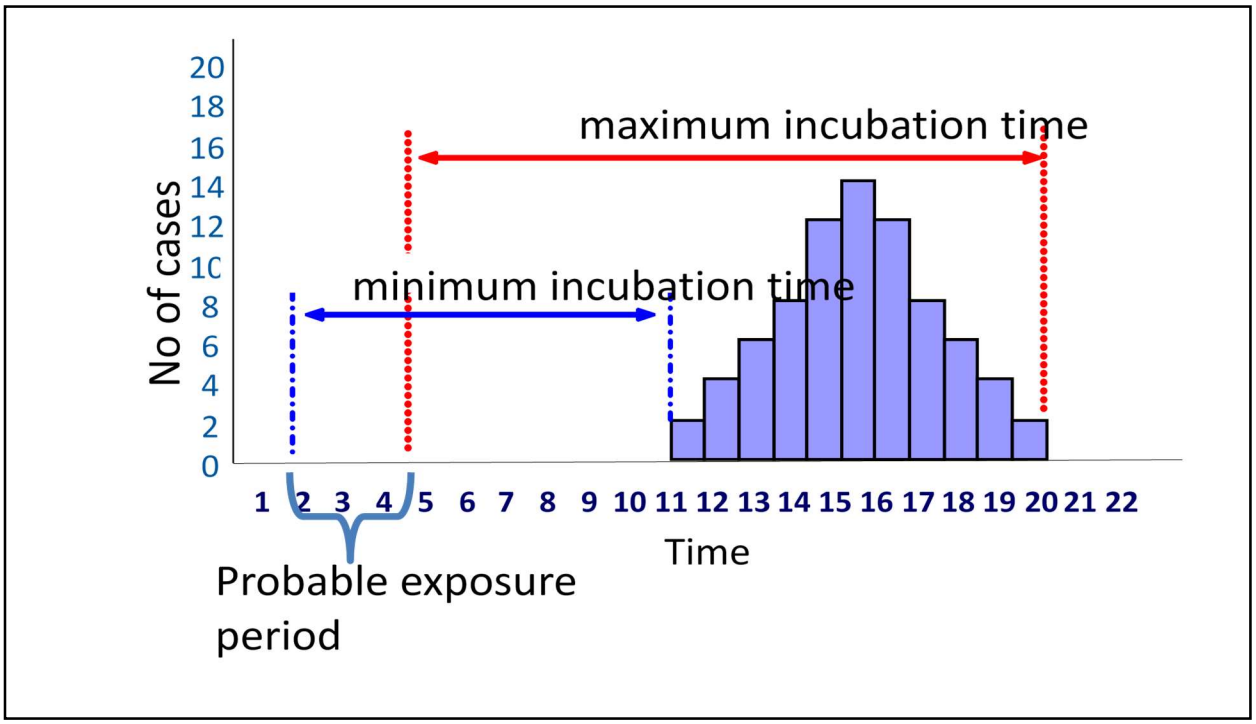
Example:

Shiga toxin-producing E. coli has an average incubation period of 3-4 days with a range from a minimum of 2 days to a maximum of 10 days.

For point source outbreak based on the Epi curve-

1) Identify the peak of the outbreak, which is the time period then the largest number of cases occurred.
2) Count back from the peak, the average incubation period for disease. Note that date.
3) Identify the earliest case in the outbreak and count back the minimum incubation period. Note that date.
4) Identify the last case in the outbreak and count back the maximum incubation period. Note that date.

The range of dates identified in Step 2-4 represent the most likely period of exposure and ideally should fall within a few days of each other. If the three dates are widely separated, this indicates that the incubation period has a wide range or the outbreak is not a point source outbreak.



Source: Curves in epidemiology: An overview (Dr. Bhoj Raj Singh)
Source: https://www.slideshare.net/singh_br1762/curves-in-epidemiology-an-overview

Description of cases

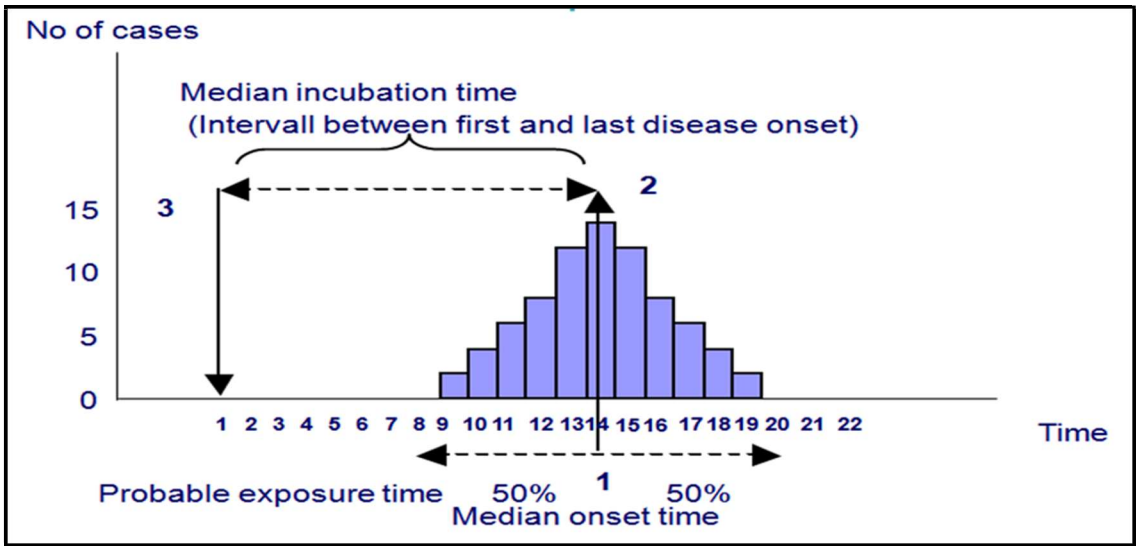
After preparing line list, detailed information should be collected from all the cases by a structured interview based on a standardized questionnaire. Patient characteristics, clinical features (disease manifestations), history of exposures that may be sources of infection should be in the questionnaire. Interviewers should probe to explore details of exposures, clinical features. Whatever information collected from reviewing medical records should be collected in a set format. If possible collect photocopies of medical and laboratory records and attach with questionnaire.

After collecting information demographic characteristics (age, sex, and occupation) should be analyzed. This is done to determine who are affected and who are at risk. Description of clinical features should be analyzed and results be showed in tables and graphs.

Type of analysis and presentation:

Characteristics	Type	Presentation
Age	Distribution (in case of discrete)	Bar diagram
	Distribution (in case of continuous)	Histogram
	mean/median, range	Table
Sex	number (percentage)	Table
Occupation	distribution (percentage)	Table/Graph
Clinical features	number (percentage)	Table

The median incubation period is calculated by sorting incubation periods from shortest to longest: the median is the incubation period of the individual at the mid-point in the list (or the average of the two middle values if the list has an even number of cases).

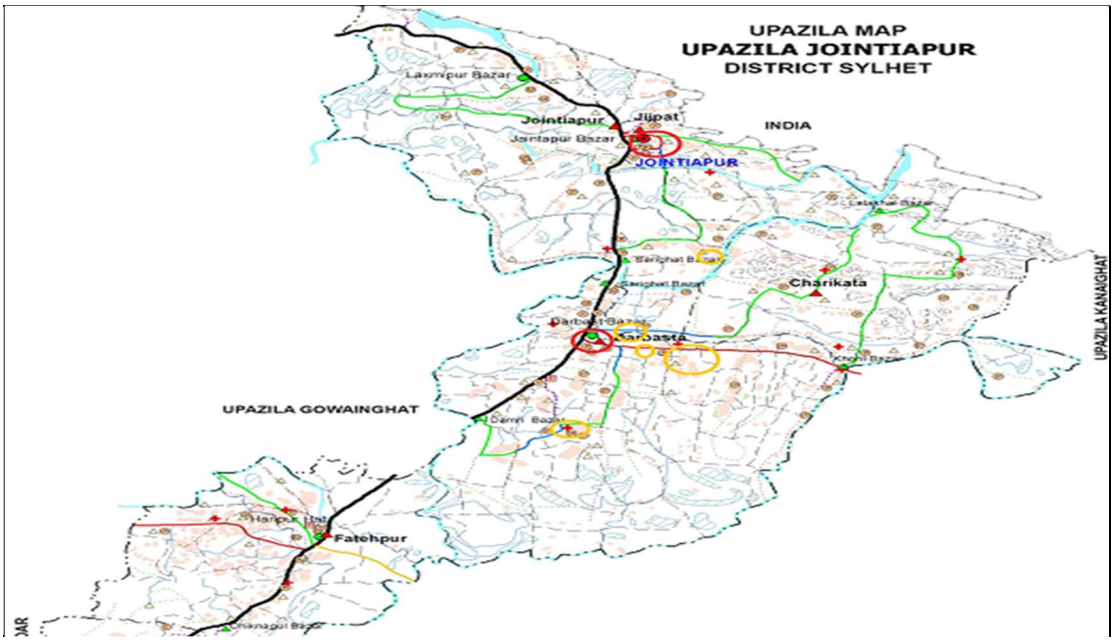


Source: https://www.semanticscholar.org/paper/Investigation-of-foodborne-disease-outbreaks.-Arnold-Hocking/7775bb90e39caa926c68db5fab3c6ae278a3c85f/figure/7

The mean is the average or the sum of all incubation periods divided by the number of observations. In practice, the median is often preferred because, unlike the mean, it is not influenced by a small number of cases with extremely short or long incubation periods (called outliers).

Place

Assessment of an outbreak by place not only provides information on the geographic extent of the problem but may also demonstrate clusters or patterns that provide important etiologic clues. A spot map is a simple and useful technique for illustrating where cases live, work, or may have been exposed.



Source: Outbreak Investigation and Response (*Draft*) Manual 2021, IEDCR

Spot maps were also used in the investigation of the occurrence of disease outbreaks. On assignment to study of puffer fish poisoning at Jaintapur, Sylhet became interested in the occurrence of sporadic cases of consumption of poisonous puffer fish. Separate spot maps of cases by residence could be developed. As seen above, the cases tended to cluster around place of residence. By combining epidemiologic evidence and biologic principles, we could able to define the normal consumption of puffer fish in the locality.

Person

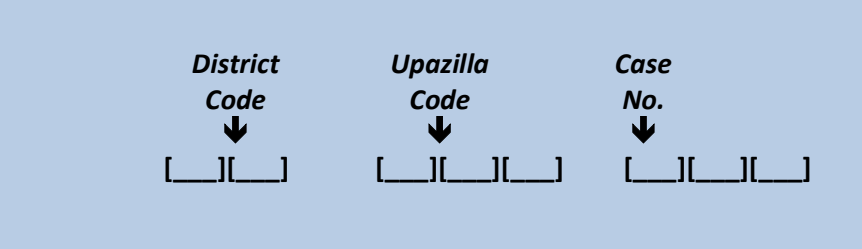
Affected group of people thoroughly described in terms of Age, Sex, Ethnicity, race, occupation, diagnosis, and other factors and prepare a line list. In a line list, each column represents an important variable, such as name, age, sex, case classification, etc., while each row represents a different case. The line list can be hand-written or computer generated.

Example of line listing:

ID No.	Name of Case	Age (yrs)	Sex	Father/ Husband/ HH head	Village	Union	Date of onset of Illness	Outcome		Lab results
								Hospital	Dead	

Identification Number:

It's a unique and uniform number to identify or track any individual. It is necessary to give specific identification number to every affected individual in outbreak investigation. We can generate an identification number easily by the method mentioned below:



1. First 2 digits – **District Code**
2. 3-5 digits – **Upazila Code**
3. 6-8 digits – **Case Number**

For example:

1) **District**
   i. Rajshahi district – RJ
   ii. Rangpur district – RN
2) Upazila.....
3) Case No.....

Outcome:

Outcome can be varied depending on the date of taking information, in case of repeated information collection. Use code in writing of outcome (e.g.- Death: 1 for Yes, 2 for No, 9 for unknown).

Laboratory result:

The results of this section are available at later stage. Write results in code (e.g. 1 for Yes, 2 for No,9 for unknown)

Annexure 5: Guideline for qualitative exploration

Anthropological investigation

Does the outbreak require any anthropological investigation?
When anthropologists are not required
If the possible cause of outbreak is known, such as any recurrent/endemic disease outbreak, without any atypical feature

Does the outbreak require any anthropological investigation?

When anthropologists are required

Stage I: before going to the field

- If the possible cause of outbreak is unknown/rare
- If the possible cause of outbreak is known but some atypical/unusual clinical/environmental features are found
- If high mortality and/or rapid spread of disease is observed in a short timeline
- If the community is sensitive (panicked or stigmatized or isolated)

Stage II: during initial field investigation

- The field team observes any of the features mentioned in stage I
- The team needs to understand any local context
- When hypothesis needs to be revised

Stage III: during containment/mitigation

- If the recommended messages are new to the community
- If the recommended messages may contradict the community's existing practice, perception, values, beliefs, norms and culture, and require bridging between the biomedical and local knowledge
- If high mortality and/or rapid spread of disease is observed in a short timeline
- If the community is sensitive (panicked or stigmatized or isolated)
- If the community becomes sensitive due to the outbreak investigation
- During advocacy for mitigation/containment at the national or division or district level (center to periphery), when bridging between the biomedical and local knowledge is required

Basic checklist for anthropological investigation

Explore from the 'emic approach' (community members'/insiders' view)

Require training on 'meaningful understanding' of the emic approach

- **Exploring exposure history**
  - Ask the 'known index case' (may not be the true index case) about the detail exposure (related to illness, such as food consumed, travel history, contact to any ill person, who participated any gathering) from the last 7-14 days of the onset retrospectively using a daily routine approach
  - **Identifying index case**
  - Cross-check information of the 'known index case' at the community level (family, friends, relatives, neighbors)

Basic checklist for anthropological investigation

- **Care seeking practices for this episode**
  - Local perception of symptoms, severity of the illness and different care seeking practices at different stages of illness
  - **How community understand the illness**
  - Explore if community is sensitive (panicked or stigmatized or isolated)
  - Explore existing rumor related to outbreak and its impact in the community
  - How community perceived the cause of the outbreak
  - What community perceive about the route of transmission
  - How/what community members label (any local term) the disease outbreak
  - Community perception regarding prevention, mitigation and/or containment

Annexure 6: Environmental Investigation

Depending on the nature of the outbreak, inclusion of environmental team can be important for collection of crucial information related to environment during the outbreak investigation. The environmental health team inspects facilities, observes operations and production processes and can obtain samples from food products, water sources, environmental surfaces and materials, and even animals that can be tested in the laboratory for etiologic agents. Environmental investigations also can provide information about opportunities for exposure to an etiologic agent or contamination with a disease-causing agent. In certain diseases, environmental investigations will be useful to document contamination of the environment in which illness occurred.

During collection, storage and transportation of environmental sample the same principle should be followed which is applicable for clinical specimen (Annexure 7). Identified public health laboratories can play an important role for testing of environmental samples.

Annexure 7: Sample collection, storage and transportation

Sample Collection, storage and transportation for laboratory investigations play an important role in identification and/or isolation of organism causing outbreak. Public health laboratories have a great role in analyzing specimens during outbreak investigations. These laboratories can test environmental samples and clinical specimens. They conduct confirmatory diagnostic testing and can be involved in forensic analysis of specimens. Their role is to identify the specific agent.

Collection of Specimen

Collection of specimens should be done by a laboratory medical technologist and in some cases by physicians (collection of CSF, arterial blood). They should be included in outbreak investigation team and must receive training on the collection, handling, and transportation of specimen, as well as safety and decontamination procedures. If a team comes from central level, local technologist should join the team, so that he gets training during the investigation.

Labeling and Identification of Specimens

Proper labeling of each sample is very important. The sample should be labeled using pre-printed labels / glass-marking pencil / permanent markers / adhesive tape, etc. Labels should be firmly affixed to the specimen container. It should contain the following:

Specimen Type:	
Patient's Name:	Identification No.
Date of Collection:	Time:

Glass slides for microscopy must be labeled individually, using glass marking pencil. This should not interfere with the staining process. Each slide should bear:

Patient's Name:
Identification No.
Date of Collection:

Storage of specimens

To preserve viability of the micro-organism, the specimens should be placed in appropriate transport media and stored at recommended temperatures for appropriate duration. For this outbreak investigation team will consult with laboratory specialist regarding storage condition, culture media for the suspected organisms.

In some instances, the outbreak investigation team may carry liquid nitrogen tank/ dry shipper for specimen preservation. In that case, proper instructions should be followed during handling of the dry shipper. In any outbreak investigation, it is essential to consult the receiving laboratory regarding the handling of specimen prior to investigation.

1. For identification and isolation of viral pathogen
    a. In type specific media at 4-8°C for <72 hours.
    b. Preservation at –70°C for 72 hours to two weeks.

2. For bacterial culture should be kept in appropriate transport media at the recommended temperature. With the exceptions of urine and sputum,
    a. Most specimens may be kept at ambient temperature if the specimen will be processed within 24 hours.
    b. For longer periods, storage on at 4-8°C would be advisable with the exception of particularly cold-sensitive organisms, such as shigella, meningococcus and pneumococcus.
    c. Longer delays are not advisable as the yield of bacteria may fall significantly.

3. For detection of antigen or antibody serum should be separated and kept
    a. at 4-8°C for 24-48 hours
    b. at –20°C for longer periods. Specific instructions should always be sought prior to collection.
    c. Repeated freeze-thaw cycle need to avoided, for this thou outbreak investigation team should not freeze the sera unless the facilities are available to keep them frozen until delivery.

Transportation

All Specimens should be transported as per the SOPs and advice of the lab-expert with careful handling in Cool box or Nitrogen container. Nitrogen container or cool boxes should be securely fastened in place in the transport vehicle. Vibration/ Shaking which encountered during travelling for long periods over rough roads, can hemolyse the samples. A spill kit containing absorbent materials, chlorine disinfectant, heavy duty reusable gloves, mask, apron, goggles, and leak roof waste disposal container should be in the vehicle. If transportation in cool box and there is delay during transportation, ice pack of cool box should be checked, if necessary ice pack should be changed from adjacent district or Upazilla health care facilities.

Basic safety precautions

1) Latex or nitrile gloves should be used during collection and handling of specimens. Alcohol based hand rub (Hexisol) should be used in between collection of samples from two patients.

2) Protective clothing (gown, coat or apron) should be worn during sample collection.

3) Used needles should be discarded directly into sharps box, without recapping them.

4) Work areas and surfaces should be organized and disinfected with disinfectants (e.g. 0.5% hypochlorite) daily. Personnel involved in cleaning or decontamination should wear a protective coat and thick rubber gloves.

5) Contaminated non-disposable equipment or materials should be soaked in 0.5% hypochlorite solution for 30 minutes. Then wash in soapy water and sterilize if necessary.

6) Heavily soiled disposable items should be soaked in 0.5%-1.0% hypochlorite solution before incineration or disposal.

7) In special circumstances additional safety equipment, such as masks or goggles, are required to protect skin and mucous membranes against contact, aspiration or inhalation of certain pathogens. N95 mask should be used for highly infective respiratory pathogens.

Annexure 8: Case-Control Study

To identify risk factors associated with the outbreak, a case control study can be conducted where -

1. Population is not well defined
2. Cases have been identified but the entire 'at risk' or potentially exposed group cannot be completely listed. (e.g. dispersed, common site and community wide outbreaks). Examples include outbreaks involving shoppers at a supermarket.
3. In case of common event outbreak when the size of the cohort is unfeasibly large or the number of cases represent a small proportion of the total 'at-risk' population.

Key features of case-control study:

1. Case-control studies compare exposure frequencies in two groups defined according to disease status. The exposures of the group of ill individuals (cases) are compared with the exposures of a group of well individuals (controls).
2. Exposures more prevalent among cases than controls are positively associated with the disease, exposures which occur with approximately equal frequency in both case and control groups are unlikely to be associated with the disease, and exposures more common in the control group than in the case group have a protective association.
3. In case-control study designs, association between exposure and disease is measured with the odds ratio. The odds ratio is the ratio between the odds (chance) of a particular exposure among cases and the odds of the same exposure among controls. A p-value or confidence interval is calculated to assess statistical significance. Considerations of chance, bias, and confounding apply to the interpretation of odds ratios.

Control selection in 'Case Control Study:

The controls should be as similar to the cases as possible with respect to opportunities for exposure. It's also important that controls do not have the concerned disease/event in any form. If persons with unrecognized mild or asymptomatic disease are included as control subjects, they're actually misclassified cases and will decrease your likelihood of finding an association that actually does exist.

Controls should represent the population from which the cases came. For example, an outbreak among preschoolers should be investigated by using controls in that same age group. It would be inappropriate to use older children or teenagers who might not have the same opportunities for exposure to an etiologic agent as preschoolers have.

Control selection can be time-consuming. In actual practice during an outbreak investigation, practical considerations frequently drive the control selection. Controls frequently have to be identified very quickly during an outbreak investigation in order to identify the etiologic agent, mode of exposure, or contaminated food product as quickly as possible. Random samples of controls can be drawn from populations which are thought to have similar opportunities for exposure to the etiologic agent. In other circumstances, friend or neighbor controls or meal companions are appropriate to use.

Annexure 9: Cohort Study

In an outbreak retrospective cohort study is done where –

- Outbreaks confined to a group that is well-defined, easy to count, and within which everyone may be identified regardless of whether they became ill or not (e.g. common event, institutional and household outbreaks)

Key features of cohort study (retrospective):

1. Cohort study collect data on the entire "at risk" population (e.g., all people attending a wedding reception, all people attending a particular school, or all people going on a cruise)

2. If the population at risk is too large for the whole population to be examined, a random sample of the entire population may be selected

3. The cohort design compares disease risks in two groups defined according to exposure(ie., the exposed group compared with the unexposed group)

4. Outbreak investigation using the cohort design allows calculation of attack rates, relative risk during the analysis stage

5. Cohort study designs are generally not used for investigating dispersed, common site and community-wide outbreaks where the potentially exposed group cannot be enumerated

Annexure 10: Daily Outbreak Reporting Format

Date of reporting

Outbreak title

(Includes suspected type of illness, time, place)

Background information of the outbreak

- Date of notification
- Date on initiation of outbreak (based on available information)
- Place of outbreak
- Number of people affected
- Number of people hospitalized
- Number of deaths

Initiation of outbreak investigation

- Date
- Time
- Team member

Objectives of the outbreak investigation

Activities completed on the day

Preliminary results of data analysis (Epi-curve, Spot map, Line listing)

Challenges

Next day plan

Additional support (if needed)

Annexure 11: Initiate and maintain surveillance

Once control and prevention measures have been implemented, they must continue to be monitored. If surveillance has not been ongoing, now is the time to initiate active surveillance. If active surveillance was initiated as part of case finding efforts, it should be continued. The reasons for conducting active surveillance at this time are twofold.

First, you must continue to monitor the situation and determine whether the prevention and control measures are working.

- Is the number of new cases slowing down or, better yet, stopping?
- Or are new cases continuing to occur?
- If so, where are the new cases?
- Are they occurring throughout the area, indicating that the interventions are generally ineffective, or are they occurring only in pockets, indicating that the interventions may be effective but that some areas were missed?

Second, you need to know whether the outbreak has spread outside its original area or the area where the interventions were targeted. If so, effective disease control and prevention measures must be implemented in these new areas.

(Ref: US CDC: https://www.cdc.gov/csels/dsepd/ss1978/lesson6/section2.html#step12)

Annexure 12: Outbreak Risk Communications

The goals of risk communication are to enhance knowledge and understanding, build trust and credibility, encourage dialogue, and influence attitudes, decisions, and behaviors of the community. For risk communication five critical practices influence the effectiveness of outbreak communication.

1. Build trust

Outbreak communications is to communicate with the public in ways that build, maintain or restore trust. Built on trust, effective outbreak communication will help speed the control of outbreaks with reduced harm to health, economies, and society.

Trust will build confidence upon the authorities, public will feel that authorities are honest and competent and in control of outbreak. This will help to prevent any unwanted reactions of public.

Three elements of trust:

Transparency: Communicators must tell – clearly and early on – what they know, what they don't know and what they are doing. It is essential not to hide relevant information.

Accountability: Communicators must demonstrate that they and their managers are accountable for what is done, said and promised.

Listening: Communicators must show clear awareness of the public's concerns. In practice, this means monitoring the media, and using other methods to understand changing public opinions about the risks posed by an outbreak and the effectiveness of its management.

2. Announce early

When an outbreak occurs authority should announce early to build trust and contributes to early containment. Delayed announcement creates an impression of concealing information that often results to lose credibility.

Public should know whenever authority get early reporting of what is known, followed by frequent updates, even some key facts about the disease are missing. When health managers of different tyres are concerned, the public should be warned. There is no excuse of failing to announce early to public. In Bangladesh updates of outbreak are posted in the website www.iedcr.gov.bd.

According to International Health Regulations (2005), disease that cause Public Health Emergency of International Concern (PHEIC) must be reported immediately (e.g. Single case of smallpox, poliomyelitis or human influenza caused by a novel virus subtype, SARS).

3. Transparency

Communication which is easily understood, complete and accurate is defined as transparent during outbreak. Public have right to know what is happening and health authority will be transparent during outbreak. For the sake of required confidentiality or proper investigation of the outbreak, ensure that limits of transparency will be used, which will not turn into loss of public trust.

4. Respect public concerns

Effective risk communications is a dialogue between technical experts and the public. Attention is gained during outbreak by different peoples – those at risk, patients and their families and neighbors, the media, researchers, community leaders, trade partners, and tourists. Public want to know information that may affects their health and the health of their families. Their concern should be respected. In announcing

decisions early in an outbreak, the press will be helpful, especially if outbreak management is transparent. But media personnel can misinterpret if they are not properly informed.

Listen to audience.

People are usually more concerned about psychological factors, such as trust, credibility, control, voluntariness, dread, familiarity, uncertainty, ethics, responsiveness, fairness, caring, and compassion, than about the technical details of a risk. To identify real concerns, a risk communicator must be willing to listen carefully to and understand the audience.

Speak clearly and with compassion:

Technical language and jargon are major barriers to effective risk communication. Abstract and unfeeling language often offends people. Acknowledging emotions, such as fear, anger, and helplessness, are typically far more effective.

5. Planning

Planning is essential for effective outbreak communications. Outbreak communications planning must be a part of outbreak management planning from the beginning. During an outbreak, information cannot be released at the last minute. Risk communication should be incorporated into preparedness planning for major events and in all aspects of an outbreak response.

Plan and tailor risk communication strategies: Different goals, audiences, and communication channels require different risk communication strategies.

Coordinate and collaborate with other credible sources: Communications about risks are enhanced when accompanied by referrals to credible, neutral sources of information. Few things hurt credibility more than conflicts and disagreements among information sources.

6. Message development

When developing a message, one must consider the audience, the message purpose, and the **channel/format/ delivery method.**

Audience / Purpose of Message Channel/ Format
Relationship / to the event Give facts & update / Spokesperson
Demographics / Rally to action / Print media
Level of outrage / Clarify event status / Web
Address rumors / Radio
Satisfy media request

During outbreak communications following tips are useful for developing messages-

- **Message map** – this is a framework which facilitates clear and concise message development. Whatever media you use, it has been recommended to develop three key messages with supporting materials with each message able to stand alone /used independently of the other messages.
- **Brief** – message should be brief, it is ideal to be around 27 words (no more than 30 words) and on the average 9-10 seconds in duration.
- **Language should be simple, easily understandable**
- **Avoid unnecessary words**
- **Avoid technical term** – use language understandable to general public
- **Avoid negative terms** – Negative terms like “Do not drink water from the pond” can be replaced by “Drink boiled water.”

A central theorem of risk communication is that people's perceptions of the magnitude of risk are influenced by factors other than numerical data

Basic message component

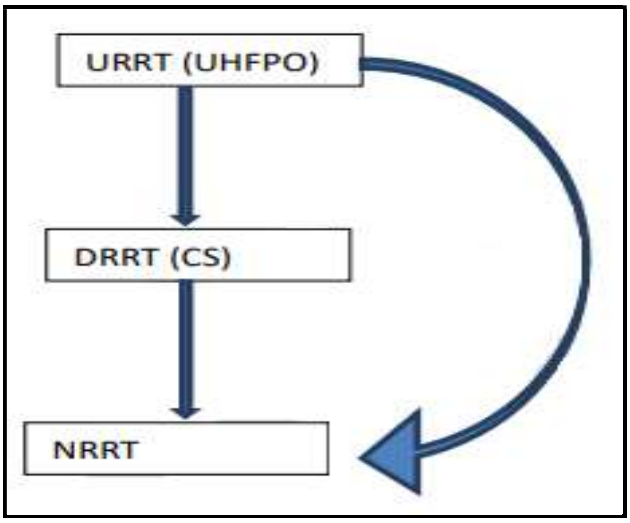
There are six basic components of creating a risk communication message

a. An expression of empathy.
   "We are aware of Swan flu, and we're concerned about what we might be facing in our communities."
b. Confirm facts about what you definitely know at that time - who, what, when, where, why, and how.
   "Till today, 30 people have been admitted to hospitals with high fever, difficulty in breathing, and severe pneumonia."
c. Be honest, frank, and open- trust and credibility are among the most valuable assets of a risk communicator. What you don't know about the situation.
   "We suspect it is the same influenza that has recently appeared in Mexico and parts of the US, but we cannot conclusively identify this disease at this time."
d. An explanation of the process you are using to deal with the problem and find the answers you don't yet know. These are actions taken and to be taken. Another aspect of dealing with the problem is to advise public on how to protect themselves
   "However, specimens have been sent to the IEDCR laboratory and we are waiting for the result. In the meantime, we have brought together the best medical and scientific expertise to care for the sick, learn the cause of their illness, and if it is a contagious disease, work to contain it."
e. A statement that you and your administration are committed to solve the outbreak
   "This is a process that is going to take a little time. We will update the public on any information as it comes to light."
f. Referrals to sources of more information, including contact names and numbers or website addresses. You can also state when the next update will occur. www.iedcr.gov.bd
   "All the outbreak related information is regularly updated at the following website: www.iedcr.gov.bd."
g. *Provide background information to those who need. Listen to the decision-makers and the audience for feedback and rectification*

7. Communication with journalist

For dissemination of outbreak updates to Media a specific health officer should be designated as 'Spokes Person' at all level of health service delivery system. Government instruction regarding media communication is recommended following.

The mass media are source of news for the community so they need news. When the official sources of information are not available for them, journalists will look in alternative sources, often not reliable and incorrect.



Spokesperson can be the Divisional Director at Division, Civil Surgeon at district, UH&FPO at Upazila level. During this media conversation, besides the number of cases, probable causes of the outbreak and measures taken by the health department, focused preventing messages could be disseminated.

The public will remember what they see, hear, and read repeatedly in the media. So before any communication with journalist, the following are to be followed.

- Prepare background information package about your organization, unit, task
- Know the organization's media policy
- Know what you want to say and what not to say
- Provide information on a regular basis
- Join or organize press conferences to save time
- Treat journalists as professionals
- Provide full and accurate information
- Admit if you don't know, provide alternative sources
- Facts, only if confirmed
- Reporters may not be well informed or technically proficient about your profession, explain terms to ensure they are understood
- You don't have to tell a reporter your views on everything
- The situation report should contain "running stories" to make it more informative (e.g. number of cases in an outbreak, progress of outbreak investigation, response operation, etc).

8. Rumour Management

The two factors that influence a rumour are its importance to the listener and its ambiguity. Rumours travel when events are important for individuals, and when the news received about the rumours is either lacking information or is ambiguous. The ambiguity may arise from the fact that the news is not clearly reported, or from the fact that conflicting versions of the news have reached the individual, or from the person's lack of understanding. Misinformation, harmful practices, information that harm reputation and diminish trust of communication by you, information that pose a public health risk are serious rumours which should be managed.

Annexure 13: Reports preparation of the outbreak investigation

1) Summary Report of the Outbreak investigation for local authority

Reported event:

a) Date and place of outbreak
b) Number of cases
c) Number hospitalized
d) Number of deaths
e) Number of recovered
f) Diagnosis
g) Control measure
h) Risk communication
i) Recommendation for containing outbreak

2) Final report of the Outbreak investigation

The Report should also be shared with National IHR Focal point

Outbreak title

(Includes suspected type of illness, time, place)

Reported event

- Date of notification
- Date on initiation of outbreak (based on available information)
- Place of outbreak
- Number of people affected
- Number of people hospitalized
- Number of deaths

Background (Literature search and differential diagnosis)

Conduct literature search focusing the symptoms and signs and draws possible differential diagnosis of the event.

Objectives of the outbreak investigation

Preliminary results of data analysis (Epi-curve, Spot map, Line listing)

Methods

(Type of study, duration of investigation, case definition, method of data collection, method of sample collection, hypothesis, methods of data analysis, ethical issues)

Results

(Includes the preliminary data analysis-descriptive and analytic)

Key statistics about the outbreak include: Attack rate (if available), Hospitalization rate, Death rate, Frequency distribution of symptoms, Median date of exposure, Median date of onset, Average incubation period, Average duration of illness, Average duration of hospitalization, relative risk, odds ratio etc.

Lab findings

(In case of preliminary report the laboratory investigation might be pending)

Final report should include laboratory findings if available

Discussion

Control measures

Risk communication

Conclusions and recommendations

- *A 'PowerPoint presentation' of the investigation report should be submitted to Chairperson (Director, IEDCR), NRRT and the CSO, Epidemiology IEDCR*
- *All notifiable Diseases under IHR (2005) should be immediately reported to the National IHR Focal point, Bangladesh*

Annexure 14: List of Common Climate Sensitive Diseases in Bangladesh

(Developed as per inputs by the Consultative workshop multidisciplinary expert stakeholders participants)

S.No.	Vector-borne	Water & Food-borne (including Enteric)	Air-borne	Other Infection/ Infectious Diseases
1.	Malaria	Leptospirosis	Meningococcal disease	Nipah Virus Infection
2.	Dengue-Fever	Cholera and Vibrio spp. infection	Respiratory Syncytial Virus Infection (RSV)	Anthrax
3.	Plague	Giardiasis	Human Influenza	Rabies
4.	Leishmaniasis	**Human Enteric Virus infection** • Rota Virus Infection • Enteroviruses • Noroviruses • Hepatitis A virus (HAV) • Hepatitis E virus (HEV)	Pneumonia (Respiratory Tract Infection)	
5.	Yellow fever	**Salmonella spp.** • Typhoid fever • Paratyphoid fever	Zoonotic Influenza	
6.	Chikungunya	Campylobacteriosis	Measles	
7.	Zika Viral Infection	**E. coli Infection** (Escherichia coli Infection) Shiga toxin-producing" E. coli, or STEC	Middle East respiratory syndrome coronavirus (MERS-CoV)	
8.	West Nile Fever	Acute Watery Diarrhea (AWD)	Severe Acute Respiratory Syndrome (SARS) • SARS -1 • SARS – 2 (COVID-19)	
9.	Japanese Encephalitis infection	Schistosomiasis outbreak		
10.	Rickettsia infections	Cryptosporidium infection		
11.	Crimean-Congo Hemorrhagic Fever (CCHF)			

Annexure 15: Questionnaire

For outbreak investigation of 'Fever with Joint pain and Skin rash'

[Example]

Questionnaire for outbreak investigation of "Fever with Joint pain and Skin rash"
Institute of Epidemiology, Disease Control & Research (IEDCR) Mohakhali, Dhaka-1212

Patient ID No: | | | | | | |

- **Interview Information**

Interviewer's name:_____

Date of interview: ___/___/_____ (dd/mm/yy)

Is the subject responding for himself/herself (✓)? 1. Yes ☐ 2. No ☐

If no, 1. Name of respondent _____, Relationship_____

1. **Name of respondent _____,** Relationship_____

Place of interview: 1. Hospital_____ 2. Community_____

2. **Demographics**

2.1. Subject's Name: _____

2.2. Father's/ Husband Name:_____

2.3**. Address**

House / Village: _____Road/Para: _____Union:_____

Upazilla: _____District: _____City… …. ….. ……. …….

Telephone/Cellphone: _____

2.2 **Age of the subject**: (In completed years/ months) ……

2.3 **Subject's Sex** (✓) 1). Male ☐ 2). Female ☐ 3). Third Gender ☐

2.4 **Religion** (✓): 1). Muslim ☐ 2). Hindu ☐ 3). Others ☐

Specify……

2.5 **Occupation** (✓):

1). Farmer 2). Student 3).Business 4). Service 5). Housewife 6). Dependent
7) Day laborer 8) Health Care provider 9) Unemployed 10) Driver
11). Others. (Please specify)……

2.6 **Monthly Expenditure/ Income (encircle /Check ✓):** *(BDTk.) per month*

1). ≤ 5000tk **2)**. 5000Tk-10000Tk. **3)**. 10000Tk-20000Tk. **4)**. 20000Tk-30000Tk **5)**. ≥ 30000

2.9. **Education Status**: 1). Primary 2). Secondary 3). Tertiary 4). Literate 5). Illiterate
(*Encircle*) 6). Others (Plz. Specify)……..

2.10. **Type of house hold (encircle /Check ✓):**

1). Concrete house. 2). Semi-concrete house 3). Clay house. 4). Wooden house

5). Others, **Specify**…….

2.11 **Source of drinking water** (Narrate): …….

2.12 **Sanitation type** (Narrate): …….

2.13 **Marital Status:** (Check ✓)

1). Unmarried 2). Married 3). Divorced. 4). Widow/ Widower 5). Separated

3. History of present illness
Symptoms (Complains)

When did patient develop ***first symptom*** of current illness? _____/____/___(dd/mm/yy)

Symptoms	**1=Yes, 2=No, 9=Don't know**	**If yes, date** symptom started (NA=**08/08/8888**)	**Date of symptoms end**
Fever			
Cough			
Sore throat			
Body ache			
Headache (children <2 year=NA)			
Swollen gland			
Itching			
Abdominal pain			
Vomiting	1= Bloody 2= normal	(Narrate)	
Diarrhea (*encircle)*	Stool type: 1= Bloody 2= Rice watery 3= Foul swelling 4= Others	(Narrate)	
Abdominal Swelling			
Any bleeding from skin or mucous membrane			
Severe weakness			
Altered mental state			
Convulsion			
Difficulty breathing			
Joint Pain			
Which joint was first affected?		Mention number	
How many joints were painful?			
Was there any joint swelling?			
Severity of joint pain at its maximum *(encircle)*		1= Minor, not interfering daily activities, 2= Moderate, pain on movement, 3=Severe pain, Preventing sleep 4. Cannot grade	

If gave history of rash, site of rash			
Face			
Upper limbs			
Axilla			
Trunk			
Lower limbs			
Other			
Any Other Symptom (if any): Specify: ……..			

4. Clinical Examination:

Findings: ……..

……..

4.1 **Axillary Temperature** at time of evaluation (^{0}F): …….
Rectal Temperature (by rectal thermometer) in case the child is ≤ 3 years (^{0}F): …….

4.2 **Examination of joints** *(If history of joint pain present)*

Joint Name	**Swelling (1=Yes, 2=No)**		**Redness (1=Yes, 2=No)**		**Tenderness (1=Yes, 2=No)**	
	Lt.	**Rt.**	**Lt.**	**Rt.**	**Lt.**	**Rt.**
Shoulder						
Elbow						
Wrist						
Hand (MCP/IP)						
Hip						
Knee						
Ankle						
Foot (MTP/IP)						

4.3 Examination of Skin rash *(If present)*

Signs	**1=Yes, 2=No**	**Details**
Rash		
If rash is "Yes", Type of rash:		
Macular		
Papular		
Maculo-papular		
Vesicular		
Pustular		
Blisters		
Crushed scab		
Scar mark		

If presence of rash/scar/ Eschar, if "Yes" Site of rash/scar/ Eschar**:**		
Face		
Upper limbs		
Axilla		
Trunk		
Lower limbs		
Other site…….. Specify: ……..		

4.4 Examination of 'Lymph nodes' (1=Enlarged, 2=Not enlarged)

Cervical	On Examination	**Axillary**	On Examination
Inguinal		**Other** **Specify: ……**	

4.5 If Required Systemic examination:

i) Respiratory system:

ii) Gastrointestinal system:

iii) Cardio vascular system:

iv) Central Nervous system:

v) Other (Specify)…….

5. Exposure/ Contact history information within [?] days before onset of illness

Exposure	1. Yes, 2. No, 3. Don't know	Days (if yes)
Did you/your child were exposed to mosquito bite?		
Did you/your children come in close contact (touching or came < 1 meter distance) with any person who had similar symptoms?		
Other Exposure…….. Specify: ……..		

Any of the family member affected with similar illness: (✓)?

1). Yes ☐ 2). No ☐ ***If yes,***

Sl no	Name	Age	Relationship	Date of onset

6. Food history: (✓)

i) Do you think your present sickness has any relationship with the food you ate?. a) Yes. b) No
ii) Before getting sick, which food you consumed within last 6-12 hours (of illness).....
iii) After how many hours of taking the food you felt sick? .....
iv) From where did you bought the food? .....
v) Any other information related to your food intake.....
vi) Any other observation.....

7. Occupational exposure

In last [.....] days have you been under any chemical exposure or came in contact to any radiation?
Specify: .....

8. Weather history in affected area:

- **What is the rainfall pattern in the area this year? (Check ✓)**
  i) Early monsoon
  ii) Late monsoon
  iii) Prolong monsoon
  iv) Intermediate rain
  v) Less rainfall in this year
- **Average Temperature:**
  i) Higher than expected temperature
  ii) Lower than expected temperature

9. Travel history

Within [.....] days prior to illness did you visit any areas outside of his/her Upazilla?

1). Yes ☐ 2). No ☐ 9). Don't remember ☐

If yes, what area(s) did you visit?

Village _____ Upazilla _____

District _____Date_____

If Abroad,

City: _____ Country _____

Mode of travel _____ Date_____

10. Any investigation done: *(check)* **1). Yes** ☐ **2). No** ☐

If yes, write name and result of the investigations:
(Please collect a copy of the report)

1).
2).
3)

11. Did you seek any treatment for this illness: *(check)* **1). Yes** ☐ **2). No** ☐

If yes**, from which type of provider **(**check **all that apply)

1). Upazilla Health Complex
2). Union sub-center
3). Private clinic/hospital
4). Unlicensed medical practitioner??
5). Local pharmacy
6). Traditional healer
7). Homoeopath
8). Other (Specify)……

12. Did you observe/know any unusual animal illness or death in your area during last 2-months?
(encircle / Check ✓) Specify illness / Death.

1. Yes ☐ **2. No** ☐

If yes,

- Describe type of illness:
- Type of animals :
- Number of animals:
- Outcome::

13. Was the patient referred from any hospital/clinic? *(check)* **1). Yes** ☐ **2). No** ☐

If yes, Name of the hospital/clinic:_____, Date of referral: ___/___/_____

14. Outcome: *(Check*) 1). Death ☐ 2). Recovery ☐ 3). Still Sick ☐

If death, *date of death* (dd/mm/yyyy): ___/___/____

15. Samples (Sample collect for which test)

Type of samples	**1=Yes, 2=No**	**Amount**	**Date (dd/mm/yy)**	
			Collection	**Transportation**
1. Blood				
2. Swab from vesicles in VTM				

3. Throat swab in VTM				
4. Nasal Swab in VTM				
5. Vesicular secretion for smear				
6. Urine				
7.Other (*Specify*)				

- **Clinical diagnosis:**
- **Differential diagnosis:**
  1) .
  2) .
  3) .

Signature of the Interviewer

Name of the Interviewer. ……..**…**

Date (dd/mm/yy**)** & Time : ……..

Annexure 16: Questionnaire

'For investigation of "Unknown Diseases'

[Example]

Institute of Epidemiology, Disease Control & Research (IEDCR)
Mohakhali, Dhaka-1212

Patient ID no: | | | | | | |

1. General Information

1.1. Interviewer's name:_____

1.2. Date of interview: ___/___/_____ (dd/mm/yy)

1.3. Is the patient responding for himself/herself (Check✓)? 1. Yes ☐ 2. No ☐

1.4. If a proxy responding

i. Name of the respondent_____, Relationship_____
ii. Name of proxy respondent_____, Relationship_____

1.5. Place of interview: 1. Hospital_____ 2. Community_____

2. Demographics

2.1. **Patient's Name**: _____

2.2. **Father's/ Husband Name**:_____

2.3. **Address**

Para _____ Village _____ Union_____

Upazilla_____District_____Telephone_____

GPS:_____

2.4. **Age of the patient**: (In completed years/ months) .....

2.5. **Patients' Sex**: (Check ✓)

1. Male ☐ 2. Female ☐ 3. Third Gender ☐

2.6. **Patient's religion**: (*encircle*)

1). Muslim 2). Hindu 3).Christian 4).Buddhist 5). Others.
(Plz. Specify.....

2.7. **Patient's occupation**: (*encircle*)

1). Farmer 2). Student 3).Business 4). Service 5). Housewife 6). Dependent
7) Day laborer. 8) Health Care provider 9) Unemployed 10) Driver
11). Others. (Please specify).....

2.8. **Education Status**: 1). Primary 2). Secondary 3). Tertiary 4). Literate 5). Illiterate
(*Encircle*) 6). Others (Plz. Specify).....

2.9. **Monthly Expenditure**/ Income: (*Encircle*) (BDTk.) per month

1). ≤ 5000tk 2). 5000Tk-10000Tk 3). 10000Tk-20000Tk 4). 20000Tk-30000Tk 5). ≥ 30000

2.10. **Type of house hold**: (*Encircle*)

1). Concrete house 2). Semi concrete house 3). Clay house 4). Wooden house

5). Others (Plz. Specify)……

2.11. **Source of drinking water**: (Narrate): ……

2.12. **Sanitation type:** (Narrate): ……

2.13 **Marital Status:** (*Encircle*)

1. Unmarried 2**.** Married **3.** Divorced**. 4.** Widow/ Widower **5.** Separated

3. History of present illness

3.1 When did patient develop **first symptom** of current illness? _____/____/___(dd/mm/yy)

Symptoms	1=Yes, 2=No, 9=Don't Know	If yes, write date symptom started (NA=08/08/8888)	Short details
Fever			
Cough			
Sore throat			
Malaise/ Body ache			
Headache (children <2 year=NA)			
Itching			
Rash			
Abdominal pain			
Vomiting			1= Bloody 2= normal
Jaundice			
Any Unusual bleeding			
Hematuria			
Altered mental state			
Convulsion/seizures			
Loss of consciousness			
Difficulty breathing			
Diarrhea/loose motion (if yes give stool Characteristics)			
Severe weakness			
Joint pain (specify which joint/s) 1. 2.			
Paralysis (specify where) 1. 2.			
Paresthesia (specify where)			
Tingling sensation (specify where)			
Other symptom1:_____			
Other symptom2: _____			

3.2 Signs

Signs	Record	Details
Temperature (measure)		
Pulse		
B.P.		
Respiratory Rate		
Heart Rate		
Rash	**1=Yes, 2=No**	
If rash is yes, type of rash		
Macular		
Papular		
Maculopapular		
Vesicular		
Blister		
If vesicle present		
Monolocular		
Multiloculcar		
Collapse on puncture		
Pustular		
Crushed scab		
Scar mark		
If presence of rash/scar/ Eschar, site of rash/scar/ Eschar		
Face		
Upper limbs		
Axilla		
Trunk		
Lower limbs		
Sole of the foot		
Mental Status (Narrate) GCS Score		
Other site……..		

4. History of exposure to a sick person

4.1. Within [……..] days prior to illness onset did the patient come in close contact (touching or came <1 meter distance) for more than 15 minutes with any person who had similar symptoms? (*check*)

1. Yes ☐ 2. No ☐ 9. Not sure ☐

If yes,

Sl no	Name	Age	Relationship	Address	Date of contact (dd/mm/yy)

5. History of exposure to animal

5.1. Within the […….] days prior to the onset of symptoms, did the patient have any contact with any sick or dead animal? (*check*)

1. Yes ☐ 2. No. ☐ . 3. Don't know

If yes

Type of animal	**1=Yes, 2=No, 9=Don't know**	**If yes, briefly write the symptoms**
Chicken		
Duck		
Cow		
Goat		
Sheep		
Pigs		
Others 1:_____		
Others 2: _____		

5.2. Did you observe / know any unusual animal illness or death in your area during last [……] months? (*check*)

1. Yes ☐ 2. No ☐ 3. Don't know ☐

If yes *what type of the animal was affected by the illness?*

Type of animal	**1=Yes, 2=No, 9=Don't know**	**If yes, briefly write the symptoms**
Chicken		
Duck		
Cow		
Goat		
Sheep		
Pigs		
Others 1:_____		
Others 2: _____		

5.3 Animal bite history: (*check*)

1. Yes ☐ 2. No ☐ 3. Don't know ☐

If yes, describe the name of the animal, Date of bite , bite details

_____

6. Family History –

Do any members in your family have a history of atopy (i.e. asthma/eczema/allergic rhinitis)?

If yes, describe……..

7. Within [……..] days prior to onset of illness did you consume any of the following?

Name	1=Yes, 2=No, 9=Don't know	If yes, date of consumption
Sick/poultry that died before slaughtering		
Partially bat eaten fruit		
Raw date palm juice/sap		
Ghagrashakh		
Puffer fish/ other sea fish		
Stored canned food		
Any other food that you think may have caused the illness (specify)		
Any other food that is generally not consumed (specify)		
High energy biscuits		
Anthelminthic tablets/syrup (name)_____		
Took any medicine Tablet / Injection		
Took any vaccine		
Others: (Specify)		

8. Travel history

8.1. Within [……..] Days prior to illness did the patient visit any areas outside of his/her Upazilla? (*check*)

1. Yes ☐ 2. No ☐ 3. Don't remember ☐

If yes, what areas did you visit? (<u>In-country</u>)

Village _____ Upazilla _____

District _____Date_____

If yes, what areas did you visit? (<u>Abroad</u>)

Village _____ Upazilla _____

District _____ Date_____

9. Food history:

i) Before illness which food he/ she consumed within 6-24 hours
ii) From where he/ she consumed the food
iii) By eating foods how many hours she felt sick
iv) Do you think the food you ate has some relation to your present sickness?
v) Any other observation……

10. Occupational exposure

In last [……] days have you been under any chemical exposure or came in contact to any radiation?

If yes, Narrate:_____

11. Weather history in affected area:

- **What is the rainfall pattern in the area this year**? *(Check)*

i) Early monsoon
ii) Late monsoon
iii) Prolong monsoon
iv) Intermediate rain
v) Less rainfall in this year

- **Temperature**: *(check)*

i) Higher than expected temperature
ii) Lower than expected temperature

12. Other exposures:

- Please describe any other possible exposure you think might have caused the outbreak.
- ***If yes, describe***_____
  _____
  _____

13. Medical History

13.1. **Temperature** of the patient at the time of evaluation (°F):_____

Rectal Temperature (rectal thermometer) in case the child is ≤ 3 years (^{0}F): ……

13.2. Has any laboratory **investigation** been done?

1. Yes 2. No 9. Don't know

If yes, write name and result of the investigations:

(Please collect a copy of the report)

1.

2.

3.

13.3 Did the patient **receive any treatment**? *(Check)*

1. Yes ☐ 2. No ☐ 3. Don't remember ☐

***If yes**, description of treatment: OPD/ Hospitalization / others (Specify)……..*

13.4 Has the patient been **admitted to a hospital**? *(Check)*

1. Yes ☐ 2. No ☐ 3.Don't know ☐

***If yes** name of the hospital/clinic:_____, and date of hospitalization: ___/___/_____.*

13.5. Was the **patient referred** from any hospital/clinic? *(Check)*

1. Yes ☐ 2. No ☐ 3.Don't know ☐

***If yes**, name of the hospital/clinic:_____, Date of referral: ___/___/_____*

13.6. **Outcome** *(Check)*

1. Death ☐ 2. Recovery ☐ 3. Still Sick ☐

If died, date of death (dd/mm/yy): ___/___/____

13.7 Comorbidity *(Check)*

1. Yes ☐ 2. No ☐ 3. Don't remember ☐

If yes, spicify_____

14. Samples Collected

ID number of samples	Type of Sample	1=Yes,2=No, 3= Patient died before sample could be collected	Date of collection of sample (day/month/year)
	Acute serum		___/___/___
	Convalescent serum		___/___/___
	Throat Swab		___/___/___
	Nasal swab		___/___/___
	CSF		___/___/___
	Urine		___/___/___
	Saliva		___/___/___
	Breast milk		___/___/___
	Other (specify)		___/___/___

15 **Clinical diagnosis**:

16 **Differential Diagnosis:**

Signature of the Interviewer

Name of the Interviewer: …….

Date (dd/mm/yy) & Time: …… (am/pm)

Annexure 17: Questionnaire

For investigation of 'Climate sensitive diseases'

(example)

(Vector-Borne Climate Sensitive Diseases / Water & Food Borne Climate Sensitive Diseases (Including Enteric Diseases Outbreak) / Air-borne and others Climate Sensitive Diseases

Institute of Epidemiology, Disease Control & Research (IEDCR)
Mohakhali, Dhaka-1212

Patient ID no: | | | | | | |

1. General Information

1.1. Interviewer's name:_____

1.2. Date of interview: ___/___/_____ (dd/mm/yy)

1.3. Is the patient responding for himself/herself (Check✓)? 1. Yes ☐ 2. No ☐

1.4. If a proxy responding

iii. Name of the respondent_____, Relationship_____
iv. Name of proxy respondent_____, Relationship_____

1.5. Place of interview: 1. Hospital_____ 2. Community_____

2.Demographics

2.1. **Patient's Name**: _____

2.2. **Father's/ Husband Name**:_____

2.3. **Address**

Para _____ Village _____ Union_____

Upazilla_____District_____Telephone_____

GPS location:_____

2.4. **Age of the patient**: (In completed years/ months) ……..

2.5. **Patients' Sex**: (*Check* ✓)

1. Male ☐ 2. Female ☐ 3. Third Gender ☐

2.6. **Patient's religion**: (*encircle*)

1). Muslim 2). Hindu 3).Christian 4).Buddhist 5). Others.
(Plz. Specify……..

2.7. **Patient's occupation**: (*encircle*)

1). Farmer 2). Student 3).Business 4). Service 5). Housewife 6). Dependent
7) Day laborer. 8) Health Care provider 9) Unemployed 10) Driver
11). Others. (please specify)……

2.8. **Education Status**: 1). Primary 2). Secondary 3). Tertiary 4). Literate 5). Illiterate (*Encircle*) 6). Others (Plz. Specify)……..

2.9. **Monthly Expenditure**/ Income: (*Encircle*) (BDTk.) per month

1). ≤ 5000tk 2). 5000Tk-10000Tk 3). 10000Tk-20000Tk 4). 20000Tk-30000Tk 5). ≥ 30000

2.10. **Type of house hold**: (*Encircle*)

1). Concrete house 2). Semi concrete house 3). Clay house 4). Wooden house 5). Others (Plz. Specify)……

2.11. Source of Drinking water *(Check)*

☐ Tubewells water ☐ Deep tube well water ☐ Tap/supply water ☐ Surface water ☐ Rain water ☐ Others (*Plz Specify*) _____

2.12. **Sanitation type:** *(check)*

☐ Sanitary Latrine ☐ Pit Latrine ☐ Hole Latrine ☐ Sewerage ☐ Others system

2.13. Hand wash with soap/detergent practice *(check)*

☐ None ☐ Before eating ☐ After using toilet ☐ Before preparing food ☐ others system

2.14 **Marital Status:** (*Encircle*)

1. Unmarried 2**.** Married **3.** Divorced**. 4.** Widow/ Widower **5.** Separated

3. History of present illness

3.1 When did patient develop **first symptom** of current illness? _____/____/___(dd/mm/yy)

Symptoms	1=Yes, 2=No, 9=Don't Know	If yes, write date symptom started (NA=08/08/8888)	Short details
Fever			
Cough			
Sore throat			
Malaise/ Body ache /Body pain			
Headache (children <2 year=NA)			
Itching			
Rash			
Abdominal pain			
Vomiting			1= Bloody 2= normal
Jaundice			
Any Unusual bleeding			
Hematuria			
Altered mental state			
Convulsion/seizures			
Loss of consciousness			
Difficulty breathing			

Diarrhea/loose motion (if yes give stool Characteristics)			
Severe weakness or fatigue			
Joint pain (specify which joint/s) 1. 2.			
Paralysis (specify where) 1. 2. 3.			
Paresthesia (specify where)			
Tingling sensation (specify where)			
Other symptom1:_____			
Other symptom2: _____			

• Patient other history

3.2 Have you been vaccinated against [*disease*]? *(Check)*

☐ Yes ☐ No ☐ Don't know

If yes,

3.2.1 What type of vaccine did you receive?_____

3.2.2 When were you vaccinated? _____

3.2.3 How many doses of vaccine did you receive?_____

3.3 Do you have a chronic disease (e.g. Crohn's disease, immune disorder, diabetes)? *(Check)*

☐ Yes (*Plz Specify*) _____

☐ No ☐ Don't know

3.4 Did you take any of the below-mentioned medications in the three months preceding this infection? *(Check)*

☐ Yes, antacids, specify ☐ Yes, antibiotics, specify

☐ Yes, immunosuppressors (including chemotherapy), specify

☐ Yes othres (*Plz Specify*) _____

☐ No ☐ Don't know

3.5 Were you hospitalized or resident in a hospice, nursing home or similar in the 'Time' before you became ill? *(Check)*

☐ Yes (*Plz Specify*) ☐ No

If yes,

3.5.1 Where was it? -_____

3.5.2 When was it? From __ /__ / __ until __ /__ / __ *(dd/mm/year)*

- **Contact with other sick cases**

3.6 How many persons, including you, live in your household?

Persons_____, Adults____,
Children aged 2-16 years____, children aged ≤ 2 years old___.

3.7 Has anyone in your household had similar symptoms? *(Check)*

☐ Yes othres (*Plz Specify*) _____

☐ No ☐ Don't know/Don't remember

If yes, how many persons became ill *(excluding yourself?)*

3.2.1 The same week _____ persons
3.2.2 The week before __ _____persons
3.2.3 The week after _____ persons

3.8 Excluding your household, are you aware of having had contact with someone with similar symptoms within one week before onset of symptoms? *(Check)*

☐ Yes othres (*Plz Specify*) _____

☐ No ☐ Don't know/Don't remember

3.9 If you had contact with other cases, could you provide the following details?

S.No.	Name of contact	Relation to contact	Age, sex	Date of symptoms	Symptoms
1					
2					
3					

3.10 If there were other people who have been ill at the same time as you, did you share meals or events with him/her/them? *(Check)*

☐ Yes othres (*Plz Specify*) _____

☐ No ☐ Don't know/Don't remember

2.20.1 ***If yes***, what was shared (meals)?

_____

3.11 Have you had contact with children attending daycare during the [*Time*] before the start of your symptoms? *(Check)*

☐ Yes othres (*Plz Specify*) _____

☐ No ☐ Don't know/Don't remember

If yes,

3.11.1 What is the name and address of the daycare facility?

3.11.2 Are you aware of any related illness in the daycare facility? *(Check)*

☐ Yes othres (*Plz Specify*) _____

☐ No

3.12 Do you have any other information about contact with other ill people that could be relevant?

_____

• Possible source of infection

3.13 According to you, what is the cause of your illness?

_____

3.14 Did you consume **food or drinks** that in your opinion smelled or tasted like it could have been spoiled? *(Check)*

☐ Yes othres (*Plz Specify*) _____ ☐ No

2.24.1 ***If yes***, what food/drink was it, when was it and where was it?

_____

3.15 Did you consume food or drinks that had gone over the expiration date? *(Check)*

☐ Yes othres (*Plz Specify*) _____ ☐ No ☐ Don't know/Don't remember

2.25.1 ***If yes,*** what food/drink was it, when was it and where was it? _____

3.16 Source of Drinking water *(Check)*

☐ Tubewells water ☐ Deep tube well water ☐ Tap/supply water ☐ Surface water

☐ Rain water ☐ Others (*Plz Specify*) _____

3.17 Source of House-hold use water *(Check)*

☐ Tubewells water ☐ Deep tube well water ☐ Tap/supply water ☐ Surface water

☐ Rain water ☐ Others (*Plz Specify*) _____

3.18 Water purification Method *(Check)*

☐ None ☐ Boil ☐ Chemical ☐ Filtering ☐ Others (specify)_____

3.19 Any history of Contact with animals? *(Check)*

☐ Yes othres (*Plz Specify*) ☐ No ☐ Don't know/Don't remember

If yes, which animal was it, when was it and where was it? _____

• Travel-related questions

3.20 Did you spend one or more nights outside your home (e.g. visiting family or business), but within **[in-country]** in the [Time] before you became ill? *(Check)*

☐ Yes ☐ No ***If yes, specify***

S.No.	City(-ies) where you stayed the night or had a meal	Name of the restaurant/place where you had a meal	Date	Transport mode to that city
1				
2				
3				

3.21 Have you received and consumed food from other countries that someone else brought back?

☐ Yes ☐ No ☐ Don't know ***If yes,***

3.21.1 Which product(s) was it? _____

3.21.2 When did you consume the product(s)? _____

3.22 Did you visit a **foreign country** in the [Time] before you became ill? *(Check)*

☐ Yes ☐ No ***If yes, specify***

S.No.	City(-ies) where you stayed the night or had a meal	Country name	Name of the restaurant/place where you had a meal	Date	Transport mode to that city
1					
2					
3					

3.23 Did your travel outside the city for Camping in the wild?

If yes,

Specify: _____

3.24 Do you have other information about travels or food from abroad which could be relevant?

If yes,

Specify: _____

• Food habits, allergies and diet

3.25 Do you have any food allergies/intolerances or follow special diet for medical, weight loss, religious, or any other reason? *(Check)*

☐ Yes ☐ No ☐ Don't know ***If yes,***

Specify: _____

3.26 Did you attend any gatherings, events or celebrations in the [Time] before you became ill? *(Check)*

☐ Yes ☐ No ☐ Don't know ***If yes,***

Specify: _____

3.27 Did you eat a mixed salad in the [Time] before you became ill? *(Check)*

☐ Yes ☐ No ☐ Don't know ***If yes,***

Specify: _____

3.28 Did you **eat half-cooked food** in the [Time] before you became ill? *(Check)*

☐ Yes ☐ No ☐ Don't know ***If yes,***

Specify: _____

3.29 Did you **dink any juice** in the [Time] before you became ill? *(Check)*

☐ Fruit Juice ☐ Date palm sap ☐ Other fruits ***If yes,***

Specify: _____

3.30 Did you **ate any half-eaten fruit from under the fruit-tree** before you became ill? *(Check)*

☐ Fruit Juice ☐ Date palm sap ☐ Other fruits ***If yes,***

Specify: _____

- ## 11. Weather history in affected area:
  - **What is the rainfall pattern in the area this year**?
    i) Early monsoon
    ii) Late monsoon
    iii) Prolong monsoon
    iv) Intermediate rain
    v) Less rainfall in this year
  - **Temperature**:
    i) Higher than expected temperature
    ii) Lower than expected temperature

For Common Climate Sensitive Vector-borne Diseases Outbreak Investigation:

1. Vector borne Diseases Outbreak Investigation

1.1 When did patient develop **first symptom** of current illness? _____/____/___(dd/mm/yy)

Clinical Features	1=Yes, 2=No	Details/site
Dizziness with or without headache		
Neck pain and stiffness		
backache		
Sore eyes and photophobia (sensitivity to light).		
Retrobulbar (Pain behind the eyeball)		
Sharp mood swings,		
Agitations and confusion		
Severe bruising / ecchymosis		
Conjunctivitis		
Petechial Rash		
Severe nosebleeds		
Uncontrolled bleeding		
Cough, with bloody mucus		
Jaundice /Discoloration of eye / skin		
Rash		
If rash is "Yes", Type of rash:		
Macular		
Papular		
Maculo-papular		
Vesicular		
Pustular		
Blisters		
Crushed scab		
Scar mark		
Eschar		
If presence of rash/scar /Eschar, if "Yes" Site of rash/scar /Eschar**:**		
Face		
Upper limbs		
Axilla		
Trunk		
Lower limbs		
Other site…….Specify: ……..		

Joint Pain	Specify	Number of Joint	Details
Which joint was first affected?		Mention number	
How many joints were painful?			

Was there any joint swelling?			
Severity of joint pain at its maximum *(encircle)*		1= Minor, not interfering daily activities, 2= Moderate, pain on movement, 3=Severe pain, Preventing sleep 4. Cannot grade	

1.2 Signs

Signs	Record	Details
Temperature (measure)		
Pulse		
B.P.		
Respiratory Rate		
Heart Rate		
Detectable liver		

1.3 **Examination of joints** *(If history of joint pain present)*

Joint Name	Swelling (1=Yes, 2=No)		Redness (1=Yes, 2=No)		Tenderness (1=Yes, 2=No)	
	Lt.	Rt.	Lt.	Rt.	Lt.	Rt.
Shoulder						
Elbow						
Wrist						
Hand (MCP/IP)						
Hip						
Knee						
Ankle						
Foot (MTP/IP)						
Other:						

1.4 Do you use mosquito nets regularly? *(Check)*

☐ Yes ☐ No ***If yes**, when*_____

1.5 Do you use other any method to protect from mosquito bite? *(Check)*

☐ Mosquito Coil ☐ Spray ☐ Repellent Cream ☐ Others (Please specify……)

2. Water & Food-borne Diseases Outbreak Investigation (Including Enteric Diseases Outbreak)

2.1 When did patient develop **first symptom** of current illness? _____/____/___(dd/mm/yy)

2.2 Time of illness onset : _____ or ☐ unknown

2.3 Did you recover or you are still ill (Check)? Recovered ☐ Still ill ☐

2.4 How long did your illness last? _____ days

2.5 Did you have any of the following symptoms?

Clinical Features	1=Yes, 2=No uk=unknown	Details/site
Diarrhea		
Nausea		
Vomiting		
Abdominal pain or cramps		
Unusual fatigue/tiredness		
Constipation		
Jaundice/yellow eyes		
Difficulty swallowing (Dysphagia)		
Severe weakness		
Painful urination (Dysuria)		
Weakness or impaired movement (Paresis of limb(s))		
Loss of muscle function (Paralysis of limb(s))		
Loss of appetite		
Blood mixed stool		
Black color Stool		
Other symptoms *If yes, Specify*		

2.6 Have you consulted a healthcare professional (e.g. doctor or nurse) for any of these symptoms?

(Check) Yes ☐ No ☐

2.6.1 ***If yes***, on <u>which date</u> did you first consult? __ /__ / __ (dd/mm/year)

2.7 Did you attend the emergency department for this illness? *(Check)*

Yes ☐ No ☐

2.8.Were you admitted to hospital due to the illness? *(Check)*

Yes ☐ No ☐ ***If yes,***

2.8.1 What was/is the name of the hospital? _____

2.8.2 When were you admitted? __ /__ / __ (dd/mm/year)

2.8.3 Are you still in the hospital? *(Check)*

☐ Yes ☐ No, specify when you were discharged? __ /__ / __ (dd/mm/year)

2.9 Was a stool sample taken? *(Check)*

☐ Yes ☐ No ☐ Don't know

2.9.1 ***If yes***, what was/ere the pathogen(s) identified?_____

2.10 Was a blood sample taken? *(Check)*

☐ Yes ☐ No ☐ Don't know

2.10.1 ***If yes***, what was/ere the pathogen(s) identified?_____

2.11 Is there anything specific you experienced during the course of illness and that you would like to share with us?

3. Air-borne Diseases Outbreak Investigation

3.1 When did patient develop **first symptom** of current illness? _____/____/___(dd/mm/yy)

Clinical Features	1=Yes, 2=No	Details/site
Cough		
Productive		
Non-productive		
Hemoptysis		
Persistent hacking cough		
Sore throat		
Difficulty breathing		
Runny nose		
Nasal congestation		
Alteration of smell (Anosmia)		
Chest pain		
Sneezing		
Loss of appetite		
Swollen glands		
Ear infections		
Confusion		
Stiff neck		
Seizures		
If presence of rash/scar /Eschar, if "Yes" Site of rash/scar /Eschar**:**		Type of rash
Face		
Upper limbs		
Axilla		
Trunk		
Lower limbs		
Others……. Specify: ……..		

4. Other Infection/ Infectious Diseases

4.1 When did patient develop **first symptom** of current illness? _____/____/___(dd/mm/yy)

Clinical Features	1=Yes, 2=No	Details/site
Fever		
Sore throat		
Headache		
Difficulty breathing		

Chest pain		
Sneezing		
Alteration of smell (Anosmia)		
Loss of appetite		
Swollen glands		
Ear infections		
Confusion		
Stiff neck		
Seizures		
Dizziness		
Unconscious		
Hydrophobia		
Aerophobia		
If presence of Eschar, if "Yes" Site of Scar /Eschar**:**		Type of Eschar
Face		
Tongue		
Hands		
Upper limbs		
Axilla		
Trunk		
Lower limbs		

4.2 History of Date palm sap intake in last 21 days *(Check)*

☐ Yes ☐ No ☐ Don't know ***If yes,***

Specify: (When)_____

4.3 History of half-eaten fruit intake last 21 days *(Check)*

☐ Yes ☐ No ☐ Don't know ***If yes,***

Specify: (When)_____

4.4 History of consumption of diseased cattle meat or slaughtering diseased cattle *(Check)*

☐ Yes ☐ No ☐ Don't know ***If yes,***

Specify: (When)_____

4.5 History of animal bites in last 01 year? *(Check)*

☐ Yes ☐ No ☐ Don't know ***If yes,***

Specify: (When and what animal) _____

Annexure 18: Outbreak investigation "Consent/ Assent Form" in Bengali

[Example]

গণপ্রজাতন্ত্রী বাংলাদেশ সরকার
রোগতত্ত্ব, রোগ নিয়ন্ত্রণ ও গবেষণা ইনস্টিটিউট (আইইডিসিআর)
মহাখালী, ঢাকা-১২১২
টেলিফোনঃ +৮৮০-২-২২২২৮০৩৭৬, ২২২২৯৮৬৯১ ফ্যাক্সঃ ০২-২২২২২৮০৪৪০
ই-মেইলঃ info@iedcr.gov.bd ওয়েবসাইটঃ www.iedcr.gov.bd

আইডি নং-

তারিখ ঃ...../...../২০.....

গণপ্রজাতন্ত্রী বাংলাদেশ সরকারের স্বাস্থ্য ও পরিবারকল্যাণ মন্ত্রণালয়ের একটি প্রতিষ্ঠান রোগতত্ত্ব, রোগ নিয়ন্ত্রণ ও গবেষণা ইনস্টিটিউট (আইইডিসিআর),.. .. .. শীর্ষক একটি রোগ প্রাদুর্ভাব (আউটব্রেক) তদন্ত (ইনভেষ্টিগেশন) কার্যক্রম পরিচালনা করতে যাচ্ছে। এই রোগ প্রাদুর্ভাব তদন্ত (আউটব্রেক ইনভেষ্টিগেশন) কার্যক্রম হতে প্রাপ্ত তথ্য রোগ প্রাদুর্ভাব (আউটব্রেক) এর কারন নিরুপন করা হবে, যা রোগ প্রাদুর্ভাব নিয়ন্ত্রণে সহায়ক হবে এবং সরকারের কর্মপরিকল্পনা গ্রহনে সহায়তা করবে। যেহেতু আপনি আমাদের রোগ প্রাদুর্ভাব তদন্ত (আউটব্রেক ইনভেষ্টিগেশন) তথ্যদাতা হিসেবে বিবেচিত হয়েছেন, সেহেতু আমরা আপনাকে এই প্রচেষ্টায় অংশগ্রহণ ও সহযোগিতা করার জন্য আমন্ত্রন জানাচ্ছি। (রোগাক্রান্ত ব্যক্তির বয়স ১৮ (আঠারো) বছরের নীচে হলে তার বৈধ অভিভাবক তার পক্ষে তথ্যদি প্রদান করবেন।)

এর জন্য আপনাকে আপনার ব্যক্তিগত ও অসুস্থতার বিষয়ে কিছু প্রশ্ন করে তথ্য সংগ্রহ করা হবে এবং পাশাপাশি আপনার রোগের ধরন অনুযায়ী পরীক্ষার জন্য আপনার শিরা থেকে রক্ত (প্রায় ৬-১০ মি.লি.), মূত্র/ পায়খানা বা মল, ক্ষতস্থানের রস, কফ্ অথবা প্রয়োজনীয় নমুনা সংগ্রহ করা হবে। এই পুরো সাক্ষাৎকার ও নমুনা সংগ্রহের জন্য আপনার প্রায় ২০ মিনিট সময়ের প্রয়োজন হবে।

নমুনা সংগ্রহের সময় আপনার সামান্য কিছু অস্বস্তি অনুভব হতে পারে। তবে, এতে আপনার কোন ক্ষতি হওয়ার সম্ভাবনা নেই। এই রোগ প্রাদুর্ভাব (আউটব্রেক) ইনভেষ্টিগেশন-এ আপনার ব্যক্তিগত অসুস্থতার বিষয়ে যে সব তথ্য পাওয়া যাবে, সে সব তথ্য সম্পূর্ণ গোপন রাখা হবে এবং শুধুমাত্র এই রোগ প্রাদুর্ভাব নিয়ন্ত্রন এবং সরকারের ভবিষ্যত কর্মপরিকল্পনায় ব্যবহার করা হবে। রোগ প্রাদুর্ভাব (আউটব্রেক) ইনভেষ্টিগেশন সংশ্লিষ্ট চিকিৎসকগণ, অংশগ্রহণকারী কর্মকর্তা, আইইডিসিআর এর নীতি-পর্যালোচনা কমিটি ছাড়া কেউ এই সব তথ্য দেখতে পারবে না।

এই রোগ প্রাদুর্ভাব (আউটব্রেক) ইনভেষ্টিগেশন-এ অংশগ্রহণকারীগণ কোনোপ্রকার ভাতাদি প্রাপ্য হবেন না। আপনি এই রোগ প্রাদুর্ভাব (আউটব্রেক) ইনভেষ্টিগেশন-এ অংশগ্রহণ করবেন অথবা করবেন না সেই সিদ্ধান্ত একমাত্র আপনিই নিতে পারেন। আপনি চাইলে এই রোগ প্রাদুর্ভাব (আউটব্রেক) ইনভেষ্টিগেশন প্রশ্ন কার্যক্রম থেকে যে কোন সময় সরে আসতে পারবেন। আপনার সরে আসার সিদ্ধান্তে আপনার চিকিৎসার উপর কোন প্রভাব বিস্তার করবে না। আপনি হাসপাতালের চিকিৎসাসেবা থেকে কোনক্রমেই বঞ্চিত হবেন না।

আপনি সম্মত থাকলে নিচের নির্দিষ্টস্থানে স্বাক্ষর (অথবা) বৃদ্ধাঙ্গুলের টিপসই দিন-

সাক্ষাৎকার প্রদানকারীর নাম ঃ

স্বাক্ষর /টিপসই-

সাক্ষাৎকার গ্রহণকারীর নাম ঃ

স্বাক্ষর-

তারিখ-

বিঃ দ্রঃ সাক্ষাৎকার প্রদানকারীর বয়স ১৮ (আঠারো) বছরের নীচে হলে তার বৈধ অভিভাবকের নাম ও স্বাক্ষর নিতে হবে।

Annexure 19: Communicate findings

When the investigation is concluded, it is important to communicate the findings to the local health authorities and to those responsible for implementing control and prevention measures. The communications usually require both oral and written reports. The written report should follow standard scientific guidelines, and it should include an introduction, background, methods, results, discussion, and recommendations

- **An Oral briefing for local authorities**.
  If the field investigator is responsible for the epidemiology but not disease control, then the oral briefing should be attended by the local health authorities and persons responsible for implementing control and prevention measures. Often these persons are not epidemiologists, so findings must be presented in clear and convincing fashion with appropriate and justifiable recommendations for action. This presentation is an opportunity for the investigators to describe what they did, what they found, and what they think should be done about it. They should present their findings in a scientifically objective fashion, and they should be able to defend their conclusions and recommendations.

- **A written report**.
  Investigators should also prepare a written report that follows the usual scientific format of introduction, background, methods, results, discussion, and recommendations. By formally presenting recommendations, the report provides a blueprint for action. It also serves as a record of performance and a document for potential legal issues. It serves as a reference if the health department encounters a similar situation in the future. Finally, a report that finds its way into the public health literature serves the broader purpose of contributing to the knowledge base of epidemiology and public health.

- In recent years, digital media environment era, people constantly receive information from many sources, ranging from print media to TV to alerts and social media on mobile devices. The moment the news media or community learns of a public health–related outbreak investigation, they want to know what is happening actually and who is affected. The public has become more aware of and interested in public health. In response, Public health departments have made great advances in attempting to keep the public informed and calm. Many health departments strive to communicate directly with the public, usually through the media, both during an investigation and when the investigation is concluded. This can only be done by the nominated responsible person at the field level and Central level.
  It's important to know how the public or members of affected groups identify a risk affects what you, as a field investigator, might communicate and how you frame the key messages. We must remember, persons most affected by a disease outbreak or health threat sometimes perceive the risk differently from the experts who mitigate or prevent the risk. Furthermore, persons perceive their own risks differently, depending on how likely they think the actual hazard will affect them personally and their beliefs about how severe the harm might be. Awareness on health risks also are tied to the degree to which persons feel alarmed or outraged—when the event causes a high level of worry or anxiety, the risk is perceived to be at a similarly high level. Persons are usually more accepting of risks or feel less outrage when the risks are voluntary, under their control, have clear benefits, are naturally occurring, are generated from a trusted source, or are familiar. Conversely, persons are less accepting of risks or have greater concern or anxiety when risks are imposed or created by others, controlled by others, are human-made, come from an untrusted source, or seem exotic.
  (Ref: US CDC: https://www.cdc.gov/csels/dsepd/ss1978/lesson6/section2.html#step13)

Annexure 20:

List if the Key Informant Interview (KII) Consulted for the Outbreak Manual

1. **Professor Dr. Tahmina Shirin PhD**
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   DGHS, MOHFW

2. **Professor Dr. Md. Nazmul Islam**
   Director, Disease Control & Line Director CDC,
   DGHS, MOHFW

3. **Professor Dr. Mahmudur Rahman**
   Former Director IEDCR.
   Country Director, Eastern Mediterranean Public Health Network,
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4. **Dr. Mohammad Ferdous Rahman Sarker**
   Senior Scientific Officer
   (Outbreaks Investigation Expert;
   Subject Matter Expert, Climate Change & Heath)
   IEDCR, DGHS, MOHFW

5. **Dr. Md. Mostafizur Rahman**
   Assistant Professor
   (Previously SSO IEDCR, Outbreak Investigation Expert)
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Annexure 21: Multidisciplinary Consultative workshops

List if the relevant Expert stakeholders / Resource participants and contributors

(Public Health Expert, Epidemiologist, Anthropologist, Lab Personal, Climatologist, Environmentalist, Disaster Personnel)

(Not according to Seniority)

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